AMITY UNIVERSITY MADHYA PRADESH, GWALIOR
AMITY SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF CIVIL ENGINEERING

PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Bachelor of Technology (B. Tech.) CE,Academic Year – 2017 - 2018

Graduates of the programme B Tech (Civil Engineering) will

PEO 1: Gain knowledge and skills in Civil engineering which will enable them to have a career and professional accomplishment in the public or private sector organizations

PEO 2: Become consultants on complex real life Civil Engineering problems related to Infrastructure development especially housing, construction, water supply, sewerage, transport, spatial planning.

PEO 3: Become entrepreneurs and develop processes and technologies to meet desired infrastructure needs of society and formulate solutions that are technically sound, Economically feasible, and socially acceptable.

PEO 4: Perform investigation for solving Civil Engineering problems by conducting research using modern equipment and software tools.

PEO 5: Function in multi-disciplinary teams and advocate policies, systems, processes and equipment to support civil engineering

Programme Outcomes:

[PO. 1]. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

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Director-ASET
Amity University Madhya Pradesh Gwalior

[PO. 2]. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

[PO. 3]. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

[PO. 4]. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

[PO. 5]. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

[PO. 6]. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

[PO. 7]. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

[PO. 8]. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

[PO. 9]. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

[PO. 10]. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

[PO. 11]. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects

[PO. 12]. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

Note: - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “- “

PROGRAMMEARTICULATIONM ATRIX

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ISEM	MAT101	3	2	3	3	3	-	-	-	2	-	2	3	-	-	-
	CHE101	3	3	3	3	-	3	3	3	3	3	3	3	-	-	-
	CSE104	3	3	3	2	-	-	-	-	-	-	-	3	3	3	3
	BME101	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2
	CIV101	3	2	2	2	-		-	-	1	1	1	2	2	-	-
	CHE121	3	3	2	-	-	-	-	-	-	-	-	2	3	-	2
	CSE124	3	3	3	2	-	-	-	-	-	-	-	3	3	3	3
	BME121	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2
	BCU141	3	2	2	2	-		-	-	1	1	1	2	2	-	-
	EVS142	3	3	2	-	-	-	-	-	-	-	-	2	3	-	2
	BSU143	3	3	2	-	-	-	-	-	-	-	-	2	3	-	2
	FLU144	3	3	3	2	-	-	-	-	-	-	-	3	3	3	3
IISEM	MAT201	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2
	PHY101	3	2	2	2	-		-	-	1	1	1	2	2	-	-
	ECE101	3	3	2	-	-	-	-	-	-	-	-	2	3	-	2
	CSE204	3	3	3	2	-	-	-	-	-	-	-	3	3	3	3
	BME102	3	2	2	-	2	-	-	3	2	-	-	2	3	-	2
	PHY121	3	2	2	-	2	-	-	3	2	-	-	2	3	-	2
	ECE121	3	2	2	-	-	-	1	-	-	-	-	2	3	-	2
	CSE224	3	2	2	-	2	-	1	-	-	-	-	2	3	-	2
	BME122	3	2	2	-	2	-	-	3	2	-	-	2	3	-	2
	BCU241	3	2	2	-	2	-	1	3	2	-	1	2	3	-	2
	EVS242	3	2	2	1	2	-	-	3	2	-	2	2	3	-	2
	BSU243	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2
	FLU244	3	2	2	-	2	-	1	-	-	-	-	2	3	-	2

PROGRAMMEARTICULATIONM ATRIX

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
2nd Year																
IIISE M	BTCE 301	3	2	1	-	-	-	-	-	-	-	-	2	1	1	1
	BTCE 302	3	3	3	2	-	-	-	-	-	-	-	3	3	3	3
	BTCE 303	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2
	BTCE 304	3	2	2	2	-		-	-	1	1	1	2	2	-	-
	BTCE 305	3	3	2	-	-	-	-	-	-	-	-	2	3	-	2
	BTCE 306	1	2	2	1	1	-	-	-	-	-	-	-	2	-	-
	BTCE 320	3	3	2	-	-	-	-	-	-	-	-	2	3	-	2
	BTCE 321	1	2	2	1	1	-	-	-	-	-	-	-	2	-	-
	BTCE 322	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2
IVSE M	BTCE 401	3	2	2	-	2	-	-	3	2	-	-	2	3	-	2
	BTCE 402	3	2	2	-	-	-	1	-	-	-	-	2	3	-	2
	BTCE 403	3	2	2	-	2	-	1	-	-	-	-	2	3	-	2
	BTCE 404	3	2	2	-	2	-	-	3	2	-	-	2	3	-	2
	BTCE 405	3	2	2	-	2	-	1	3	2	-	1	2	3	-	2
	BTCE 406	3	2	2	1	2	-	-	3	2	-	2	2	3	-	2
	BTCE 420	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2
	BTCE 421	3	2	2	1	2	-	-	3	2	-	2	2	3	-	2
	BTCE 422	3	2	2	1	2	-	-	3	2	-	2	2	3	-	2

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Established vide Government of Madhya Pradesh Act No. 27 of 2010

PROGRAMME ARTICULATION MATRIX

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
VSEM	BTCE501	3	3	2	3	3	2	2	-	3	2	3	3	3	3	3
	BTCE502	2	2	2	-	3	-	3	2	-	3	-	3	1	2	1
	BTCE503	3	3	1	2	3	3	3	3	3	-	1	3	3	2	2
	BTCE504	2	-	2	-	3	-	3	2	-	3	-	3	3	2	2
	BTCE505	3	3	3	2	2	1	1	-	-	-	-	3	3	3	3
	BTCE506	2	2	2	-	3	-	3	2	-	3	-	3	1	2	1
	BTCE520	2	-	2	-	3	-	3	2	-	3	-	3	3	2	2
	BTCE521	3	3	1	2	3	3	3	3	3	-	1	3	3	2	2
	BTCE550	3	3	2	3	3	2	2	-	3	2	3	3	3	3	3
VISEM	BTCE601	3	3	2	3	3	2	2	-	3	2	3	3	1	2	1
	BTCE602	2	2	2	-	3	-	3	2	-	3	-	3	3	2	2
	BTCE603	3	3	1	2	3	3	3	3	3	-	1	3	3	2	2
	BTCE604	2	2	2	-	3	-	3	2	-	3	-	3	3	3	3
	BTCE605	3	3	1	2	3	3	3	3	3	-	1	3	1	2	1
	BTCE606	2	-	2	-	3	-	3	2	-	3	-	3	3	2	2
	BTCE620	3	3	1	2	3	3	3	3	3	-	1	3	3	3	3
	BTCE621	2	2	2	-	3	-	3	2	-	3	-	3	1	2	1

PROGRAMME ARTICULATION MATRIX

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
VII SEM	BTCE 701	3	3	2	3	3	2	2	-	3	2	3	3	3	3	3
	BTCE 702	2	2	2	-	3	-	3	2	-	3	-	3	1	2	1
	BTCE 703	2	2	2	-	3	-	3	2	-	3	-	3	1	2	1
	BTCE 707	3	3	2	3	3	2	2	-	3	2	3	3	3	3	3
	BTCE 720	3	2	1		1	2	1	-	2	-	1	3	3	3	3
	BTCE 721	3	2	1		1	2	1	-	2	-	1	3	3	3	3
	BTCE 760	3	2	1		1	2	1	-	2	-	1	3	3	3	3
	BTCE 750	3	2	1		1	2	1	-	2	-	1	3	3	3	3
VIII SEM	BTCE 801	3	3	2	3	3	2	2	-	3	2	3	3	1	2	1
	BTCE 802	2	2	2	-	3	-	3	2	-	3	-	3	3	2	2
	BTCE 804	3	3	1	2	3	3	3	3	3	-	1	3	3	2	2
	BTCE 860	2	-	2	-	3	-	3	2	-	3	-	3	3	2	2

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : AppliedPhysics II
Course Code : BTCE 202, Crédits : 3, Session :2017-18(Even Sem.), Class : B.Tech. 1st Year
Faculty Name : Dr. Manisha Singh, Dr. Pankaj Kumar Mishra, Dr.SnehalJani

A. **Introduction:**The objective of this course is to familiarize the prospective engineers with practical knowledge of oscillations, waves and mechanics. The course aims to educate the students with concept of mechanics that will help them in further development of novel mechanical instrumentation.

B. **Course Outcomes:**After successful completion of the course students will have the knowledge and skill to:

BTCE2*02*.1. Special Theory of Relativity

Michelson-Morley experiment, Importance of negative result, Inertial & non-inertial frames of reference, Einstein's postulates of Special theory of Relativity, Space-time coordinate system, Relativistic Space Time transformation (Lorentz transformation equation), Transformation of velocity, Addition of velocities, Length contraction and Time dilation, Mass-energy equivalence (Einstein's energy mass relation) & Derivation of Variation of mass with velocity.

BTCE2*02*.2. Wave particle duality, De-Broglie matter waves, phase and group velocity, Heisenberg uncertainty principle, wave function and its physical interpretation, Operators, expectation values. Time dependent & time independent Schrödinger wave equation for free & bound states, square well potential (rigid wall), Step potential.

BTCE2*02*.3. Laser and Fibre optics: Lasers – Einstein coefficients, conditions for light amplification, population inversion, optical pumping, three level and four level lasers, He-Ne and Ruby laser, Properties and applications of lasers

Fiber Optics: Fundamental ideas about optical fibers, Manufacturing of optical fibers , Propagation of light through fiber, Numerical Aperture, Acceptance Angle and Cone, Applications of Fiber Optics

BTCE2*02*.4. Semiconductor and Superconductivity

Band Theory of Solids, Semi-conductors: Intrinsic and Extrinsic,Carreir concentration, p-n Junction Diode,Diode Equation, Breakdown in p-n Junction Diode: Avalanche and Zener, Zener Diode and its applications photoconductivity and photovoltaics.

Superconductivity, Meissner Effect, Type I and Type II Superconductors, BCS theory (qualitative)

Programme Outcomes:

[PO.1].**Engineeringknowledge**:Applytheknowledgeofmathematics,science,engineeringfundamentals,andanengineeringspecializationtothesolutionofcomplexengineeringproblems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineeringproblems reaching substantiated conclusions using first principles of mathematics, natural sciences,andengineeringsciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and designsystem components or processes that meet the specified needs with appropriate consideration for thepublichealthandsafety,andthecultural,societal,andenvironmentalconsiderations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of theinformationtoprovidevalidconclusions

[PO.5].**Moderntoolusage**:Create,select,andapplyappropriatetechniques,resources,andmodernengineering and IT tools including prediction and modeling to complex engineering activities with anunderstandingofthelimitations
[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to theprofessionalengineeringpractice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societalandenvironmentalcontexts,anddemonstratetheknowledgeof,andneedforsustainabledevelopment

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities andnorms oftheengineeringpractices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverseteams,andinmultidisciplinarysettings

[PO.10].**Communication**:Communicateeffectivelyoncomplexengineeringactivitieswiththeengineeringcommunity and with society at large, such as, being able to comprehend and write effective reports anddesigndocumentation,makeeffectivepresentations,andgiveandreceiveclearinstructions

[PO.11].**Projectmanagementandfinance**:Demonstrateknowledgeandunderstandingoftheengineeringandmanagementprinciplesandapplythesetoone'sownwork,asamemberandleaderinateam,tomanageprojectsandinmultidisciplinaryenvironments

[PO.12].**Life-longlearning**:Recognizetheneedfor,andhavethepreparationandabilityto engageinindependent andlife-longlearninginthebroadestcontextoftechnologicalchange

C. Programme Specific Outcomes:

A graduate of Civil Engineering Program will demonstrate:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

D. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

E. Syllabus

Module I: Special Theory of Relativity

Michelson-Morley experiment, Importance of negative result, Inertial & non-inertial frames of reference, Einstein's postulates of Special theory of Relativity, Space-time coordinate system, Relativistic Space Time transformation (Lorentz transformation equation), Transformation of velocity, Addition of velocities, Length contraction and Time dilation, Mass-energy equivalence (Einstein's energy mass relation) & Derivation of Variation of mass with velocity,

Module II: Wave Mechanics

Wave particle duality, De-Broglie matter waves, phase and group velocity, Heisenberg uncertainty principle, wave function and its physical interpretation, Operators, expectation values. Time dependent & time independent Schrödinger wave equation for free & bound states, square well potential (rigid wall), Step potential.

Module III:**Laser and Fibre optics**: Lasers – Einstein coefficients, conditions for light amplification, population inversion, optical pumping, three level and four level lasers, He-Ne and Ruby laser, Properties and applications of lasers

Fiber Optics: Fundamental ideas about optical fibers, Manufacturing of optical fibers , Propagation of light through fiber, Numerical Aperture, Acceptance Angle and Cone, Applications of Fiber Optics

Module IV : Semiconductor and Superconductivity
Band Theory of Solids, Semi-conductors: Intrinsic and Extrinsic,Carreir concentration, p-n Junction Diode,Diode Equation, Breakdown in p-n Junction Diode: Avalanche and Zener, Zener Diode and its applications photoconductivity and photovoltaics.
Superconductivity, Meissner Effect, Type I and Type II Superconductors, BCS theory (qualitative)

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Course Outcomes:

Upon completion of this course students will have the knowledge and skills to

- Identify and manipulate forces and their resultant in one, two and three dimensions
- Recognize and classify moments and couples created by them.
- Analyze and demonstrate the stability conditions of mechanical strain.

A: Attendance,CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination;

Text & References:

F. Suggested Text/Reference Books:

References:

1. Concept of Modern Physics, A. Beiser
2. Applied Physics II, Agarawal&Goel
3. Solid State Physics, S. O. Pallai
4. Physics of Atom, Wehr& Richards
5. Principles of Mechanics – JL Synge & BA Griffiths

G. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Michelson-Morley experiment, Importance of negative result	Lecture/ Tutorial	BTCE202.1	Mid Term Exam, Assignment& End Sem Exam
2	Inertial & non-inertial frames of reference, Einstein's postulates of Special theory of Relativity	Lecture/ Tutorial	BTCE202.1	Mid Term Exam, Assignment& End Sem Exam
3	Space-time coordinate system, Relativistic Space Time transformation (Lorentz transformation equation)	Lecture/ Tutorial	BTCE202.1	Mid Term Exam, Assignment& End Sem Exam
4	Transformation of velocity, Addition of velocities	Lecture	BTCE202.1	Mid Term Exam, Assignment&End Sem Exam
5	Length contraction and Time dilation,	Lecture/ Tutorial	BTCE202.1	Mid Term Exam, Assignment& End Sem Exam

6	Mass-energy equivalence (Einstein's energy mass relation)&	Lecture/ Tutorial	BTCE202.1	Mid Term Exam, Assignment& End Sem Exam
7	Derivation of Variation of mass with velocity	Lecture/ Tutorial	BTCE202.1	Mid Term Exam, Assignment& End Sem Exam
8	Wave particle duality, De-Broglie matter waves, phase and group velocity	Lecture/ Tutorial	BTCE202.2	Mid Term Exam, Assignment& End Sem Exam
9	Heisenberg uncertainty principle	Lecture/ Tutorial	BTCE202.2	Mid Term Exam, Assignment& End Sem Exam
10	wave function and its physical interpretation,	Lecture/ Tutorial	BTCE202.2	Mid Term Exam, Assignment& End Sem Exam
11	Operators, expectation values	Lecture/ Tutorial	BTCE202.2	Mid Term Exam, Assignment& End Sem Exam
12	Time dependent & time independent Schrödinger wave equation for free	Lecture/ Tutorial	BTCE202.2	Mid Term Exam, Assignment& End Sem Exam
13	Time dependent & time independent Schrödinger wave equation for bound states	Lecture/ Tutorial	BTCE202.2	Mid Term Exam, Assignment& End Sem Exam
14	square well potential (rigid wall)	Lecture/ Tutorial	BTCE202.2	Mid Term Exam, Assignment& End Sem Exam
15	Step potential	Lecture/ Tutorial	BTCE202.2	Assignment & End Sem Exam
16	Tutorials/problems	Lecture/ Tutorial	BTCE202.2	Assignment & End Sem Exam
17	Lasers – Einstein coefficients, conditions for light amplification	Lecture/ Tutorial	BTCE202.3	Assignment & End Sem Exam
18	population inversion, optical pumping	Lecture/ Tutorial	BTCE202.3	Assignment & End Sem Exam
19	three level and four level lasers	Lecture/ Tutorial	BTCE202.3	Assignment & End Sem Exam
20	He-Ne and Ruby laser	Lecture/ Tutorial	BTCE202.3	Assignment & End Sem Exam
21	Properties and applications of lasers	Lecture/ Tutorial	BTCE202.3	Assignment & End Sem Exam
22	Fundamental ideas about optical fibers	Lecture/ Tutorial	BTCE202.3	Assignment & End Sem Exam
23	Manufacturing of optical fibers	Lecture/ Tutorial	BTCE202.3	Assignment & End Sem Exam
24	Propagation of light through fiber	Lecture/ Tutorial	BTCE202.3	Assignment & End Sem Exam
25	Numerical Aperture,	Lecture/	BTCE202.3	Assignment &

	Acceptance Angle and Cone	Tutorial		End Sem Exam
26	Applications of Fiber Optics	Lecture/ Tutorial	BTCE202.3	Assignment & End Sem Exam
27	Tutorials/Numerical	Lecture/ Tutorial	BTCE202.3	Assignment & End Sem Exam
28	Band Theory of Solids	Lecture/ Tutorial	BTCE202.4	Assignment & End Sem Exam
29	Semi-conductors: Intrinsic and Extrinsic	Lecture/ Tutorial	BTCE202.4	Assignment & End Sem Exam
30	Carreir concentration, p-n Junction	Lecture/ Tutorial	BTCE202.4	Assignment & End Sem Exam
31	Diode,Diode Equation,	Lecture/ Tutorial	BTCE202.4	Assignment & End Sem Exam
32	Breakdown in p-n Junction Diode: Avalanche and Zener	Lecture/ Tutorial	BTCE202.4	Assignment & End Sem Exam
33	Zener Diode and its applications	Lecture/ Tutorial	BTCE202.4	Assignment & End Sem Exam
34	photoconductivity and photovoltaics	Lecture/ Tutorial	BTCE202.4	Assignment & End Sem Exam
35	Superconductivity, Meissner Effectlasers in science	Lecture/ Tutorial	BTCE202.4	Assignment & End Sem Exam
36	Type I and Type II Superconductors, BCS theory (qualitative)	Assessm ent	BTCE202.1 /2/3/4	Internal Assessment

H. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE202.1	Michelson-Morley experiment, Importance of negative result, Inertial & non-inertial frames of reference, Einstein's postulates of	3	3	1	1	1	-	-	-	-	-	2	1	-	-	-

	Special theory of Relativity, Space-time coordinate system, Relativistic Space Time transformation (Lorentz transformation equation), Transformation of velocity, Addition of velocities, Length contraction and Time dilation, Mass-energy equivalence (Einstein's energy mass relation) & Derivation of Variation of mass with velocity															
BTCE202. 2	Wave particle duality, De-Broglie matter waves, phase and group velocity, Heisenberg uncertainty principle, wave function and its physical interpretation, Operators, expectation values. Time dependent & time independent Schrödinger wave equation for free & bound states, square well potential (rigid wall), Step potential.	3	3	**1**	1	2	**-**	**-**	**-**	**-**	**-**	1	2	**-**	**-**	**-**
BTCE202. 3	Lasers – Einstein coefficients, conditions for light amplification, population inversion, optical pumping, three level and four level lasers, He-Ne and Ruby laser,	3	3	3	2	2	**-**	**-**	**-**	-	**-**	3	3	**-**	**-**	**-**

	Properties and applications of lasers **Fiber Optics:** Fundamental ideas about optical fibers, Manufacturing of optical fibers , Propagation of light through fiber, Numerical Aperture, Acceptance Angle and Cone, Applications of Fiber Optics															
BTCE202. 4	Band Theory of Solids, Semi-conductors: Intrinsic and Extrinsic,Carreir concentration, p-n Junction Diode,Diode Equation, Breakdown in p-n Junction Diode: Avalanche and Zener, Zener Diode and its applications photoconductivity and photovoltaics. Superconductivity, Meissner Effect, Type I and Type II Superconductors, BCS theory (qualitative)	3	3	2	1	2	-	-	-	-	-	2	3	-	-	-

Course Code				BTCE 202		
Associated Credit Units				**3**		
Ser. No.	**Name**	**Enrollment No.**	**Roll No.**	**30**	**70**	**100**
1	**DHANANJAY CHAUHAN**	**A60515817003**	**AU17UCV8101**	19	**35**	**54**
2	**KARAN SINGH SIKARWAR**	**A60515817001**	**AU17UCV8102**	22	**41**	**63**
3	**NEHA KARAIYA**	**A60215817003**	**AU17UCV8103**	24	**44**	**68**
4	**RAHUL PINGLE**	**A60215817005**	**AU17UCV8104**	16	**22**	**38**
5	**UDDESHYA UPADHYAY**	**A60215817001**	**AU17UCV8105**	16	**21**	**37**
No. of students attended the Exam				5		
No. of students secure more than 60% marks				2		
Percentage of students secure more than 60% marks				40.00		
Attainment Level				-		

Course Code : BTCE220, Crédits : 01, Session :2017-18(Even Sem.), Class : B.Tech. 1st Year

Faculty Name : Dr. Manisha Singh, Dr. Pankaj Kumar Mishra, Dr. Snehal Jani

I. **Introduction:**The objective of this course is to familiarize the prospective engineers with practical knowledge of oscillations, waves and optics. The course aims to educate the students with concept of advance wave optics that will help them in further development of novel optical instrumentation.

J. **Course Outcomes:**After successful completion of the course students will have the knowledge and skill to:

BTCE220.1. To determine the wavelength of prominent lines of mercury spectrum using plane transmission grating.

BTCE220.2. *To determine the thickness of a given wire by Wedge method.*

***BTCE220*.3**. To determine the wavelength of He-Ne laser light using single slit.

***BTCE220*.4**. To determine the frequency of an electrically maintained tunning fork by Melde'smethod.

BTCE220.5. To study the variation of magnetic field along the axis of Helmholtz coil and to find outreduction factor.

BTCE220.6. To draw the V – I characteristics of a forward and reverse bias PN junction diode.

BTCE220.7. To determine the frequency of AC mains using sonometer.

BTCE220.8. To determine the value of acceleration due to gravity ('g') in the laboratory using bar pendulum.

BTCE220.9. To determine the energy band-gap of Germanium crystal using four probes method.

BTCE220.10. To draw V – I characteristics of a photocell and to verify the inverse square law of radiation.

BTCE220.11. To determine the acceleration due to gravity ('g') using Keter's reversible pendulum.

BTCE220.12 To study the characteristics of photo voltaic cell (solar cell).

Programme Outcomes:

[PO.1].**Engineeringknowledge**:Applytheknowledgeofmathematics,science,engineeringfundamentals,andanengineeringspecializationtothesolutionofcomplexengineeringproblems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineeringproblems reaching substantiated conclusions using first principles of mathematics, natural sciences,andengineeringsciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and designsystem components or processes that meet the specified needs with appropriate consideration for thepublichealthandsafety,andthecultural,societal,andenvironmentalconsiderations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of theinformationtoprovidevalidconclusions

[PO.5].**Moderntoolusage**:Create,select,andapplyappropriatetechniques,resources,andmodernengineering and IT tools including prediction and modeling to complex engineering activities with anunderstandingofthelimitations
[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to theprofessionalengineeringpractice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societalandenvironmentalcontexts,anddemonstratetheknowledgeof,andneedforsustainabledevelopment

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities andnorms oftheengineeringpractices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverseteams,andinmultidisciplinarysettings

[PO.10].**Communication**:Communicateeffectivelyoncomplexengineeringactivitieswiththeengineeringcommunity and with society at large, such as, being able to comprehend and write effective reports anddesigndocumentation,makeeffectivepresentations,andgiveandreceiveclearinstructions

[PO.11].**Projectmanagementandfinance**:Demonstrateknowledgeandunderstandingoftheengineeringandmanagementprinciplesandapplythesetoone'sownwork,asamemberandleaderinateam,tomanageprojectsandinmultidisciplinaryenvironments

[PO.12].**Life-longlearning**:Recognizetheneedfor,andhavethepreparationandabilityto engageinindependent andlife-longlearninginthebroadestcontextoftechnologicalchange

K. Programme Specific Outcomes:
A graduate of Civil Engineering Program will demonstrate:
PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

L. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**

Continuous Internal Evaluation	Mid Term	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

M. Syllabus

APPLIED PHYSICS LAB - II

Course Code: **BTM/BTB/BTC/BTI/BTCE/BTE/ 220** **Credit Units: 01**

List of Experiments:

1. To determine the wavelength of prominent lines of mercury spectrum using plane transmission grating.
2. To determine the thickness of a given wire by Wedge method.
3. To determine the wavelength of He-Ne laser light using single slit.
4. To determine the frequency of an electrically maintained tunning fork by Melde's method.
5. To study the variation of magnetic field along the axis of Helmholtz coil and to find out reduction factor.
6. To draw the V – I characteristics of a forward and reverse bias PN junction diode.
7. To determine the frequency of AC mains using sonometer.
8. To determine the energy band-gap of Germanium crystal using four probes method.
9. To draw V – I characteristics of a photocell and to verify the inverse square law of radiation.
10. To determine the acceleration due to gravity ('g') using Keter's reversible pendulum.
11. To study the characteristics of photo voltaic cell (solar cell).
12. To study the diffraction pattern of LASER light through N-slit

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**

5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

N. Suggested Text/Reference Books:

- Physics of waves, W. C. Elmore & M. A. Heald
- Introduction to Electrodynamics, D. J. Griffith
- Engineering Physics, Satya Prakash
- Concept of Modern Physics, A. Beiser
- Solid State Physics, S. O. Pallai

O. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	To determine the wavelength of prominent lines of mercury spectrum using plane transmission grating.	Practical	BTCE220.1	Mid Term Exam, Assignment& End Sem Exam
2	To determine the thickness of a given wire by Wedge method.	Practical	BTCE220.2	Mid Term Exam, Assignment& End Sem Exam
3	To determine the wavelength of He-Ne laser light using single slit.	Practical	BTCE220.3	Mid Term Exam, Assignment& End Sem Exam
4	To determine the frequency of an electrically maintained tunning fork by Melde's method.	Practical	BTCE220.4	Mid Term Exam, Assignment& End Sem Exam
5	To study the variation of magnetic field along the axis of Helmholtz coil and to find out reduction factor.	Practical	BTCE220.5	Mid Term Exam, Assignment& End Sem Exam
6	To draw the V – I characteristics of a forward and reverse bias PN junction diode.	Practical	BTCE220.6	Mid Term Exam, Assignment& End Sem Exam
7	To determine the frequency of AC mains using sonometer.	Practical	BTCE220.7	Mid Term Exam, Assignment& End Sem Exam
8	To determine the energy band-gap of Germanium crystal using four probes method.	Practical	BTCE220.8	Mid Term Exam, Assignment& End Sem Exam
9	To draw V – I characteristics of a photocell and to verify the inverse square law of radiation.	Practical	BTCE220.9	Mid Term Exam, Assignment& End Sem Exam
10	To determine the acceleration due to gravity ('g') using Keter's reversible pendulum	Practical	BTCE220.1 0	Mid Term Exam, Assignment& End Sem Exam

11	To study the characteristics of photo voltaic cell (solar cell).	Practical	BTCE220.10	Mid Term Exam, Assignment& End Sem Exam
12	To study the diffraction pattern of LASER light through N-slit	Practical	BTCE220.10	Mid Term Exam, Assignment& End Sem Exam

P. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTM220.1	To determine the wavelength of prominent lines of mercury spectrum using plane transmission grating.	3	3	1	1	1	-	-	-	-	-	2	1	-	**2**	**3**
BTM220.2	To determine the thickness of a given wire by Wedge method.	3	3	**1**	1	2	-	-	-	-	-	1	2	-	**2**	**3**
BTM220.3	To determine the wavelength of He-Ne laser light using single slit.	3	3	3	2	2	-	-	-	-	-	3	3	-	**2**	**3**
BTM220.4	To determine the frequency of an electrically maintained tunning fork by Melde's method.	3	3	2	1	2	-	-	-	-	-	2	3	-	**2**	**3**
BTM220.5	To study the variation of magnetic field along the axis of Helmholtz coil and to find out reduction factor.	3	3	3	**3**	3	-	-	-	-	-	2	**3**	-	**2**	**3**

BTM220.6	To draw the V – I characteristics of a forward and reverse bias PN junction diode.	3	3	1	1	1	-	-	-	-	-	2	1	-	**2**	**3**
BTM220.7	To determine the frequency of AC mains using sonometer.	3	3	1	1	1	-	-	-	-	-	2	1	-	**2**	**3**
BTM220.8	To determine the energy band-gap of Germanium crystal using four probes method.	3	3	1	1	1	-	-	-	-	-	2	1	-	**2**	**3**
BTM220.9	To draw V – I characteristics of a photocell and to verify the inverse square law of radiation.	3	3	1	1	1	-	-	-	-	-	2	1	-	**2**	**3**
BTM220.10	To determine the acceleration due to gravity ('g') using Keter's reversible pendulum.	3	3	1	1	1	-	-	-	-	-	2	1	-	**2**	**3**
BTM220.11	To study the characteristics of photo voltaic cell (solar cell).	3	3	1	1	1	-	-	-	-	-	2	1	-	**2**	**3**
BTM220.12	To study the diffraction pattern of LASER light through N-slit	3	3	1	1	1	-	-	-	-	-	2	1	-	**2**	**3**

APPLIED PHYSICS LAB - II						
Course Code				BTCE 220		
Associated Credit Units				**1**		
Ser. No.	**Name**	**Enrollment No.**	**Roll No.**	**30**	**70**	**100**
1	**DHANANJAY**	**A60515817003**	**AU17UCV8101**	21	**53**	**74**

	CHAUHAN					
2	KARAN SINGH SIKARWAR	A60515817001	AU17UCV8102	19	46	65
3	NEHA KARAIYA	A60215817003	AU17UCV8103	20	46	66
4	RAHUL PINGLE	A60215817005	AU17UCV8104	20	44	64
5	UDDESHYA UPADHYAY	A60215817001	AU17UCV8105	16	43	59
				APPLIED PHYSICS LAB - II		
				BTCE 220		
				1		
No. of students attended the Exam				5		
No. of students secure more than 60% marks				4		
Percentage of students secure more than 60% marks				80.00		
Attainment Level				Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **NUMERICAL ANALYSIS AND PROGRAMMING**
Course Code : BTCE 401, Credits : 03, Session : 2017 - 2018(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Shashank Gupta, Mr. Mohan Kantharia

A. Introduction

This course deals with the techniques of numerical analysis, which gives the solution to applied problem when ordinary analytical method fails. Emphasis is given on computer programming also so that the given techniques can be used in design of engineering and scientific problems.

B. At the end of the course students will able to learn:

- **BTCE401.1** Able to apply finite element method for the analysis of complex Civil Engineering structures using advanced techniques.
- **BTCE401.2** Understand the mathematical and statistical knowledge and skills applying in various civil engineering structures.
- **BTCE401.3** Able to proficient in the application of the laws of logic to mathematical statements.

C. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Function as design consultants in construction industry for the design of civil engineering structures.

PSO2: Provide sustainable solutions to the Civil Engineering Problems

PSO3: It. will help students to analyze and Provide concrete solution to environmental problem.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module I: Solution of Algebraic and Transcendental Equation
Error in a series approximation, Bisection Method, Iteration method, Method of false position, Newton-Raphson method **Solutions of Simultaneous equation** Gauss elimination method, Jacobi iteration method, Gauss Seidal method

Module II: Interpolation Finite Differences, Difference tables Polynomial Interpolation**:** Newton's forward and backward formula Central Difference Formulae: Gauss forward and backward formula. Interpolation with unequal intervals: Lagrange's Interpolation, Newton Divided difference formula

Module III: Numerical Integration and Differentiation Introduction, Numerical differentiation Numerical Integration: Trapezoidal rule, Simpson's 1/3 and 3/8 rules.

Module IV: Solution of differential Equations: Euler's Method, Runga-Kutta Methods.

Module V: Statistical Computation: Frequency chart, Curve fitting by method of least squares, fitting of straight lines, polynomials, exponential curves etc, Data fitting with Cubic disciplines.

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- Rajaraman V, "Computer Oriented Numerical Methods", Pearson Education
- Gerald & Whealey, "Applied Numerical Analyses", AW
- Jain, Iyengar and Jain, "Numerical Methods for Scientific and Engineering Computations", New Age Int.
- Grewal B S, "Numerical methods in Engineering and Science", Khanna Publishers, Delhi **I.**

I. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Corresponding CO**	**Mode of Assessing CO**
1	Error in a series approximation	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
2	Bisection Method	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
3	Iteration method	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
4	Method of false position	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
5	Newton-Raphson method	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
6	Solutions of Simultaneous equation Gauss elimination method	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
7	Jacobi iteration method	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam

8	Gauss Seidal method	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
9	Gauss Seidal method	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
10	Finite Differences.	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
11	Difference tables Polynomial Interpolation	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
12	Difference tables Polynomial Interpolation	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
13	Newton's forward and backward formula	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
14	Newton's forward and backward formula	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
15	Central Difference Formulae	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
16	Gauss forward and backward formula	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
17	Gauss forward and backward formula	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
18	Interpolation with unequal intervals	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
19	Interpolation with unequal intervals	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
20	Lagrange's Interpolation,	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
21	Newton Divided difference formula	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam
22	Introduction, Numerical differentiation,	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam
23	Numerical Integration	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam
24	Trapezoidal rule	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam
25	Simpson's 1/3 rules	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam
26	Simpson's 3/8 rules	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam
27	Euler's Method,	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam
28	Runga-Kutta Methods.	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam
29	Runga-Kutta Methods.	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam
30	Frequency chart	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam
31	Curve fitting by method of least squares	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam
32	fitting of straight lines	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam

33	Polynomials	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam
34	Exponential curves etc	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam
35	Data fitting with Cubic disciplines	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam
36	Data fitting with Cubic disciplines	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam

J.Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE401.1	Function as design consultants in construction industry for the design of civil engineering structures.	3	3	1	3	1				2		2	1	1	2	1
BTCE401.2	Provide sustainable solutions to the Civil Engineering Problem	3	2	2	2	2				2		1	1	2	2	1
BTCE401.3	It will help students to analyze and Provide concrete solution to environmental problem.	2	1	1	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–IV)2017-18						
Class: B.Tech (CE) 4^{th} Semester						
Subject t Name: BTCE 401 Numerical analysis and Programming Lab		Time:1.5Hrs			Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		

Student will be able to

CO1: Able to apply finite element method for the analysis of complex Civil Engineering structures using advanced techniques.

CO2: Understand the mathematical and statistical knowledge and skills applying invarious civil engineering structures.

CO3: Able to proficient in the application of the laws of logic to mathematicalstatements.

CO Map	Question No.	Question	Marks
CO1	Q.1	Solve the following equation by gauss elimination method. 2x + y + z = 10 3x + 2y + 3z = 18 x + 4y + 9z = 16	3
CO1	Q.2a	What is Runge- Kutte Method?	3
	Q.2b	Use Runge – Kutta method to solve = xy for x = 1.4 initially x =1, y = 2 (take h= 0.2)	3
CO1	Q.3	What is bisection method?	6
CO2	Q.4	What is Simpson’s 1/3 rd rule	3
CO2	Q.5a	What is trapezoidal rule?	3
	Q.5b	Discuss Finite difference.	3
CO3	Q6	Discuss Newton’s forward and backward formula Central Difference Formulae	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

Ser. No.	Name	Enrollment No.	Roll No.	NUMERICAL ANALYSIS & PROGRAMMING		
Course Code				BTCE 401		
Associated Credit Units				3		
				30	70	100
1	AMAN PARASHAR	A60515816004	AU16UCV8601	13	30	43
2	ANUJ BANSAL	A60215816013	AU16UCV8602	13	30	43
3	ANUJ PRATAP SINGH PARMAR	A60215816011	AU16UCV8603	14	25	39
4	ANUJ SHARMA	A60515816006	AU16UCV8604	13	25	38
5	ANUJ SINGH BHADORIA	A60515816001	AU16UCV8605	17	44	61
6	DAMODAR SINGH CHAUHAN	A60215816008	AU16UCV8606	14	34	48
7	DEEPAK SHARMA	A60515816005	AU16UCV8607	13	33	46
8	HIMANSHU MAHLI	A60215816012	AU16UCV8609	15	25	40
9	KUNAL KUMAR	A60515816002	AU16UCV8611	13	26	39
10	KUNAL MUKHARIYA	A60215816007	AU16UCV8612	22	48	70
11	MONUSHA DHAKAD	A60515816003	AU16UCV8613	16	43	59
12	RAHUL SINGH BAGHEL	A60215816015	AU16UCV8614	20	53	73
13	ROHIT BHADORIA	A60215816016	AU16UCV8616	12	23	35
14	SATENDRA SINGH KUSHWAH	A60215816009	AU16UCV8617	11	24	35
15	SHIVAM SHRIVASTAVA	A60215816014	AU16UCV8618	11	40	51
16	UTKARSH TOMAR	A60215816004	AU16UCV8619	14	41	55

	NUMERICAL ANALYSIS & PROGRAMMING
	BTCE 401
	3
No. of students attended the Exam	16
No. of students secure more than 60% marks	3
Percentage of students secure more than 60% marks	18.75
Attainment Level	-

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **STRUCTURAL ANALYSIS-I**
Course Code : BTCE 402, Credits : 04, Session : 2017 - 2018(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Shashank Gupta, Mr. Mohan Kantharia, Mr. Sachin Tiwari

A. Introduction

Structural analysis is a branch of Solid Mechanics which uses simplified models for solids like bars, beams and shells for engineering decision making. It's main objective is to determine the effect of loads on the physical structures and their components.

B. At the end of the course students will able to learn:

- **BTCE401.1** Able to analysis various type of loads by influence line diagram method.
- **BTCE401.2** To understand develop computer program for the analysis of structures. Able to identify determinate, indeterminate, stable and unstable structures.
- **BTCE401.3** Able to use slope defection method and rotation contribution method

C. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Function as design consultants in construction industry for the design of civil engineering structures.

PSO2: Provide sustainable solutions to the Civil Engineering Problems

PSO3: It. will help students to analyze and Provide concrete solution to environmental problem.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module I: Deflection of beams: Differential equation of the elastic curve - slope and deflection of beams by method of successive integration - Macaulay's method - Moment area method - Conjugate beam method - Deflection due to shear.

Module II: Elastic theorems and energy principles: Strain energy and complementary energy - review of strain energy due to axial load - bending, shear and torsion - principle of superposition - principle of virtual work - Castigliano's theorem for deflection - theorem of complementary energy - Betti's theorem - Maxwell's law of reciprocal deflections - principle of least work - application of method of virtual work (unit load method) and strain energy method for determination of deflections of statically determinate beams - pin-joined trusses and rigid frames - temperature effects.

Module III: Fixed and continuous beams: Statically indeterminate structures - degree of static and kinematic indeterminacies – brief introduction to force and displacement methods - fixed and continuous beams - force method - analysis by consistent deformation method - application of moment area and conjugate beam methods for fixed beams - theorem of three moments for continuous beams - shear force and bending moment diagrams - deflection and support settlement.

Module IV: Beams curved in plan: Analysis of cantilever beam curved in plan - analysis of circular beams over simple supports

Theory of columns V: Axial loading of short strut - long columns - Euler's Formula - Rankine Formula – Secant Formula - eccentric loading - direct and bending stresses – Buckling Load as an eigen value problem.

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- R. Vaidyanathan, P. Perumal, Comprehensive Structural Analysis Vol. I & II, Laxmi Publications, New Delhi
- Reddy C.S., Basic Structural Analysis, 2nd ed., Tata McGraw Hill, New Delhi (2004).

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Differential equation of the elastic curve	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
2	Slope and deflection of beams by method of successive integration	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
3	Macaulay's method	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
4	Moment area method	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
5	Conjugate beam method	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
6	Deflection due to shear.	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
7	Strain energy and complementary energy Castigliano's theorem for (unit load method)	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
8	Review of strain energy due to axial load	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
9	Bending, shear and torsion strain energy	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
10	Principle of superposition	Lecture	BTCE402.1	Mid Term-1, Quiz

				& End Sem Exam
11	Principle of virtual work	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
12	Deflection - theorem of complementary energy	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
13	Maxwell's law of reciprocal deflections - principle of least work	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
14	Betti's theorem - application of method of virtual work	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
15	Method for determination of deflections of statically determinate beams - pin-joined trusses	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
16	Rigid frames - temperature effects.	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
17	Statically indeterminate structures	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
18	Degree of static and kinematic indeterminacies	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
19	Degree of static and kinematic indeterminacies	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
20	Degree of static and kinematic indeterminacies	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
21	brief introduction to force and displacement methods - fixed and continuous beams	Lecture	BTCE402.1	Mid Term-2, Quiz & End Sem Exam
22	Force method - analysis by consistent deformation method	Lecture	BTCE402.1	Mid Term-2, Quiz & End Sem Exam
23	Application of moment area and conjugate beam methods for fixed beams	Lecture	BTCE402.1	Mid Term-2, Quiz & End Sem Exam
24	Theorem of three moments for continuous beams - shear force and bending moment diagrams	Lecture	BTCE402.1	Mid Term-2, Quiz & End Sem Exam
25	Deflection and support settlement.	Lecture	BTCE402.1	Mid Term-2, Quiz & End Sem Exam
26	Analysis of cantilever beam curved in plan	Lecture	BTCE402.1	Mid Term-2, Quiz & End Sem Exam
27	Analysis of circular beams over simple supports	Lecture	BTCE402.1	Mid Term-2, Quiz & End Sem Exam
28	Analysis of circular beams over simple supports	Lecture	BTCE402.1	Mid Term-2, Quiz & End Sem Exam
29	Analysis of circular beams over simple supports	Lecture	BTCE402.1	Mid Term-2, Quiz & End Sem Exam
30	Axial loading of short strut	Lecture	BTCE402.1	Mid Term-2, Quiz & End Sem Exam
31	Axial loading of short strut	Lecture	BTCE402.1	Mid Term-2, Quiz & End Sem Exam

32	Rankine Formula	Lecture	BTCE402.1	Mid Term-2, Quiz & End Sem Exam
33	Long columns - Euler's Formula -– Secant Formula	Lecture	BTCE402.1	Mid Term-2, Quiz & End Sem Exam
34	Eccentric loading - direct and bending stresses	Lecture	BTCE402.1	Mid Term-2, Quiz & End Sem Exam
35	Buckling Load as an eigen value problem	Lecture	BTCE402.1	Mid Term-2, Quiz & End Sem Exam
36	Buckling Load as an eigen value problem	Lecture	BTCE402.1	Mid Term-2, Quiz & End Sem Exam

J.Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE402.1	Able to analysis various type of loads by influence line diagram method.	3	3	1	3	1				2		2	1	1	2	1
BTCE402.2	To understand develop computer program for the analysis of structures. Able to identify determinate, indeterminate, stable and unstable structures.	3	2	2	2	2				2		1	1	2	2	1
BTCE402.3	Able to use slope defection method and rotation contribution method	2	1	1	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–IV)2017-18		
Class: B.Tech (CE) 4th Semester		
Subject t Name: BTCE 402 Structural Analysis I	Time:1.5Hrs	Max.Marks:30

Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		

Student will be able to
CO1: Able to analysis various type of loads by influence line diagram method.
CO2: To understand develop computer program for the analysis of structures. Able to identify determinate, indeterminate, stable and unstable structures.
CO3: Able to use slope defection method and rotation contribution method.

CO Map	Question No.	Question	Marks
CO1	Q.1	Define Muller Breslau Principle. What is retaining wall?	3
CO1	Q.2a	What do you understand from a determinate structure?	3
	Q.2b	What is method of Joint and Section?	3
CO1	Q.3	Describe in brief the significance of influence line diagram.	6
CO2	Q.4	What is middle third rule? Describe in brief.	3
CO2	Q.5a	Write down different types of retaining walls	3
	Q.5b	How behaviour of an arch is different from a beam, explain?	3
CO3	Q6	What will be the value of horizontal thrust if a cable supported at same level with dip ‘d’ is subjected to udl of intensity ‘w’ throughout its length ‘L’.	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

				STRUCTURAL ANALYSIS - I		
Course Code				BTCE 402		
Associated Credit Units				4		
Ser. No.	Name	Enrollment No.	Roll No.	30	70	100
1	AMAN PARASHAR	A60515816004	AU16UCV8601	20	43	63
2	ANUJ BANSAL	A60215816013	AU16UCV8602	18	41	59
3	ANUJ PRATAP SINGH PARMAR	A60215816011	AU16UCV8603	19	39	58
4	ANUJ SHARMA	A60515816006	AU16UCV8604	24	55	79
5	ANUJ SINGH BHADORIA	A60515816001	AU16UCV8605	20	52	72
6	DAMODAR SINGH CHAUHAN	A60215816008	AU16UCV8606	15	45	60
7	DEEPAK SHARMA	A60515816005	AU16UCV8607	20	52	72
8	HIMANSHU MAHLI	A60215816012	AU16UCV8609	14	45	59
9	KUNAL KUMAR	A60515816002	AU16UCV8611	14	30	44
10	KUNAL MUKHARIYA	A60215816007	AU16UCV8612	16	54	70
11	MONUSHA DHAKAD	A60515816003	AU16UCV8613	26	36	62
12	RAHUL SINGH BAGHEL	A60215816015	AU16UCV8614	26	56	82
13	ROHIT BHADORIA	A60215816016	AU16UCV8616	22	40	62
14	SATENDRA SINGH KUSHWAH	A60215816009	AU16UCV8617	20	50	70
15	SHIVAM SHRIVASTAVA	A60215816014	AU16UCV8618	17	46	63
16	UTKARSH TOMAR	A60215816004	AU16UCV8619	16	50	66

				STRUCTURAL ANALYSIS - I
				BTCE 402
				4
No. of students attended the Exam				16
No. of students secure more than 60% marks				11
Percentage of students secure more than 60% marks				68.75
Attainment Level				Level 1

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **CONCRETE TECHNOLOGY**
Course Code : BTCE 403, Credits : 03, Session : 2017 - 2018(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Shashank Gupta, Mr. Mohan Kantharia, Mr. Sachin Tiwari, Dr. Ripunjoy Gogoi

A. Introduction

Concrete is the most commonly used man-made material on earth. It is an important construction material used extensively in buildings, bridges, roads and dams. Its uses range from structural applications, to kerbs, pipes and drains.

B. At the end of the course students will able to learn:

- **BTCE403.1** Understand the theoretical concept of Concrete material which includes Cement, Admixtures and Aggregates.
- **BTCE403.2** Learn different types of aggregates, admixtures & know the mechanism of hydration of cement.

C. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Function as design consultants in construction industry for the design of civil engineering structures.

PSO2: Provide sustainable solutions to the Civil Engineering Problems

PSO3: It. will help students to analyze and Provide concrete solution to environmental problem.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module I: Materials: Materials: cement - different types - chemical composition and physical properties - tests on cement - I.S. specifications - aggregates - classification - mechanical properties and tests as per I.S. - alkali aggregate reaction - grading requirements - heavy weight - light weight - normal weight - aggregate - sampling of aggregate - water - quality of water - permissible impurities as per I.S - admixtures - accelerators - retarders - water reducing agents – super plasticizers- use of silica fumes.

Module II: Manufacture: Manufacture of concrete - measurement of materials - storage and handling - batching plant and equipment - mixing - types of mixers - transportation of concrete - pumping of concrete - placing of concrete - under water concreting - compaction of concrete - curing of concrete - ready mixed concrete - mix design - nominal mixes - design mixes - factors influencing mix design - A.C.I method - I.S method - design for high strength mixes.

Module III: Properties of Concrete: Properties of concrete - fresh concrete - workability - factors affecting workability - tests for workability - segregation and bleeding - hardened concrete - factors affecting strength of concrete - strength of concrete in compression, tension and flexure - stress- strain characteristics and elastic properties - shrinkage and creep - durability of concrete - permeability - chemical attack - sulphate attack - resistance to abrasion and cavitaion - resistance to freezing and thawing - resistance to fire - marine atmosphere - quality control - frequency of sampling - test specimens - statistical analysis of test results - standard deviation - acceptance criteria

Module IV: Special Concretes: Special concrete - light weight concrete - high density concrete - vacuum concrete - shotcrete - Fibre reinforced concrete-polymer concrete - ferrocement - high performance concrete - self compacting concrete - types of failure - diagnosis of distress in concrete - crack control - leak proofing - guniting and jacketing techniques.

G. Examination Scheme:

Components	A	CT	S/V/Q/ HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- Neville A.M., Properties of Concrete, Pitman
- Shetty M.S., Concrete Technology, S I Chand & Company, 1993.
- Gambhir M.L., Concrete Technology, Tata McGraw Hill, 1995.
- Orchard D.F., Concrete Technology Vol. I & II, 1968.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Materials: cement aggregates - -	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
2	Different types - chemical composition and physical properties	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
3	Tests on cement - I.S. specifications	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
4	Classification - mechanical properties and tests as per I.S.	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
5	Alkali aggregate reaction - grading requirements	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
6	Heavy weight - light weight normal weight - aggregate	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
7	Sampling of aggregate - water - quality of water	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
8	Permissible impurities as per I.S - admixtures - accelerators	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
9	Retarders - water reducing agents – super plasticizers- use of silica fumes	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
10	Manufacture of concrete - - ready mixed concrete A.C.I method	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam

11	Measurement of materials	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
12	storage and handling - batching	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
13	Batching plant and equipment - mixing - types of mixers	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
14	Transportation of concrete - pumping of concrete	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
15	Placing of concrete - under water concreting	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
16	Compaction of concrete - curing of concrete	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
17	Mix design - nominal mixes - design mixes	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
18	Factors influencing mix design	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
19	I.S method - design for high strength mixes	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
20	Properties of concrete - fresh concrete - workability, tension and flexure - stress- strain characteristics and - resistance to abrasion and	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
21	Tests for workability - segregation and bleeding - hardened concrete - factors affecting strength of concrete	Lecture	BTCE403.1	Mid Term-2, Quiz & End Sem Exam
22	Factors affecting workability - - strength of concrete in compression	Lecture	BTCE403.1	Mid Term-2, Quiz & End Sem Exam
23	Elastic properties - shrinkage and creep - durability of concrete -	Lecture	BTCE403.1	Mid Term-2, Quiz & End Sem Exam
24	cavitaion resistance to freezing and thawing - -	Lecture	BTCE403.1	Mid Term-2, Quiz & End Sem Exam
25	resistance to fire marine atmosphere	Lecture	BTCE403.1	Mid Term-2, Quiz & End Sem Exam
26	resistance to fire marine atmosphere	Lecture	BTCE403.1	Mid Term-2, Quiz & End Sem Exam
27	quality control - frequency of sampling test specimens - statistical	Lecture	BTCE403.1	Mid Term-2, Quiz & End Sem Exam
28	permeability - chemical attack - sulphate attack	Lecture	BTCE403.1	Mid Term-2, Quiz & End Sem Exam
29	Analysis of test results - standard deviation - acceptance criteria	Lecture	BTCE403.1	Mid Term-2, Quiz & End Sem Exam
30	Special concrete high performance concrete self .	Lecture	BTCE403.1	Mid Term-2, Quiz & End Sem Exam

31	Light weight concrete - high density concrete	Lecture	BTCE403.1	Mid Term-2, Quiz & End Sem Exam
32	vacuum concrete - shotcrete	Lecture	BTCE403.1	Mid Term-2, Quiz & End Sem Exam
33	Fibre reinforced concrete- polymer concrete - ferrocement -	Lecture	BTCE403.1	Mid Term-2, Quiz & End Sem Exam
34	compacting concrete - types of failure - diagnosis of distress in concrete	Lecture	BTCE403.1	Mid Term-2, Quiz & End Sem Exam
35	crack control - leak proofing - guniting	Lecture	BTCE403.1	Mid Term-2, Quiz & End Sem Exam
36	jacketing techniques	Lecture	BTCE403.1	Mid Term-2, Quiz & End Sem Exam

J.Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE402.1	Understand the theoretical concept of Concrete material which includes Cement, Admixtures and Aggregates.	3	3	1	3	1				2		2	1	1	2	1
BTCE402.2	Learn different types of aggregates, admixtures & know the mechanism of hydration of cement	3	2	2	2	2				2		1	1	2	2	1

<u>Sample Question Paper</u>

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–IV)2017-18						
Class: B.Tech (CE) 4th Semester						
Subject t Name: BTCE 403 Concrete Technology		Time:1.5Hrs		Max.Marks:30		
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		

Student will be able to
CO1: Understand the theoretical concept of Concrete material which includes Cement, Admixtures and Aggregates.
CO2: Learn different types of aggregates, admixtures & know the mechanism of hydration of cement

CO Map	Question No.	Question	Marks
CO1	Q.1	How are super plasticizers classified? Explain in detail.	3
CO1	Q.2a	Write the oxide composition limits of OPC and explain their necessity.	3
	Q.2b	Explain the field tests for cement and what do you conclude from them	3
CO1	Q.3	What are BOGUE'S compounds.	6
CO2	Q.4	Classify the types of admixtures and write a short note on them	3
CO2	Q.5a	Write about the laboratory tests of cement	3
	Q.5b	which test do you choose to find strength of cement in laboratory.explain	3
CO2	Q6	List out various mineral admixtures and explain about them in detail	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

				CONCRETE TECHNOLOGY		
Course Code				**BTCE 403**		
Associated Credit Units				**3**		
Ser. No.	**Name**	**Enrollment No.**	**Roll No.**	**30**	**70**	**100**
1	**AMAN PARASHAR**	**A60515816004**	**AU16UCV8601**	**18**	**30**	**48**
2	**ANUJ BANSAL**	**A60215816013**	**AU16UCV8602**	**15**	**24**	**39**
3	**ANUJ PRATAP SINGH PARMAR**	**A60215816011**	**AU16UCV8603**	**20**	**27**	**47**
4	**ANUJ SHARMA**	**A60515816006**	**AU16UCV8604**	**21**	**30**	**51**
5	**ANUJ SINGH BHADORIA**	**A60515816001**	**AU16UCV8605**	**20**	**33**	**53**
6	**DAMODAR SINGH CHAUHAN**	**A60215816008**	**AU16UCV8606**	**14**	**36**	**50**
7	**DEEPAK SHARMA**	**A60515816005**	**AU16UCV8607**	**19**	**30**	**49**

8	HIMANSHU MAHLI	A60215816012	AU16UCV8609	15	24	39
9	KUNAL KUMAR	A60515816002	AU16UCV8611	17	30	47
10	KUNAL MUKHARIYA	A60215816007	AU16UCV8612	16	45	61
11	MONUSHA DHAKAD	A60515816003	AU16UCV8613	21	32	53
12	RAHUL SINGH BAGHEL	A60215816015	AU16UCV8614	22	42	64
13	ROHIT BHADORIA	A60215816016	AU16UCV8616	14	25	39
14	SATENDRA SINGH KUSHWAH	A60215816009	AU16UCV8617	15	25	40
15	SHIVAM SHRIVASTAVA	A60215816014	AU16UCV8618	15	26	41
16	UTKARSH TOMAR	A60215816004	AU16UCV8619	16	27	43

				CONCRETE TECHNOLOGY
				BTCE 403
				3
No. of students attended the Exam				16
No. of students secure more than 60% marks				2
Percentage of students secure more than 60% marks				12.50
Attainment Level				-

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **GEOINFORMATICS-II**
Course Code : BTCE 404, Credits : 03, Session : 2017 - 2018(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Shashank Gupta, Mr. Mohan Kantharia, Dr. Ripunjoy Gogoi

A. Introduction

Geoinformatics is the integration of different disciplines dealing with spatial information. The advent of Satellite Remote Sensing and subsequent development of Global Positioning System (GPS) and Geographical Information System (GIS) have made significant changes in surveying and map making.

B. Students will be able to learn after completion of this course

- **BTCE404.1** Explore mapped data Relate GIS with remote sensing technologies
- **BTCE404.2** Analyze spatial data, using GIS analysis tools Develop and manage geo databases
- **BTCE404.3** Apply Python as a GIS computer language Create maps, images and apps to communicate spatial data in a meaningful way to other.

C. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Function as design consultants in construction industry for the design of civil engineering structures.

PSO2: Provide sustainable solutions to the Civil Engineering Problems

PSO3: It. will help students to analyze and Provide concrete solution to environmental problem.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module I: Triangulation - principle - reconnaissance - selection of site for base line - selection of stations - orders of triangulation - triangulation figures - scaffolds and signals - marking of stations - intervisibility and heights of stations - satellite stations - base line measurement - equipment and corrections - adjustment of observations.

Module II: Survey adjustments and theory of errors – introduction – laws of accidental errors – probability curve – principle of least squares – laws of weights – probable error – normal equation – most probable value – method of correlates – angle adjustment – station adjustment – figure adjustment – adjustment of triangles – adjustment of a geodetic quadrilateral.

Module III: Curves - types of curves - elements of a curve - simple curves - different methods of setting out – introduction to compound curves - reverse curves, transition curves, vertical curves -hydrographic survey - scope - shoreline survey - river survey - soundings – sounding equipment - methods - ranges - locating sounding - plotting - three point problem.

Module IV: Photogrammetry – terrestrial and aerial photogrammetry – heights and distances from Photographs – flight planning – elements of stereoscopy – photo mosaic – photo interpretation – applications of photogrammetry. GNSS – GPS – differential GPS.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- S.K Duggal, Sruveying Vol. I and II, 2nd ed., Tata McGraw Hill, New Delhi (2004).
- Arora K.R., Surveying Vol. I & II, Standard Book House, New Delhi (2008)
- Punmia B.C., Ashok Kr. Jain, Arun Kr. Jain, Surveying Vol. I &II, Laxmi Pub, New Delhi (2004)

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Triangulation - s - - marking of stations	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
2	Principle - reconnaissance	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
3	Selection of site for base line	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
4	selection of stations - orders of triangulation	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
5	Triangulation figures - scaffolds and signals	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
6	Intervisibility and heights of stations	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
7	Satellite stations - base line	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
8	Measurement - equipment and corrections	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
9	Adjustment of observations	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
10	Survey adjustments and theory of errors figure adjustment	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
11	introduction – laws of accidental errors	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
12	probability curve	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
13	principle of least squares – laws of weights	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
14	probable error – normal equation	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
15	most probable value – method of correlates – angle adjustment	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
16	station adjustment	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
17	adjustment of triangles	Lecture	BTCE404.1	Mid Term-1, Quiz

				& End Sem Exam
18	Adjustment of a geodetic quadrilateral.	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
19	Curves - types of curves hydrographic	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
20	elements of a curve - simple curves	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
21	elements of a curve - simple curves	Lecture	BTCE404.1	Mid Term-2, Quiz & End Sem Exam
22	different methods of setting out –	Lecture	BTCE404.1	Mid Term-2, Quiz & End Sem Exam
23	different methods of setting out – introduction to compound curves	Lecture	BTCE404.1	Mid Term-2, Quiz & End Sem Exam
24	reverse curves, transition curves, vertical curves	Lecture	BTCE404.1	Mid Term-2, Quiz & End Sem Exam
25	reverse curves, transition curves, vertical curves	Lecture	BTCE404.1	Mid Term-2, Quiz & End Sem Exam
26	scope - shoreline survey - river survey - soundings	Lecture	BTCE404.1	Mid Term-2, Quiz & End Sem Exam
27	survey - – sounding equipment - methods - ranges	Lecture	BTCE404.1	Mid Term-2, Quiz & End Sem Exam
28	locating sounding - plotting - three point problem.	Lecture	BTCE404.1	Mid Term-2, Quiz & End Sem Exam
29	introduction to compound curves	Lecture	BTCE404.1	Mid Term-2, Quiz & End Sem Exam
30	Photogrammetry– flight planning ——	Lecture	BTCE404.1	Mid Term-2, Quiz & End Sem Exam
31	terrestrial and aerial photogrammetry	Lecture	BTCE404.1	Mid Term-2, Quiz & End Sem Exam
32	heights and distances from Photographs	Lecture	BTCE404.1	Mid Term-2, Quiz & End Sem Exam
33	elements of stereoscopy	Lecture	BTCE404.1	Mid Term-2, Quiz & End Sem Exam
34	interpretation – applications of photogrammetry.	Lecture	BTCE404.1	Mid Term-2, Quiz & End Sem Exam
35	photo mosaic – photo GNSS	Lecture	BTCE404.1	Mid Term-2, Quiz & End Sem Exam
36	GPS – differential GPS	Lecture	BTCE404.1	Mid Term-2, Quiz & End Sem Exam

J.Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES	CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE402.1	Analyze spatial data, using GIS analysis tools Develop and manage geo databases.	3	3	1	3	1				2		2	1	1	2	1
BTCE402.2	Apply Python as a GIS computer language Create maps, images and apps to communicate spatial data in a meaningful way to other.	3	2	2	2	2				2		1	1	2	2	1

Sample Question Paper

<table>
<tr><td colspan="8">Amity School of Engineering and Technology
Department of CIVIL Engineering
MID-SEMESTER(SEM–IV)2017-18</td></tr>
<tr><td colspan="8">Class: B.Tech (CE) 4th Semester</td></tr>
<tr><td colspan="3">Subject t Name:
BTCE 404 Geoinformatics II</td><td colspan="3">Time:1.5Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td colspan="2">Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3,6</td><td>Q.4</td><td>Q.2,5</td><td></td><td colspan="2"></td></tr>
<tr><td colspan="8">Student will be able to
CO1: Explore mapped data Relate GIS with remote sensing technologies
CO2: Apply Python as a GIS computer language Create maps, images and apps to communicate spatial data in a meaningful way to other.
CO3: Analyze spatial data, using GIS analysis tools Develop and manage geo databases</td></tr>
</table>

CO Map	Question No.	Question	Marks
CO1	Q.1	What is remote sensing?	3
CO1	Q.2a	Discuss application of remote sensing?	3
	Q.2b	Discuss elements of a curve - simple curves	3
CO1	Q.3	different methods of setting out – different methods of setting out – introduction to compound curves	6
CO2	Q.4	Discuss scope - shoreline survey - river survey -	3

		soundings	
CO2	Q.5a	Discuss GIS and its application	3
	Q.5b	Discuss GPS and its application	3
CO2	Q6	Discuss reverse curves, transition curves, vertical curves	6

Attainments		Rubric
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

				GEO INFORMATICS - I		
Course Code				BTCE 404		
Associated Credit Units				3		
Ser. No.	Name	Enrollment No.	Roll No.	30	70	100
1	AMAN PARASHAR	A60515816004	AU16UCV8601	12	23	35
2	ANUJ BANSAL	A60215816013	AU16UCV8602	15	28	43
3	ANUJ PRATAP SINGH PARMAR	A60215816011	AU16UCV8603	17	39	56
4	ANUJ SHARMA	A60515816006	AU16UCV8604	22	31	53
5	ANUJ SINGH BHADORIA	A60515816001	AU16UCV8605	19	42	61
6	DAMODAR SINGH CHAUHAN	A60215816008	AU16UCV8606	14	21	35
7	DEEPAK SHARMA	A60515816005	AU16UCV8607	23	47	70
8	HIMANSHU MAHLI	A60215816012	AU16UCV8609	14	9	23
9	KUNAL KUMAR	A60515816002	AU16UCV8611	13	33	46
10	KUNAL MUKHARIYA	A60215816007	AU16UCV8612	16	41	57
11	MONUSHA DHAKAD	A60515816003	AU16UCV8613	20	40	60
12	RAHUL SINGH BAGHEL	A60215816015	AU16UCV8614	23	40	63
13	ROHIT BHADORIA	A60215816016	AU16UCV8616	14	30	44
14	SATENDRA SINGH KUSHWAH	A60215816009	AU16UCV8617	13	30	43
15	SHIVAM SHRIVASTAVA	A60215816014	AU16UCV8618	14	34	48
16	UTKARSH TOMAR	A60215816004	AU16UCV8619	15	33	48

	GEO INFORMATICS - I
	BTCE 404
	3
No. of students attended the Exam	16
No. of students secure more than 60% marks	3
Percentage of students secure more than 60% marks	18.75
Attainment Level	-

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **CONSTRUCTION MANAGEMENT AND QUANTITY SURVEYING**
Course Code : BTCE 405, Credits : 03, Session : 2017 - 2018(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Shashank Gupta, Mr. Mohan Kantharia, Dr. Ripunjoy Gogoi, Dr. Imran Ahmad Khan

A. Introduction

Before starting any construction project, the quantity surveyor analyzes the drawing and specifications of the new building that architects or engineers provide. The surveyors calculate the quantity of the material used in the building. Also, they must calculate the actual work or labor cost.

B. At the end of this course students will able to learn:

- **BTCE405.1** Able to describe the requirement of planning and management to recognize the critical path and pert suitability for research projects.
- **BTCE405.2** Able to determine projects schedule and estimate the activity time of CPM to discuss resource scheduling and planning of civil engineering.
- **BTCE405.3** Projects Able to illustrate various construction equipments, machinery and their utility.

C. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Function as design consultants in construction industry for the design of civil engineering structures.

PSO2: Provide sustainable solutions to the Civil Engineering Problems

PSO3: It. will help students to analyze and Provide concrete solution to environmental problem.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module I: Construction Management – Network techniques – introduction – Bar charts – use of CPM and PERT for planning – time estimates – critical path – updating – crashing – resource smoothing – resource leveling – computer applications **Construction planning:** Preparation of job layout – labour schedule – material schedule – equipment schedule

Module II: Project Implementation **–** Tender – earnest money deposit – security deposit – contract – contract documents – measurements – completion certificate – inspection and quality control – standardization – organisations at national and international level (BIS & ISO) – role of certification

Module III: Quantity surveying - preparation of detailed estimates for: buildings - reinforced concrete structures - sanitary and water supply works

Module IV: Preparation of specification for common materials of construction and items of work as per IS - analysis of rates and preparation of abstract of estimate Introduction to valuation of real properties: Depreciation – Sinking fund – methods of valuation

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- Vazirani V.N. & Chandola S.P., Heavy Construction, 1978.
- Jha J. & Sinha S.K., Construction & Foundation Engine.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Network techniques—— labour schedule	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
2	Introduction – Bar charts	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
3	use of CPM and PERT for planning	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
4	time estimates – critical path	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
5	updating – crashing – resource	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
6	smoothing – resource leveling – computer applications	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
7	**Construction planning:** Preparation of job layout	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
8	material schedule – equipment schedule	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
9	Project Implementation	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
10	Tender earnest money deposit – security deposit	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
11	Tender – earnest money deposit – security deposit	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
12	contract – contract documents measurements	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
13	completion certificate	Lecture	BTCE405.1	Mid Term-1, Quiz

				& End Sem Exam
14	inspection and quality control – standardization	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
15	Organisations at national and international level	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
16	(BIS & ISO) – role of certification	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
17	preparation of detailed estimate	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
18	buildings - reinforced	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
19	sanitary and water supply works	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
20	sanitary and water supply works	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
21	sanitary and water supply works	Lecture	BTCE405.1	Mid Term-2, Quiz & End Sem Exam
22	concrete structures	Lecture	BTCE405.1	Mid Term-2, Quiz & End Sem Exam
23	concrete structures	Lecture	BTCE405.1	Mid Term-2, Quiz & End Sem Exam
24	concrete structures	Lecture	BTCE405.1	Mid Term-2, Quiz & End Sem Exam
25	Preparation of specification for common	Lecture	BTCE405.1	Mid Term-2, Quiz & End Sem Exam
26	analysis of rates and	Lecture	BTCE405.1	Mid Term-2, Quiz & End Sem Exam
27	materials of construction and items of work as per IS -	Lecture	BTCE405.1	Mid Term-2, Quiz & End Sem Exam
28	materials of construction and items of work as per IS -	Lecture	BTCE405.1	Mid Term-2, Quiz & End Sem Exam
29	materials of construction and items of work as per IS -	Lecture	BTCE405.1	Mid Term-2, Quiz & End Sem Exam
30	preparation of abstract of estimate	Lecture	BTCE405.1	Mid Term-2, Quiz & End Sem Exam
31	preparation of abstract of estimate	Lecture	BTCE405.1	Mid Term-2, Quiz & End Sem Exam
32	Introduction to valuation of real properties	Lecture	BTCE405.1	Mid Term-2, Quiz & End Sem Exam
33	Introduction to valuation of real properties	Lecture	BTCE405.1	Mid Term-2, Quiz & End Sem Exam
34	Depreciation – Sinking fund	Lecture	BTCE405.1	Mid Term-2, Quiz & End Sem Exam
35	methods of valuation	Lecture	BTCE405.1	Mid Term-2, Quiz & End Sem Exam
36	materials of construction and items of work as per IS -	Lecture	BTCE405.1	Mid Term-2, Quiz & End Sem Exam

J.Course Articulation Matrix (Mapping of COs with POs

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE405.1	Able to describe the requirement of planning and management to recognize the critical path and pert suitability for research projects. .	3	3	1	3	1				2		2	1	1	2	1
BTCE405.2	Projects Able to illustrate various construction equipments, machinery and their utility.	3	2	2	2	2				2		1	1	2	2	1
BTCE405.3	Able to determine projects schedule and estimate the activity time of CPM to discuss resource scheduling and planning of civil engineering		2	1	3	2				2		1	1	2	1	

<u>Sample Question Paper</u>

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–IV)2017-18						
Class: B.Tech (CE) 4th Semester						
Subject t Name: BTCE 405 Construction management and Quality Surveying		Time:1.5Hrs			Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		

Student will be able to

CO1: Able to describe the requirement of planning and management to recognize the critical path and pert suitability for research projects.

CO2: Able to determine projects schedule and estimate the activity time of CPM to discuss resource scheduling and planning of civil engineering.

CO3: Projects Able to illustrate various construction equipments, machinery and their utility.

CO Map	Question No.	Question	Marks
CO1	Q.1	Discuss Network techniques—— labour schedule.	3
CO1	Q.2a	Discuss Bar charts use of CPM and PERT for planning.	3
	Q.2b	Discuss tender earnest money deposit – security deposit.	3
CO1	Q.3	Discuss material schedule – equipment schedule Project Implementation.	6
CO2	Q.4	Discuss various materials of construction and items of work.	3
CO2	Q.5a	What is valuation of real properties?	3
	Q.5b	Discuss Depreciation and Sinking fund	3
CO3	Q6	Discuss concrete structures.	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

				CONSTRUCTION MANAGEMENT AND QUANTITY SURVEYING		
Course Code				**BTCE 405**		
Associated Credit Units				**3**		
Ser. No.	**Name**	**Enrollment No.**	**Roll No.**	**30**	**70**	**100**
1	**AMAN PARASHAR**	**A60515816004**	**AU16UCV8601**	**14**	**23**	**37**
2	**ANUJ BANSAL**	**A60215816013**	**AU16UCV8602**	**15**	**22**	**37**
3	**ANUJ PRATAP SINGH PARMAR**	**A60215816011**	**AU16UCV8603**	**19**	**28**	**47**
4	**ANUJ SHARMA**	**A60515816006**	**AU16UCV8604**	**18**	**33**	**51**
5	**ANUJ SINGH BHADORIA**	**A60515816001**	**AU16UCV8605**	**20**	**38**	**58**
6	**DAMODAR SINGH CHAUHAN**	**A60215816008**	**AU16UCV8606**	**12**	**24**	**36**

7	DEEPAK SHARMA	A60515816005	AU16UCV8607	20	32	52
8	HIMANSHU MAHLI	A60215816012	AU16UCV8609	14	28	42
9	KUNAL KUMAR	A60515816002	AU16UCV8611	13	13	26
10	KUNAL MUKHARIYA	A60215816007	AU16UCV8612	18	34	52
11	MONUSHA DHAKAD	A60515816003	AU16UCV8613	15	45	60
12	RAHUL SINGH BAGHEL	A60215816015	AU16UCV8614	22	31	53
13	ROHIT BHADORIA	A60215816016	AU16UCV8616	14	22	36
14	SATENDRA SINGH KUSHWAH	A60215816009	AU16UCV8617	17	24	41
15	SHIVAM SHRIVASTAVA	A60215816014	AU16UCV8618	16	23	39
16	UTKARSH TOMAR	A60215816004	AU16UCV8619	15	34	49

				CONSTRUCTION MANAGEMENT AND QUANTITY SURVEYING
				BTCE 405
				3
No. of students attended the Exam				16
No. of students secure more than 60% marks				0
Percentage of students secure more than 60% marks				0.00
Attainment Level				-

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **TRANSPORTATION ENGINEERING - I**
Course Code : BTCE 406, Credits : 04, Session : 2017 - 2018(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Shashank Gupta, Mr. Mohan Kantharia, Dr. Ripunjoy Gogoi

A. Introduction

Transportation engineering or transport engineering is the application of technology and scientific principles to the planning, functional design, operation and management of facilities for any mode of transportation in order to provide for the safe, efficient, rapid, comfortable, convenient, economical.

B. After completion of this course students will able to learn

- **BTCE406.1** Able to calculate traffic flow parameters, to Judge the properties of various pavement materials and their applications.
- **BTCE406.2** Able to design the flexible and rigid pavements and to compute road vehicle characteristics
- **BTCE406.3** Estimate braking and stopping distances based on vehicle and human factors
- **Programme Outcomes:**

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

- **Programme Specific Outcomes:**

PSO1: Function as design consultants in construction industry for the design of civil engineering structures.

PSO2: Provide sustainable solutions to the Civil Engineering Problems

PSO3: It. will help students to analyze and Provide concrete solution to environmental problem.

-

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastu	A	5%

	dentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module I: Components & Geometric Design of Railways: Introduction. Typical cross-sections. Various gauges. Coning of wheels and tilting of rails. Functions and requirements of component parts of a railway track. Creep of rails. Geometrical design of railway track. Horizontal curves, radius, superelevation, cant deficiency, transition curves, safe speed on curves, different types of gradients, grade compensation. Worked out problems.

Module II: Railway Operation and Control: Points and crossings and their design. Track junctions and simple track layouts. Details of different types of stations and yards. Signaling and interlocking. Control of train movements. Absolute block . Automatic block system and CTC system. Railway Construction and Maintenance: Construction of railway track: earthwork, plate laying and packing. Maintenance of track-alignment, gauge, renewal of component parts and drainage, modern methods of track maintenance.

Module III: Tunneling: Tunnel alignment and grade. Size and shape of a tunnel. Methods of tunneling in hard rocks. Full face method, heading and bench method, drift method. Methods of tunneling in soft soils. Compressed air and shield tunneling Shafts in tunnels. Ventilation of tunnel and various methods. Lining of tunnels. Drainage and lighting of . Micro Tunneling. Trenchless technology.

Module IV: Elements of bridge design: General – IRC Bridge code –loading standards–impact effect – wind load – longitudinal forces – centrifugal forces – force due to water currents – buoyancy effect – temperature effects – secondary stresses – erection – seismic force

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- Antia K.F, Railway Track, New Book Company Pvt. Ltd, 1960.
- Agarwal M.M., Railway Engineering, Prabha and Co
- Khanna S.K & Arora M.G., Airport Planning and Design, Nemchand & Bros.
- Horonjeff R., Planning and Design of Airports, Mc Graw Hill
- Mundrey J.S, Railway Track Engineering, TMGS, 1988.

I.Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Introduction Creep of rails., transition curves, safe speed on curves	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
2	Typical cross-sections.	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
3	Various gauges	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
4	Coning of wheels and tilting of rails. Functions and requirements of component parts of a railway track.	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
5	Geometrical design of railway track. Horizontal curves	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
6	Different types of gradients	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
7	Grade compensation. Worked out problems.	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
8	Radius, superelevation, cant deficiency	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
9	Points and crossings and their design.. . ..	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
10	Track junctions and simple track layouts	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
11	Details of different types of stations and yards	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
12	Signaling and interlocking. Control of train movements	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
13	Absolute block . Automatic block system and CTC system.	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
14	Construction and Maintenance: Construction of railway track: earthwork.	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
15	Railway, plate laying and packing	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
16	Methods of track maintenance.	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
17	Maintenance of track-alignment.	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
18	Gauge, renewal of component parts and drainage, modern	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
19	Tunnel alignment and grade.., drift method.Micro Tunneling	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
20	Size and shape of a tunnel	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
21	Methods of tunneling in hard rocks.	Lecture	BTCE406.1	Mid Term-2, Quiz & End Sem Exam

22	Full face method, heading and bench method	Lecture	BTCE406.1	Mid Term-2, Quiz & End Sem Exam
23	Methods of tunneling in soft soils	Lecture	BTCE406.1	Mid Term-2, Quiz & End Sem Exam
24	Compressed air and shield tunneling Shafts in tunnels	Lecture	BTCE406.1	Mid Term-2, Quiz & End Sem Exam
25	Ventilation of tunnel and various methods	Lecture	BTCE406.1	Mid Term-2, Quiz & End Sem Exam
26	Lining of tunnels. Drainage and lighting	Lecture	BTCE406.1	Mid Term-2, Quiz & End Sem Exam
27	Trenchless technology .impact effect – wind load longitudinal forces centrifugal forces	Lecture	BTCE406.1	Mid Term-2, Quiz & End Sem Exam
28	force due to water currents – buoyancy effect – temperature effects	Lecture	BTCE406.1	Mid Term-2, Quiz & End Sem Exam
29	secondary stresses – erection – seismic force	Lecture	BTCE406.1	Mid Term-2, Quiz & End Sem Exam
30	General – IRC Bridge code – loading standards.	Lecture	BTCE406.1	Mid Term-2, Quiz & End Sem Exam
31	General – IRC Bridge code – loading	Lecture	BTCE406.1	Mid Term-2, Quiz & End Sem Exam
32	wind load – longitudinal forces – centrifugal forces	Lecture	BTCE406.1	Mid Term-2, Quiz & End Sem Exam
33	impact effect –– force due to water currents	Lecture	BTCE406.1	Mid Term-2, Quiz & End Sem Exam
34	buoyancy effect – temperature effects	Lecture	BTCE406.1	Mid Term-2, Quiz & End Sem Exam
35	Standards secondary stresses – erection – seismic force	Lecture	BTCE406.1	Mid Term-2, Quiz & End Sem Exam
36	Standards econdary stresses – erection – seismic force	Lecture	BTCE406.1	Mid Term-2, Quiz & End Sem Exam

J.Course Articulation Matrix (Mapping of COs with POs

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE406.1	Able to calculate traffic flow parameters, to Judge the properties of various pavement materials and their applications.	3	3	1	3	1				2		2	1	1	2	1

BTCE406.2	Able to design the flexible and rigid pavements and to compute road vehicle characteristics	3	2	2	2	2				2		1	1	2	2	1
BTCE406.3	Estimate braking and stopping distances based on vehicle and human factor		2	1	3	2				2		1	1	2	1	

<u>Sample Question Paper</u>

Amity School of Engineering and Technology
Department of CIVIL Engineering
MID-SEMESTER(SEM–IV)2017-18

Class: B.Tech (CE) 4th Semester

Subject t Name: BTCE 406 **TRANSPORTATION ENGINEERING - I**	Time:1.5Hrs	Max.Marks:30

Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		

Student will be able to
CO1: Able to calculate traffic flow parameters, to Judge the properties of various pavement materials and their applications.
CO2: Estimate braking and stopping distances based on vehicle and human factors.
CO3: Able to design the flexible and rigid pavements and to compute road vehicle characteristics

CO Map	Question No.	Question	Marks
CO1	Q.1	Explain with sketches the various factors controlling the alignment of roads. Discuss the special care to be taken while aligning hill roads.	3
CO1	Q.2a	Derive an expression for finding the stopping sight distance at level and at grades	3
	Q.2b	With sketches explain different types of failures in flexible pavements. Also discuss their causes.	3
CO1	Q.3	Explain how spot speed data are presented and the results used in traffic engineering.	6
CO2	Q.4	Explain the desirable properties of aggregates to be used in different types of pavement construction	3
	Q.5a	What is wind rose diagram?	3

CO2	Q.5b	Explain various types of road markings commonly used with the uses of each markings	3
CO3	Q6	Explain wind rose diagram and how it is being used for determination of runway orientation.	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

				TRANSPORTATION ENGINEERING - I		
Course Code				BTCE 406		
Associated Credit Units				4		
Ser. No.	Name	Enrollment No.	Roll No.	30	70	100
1	AMAN PARASHAR	A60515816004	AU16UCV8601	13	35	48
2	ANUJ BANSAL	A60215816013	AU16UCV8602	17	40	57
3	ANUJ PRATAP SINGH PARMAR	A60215816011	AU16UCV8603	17	52	69
4	ANUJ SHARMA	A60515816006	AU16UCV8604	21	38	59
5	ANUJ SINGH BHADORIA	A60515816001	AU16UCV8605	18	46	64
6	DAMODAR SINGH CHAUHAN	A60215816008	AU16UCV8606	12	42	54
7	DEEPAK SHARMA	A60515816005	AU16UCV8607	21	42	63
8	HIMANSHU MAHLI	A60215816012	AU16UCV8609	14	38	52
9	KUNAL KUMAR	A60515816002	AU16UCV8611	13	35	48
10	KUNAL MUKHARIYA	A60215816007	AU16UCV8612	12	51	63
11	MONUSHA DHAKAD	A60515816003	AU16UCV8613	20	42	62
12	RAHUL SINGH BAGHEL	A60215816015	AU16UCV8614	22	42	64
13	ROHIT BHADORIA	A60215816016	AU16UCV8616	14	32	46
14	SATENDRA SINGH KUSHWAH	A60215816009	AU16UCV8617	18	43	61
15	SHIVAM SHRIVASTAVA	A60215816014	AU16UCV8618	13	39	52
16	UTKARSH TOMAR	A60215816004	AU16UCV8619	15	54	69

				TRANSPORTATION ENGINEERING - I
				BTCE 406
				4
No. of students attended the Exam				16
No. of students secure more than 60% marks				8
Percentage of students secure more than 60% marks				50.00
Attainment Level				-

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **Geology LAB**
Course Code : BTCE 420, Credits : 04, Session : 2017 - 2018(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Shashank Gupta, Mr. Mohan Kantharia, Dr. Ripunjoy Gogoi

A. **Introduction** The course is designed to provide the students a knowledge of geology mineral properties

B. **After completion of this course students will able to learn**

- **BTCE420.1** Identification of rocks (Igneous Petrology)
- **BTCE420.2** Identification of rocks (Sedimentary Petrology
- **BTCE420.3** Identification of rocks (Metamorphic Petrolody)
- **Programme Outcomes:**

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

- **Programme Specific Outcomes:**

PSO1: Function as design consultants in construction industry for the design of civil engineering structures.

PSO2: Provide sustainable solutions to the Civil Engineering Problems

PSO3: It. will help students to analyze and Provide concrete solution to environmental problem.

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Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

Course Content

1. Study of physical properties ofminerals:(2Hour)
2. Study of spgravity of minerals and rocks (2 hour)
3. Study of different group ofminerals:(2Hour)
4. Study of Crystal and Crystalsystem: (2Hour)
5. Identification of minerals: Silica group: Quartz, Amethyst, Opal; Feldspar group: Orthoclase, Plagioclase; Cryptocrystalline group: Jasper; Carbonate group: Calcite; Element group: Graphite; Pyroxene group: Talc; Mica group: Muscovite; Amphibole group: Asbestos, Olivine, Hornblende, Magnetite, Hematite, Corundum, Kyanite, Garnet, Galena,Gypsum: (2 Hour)
6. Identification of rocks (Igneous Petrology): Acidic Igneous rock: Granite and its varieties, Syenite, Rhyolite, Pumice, Obsidian, Scoria, Pegmatite, Volcanic Tuff. Basic rock: Gabbro, Dolerite, Basalt and its varieties,Trachyte. (2 Hour)
7. Identification of rocks (Sedimentary Petrology): Conglomerate, Breccia, Sandstone and its varieties, Laterite, Limestone and its varieties, Shales and itsvarieties. (2Hour)
8. Identification of rocks (Metamorphic Petrolody): Marble, slate, Gneiss and its varieties, Schist and its varieties. Quartzite,Phyllite.(2Hour)
9. Study of topographical features from Geological maps. Identification of symbols inmaps :(2Hour)
10. Field study of foulds and faults (2 hour)

Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–IV)2017 - 2018						
Class: B.Tech (CE) 4th Semester						
Subject t Name: Geology Lab BTCE 420		Time:1.5Hrs			Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		

Student will be able to
CO1:
CO2:
CO3:

CO Map	Question No.	Question	Marks
CO1	Q.1	*1. Study of physical properties ofminerals:(2Hour)*	3
CO1	Q.2a	*2. Study of spgravity of minerals and rocks (2 hour)*	3
	Q.2b	*Breccia, Sandstone and its varieties, Laterite, Limestone and its varieties, Shales and itsvarieties*	3
CO1	Q.3	*3. Study of different group ofminerals:(2Hour)*	6
CO2	Q.4	*Identification of rocks (Metamorphic Petrolody):* Field study of foulds and faults	3
CO2	Q.5a	Study of topographical features from Geological maps. Identification of symbols in maps	3
	Q.5b	Marble, slate, Gneiss and its varieties, Schist and its varieties. Quartzite	3
CO3	Q6	Identification of rocks (Sedimentary Petrology): Conglomerate,	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

Ser. No.	Name	Enrollment No.	Roll No.	NUMERICAL ANALYSIS LAB (PROG.LAB)		
Course Code				BTCE 420		
Associated Credit Units				1		
Ser. No.	Name	Enrollment No.	Roll No.	30	70	100
1	AMAN PARASHAR	A60515816004	AU16UCV8601	20	53	73
2	ANUJ BANSAL	A60215816013	AU16UCV8602	20	55	75
3	ANUJ PRATAP SINGH PARMAR	A60215816011	AU16UCV8603	21	52	73
4	ANUJ SHARMA	A60515816006	AU16UCV8604	20	58	78
5	ANUJ SINGH BHADORIA	A60515816001	AU16UCV8605	22	58	80
6	DAMODAR SINGH CHAUHAN	A60215816008	AU16UCV8606	20	56	76
7	DEEPAK SHARMA	A60515816005	AU16UCV8607	20	54	74
8	HIMANSHU MAHLI	A60215816012	AU16UCV8609	20	58	78
9	KUNAL KUMAR	A60515816002	AU16UCV8611	22	51	73
10	KUNAL MUKHARIYA	A60215816007	AU16UCV8612	24	61	85
11	MONUSHA DHAKAD	A60515816003	AU16UCV8613	22	57	79
12	RAHUL SINGH BAGHEL	A60215816015	AU16UCV8614	21	61	82
13	ROHIT BHADORIA	A60215816016	AU16UCV8616	21	55	76
14	SATENDRA SINGH KUSHWAH	A60215816009	AU16UCV8617	22	50	72
15	SHIVAM SHRIVASTAVA	A60215816014	AU16UCV8618	21	55	76
16	UTKARSH TOMAR	A60215816004	AU16UCV8619	20	55	75

				NUMERICAL ANALYSIS LAB (PROG.LAB)
				BTCE 420
				1
No. of students attended the Exam				16
No. of students secure more than 60% marks				16
Percentage of students secure more than 60% marks				100.00
Attainment Level				Level 3

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : Environmental Engineering – I
Course Code : BTCE601, Crédits : 03, Session : 2017-18(Even Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Mohan Kantharia, Dr. Imran Ahmad Khan,

A. Introduction: The objective of this course is to teach students the basic principles and concepts of unit operations and processes involved in water and wastewater treatment and to develop a student's skill in the basic design of unit operations and processes involved in water and wastewater treatment. It aims to develop a student's skill in evaluating the performance of water and wastewater treatment plants and to teach students the various methods of sludge management.

B. Course Outcomes: At the end of the course, students will be able to:

BTCE601.1. Examine the Quantity of water, calculate the demand of water and design period

BTCE601.2. Estimate the various ground water sources and water quality parameters.

BTCE601.3. Able to identify the type of unit operations and processes involved in water and wastewater treatment plants based on the water quality

BTCE601.4. Prepare the layout of water and water treatment plants and evaluate the distribution system and its maintenance

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Scope of Environmental Engineering

Water Supply Engineering. Quantity of water. Types of water demand. Fluctuation in demand. Factors affecting consumption. Forecasting population. Design period.

Module II: Sources of water
Surface water sources. Intakes. Ground water Sources. Estimation of yield from various ground water sources. Quality of water. Drinking water standards – Water quality parameters- effects on human health- Methods of Physical, Chemical and Bacteriological analysis of water.

Module III: Treatment of water
Process details and design considerations. Aeration. Coagulation. Flocculation. Sedimentation. Filtration. Disinfection. Miscellaneous and advanced treatments. Iron and manganese removal. Fluoridation and defluoridation. Water Softening. Arsenic removal. Desalination. Membrane filtration.

Module IV: Water supply schemes
Gravitational, pumping and combined schemes. Pumps. Pumping stations. Transmission of water. Materials of water supply pipes. Design of gravity and pumping main. Distribution systems. Different layout of pipe networks.House connection from mains. Different valves, meters and hydrants. Storage reservoirs. Balancing reservoir. Detection and prevention of leaks in the distribution systems. Maintenance of distribution systems.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Garg S. K, Environmental Engineering, Vol. I, Khanna Publications, 2001, New Delhi.
- Birdie G.S & Birdie J.S, Water Supply and Sanitary Engineering, Dhanpat Rai & Sons, 1998, New Delhi.
- Duggal, K.N., Elements of Environmental Engineering, S Chand & Co. Ltd., 2000, New Delhi.
- Mark J. Hammer & Mark J. Hammer Jr., Water and Waste Water Technology, Prentice Hall of India Pvt. Ltd., 1998, New Delhi.
- Fair, Geyer & Okun, Water &Waste Water Engineering, John Wiley, 1966, New York.
- Ernest W. Steel & Terence J. Mc Ghee, Water Supply & Sewage, McGraw Hill, 1990, New York.
- Relevant BIS Codes.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Water Supply Engineering	Lecture	BTCE601.1	Mid Term-1, Quiz & End Sem Exam
2	Quantity of water	Lecture	BTCE601.1	Mid Term-1, Quiz & End Sem Exam
3	Types of water demand	Lecture	BTCE601.1	Mid Term-1, Quiz & End Sem Exam
4	*Fluctuation in demand*	Lecture	BTCE601.1	Mid Term-1, Quiz & End Sem Exam
5	Factors affecting consumption. Forecasting population	Lecture	BTCE601.1	Mid Term-1, Quiz & End Sem Exam
6	Design period.	Lecture	BTCE601.1	Mid Term-1, Quiz & End Sem Exam
7	Surface water sources	Lecture	BTCE601.2	Mid Term-1, Quiz

				& End Sem Exam
8	Intakes. Ground water Sources	Lecture	BTCE601.2	Mid Term-1, Quiz & End Sem Exam
9	Estimation of yield from various ground water sources.	Lecture	BTCE601.2	Mid Term-1, Quiz & End Sem Exam
10	Quality of water	Lecture	BTCE601.2	Mid Term-1, Quiz & End Sem Exam
11	Drinking water standards	Lecture	BTCE601.2	Mid Term-1, Quiz & End Sem Exam
12	Water quality parameters	Lecture	BTCE601.2	Mid Term-1, Quiz & End Sem Exam
13	effects on human health	Lecture	BTCE601.3	Mid Term-1, Quiz & End Sem Exam
14	Methods of Physical, Chemical and Bacteriological analysis of water	Lecture	BTCE601.3	Mid Term-1, Quiz & End Sem Exam
15	**Treatment of water**	Lecture	BTCE601.3	Mid Term-1, Quiz & End Sem Exam
16	Process details and design considerations	Lecture	BTCE601.3	Mid Term-1, Quiz & End Sem Exam
17	Aeration. Coagulation	Lecture	BTCE601.3	Mid Term-1, Quiz & End Sem Exam
18	Flocculation. Sedimentation	Lecture	BTCE601.3	Mid Term-1, Quiz & End Sem Exam
19	Filtration. Disinfection	Lecture	BTCE601.3	Mid Term-1, Quiz & End Sem Exam
20	Miscellaneous and advanced treatments	Lecture	BTCE601.3	Mid Term-1, Quiz & End Sem Exam
21	Iron and manganese removal.	Lecture	BTCE601.3	Assignment, Quiz & End Sem Exam
22	Fluoridation and defluoridation.	Lecture	BTCE601.3	Assignment, Quiz & End Sem Exam
23	Water Softening. Arsenic removal	Lecture	BTCE601.3	Assignment, Quiz & End Sem Exam
24	Desalination. Membrane filtration	Lecture	BTCE601.3	Assignment, Quiz & End Sem Exam
25	Gravitational, pumping and combined schemes	Lecture	BTCE601.4	Assignment, Quiz & End Sem Exam
26	Pumps. Pumping stations	Lecture	BTCE601.4	Assignment, Quiz & End Sem Exam
27	Transmission of water. Materials of water supply pipes	Lecture	BTCE601.4	Assignment, Quiz & End Sem Exam
28	Design of gravity and pumping main. Distribution systems	Lecture	BTCE601.4	Assignment, Quiz & End Sem Exam
29	Different layout of pipe networks	Lecture	BTCE601.4	Assignment, Quiz & End Sem Exam
30	House connection from mains	Lecture	BTCE601.4	Assignment, Quiz & End Sem Exam
31	Different valves, meters and hydrants	Lecture	BTCE601.4	Assignment, Quiz & End Sem Exam

32	Storage reservoirs	Lecture	BTCE601.4	Assignment, Quiz & End Sem Exam
33	Balancing reservoir	Lecture	BTCE601.4	Assignment, Quiz & End Sem Exam
34	Detection and prevention of leaks in the distribution systems	Lecture	BTCE601.4	Assignment, Quiz & End Sem Exam
35	Maintenance of distribution systems	Lecture	BTCE601.4	Assignment, Quiz & End Sem Exam
36	Gravitational, pumping and combined schemes	Lecture	BTCE601.4	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE601.1.	Examine the Quantity of water, calculate the demand of water and design period	3	2	3	1	2	-	1	-	3	2	3	3	**3**	**2**	**1**
BTCE601.2.	Estimate the various ground water sources and water quality parameters.	3	3	2	2	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE601.3.	Able to identify the type of unit operations and processes involved in water and wastewater treatment plants based on the water quality	3	3	2	2	3	-	1	2	-	2	3	3	**2**	**2**	**1**
BTCE601.4.	*Prepare the layout of water and* water treatment	3	3	2	1	1	2	1	-	1	2	3	3	**3**	**2**	**1**

	plants and evaluate the *distribution system and its maintenance*															

Sample Question Paper

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–VI) 2017-18						
Class: B.Tech.(CE) VI Semester						
Subject Name: BTCE601 Environmental Engineering - I		Time: 2 Hrs		Max.Marks:30		
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		
Student will be able to CO1: Examine the Quantity of water, calculate the demand of water and design period CO2: Estimate the various ground water sources and water quality parameters.						

CO Map	Question No.	Question	Marks
CO1	Q.1	What is an intake structure?	3
CO1	Q.2a	What are the consideration in locating Intake structure?	3
	Q.2b	Explain the factors controlling the choice of material for water conduits?	3
CO1	Q.3	Draw the sketch of spigot and socket joint showing the position of materials used in making it water tight?	6
CO2	Q.4	What is the loss of head in C.I transmission main of 300 mm in dia and 2 km length with C – value 100, when it carries a flow of 10 m^3/min?	3
CO2	Q.5a	What are the advantages expected in using pressure conduit instead of gravity conduict?	3
	Q.5b	What are the classification of intakes based on source also explain with a sketch any one of the intake?	3
CO2	Q6	With the help of schematic diagram, Explain different type of water intake structures?	6

Attainments	**Rubric**

Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

				ENVIRONMENTA L ENGINEERING - I		
Course Code				**BTCE 601**		
Associated Credit Units				**3**		
Ser. No.	**Name**	**Enrollment No.**	**Roll No.**	**30**	**70**	**100**
1	ABHISHEK MODI	A60215815012	AU15UCV8371	17	48	65
2	AJAY SINGH SIKARWAR	A60215815016	AU15UCV8372	16	44	60
3	ANCHAL SHRIVASTAVA	A60215815024	AU15UCV8373	23	44	67
4	ASHUTOSH DAIPURIA	A60215815017	AU15UCV8375	22	48	70
5	AYUSHI GUPTA	A60215815025	AU15UCV8376	25	53	78
6	BRAJMOHAN SINGH KUSHWAH	A60215815013	AU15UCV8377	19	40	59
7	DEEPAK SHRIVASTAVA	A60215815018	AU15UCV8378	23	49	72
8	HIMANSHU GUPTA	A60215815026	AU15UCV8380	18	46	64
9	JAGRATI DHINGRA	A60215815023	AU15UCV8381	18	37	55
10	NAVNEET PATHAK	A60215815003	AU15UCV8383	19	31	50
11	NIKHIL SINGH CHAUHAN	A60215815019	AU15UCV8384	25	57	82
12	PAWAN KUMAR SINGH	A60215815008	AU15UCV8385	23	47	70
13	SHALINI CHAKRABORTY	A60215815001	AU15UCV8386	22	53	75
14	SHISHIR SINGH	A60215815004	AU15UCV8387	25	54	79
15	SHIVAM GURJAR	A60215815009	AU15UCV8388	20	52	72
16	SUSHIL RAI	A60515815001	AU15UCV8389	23	47	70
17	VAIBHAV KANKAR	A60215815010	AU15UCV8390	20	46	66
18	VAIBHAV RAI	A60215815005	AU15UCV8391	21	43	64
19	VAISHNAV SAXENA	A60215815014	AU15UCV8392	25	59	84
20	VIPUL TRIPATHI	A60215815006	AU15UCV8394	15	52	67
21	YASH SONI	A60215815022	AU15UCV8396	17	34	51

				ENVIRONMENTA L ENGINEERING - I
				BTCE 601
				3
No. of students attended the Exam				21
No. of students secure more than 60% marks				16
Percentage of students secure more than 60% marks				76.19
Attainment Level				Level 2

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : Structural Concrete Design
Course Code : BTCE602, Crédits : 03, Session : 2017-18(Even Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Mr. P Mahakavi, Mr. Sachin Tiwari

K. **Introduction:** The objective of this course is to teach students the basic principles and concepts of design concept of RCC and Steel structure. and to develop a have knowledge of principal of structural design. It aims to develop a student's skill in evaluating the performance of design of elements.

L. **Course Outcomes:**At the end of the course, students will be able to:
BTCE602.1.design, analysis, and proportioning of reinforced concrete members and structures.
BTCE602.2.design different type of foundations..
BTCE602.3.effective use of latest industry standard formula, table, design aids used for design of Reinforced concrete Structure.
BTCE602.4. Prepare the layout of building evaluate the RCC elements

M. **Programme Outcomes:**
PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

N. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

O. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

P. Syllabus

Module I: Introduction to limit state method of design
Review of partial safety factors. Limit state of collapse. Limit state of serviceability.
Limit State of Collapse: Flexure. Limit state of collapse for flexure as per IS. Assumptions. Moment capacity

of rectangular and flanged sections. Singly and doubly reinforced sections. Design tables and charts. Critical sections for bending in important structural elements such as slabs, beams, retaining wall, footings, staircase etc. Design project for the design and detailing of a floor slab system and staircase of aresidence (load bearing masonry walls).

Module II: Shear and Torsion
Limit State of Collapse: Shear. Nominal shear stress. Design shear strength of concrete. Design of shear reinforcement. Use of SP16 for shear design. Critical sections for shear in important structural elements such as slabs, beams, retaining walls, footings etc. Design project for the design and detailing the beams of a framed system.
Limit State of Collapse: Torsion. General. Critical section.Shear and torsion. Equivalent . Reinforcement for torsion. Equivalent longitudinal moment. Design project for the design and detailing of a water tank with curved beams.

Module III: Compression
Limit State of Collapse: Compression. Analysis and design of columns of rectangular and circular cross sections. Axially loaded columns Columns with uniaxial and biaxial eccentricity using SP 16 design charts. Short and slender columns. Design project for the design and detailing the columns of a framed system and isolated and combined footings.

Module IV: Limit State of Serviceability
Deflection. Short term deflection. Long term deflection. Cracking. Control of cracking. Estimation of width of cracks

Q. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

R. Suggested Text/Reference Books:

- Pillai S.U. & Menon D., Reinforced Concrete Design Tata McGraw Hill, 2003
- Varghese P.C., Limit State Design of Reinforced Concrete, Prentice Hall of India, 2003
- Mallick S.K. & Gupta A.K., Reinforced Concrete, Oxford & IBH, 1982
- Jain A.K., Reinforced Concrete - Limit State Design, Standard Book House, 1998
- Punmia B.C., Reinforced Concrete Structures Vol. I, Standard Book House,2005
- Jain & Jaikrishna, Plain & Reinforced Concrete Vol. I, Nemchand, 2000
- Sinha S.N., Reinforced Concrete Design, Tata McGraw Hill, 2005
- BIS codes (IS 456, SP 16, SP 24, SP 34)

S. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Review of partial safety factors	Lecture	BTCE602.1	Mid Term-1, Quiz & End Sem Exam
2	Limit state of collapse	Lecture	BTCE602.1	Mid Term-1, Quiz & End Sem Exam
3	Limit state of serviceability.	Lecture	BTCE602.1	Mid Term-1, Quiz & End Sem Exam
4	***Limit State of Collapse: Flexure***	Lecture	BTCE602.1	Mid Term-1, Quiz & End Sem Exam
5	Limit state of collapse for flexure as per IS	Lecture	BTCE602.1	Mid Term-1, Quiz & End Sem Exam
6	Assumptions. Moment capacity of rectangular and	Lecture	BTCE602.1	Mid Term-1, Quiz

	flanged sections			& End Sem Exam
7	Singly and doubly reinforced sections	Lecture	BTCE602.2	Mid Term-1, Quiz & End Sem Exam
8	Design tables and charts	Lecture	BTCE602.2	Mid Term-1, Quiz & End Sem Exam
9	Critical sections for bending in important structural elements such as slabs, beams, retaining	Lecture	BTCE602.2	Mid Term-1, Quiz & End Sem Exam
10	wall, footings, staircase	Lecture	BTCE602.2	Mid Term-1, Quiz & End Sem Exam
11	Design project for the design and detailing of a floor slab system	Lecture	BTCE602.2	Mid Term-1, Quiz & End Sem Exam
12	Nominal shear stress	Lecture	BTCE602.2	Mid Term-1, Quiz & End Sem Exam
13	Design shear strength of concrete	Lecture	BTCE602.3	Mid Term-1, Quiz & End Sem Exam
14	Design of shear reinforcement.	Lecture	BTCE602.3	Mid Term-1, Quiz & End Sem Exam
15	Use of SP16 for shear design.	Lecture	BTCE602.3	Mid Term-1, Quiz & End Sem Exam
16	Critical sections for shear in important structural elements such as slabs, beams, retaining walls, footings etc	Lecture	BTCE602.3	Mid Term-1, Quiz & End Sem Exam
17	**Limit State of Collapse: Torsion.**	Lecture	BTCE602.3	Mid Term-1, Quiz & End Sem Exam
18	General. Critical section.Shear and torsion. Equivalent	Lecture	BTCE602.3	Mid Term-1, Quiz & End Sem Exam
19	Reinforcement for torsion. Equivalent longitudinal moment	Lecture	BTCE602.3	Mid Term-1, Quiz & End Sem Exam
20	Miscellaneous and advanced treatments	Lecture	BTCE602.3	Mid Term-1, Quiz & End Sem Exam
21	Design project for the design and detailing of a water tank with curved beams.	Lecture	BTCE602.3	Assignment, Quiz & End Sem Exam
22	Analysis and design of columns of rectangular and circular cross sections.	Lecture	BTCE602.3	Assignment, Quiz & End Sem Exam
23	Axially loaded columns Columns with uniaxial and biaxial eccentricity using SP 16 design charts	Lecture	BTCE602.3	Assignment, Quiz & End Sem Exam
24	Short and slender columns	Lecture	BTCE602.3	Assignment, Quiz & End Sem Exam
25	Design project for the design and detailing the columns of a framed system and isolated and combined footing	Lecture	BTCE602.4	Assignment, Quiz & End Sem Exam
26	**Limit State of Serviceability**	Lecture	BTCE602.4	Assignment, Quiz & End Sem Exam
27	Deflection. Short term deflection	Lecture	BTCE602.4	Assignment, Quiz & End Sem Exam
28	Long term deflection.	Lecture	BTCE602.4	Assignment, Quiz & End Sem Exam

29	Cracking. Control of cracking.	Lecture	BTCE602.4	Assignment, Quiz & End Sem Exam
30	Estimation of width of cracks.	Lecture	BTCE602.4	Assignment, Quiz & End Sem Exam
31	Reinforcement for torsion. Equivalent longitudinal moment	Lecture	BTCE602.4	Assignment, Quiz & End Sem Exam
32	Miscellaneous and advanced treatments	Lecture	BTCE602.4	Assignment, Quiz & End Sem Exam
33	Design project for the design and detailing of a water tank with curved beams.	Lecture	BTCE602.4	Assignment, Quiz & End Sem Exam
34	Analysis and design of columns of circular cross sections.	Lecture	BTCE602.4	Assignment, Quiz & End Sem Exam
35	Estimation of width of cracks.	Lecture	BTCE602.4	Assignment, Quiz & End Sem Exam
36	Reinforcement for torsion. Equivalent longitudinal moment	Lecture	BTCE602.4	Assignment, Quiz & End Sem Exam

T. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE602.1 .	*Able to design, analysis, and proportioning of reinforced concrete members and structures*	3	2	3	1	2	-	1	-	3	2	3	3	**3**	**2**	**1**
BTCE602.2 .	Able to design different type of foundations.	3	3	2	2	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE602.3 .	effective use of latest industry standard formula, table, design aids used for design of Reinforced concrete	3	3	2	2	3	-	1	2	-	2	3	3	**2**	**2**	**1**

	Structure															
BTCE602.4 .	Prepare the layout of *building* evaluate the *RCC elements*	3	3	2	1	1	2	1	-	1	2	3	3	**3**	**2**	**1**

Sample Question Paper

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–VI) 2017-18		
Class: B.Tech.(CE) VI Semester		
Subject Name: BTCE602 Structural Concrete Design	Time: 2 Hrs	Max.Marks:30

Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: design, analysis, and proportioning of reinforced concrete members and structures.

CO2: design different type of foundations..

CO Map	Question No.	Question	Marks
CO1	Q.1	Write any two assumptions about limit state of collapse by flexure.	3
CO1	Q.2a	What are the classifications available in serviceability limit state?	3
	Q.2b	How does limit state method of design differ from working stress method of design?	3
CO1	Q.3	Define characteristic of load and characteristic of strength.	6
CO2	Q.4	Calculate the limiting value of tensile stress in an uncracked section of a flexural member made with M25 grade of concrete.	3
CO2	Q.5a	is the expression recommended by the IS456-2000 for modulus of elasticity?	3
	Q.5b	Enlist different factors that are influencing the durability of concrete as per BIS	3
CO2	Q6	are the relative advantages of ultimate load method over modular ratio method?	6

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

STRUCTURAL CONCRETE DESIGN						
Course Code				BTCE 602		
Associated Credit Units				3		
Ser. No.	Name	Enrollment No.	Roll No.	30	70	100
1	ABHISHEK MODI	A60215815012	AU15UCV8371	18	27	45
2	AJAY SINGH SIKARWAR	A60215815016	AU15UCV8372	18	26	44
3	ANCHAL SHRIVASTAVA	A60215815024	AU15UCV8373	18	33	51
4	ASHUTOSH DAIPURIA	A60215815017	AU15UCV8375	20	35	55
5	AYUSHI GUPTA	A60215815025	AU15UCV8376	23	38	61
6	BRAJMOHAN SINGH KUSHWAH	A60215815013	AU15UCV8377	17	30	47
7	DEEPAK SHRIVASTAVA	A60215815018	AU15UCV8378	23	43	66
8	HIMANSHU GUPTA	A60215815026	AU15UCV8380	16	29	45
9	JAGRATI DHINGRA	A60215815023	AU15UCV8381	14	22	36
10	NAVNEET PATHAK	A60215815003	AU15UCV8383	15	24	39
11	NIKHIL SINGH CHAUHAN	A60215815019	AU15UCV8384	24	45	69
12	PAWAN KUMAR SINGH	A60215815008	AU15UCV8385	19	37	56
13	SHALINI CHAKRABORTY	A60215815001	AU15UCV8386	21	39	60
14	SHISHIR SINGH	A60215815004	AU15UCV8387	25	38	63
15	SHIVAM GURJAR	A60215815009	AU15UCV8388	18	31	49
16	SUSHIL RAI	A60515815001	AU15UCV8389	18	25	43
17	VAIBHAV KANKAR	A60215815010	AU15UCV8390	15	41	56
18	VAIBHAV RAI	A60215815005	AU15UCV8391	15	26	41
19	VAISHNAV SAXENA	A60215815014	AU15UCV8392	25	44	69
20	VIPUL TRIPATHI	A60215815006	AU15UCV8394	18	38	56
21	YASH SONI	A60215815022	AU15UCV8396	17	21	38
No. of students attended the Exam				21		
No. of students secure more than 60% marks				5		
Percentage of students secure more than 60% marks				23.81		
Attainment Level				-		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : Geotechnical Engineering II
Course Code : BTCE603, Crédits : 03, Session : 2017-18(Even Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Mr. P Mahakavi, Mr. Sachin Tiwari

A. **Introduction:** The objective of this course is to teach students the basic principles and concepts of design concept of RCC and Steel structure. and to develop a have knowledge of principal of structural design. It aims to develop a student's skill in evaluating the performance of design of elements.

B. **Course Outcomes:**At the end of the course, students will be able to:
BTCE603.1.apply the knowledge of concepts of Soil Mechanics and to describe the objectives and methods of soil investigation.
BTCE603.2apply the various earth pressure theories
BTCE603.3design various kinds of foundations and to perform various required tests for foundation.
BTCE603.4apply the utility of caissons and wells in the different conditions.

C. **Programme Outcomes:**
PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Earth pressure

Earth pressure at rest. Active and passive earth pressure for cohesionless and cohesive soils. Coulomb's and Rankine's theories. Point of application of earth pressure for cases of with and without surcharge in cohesionless and cohesive soils. Culmann's and Rebhan's graphical construction for active earth pressure. Friction circle method for active earth pressure. **Site investigation and soil exploration:** Objectives. Planning. Reconnaissance. Depth of exploration. Methods of subsurface exploration. Test pits. Auger borings. Wash boring. Rotary drilling. Percussion drilling. Core drilling. Sampling. Types of soil samples. Splitspoon sampler. Thin walled sampler. Piston sampler. Denison sampler. Hand cut samples. Location of water table. S.P.T. Field vane shear test. Introduction to geophysical methods. Boring log. Soil profile.

Module II: Bearing capacity

Ultimate and allowable bearing capacity. Terzaghi's equation for bearing capacity for continuous circular and square footings. Types of shear failures. Bearing capacity factors and charts. Effect of water table on bearing capacity. Meyerhoff's bearing capacity heory. Skempton's formulae. Bearing capacity from field tests. Bearing capacity from building codes. Net bearing pressure. Methods of improvement of soil bearing capacity: vibro flotation and sand drains.
Settlement analysis: Distribution of contact pressure. Immediate and consolidation settlement. Estimation of initial and final settlement under building loads. Limitations in settlement computation. Causes of . Permissible, total and differential settlements. Cracks and effects of settlement.

Module III: Foundations
General considerations: Functions of foundations. Requisites of satisfactory foundations. Different types of foundations. Definition of shallow and deep foundation. Selection of type of foundation. Advantages and limitations of various types of foundations. Design considerations . Footings subjected to eccentric loading. Conventional procedure for proportioning footings for equal settlements.
Open excavation: Open foundation excavations with unsupported slopes. Supports for shallow and deep excavations. Stress distribution in sheeting and bracing of shallow and deep excavations. Stability of bottom of excavations. **Raft foundations**: Bearing capacity equations. Design considerations. Conventional design procedure for rigid mat. Uplift pressures. Methods of resisting uplift. Floating foundations.

Module IV: Pile foundations
Uses of piles. Classification of piles based on purpose and material. Determination of type and length of piles. Determination of bearing capacity of axially loaded. Single vertical pile. Static and dynamic formulae. Determination of bearing capacity by penetration tests and pile load tests (IS methods). Negative skin friction. Group action and pile spacing. Analysis of pile groups. Load distribution by Culmann's method. **Caissons and piers:** Open (well) caissons. Box (floating) caissons. Pneumatic caissons. Construction details and design considerations of well foundations. Drilled piers and theirconstruction details.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Joseph E. & Bowles, *Foundation Analysis & Design*, McGraw Hill
- Leonards G.A., *Foundation Engineering*, McGraw Hill
- Teng W.C., Foundation Design, PHI, 1984
- Tomlinson M.J., Foundation Design & Construction, Pitman, 1963.
- Terzaghi & Peck, Soil Mechanics in Engineering Practice, Asia Publishing
- Arora K.R., *Soil Mechanics & Foundation Engg.*, Standard Publications, 1987.
- Murthy V.N.S., Soil Mechanics & Foundations.
- Punmia B.C., Soil Mechanics & Foundations, Laxmi, 1988.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Earth pressure at rest. Active and passive earth pressure for cohesionless and cohesive soils	Lecture	BTCE603.1	Mid Term-1, Quiz & End Sem Exam
2	Coulomb's and Rankine's theories	Lecture	BTCE603.1	Mid Term-1, Quiz & End Sem Exam
3	Point of application of earth pressure for cases of with and without surcharge in cohesionless	Lecture	BTCE603.1	Mid Term-1, Quiz & End Sem Exam

4	*Culmann's and Rebhan's graphical construction for active earth pressure*	Lecture	BTCE603.1	Mid Term-1, Quiz & End Sem Exam
5	Friction circle method for active earth pressure	Lecture	BTCE603.1	Mid Term-1, Quiz & End Sem Exam
6	**Site investigation and soil exploration**	Lecture	BTCE603.1	Mid Term-1, Quiz & End Sem Exam
7	Objectives. Planning. Reconnaissance. Depth of exploration	Lecture	BTCE603.2	Mid Term-1, Quiz & End Sem Exam
8	Methods of subsurface exploration. Test pits	Lecture	BTCE603.2	Mid Term-1, Quiz & End Sem Exam
9	Auger borings. Wash boring. Rotary drilling. Percussion drilling	Lecture	BTCE603.2	Mid Term-1, Quiz & End Sem Exam
10	Core drilling. Sampling. Types of soil samples. Splitspoon sampler	Lecture	BTCE603.2	Mid Term-1, Quiz & End Sem Exam
11	Thin walled sampler. Piston sampler. Denison sampler	Lecture	BTCE603.2	Mid Term-1, Quiz & End Sem Exam
12	Hand cut samples. Location of water table	Lecture	BTCE603.2	Mid Term-1, Quiz & End Sem Exam
13	S.P.T. Field vane shear test. Introduction to geophysical methods. Boring log. Soil profile.	Lecture	BTCE603.3	Mid Term-1, Quiz & End Sem Exam
14	Ultimate and allowable bearing capacity	Lecture	BTCE603.3	Mid Term-1, Quiz & End Sem Exam
15	Terzaghi's equation for bearing capacity for continuous circular and square footings. Types of shear failures. Bearing capacity factors and charts	Lecture	BTCE603.3	Mid Term-1, Quiz & End Sem Exam
16	Bearing capacity factors and charts.	Lecture	BTCE603.3	Mid Term-1, Quiz & End Sem Exam
17	Skempton's formulae. Bearing capacity from field tests. Bearing	Lecture	BTCE603.3	Mid Term-1, Quiz & End Sem Exam
18	Net bearing pressure. Methods of improvement of soil bearing capacity: vibro flotation and sand drains.	Lecture	BTCE603.3	Mid Term-1, Quiz & End Sem Exam
19	**Settlement analysis:** Distribution of contact pressure.	Lecture	BTCE603.3	Mid Term-1, Quiz & End Sem Exam
20	Immediate and consolidation settlement. Estimation of initial and final settlement under building loads	Lecture	BTCE603.3	Mid Term-1, Quiz & End Sem Exam
21	Limitations in settlement computation. Causes of . Permissible, total and differential settlements. Cracks and effects of settlement	Lecture	BTCE603.3	Assignment, Quiz & End Sem Exam
22	General considerations: Functions of foundations. Requisites of satisfactory foundations	Lecture	BTCE603.3	Assignment, Quiz & End Sem Exam
23	Different types of foundations. Definition of	Lecture	BTCE603.3	Assignment, Quiz & End Sem Exam

	shallow and deep foundation			
24	Selection of type of foundation. Advantages and limitations of various types of foundations. Design considerations	Lecture	BTCE603.3	Assignment, Quiz & End Sem Exam
25	Footings subjected to eccentric loading. Conventional procedure for proportioning footings for equal settlements	Lecture	BTCE603.4	Assignment, Quiz & End Sem Exam
26	**Open excavation:** Open foundation excavations with unsupported slopes	Lecture	BTCE603.4	Assignment, Quiz & End Sem Exam
27	Supports for shallow and deep excavations. Stress distribution in sheeting and bracing of shallow and deep excavations	Lecture	BTCE603.4	Assignment, Quiz & End Sem Exam
28	Stability of bottom of excavations. **Raft foundations**: Bearing capacity equations	Lecture	BTCE603.4	Assignment, Quiz & End Sem Exam
29	Design considerations. Conventional design procedure for rigid mat. Uplift pressures. Methods of resisting uplift. Floating foundations	Lecture	BTCE603.4	Assignment, Quiz & End Sem Exam
30	Uses of piles. Classification of piles based on purpose and material	Lecture	BTCE603.4	Assignment, Quiz & End Sem Exam
31	Determination of type and length of piles. Determination of bearing capacity of axially loaded. Single vertical pile	Lecture	BTCE603.4	Assignment, Quiz & End Sem Exam
32	Static and dynamic formulae. Determination of bearing capacity by penetration tests and pile load tests (IS methods).	Lecture	BTCE603.4	Assignment, Quiz & End Sem Exam
33	Negative skin friction. Group action and pile spacing. Analysis of pile groups. Load distribution by Culmann's method	Lecture	BTCE603.4	Assignment, Quiz & End Sem Exam
34	**Caissons and piers:** Open (well) caissons. Box (floating) caissons	Lecture	BTCE603.4	Assignment, Quiz & End Sem Exam
35	Pneumatic caissons. Construction details and design considerations of well foundations	Lecture	BTCE603.4	Assignment, Quiz & End Sem Exam
36	Drilled piers and theirconstruction details.	Lecture	BTCE603.4	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE603.1.	apply the knowledge of concepts of Soil Mechanics and to describe the objectives and methods of soil investigation.	3	2	3	1	2	-	1	-	3	2	3	3	**3**	**2**	**1**
BTCE603.2.	apply the various earth pressure theories	3	3	2	2	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE603.3.	design various kinds of foundations and to perform various required tests for foundation.	3	3	2	2	3	-	1	2	-	2	3	3	**2**	**2**	**1**
BTCE603.4.	*apply the utility of caissons and wells in the different conditions*	3	3	2	1	1	2	1	-	1	2	3	3	**3**	**2**	**1**

Sample Question Paper

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–VI) 2017-18						
Class: B.Tech.(CE) VI Semester						
Subject Name: BTCE603 Geotechnical Engineering II		Time: 2 Hrs		Max.Marks:30		
Levels of the questions as per Blooms	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

Taxonomy						
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: apply the knowledge of concepts of Soil Mechanics and to describe the objectives and methods of soil investigation.

CO2: apply the various earth pressure theories

CO Map	Question No.	Question	Marks
CO1	Q.1	Differentiate between representative and undisturbed samples	3
CO1	Q.2a	two Disadvantage of static cone penetration Test.	3
	Q.2b	ı perform classification tests on a Non representative sample? Justify your answer?	3
CO1	Q.3	the corrections that are to be carried out to the observed N-value	6
CO2	Q.4	Give the two corrections to find corrected SPT value	3
CO2	Q.5a	in in detail the geographical methods of soil explorations with neat sketch.	3
	Q.5b	the electrical resistivity method in detail.	3
CO2	Q6	What is SPT 'N' value? Discuss in detail how is it interpreted to arrive at the bearing capacity of soil	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

GEOTECHNICAL ENGINEERING - II

Course Code				BTCE 603		
Associated Credit Units				4		
Ser. No.	Name	Enrollment No.	Roll No.	30	70	100
1	ABHISHEK MODI	A60215815012	AU15UCV8371	14	25	39
2	AJAY SINGH SIKARWAR	A60215815016	AU15UCV8372	14	22	36
3	ANCHAL SHRIVASTAVA	A60215815024	AU15UCV8373	15	36	51
4	ASHUTOSH DAIPURIA	A60215815017	AU15UCV8375	15	30	45
5	AYUSHI GUPTA	A60215815025	AU15UCV8376	22	40	62
6	BRAJMOHAN SINGH KUSHWAH	A60215815013	AU15UCV8377	14	22	36
7	DEEPAK SHRIVASTAVA	A60215815018	AU15UCV8378	22	37	59
8	HIMANSHU GUPTA	A60215815026	AU15UCV8380	14	22	36
9	JAGRATI DHINGRA	A60215815023	AU15UCV8381	14	22	36
10	NAVNEET PATHAK	A60215815003	AU15UCV8383	15	22	37
11	NIKHIL SINGH CHAUHAN	A60215815019	AU15UCV8384	23	50	73
12	PAWAN KUMAR SINGH	A60215815008	AU15UCV8385	19	25	44
13	SHALINI CHAKRABORTY	A60215815001	AU15UCV8386	20	31	51
14	SHISHIR SINGH	A60215815004	AU15UCV8387	22	58	80
15	SHIVAM GURJAR	A60215815009	AU15UCV8388	16	25	41
16	SUSHIL RAI	A60515815001	AU15UCV8389	16	23	39
17	VAIBHAV KANKAR	A60215815010	AU15UCV8390	15	29	44
18	VAIBHAV RAI	A60215815005	AU15UCV8391	18	27	45
19	VAISHNAV SAXENA	A60215815014	AU15UCV8392	23	55	78
20	VIPUL TRIPATHI	A60215815006	AU15UCV8394	15	46	61
21	YASH SONI	A60215815022	AU15UCV8396	17	24	41

				GEOTECHNICAL ENGINEERING - II
				BTCE 603
				4
No. of students attended the Exam				21
No. of students secure more than 60% marks				5
Percentage of students secure more than 60% marks				23.81
Attainment Level				-

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **COMPUTER APPLICATION IN CIVIL ENGINEERING**
Course Code : BTCE604, Crédits : 03, Session : 2017-18(Even Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Mr. P Mahakavi, Mr. Sachin Tiwari

K. **Introduction:** The objective of this course is to teach students the basic principles and concepts of design concept of RCC and Steel structure. and to develop a have knowledge of principal of structural design. It aims to develop a student's skill in evaluating the performance of design of elements.

L. **Course Outcomes:**At the end of the course, students will be able to:

BTCE604.1.operate softwares related design and drawings of Civil Engineering structures.

BTCE604.2 Design of different component of various structures and representation in different drawings for carrying out construction activity

BTCE604.3produce design calculations and drawings in appropriate professional formats identify and compute the design loads on a typical steel building.

BTCE604.4select the most suitable section shape and size for tension and compression members and beams according to specific design criteria.

M. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

N. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

O. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

P. Syllabus

Module I: Introduction of Computer applications in Civil Engineering

Introduction and application of computer in structural engineering, geotechnical engineering, water resources engineering, project management, surveying, highway, estimating and costing, Introduction to MATLAB.

Module II: Introduction to CAD

Computer Aided drafting, 2-D drawings, Introduction to CAD software, Planning and drawing of buildings, 2-D modeling, Problems in civil engineering.

Module III: Auto CAD
Introduction to computer graphics, 3-D drawings, 3-D modeling software and analysis software Learning of civil engineering drawing.

Module IV: Stadd Pro
Introduction to structural Analysis:- Loading system, Dead Load, Live Load, Imposed Load. Design of structural members:- Beam Design, Column Design, Slab Design, Foundation Design
Residential Building, Design of Multistoried Building.\

Q. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

R. Suggested Text/Reference Books:

- Groover M.P. and Zimmers E.W. Jr., "CAD/CAM, Computer Aided Design and
- Manufacturing", Prentice Hall of India Ltd, New Delhi, 1993.
- Krishnamoorthy C.S. Rajeev S., "Computer Aided Design", Narosa Publishing House, New
- Delhi, 1993, Harrison H.B., "Structural Analysis and Design", Part I and II Pergamon Press,
- Oxford, 1990. Comptter Application in Civil Engineering:Paul D. Spindel, publisher: Van Nostrand
- Reinhold Co.
- AutoCAD Civil 3D 2015 Essentials: Autodesk Official, Eric Chappel
- T.S Sarma, "Stadd Pro V8i for Beginners", Notion Press 2014

S. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	**Introduction of Computer applications in Civil Engineering**	Lecture	BTCE604.1	Mid Term-1, Quiz & End Sem Exam
2	Introduction and application of computer in structural engineering,	Lecture	BTCE604.1	Mid Term-1, Quiz & End Sem Exam
3	Introduction and application of computer in geotechnical engineering	Lecture	BTCE604.1	Mid Term-1, Quiz & End Sem Exam
4	Introduction and application of computer in water resources engineering	Lecture	BTCE604.1	Mid Term-1, Quiz & End Sem Exam
5	Introduction and application of computer in project management	Lecture	BTCE604.1	Mid Term-1, Quiz & End Sem Exam
6	Introduction and application of computer in surveying	Lecture	BTCE604.1	Mid Term-1, Quiz & End Sem Exam
7	Introduction and application of computer in highway	Lecture	BTCE604.2	Mid Term-1, Quiz & End Sem Exam
8	Introduction and application of computer in estimating and costing	Lecture	BTCE604.2	Mid Term-1, Quiz & End Sem Exam
9	Introduction and application of computer in project management	Lecture	BTCE604.2	Mid Term-1, Quiz & End Sem Exam

10	Introduction to MATLAB	Lecture	BTCE604.2	Mid Term-1, Quiz & End Sem Exam
11	Computer Aided drafting	Lecture	BTCE604.2	Mid Term-1, Quiz & End Sem Exam
12	2-D drawings, Introduction to CAD software	Lecture	BTCE604.2	Mid Term-1, Quiz & End Sem Exam
13	Planning and drawing of buildings	Lecture	BTCE604.3	Mid Term-1, Quiz & End Sem Exam
14	2-D modeling, Problems in civil engineering.	Lecture	BTCE604.3	Mid Term-1, Quiz & End Sem Exam
15	**Auto CAD**	Lecture	BTCE604.3	Mid Term-1, Quiz & End Sem Exam
16	Introduction to computer graphics	Lecture	BTCE604.3	Mid Term-1, Quiz & End Sem Exam
17	3-D drawings	Lecture	BTCE604.3	Mid Term-1, Quiz & End Sem Exam
18	3-D modeling software and analysis software	Lecture	BTCE604.3	Mid Term-1, Quiz & End Sem Exam
19	Learning of civil engineering drawing	Lecture	BTCE604.3	Mid Term-1, Quiz & End Sem Exam
20	**Stadd Pro**	Lecture	BTCE604.3	Mid Term-1, Quiz & End Sem Exam
21	Introduction to structural Analysis	Lecture	BTCE604.3	Assignment, Quiz & End Sem Exam
22	Loading system	Lecture	BTCE604.3	Assignment, Quiz & End Sem Exam
23	Loading system, Dead Load, Live Load, Imposed Load	Lecture	BTCE604.3	Assignment, Quiz & End Sem Exam
24	Design of structural members	Lecture	BTCE604.3	Assignment, Quiz & End Sem Exam
25	Beam Design	Lecture	BTCE604.4	Assignment, Quiz & End Sem Exam
26	Column Design	Lecture	BTCE604.4	Assignment, Quiz & End Sem Exam
27	Slab Design	Lecture	BTCE604.4	Assignment, Quiz & End Sem Exam
28	Foundation Design Residential Building	Lecture	BTCE604.4	Assignment, Quiz & End Sem Exam
29	Design of Multistoried Building	Lecture	BTCE604.4	Assignment, Quiz & End Sem Exam
30	Loading system, Dead Load, Live Load, Imposed Load	Lecture	BTCE604.4	Assignment, Quiz & End Sem Exam
31	Design of structural members	Lecture	BTCE604.4	Assignment, Quiz & End Sem Exam
32	Beam Design	Lecture	BTCE604.4	Assignment, Quiz & End Sem Exam
33	Column Design	Lecture	BTCE604.4	Assignment, Quiz & End Sem Exam
34	Slab Design	Lecture	BTCE604.4	Assignment, Quiz & End Sem Exam

35	Foundation Design Residential Building	Lecture	BTCE604.4	Assignment, Quiz & End Sem Exam
36	Design of Multistoried Building	Lecture	BTCE604.4	Assignment, Quiz & End Sem Exam

T. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE604.1.	operate softwares related design and drawings of Civil Engineering structures.	3	2	3	1	2	-	1	-	3	2	3	3	**3**	**2**	**1**
BTCE604.2.	Design of different component of various structures and representation in different drawings for carrying out construction activity	3	3	2	2	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE604.3.	produce design calculations and drawings in appropriate professional formats identify and compute the design loads on a typical steel building.	3	3	2	2	3	-	1	2	-	2	3	3	**2**	**2**	**1**
BTCE604.4.	select the most suitable section shape and size for tension and compression members and beams according to specific design criteria.	3	3	2	1	1	2	1	-	1	2	3	3	**3**	**2**	**1**

<u>**Sample Question Paper**</u>

<table>
<tr><td colspan="7">Amity School of Engineering and Technology
Department of Civil Engineering
I MID-SEMESTER (SEM–VI) 2017-18</td></tr>
<tr><td colspan="7">Class: B.Tech.(CE) VI Semester</td></tr>
<tr><td colspan="2">Subject Name:
BTCE604 COMPUTER APPLICATION IN CIVIL ENGINEERING</td><td colspan="3">Time: 2 Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3</td><td>Q.4</td><td>Q.2,5,6</td><td></td><td></td></tr>
<tr><td colspan="7">Student will be able to
CO1: operate softwares related design and drawings of Civil Engineering structures.
CO2: Design of different component of various structures and representation in different drawings for carrying out construction activity</td></tr>
</table>

CO Map	Question No.	Question	Marks
CO1	Q.1	Which one is a correct statement regarding AutoCAD blocks?	3
CO1	Q.2a	what are the differences present in the software's features? - AutoCAD	3
	Q.2b	Discuss the step by step method of to draw rectangles and polygons in AutoCAD	3
CO1	Q.3	Discuss step by step process to draw the beam of size 450mm × 500 mm and length of 3m in AutoCAD	6
CO2	Q.4	Explain the extend command in AutoCAD. Discuss its use and application.	3
CO2	Q.5a	What are the steps involved in setting up the default drawing directory?	3
	Q.5b	Why AutoCAD software is used?	3
CO2	Q6	What is meant by staad pro? List out the methods of staad pro?	6

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

				COMPUTER APPLICATION IN CIVIL ENGINEERING		
Course Code				BTCE 604		
Associated Credit Units				3		
Ser. No.	Name	Enrollment No.	Roll No.	30	70	100
1	ABHISHEK MODI	A60215815012	AU15UCV8371	14	50	64
2	AJAY SINGH SIKARWAR	A60215815016	AU15UCV8372	17	44	61
3	ANCHAL SHRIVASTAVA	A60215815024	AU15UCV8373	22	46	68
4	ASHUTOSH DAIPURIA	A60215815017	AU15UCV8375	23	50	73
5	AYUSHI GUPTA	A60215815025	AU15UCV8376	26	50	76
6	BRAJMOHAN SINGH KUSHWAH	A60215815013	AU15UCV8377	22	43	65
7	DEEPAK SHRIVASTAVA	A60215815018	AU15UCV8378	25	53	78
8	HIMANSHU GUPTA	A60215815026	AU15UCV8380	19	48	67
9	JAGRATI DHINGRA	A60215815023	AU15UCV8381	19	48	67
10	NAVNEET PATHAK	A60215815003	AU15UCV8383	17	45	62
11	NIKHIL SINGH CHAUHAN	A60215815019	AU15UCV8384	25	60	85
12	PAWAN KUMAR SINGH	A60215815008	AU15UCV8385	24	52	76
13	SHALINI CHAKRABORTY	A60215815001	AU15UCV8386	22	48	70
14	SHISHIR SINGH	A60215815004	AU15UCV8387	25	56	81
15	SHIVAM GURJAR	A60215815009	AU15UCV8388	20	47	67
16	SUSHIL RAI	A60515815001	AU15UCV8389	23	39	62
17	VAIBHAV KANKAR	A60215815010	AU15UCV8390	21	49	70
18	VAIBHAV RAI	A60215815005	AU15UCV8391	18	47	65
19	VAISHNAV SAXENA	A60215815014	AU15UCV8392	25	57	82

20	**VIPUL TRIPATHI**	**A60215815006**	**AU15UCV8394**	**21**	**55**	**76**
21	**YASH SONI**	**A60215815022**	**AU15UCV8396**	**17**	**51**	**68**

				COMPUTER APPLICATION IN CIVIL ENGINEERING
				BTCE 604
				3
No. of students attended the Exam				21
No. of students secure more than 60% marks				21
Percentage of students secure more than 60% marks				100.00
Attainment Level				Level 3

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : ENGINEERING GEOLOGY
Course Code : BTCE605, Crédits : 03, Session :2017-18(Even Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Mohan Kantharia, Dr. Imran Ahmad Khan

A. Introduction: The objective of this course is to provide and train students of hydraulic engineering. The course will introduce students to various fluid properties, and their behavior under different condition.

B. Course Outcomes: At the end of the course, students will be able to:
BTCE605.1.know the importance of seismic activity considerations in a terrain.
BTCE605.2. learn geology and its types, various structural features like folds, faults, joints, weathering etc., minerals, rocks, and rock formations in relation to civil engineering project
BTCE605.3.understand various techniques to determine engineering properties of rocks etc. and distinguish the different types of rocks and minerals
BTCE605.4.understand various techniques to analyze and to make possible solutions for various Geological Engineering problems

C. Programme Outcomes:
PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal	Mid Term 1	CT	15%

Evaluation	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Branches and scope of geology
Physical geology
Geological agents and their action, weathering, volcanism, earthquake and plate tectonics

Module II: Elements of crystallography and mineralogy
Petrology
Types of rocks, genesis and physical and chemical characters, Building stones

Module III: Structural geology
Types of structures and classification and their effect on civil engineering projects and Geological mapping
Hydrogeology
Groundwater and occurrence, investigations, quality, artificial recharge

Module IV: Geology in Civil Engineering
Tunnels, dams, reservoirs, bridges, Runways, Roads and Buildings.
Slope failures and landslides. Investigations, Remote sensing and GIS applications
Geology of India
Types, age and occurrence of rock formations and economic importance
.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Parbin Singh, Engineering & General Geology, S.K. Kataria & Sons, New Delhi (2008)
- Bangar, K.M., Principles of Engineering Geology, Standard Publishers Distributors, Delhi (2009)
- Billings, Marland P., Structural Geology, 3rd ed., Prentice-Hall India, New Delhi.
- Todd, D.K., Ground Water Hydrology, 2nd ed., Wiley India, New Delhi (2008)

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	**Branches and scope of geology**	Lecture	BTCE605.1	Mid Term-1, Quiz & End Sem Exam
2	**Physical geology**	Lecture	BTCE605.1	Mid Term-1, Quiz & End Sem Exam

3	weathering, volcanism	Lecture	BTCE605.1	Mid Term-1, Quiz & End Sem Exam
4	*earthquake and plate tectonics*	Lecture	BTCE605.1	Mid Term-1, Quiz & End Sem Exam
5	**Elements of crystallography and mineralogy** **Petrology**	Lecture	BTCE605.1	Mid Term-1, Quiz & End Sem Exam
6	Types of rocks	Lecture	BTCE605.1	Mid Term-1, Quiz & End Sem Exam
7	genesis and physical and chemical characters	Lecture	BTCE605.1	Mid Term-1, Quiz & End Sem Exam
8	weathering, volcanism	Lecture	BTCE605.1	Mid Term-1, Quiz & End Sem Exam
9	*earthquake and plate tectonics*	Lecture	BTCE605.2	Mid Term-1, Quiz & End Sem Exam
10	**Elements of crystallography and mineralogy** **Petrology**	Lecture	BTCE605.2	Mid Term-1, Quiz & End Sem Exam
11	Types of rocks	Lecture	BTCE605.2	Mid Term-1, Quiz & End Sem Exam
12	genesis and physical and chemical characters	Lecture	BTCE605.2	Mid Term-1, Quiz & End Sem Exam
13	weathering, volcanism	Lecture	BTCE605.2	Mid Term-1, Quiz & End Sem Exam
14	**Module III: Structural geology**	Lecture	BTCE605.2	Mid Term-1, Quiz & End Sem Exam
15	Types of structures and classification	Lecture	BTCE605.2	Mid Term-1, Quiz & End Sem Exam
16	effect on civil engineering projects and Geological mapping	Lecture	BTCE605.3	Mid Term-1, Quiz & End Sem Exam
17	**Hydrogeology**	Lecture	BTCE605.3	Mid Term-1, Quiz & End Sem Exam
18	Groundwater and occurrence	Lecture	BTCE605.3	Mid Term-1, Quiz & End Sem Exam
19	investigations, quality, artificial recharge	Lecture	BTCE605.3	Mid Term-1, Quiz & End Sem Exam
20	**Module IV: Geology in Civil Engineering**	Lecture	BTCE605.3	Mid Term-1, Quiz & End Sem Exam
21	selection of turbines hydroelectric plants.	Lecture	BTCE605.3	Assignment, Quiz & End Sem Exam
22	Tunnels, dams, reservoirs, bridges	Lecture	BTCE605.3	Assignment, Quiz & End Sem Exam
23	Runways, Roads and Buildings.	Lecture	BTCE605.3	Assignment, Quiz & End Sem Exam
24	Slope failures and landslides. Investigations	Lecture	BTCE605.3	Assignment, Quiz & End Sem Exam
25	Remote sensing and GIS applications	Lecture	BTCE605.3	Assignment, Quiz & End Sem Exam
26	**Geology of India**	Lecture	BTCE605.4	Assignment, Quiz & End Sem Exam
27	Types, age and occurrence of rock	Lecture	BTCE605.4	Assignment, Quiz

	formations and economic importance			& End Sem Exam
28	Groundwater and occurrence	Lecture	BTCE605.4	Assignment, Quiz & End Sem Exam
29	investigations, quality, artificial recharge	Lecture	BTCE605.4	Assignment, Quiz & End Sem Exam
30	**Module IV: Geology in Civil Engineering**	Lecture	BTCE605.4	Assignment, Quiz & End Sem Exam
31	selection of turbines hydroelectric plants.	Lecture	BTCE605.4	Assignment, Quiz & End Sem Exam
32	Tunnels, dams, reservoirs, bridges	Lecture	BTCE605.4	Assignment, Quiz & End Sem Exam
33	Runways, Roads and Buildings.	Lecture	BTCE605.4	Assignment, Quiz & End Sem Exam
34	Slope failures and landslides. Investigations	Lecture	BTCE605.4	Assignment, Quiz & End Sem Exam
35	Remote sensing and GIS applications	Lecture	BTCE605.4	Assignment, Quiz & End Sem Exam
36	**Geology of India**	Lecture	BTCE605.4	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE605.1.	know the importance of seismic activity considerations in a terrain.	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE605.2.	learn geology and its types, various structural features like folds, faults, joints, weathering etc., minerals, rocks, and rock formations in relation to civil engineering project	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**

BTCE605.3 .	understand various techniques to determine engineering properties of rocks etc. and distinguish the different types of rocks and minerals	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**
BTCE605.4 .	understand various techniques to analyze and to make possible solutions for various Geological Engineering problems	3	3	2	3	3	2	2	-	3	2	3	3	**1**	**2**	**3**

Sample Question Paper

Amity School of Engineering and Technology
Department of Civil Engineering
I MID-SEMESTER (SEM–VI) 2017-18

Class: B.Tech.(CE) VI Semester

Subject Name: BTCE605 ENGINEERING GEOLOGY	Time: 2 Hrs	Max.Marks:30

Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: know the importance of seismic activity considerations in a terrain.

CO2: learn geology and its types, various structural features like folds, faults, joints, weathering etc., minerals, rocks, and rock formations in relation to civil engineering project

CO Map	Question No.	Question	Marks
CO1	Q.1	Write notes on Lithosphere	3
CO1	Q.2a	Define sea floor spreading.	3
	Q.2b	What are the subdivisions in geology?	3

CO1	Q.3	Define terms bedding, outcrop, dip and strike with neat diagrams. Also explain types of dip.	6
CO2	Q.4	Give the example for chemical reaction in chemical weathering?	3
CO2	Q.5a	Give the two types of discontinuity.	3
	Q.5b	What is mean by continental crust?	3
CO2	Q6	Describe Moh's scale of hardness for minerals and cleavage properties to indentify a mineral in hand specimen	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

				ENGINEERING GEOLOGY		
Course Code				**BTCE 605**		
Associated Credit Units				**3**		
Ser. No.	**Name**	**Enrollment No.**	**Roll No.**	**30**	**70**	**100**
1	**ABHISHEK MODI**	**A60215815012**	**AU15UCV8371**	**15**	**24**	**39**
2	**AJAY SINGH SIKARWAR**	**A60215815016**	**AU15UCV8372**	**15**	**21**	**36**
3	**ANCHAL SHRIVASTAVA**	**A60215815024**	**AU15UCV8373**	**17**	**50**	**67**
4	**ASHUTOSH DAIPURIA**	**A60215815017**	**AU15UCV8375**	**21**	**36**	**57**
5	**AYUSHI GUPTA**	**A60215815025**	**AU15UCV8376**	**25**	**42**	**67**
6	**BRAJMOHAN SINGH KUSHWAH**	**A60215815013**	**AU15UCV8377**	**17**	**24**	**41**
7	**DEEPAK SHRIVASTAVA**	**A60215815018**	**AU15UCV8378**	**24**	**54**	**78**
8	**HIMANSHU GUPTA**	**A60215815026**	**AU15UCV8380**	**17**	**25**	**42**
9	**JAGRATI DHINGRA**	**A60215815023**	**AU15UCV8381**	**15**	**22**	**37**
10	**NAVNEET PATHAK**	**A60215815003**	**AU15UCV8383**	**14**	**22**	**36**
11	**NIKHIL SINGH CHAUHAN**	**A60215815019**	**AU15UCV8384**	**21**	**54**	**75**

12	PAWAN KUMAR SINGH	A60215815008	AU15UCV8385	22	34	56
13	SHALINI CHAKRABORTY	A60215815001	AU15UCV8386	19	28	47
14	SHISHIR SINGH	A60215815004	AU15UCV8387	24	41	65
15	SHIVAM GURJAR	A60215815009	AU15UCV8388	19	41	60
16	SUSHIL RAI	A60515815001	AU15UCV8389	18	25	43
17	VAIBHAV KANKAR	A60215815010	AU15UCV8390	20	28	48
18	VAIBHAV RAI	A60215815005	AU15UCV8391	15	28	43
19	VAISHNAV SAXENA	A60215815014	AU15UCV8392	25	54	79
20	VIPUL TRIPATHI	A60215815006	AU15UCV8394	17	50	67
21	YASH SONI	A60215815022	AU15UCV8396	16	36	52

				ENGINEERING GEOLOGY
				BTCE 605
				3
No. of students attended the Exam				21
No. of students secure more than 60% marks				7
Percentage of students secure more than 60% marks				33.33
Attainment Level				-

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : HYDROLOGY & WATER RESOURCES ENGINEERING
Course Code : BTCE606 Crédits : 03, Session :2017-18(Even Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Mr. Sachin Tiwari

A. **Introduction:** The objective of this course is *to deal with various concepts of water resources engineering. The course introduces the concept of hydrology, ground water and then deals with irrigation engineering. It also deals with design of dam.*

B. **Course Outcomes:** At the end of the course, students will be able to:
BTCE606.1. Identify the various components of hydrological cycle and the spatial and temporal variation of rainfall.
BTCE606.2. Determine the different methods and hydrological models to estimate the stream flow.
BTCE606.3. Examine the different techniques to calculate the probable maximum flood based on different returned period.
BTCE606.4. Evaluate the basic aquifer parameters and groundwater resources for different hydro geological boundary conditions.
BTCE606.5. Understand the different methods of irrigation and find the optimum methods of irrigation for judicious use of water resources.

C. **Programme Outcomes:**
PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Moduls I : Precipitation Measurement
Hydrologic cycle- Precipitation, rainfall variations, measurement, presentation of RF data, Mean precipitation, Abstractions from precipitation

Moduls II : Flow Measurement
Runoff-Long term runoff, empirical formulae, short term runoff- hydrograph analysis. Flood-Rational and Empirical methods for prediction – Design floods. Ground water – Aquifer types – flow of ground water – Well hydraulics- Types of wells –Other sources of ground water.

Moduls III : Irrigation
Necessity of irrigation and type of irrigation systems. – Total planning concept- Water requirements of crops- Command area- duty-delta. Consumptive use of water – Irrigation efficiency – Irrigation requirement of crops- Reservoir planning – Site investigation- Zone of storage- Reservoir yield- Reservoir losses and Control- Life of reservoir.
Moduls IV : Reservoir
Reservoir planning – Site investigation – Zone of storage-Reservoir yield- Reservoir losses and Control- Life of reservoir.

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- K Subramanya, Engineering Hydrology, Mc-Graw Hill.
- K N Muthreja, Applied Hydrology, Tata Mc-Graw Hill.
- K Subramanya, Water Resources Engineering through Objective Questions, Tata McGraw Hill.
- G L Asawa, Irrigation Engineering, Wiley Eastern

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Introduction - hydrologic cycle,	Lecture	BTCE606.1	Mid Term-1, Quiz & End Sem Exam
2	water-budget equation,	Lecture	BTCE606.1	Mid Term-1, Quiz & End Sem Exam
3	history of hydrology,	Lecture	BTCE606.1	Mid Term-1, Quiz & End Sem Exam
4	*world water balance,*	Lecture	BTCE606.1	Mid Term-1, Quiz & End Sem Exam
5	applications in engineering, sources of data**.**	Lecture	BTCE606.1	Mid Term-1, Quiz & End Sem Exam
6	Precipitation - forms of precipitation, characteristics of precipitation in India	Lecture	BTCE606.1	Mid Term-1, Quiz & End Sem Exam
7	measurement of precipitation	Lecture	BTCE606.1	Mid Term-1, Quiz & End Sem Exam
8	rain gauge network, mean precipitation over an area	Lecture	BTCE606.2	Mid Term-1, Quiz & End Sem Exam
9	deptharea-duration relationships	Lecture	BTCE606.2	Mid Term-1, Quiz & End Sem Exam
10	maximum intensity/depth	Lecture	BTCE606.2	Mid Term-1, Quiz & End Sem Exam
11	duration-frequency relationship	Lecture	BTCE606.2	Mid Term-1, Quiz & End Sem Exam
12	Probable Maximum Precipitation (PMP),	Lecture	BTCE606.2	Mid Term-1, Quiz & End Sem Exam
13	rainfall data in India.	Lecture	BTCE606.2	Mid Term-1, Quiz & End Sem Exam
14	Abstractions from precipitation - evaporation process	Lecture	BTCE606.2	Mid Term-1, Quiz & End Sem Exam
15	evaporimeters, analytical methods of evaporation estimation,	Lecture	BTCE606.3	Mid Term-1, Quiz & End Sem Exam
16	Reservoir evaporation and methods for its reduction	Lecture	BTCE606.3	Mid Term-1, Quiz & End Sem Exam
17	evapotranspiration, measurement of evapotranspiration, evapotranspiration	Lecture	BTCE606.3	Mid Term-1, Quiz & End Sem Exam
18	potential evapotranspiration over India,	Lecture	BTCE606.3	Mid Term-1, Quiz & End Sem Exam
19	actual evapotranspiration, interception	Lecture	BTCE606.3	Mid Term-1, Quiz & End Sem Exam
20	depression storage,	Lecture	BTCE606.3	Mid Term-1, Quiz

	infiltration, infiltration capacity, measurement of infiltration,			& End Sem Exam
21	modelling infiltration capacity, classification of infiltration capacities, infiltration indices	Lecture	BTCE606.3	Assignment, Quiz & End Sem Exam
22	Runoff - runoff volume,	Lecture	BTCE606.4	Assignment, Quiz & End Sem Exam
23	SCS-CN method of estimating runoff volume	Lecture	BTCE606.4	Assignment, Quiz & End Sem Exam
24	flow duration curve, flow-mass curve	Lecture	BTCE606.4	Assignment, Quiz & End Sem Exam
25	hydrograph, factors affecting runoff hydrograph	Lecture	BTCE606.4	Assignment, Quiz & End Sem Exam
26	components of hydrograph, base flow separation	Lecture	BTCE606.4	Assignment, Quiz & End Sem Exam
27	effective rainfall,	Lecture	BTCE606.4	Assignment, Quiz & End Sem Exam
28	unit hydrograph surface water resources of India	Lecture	BTCE606.4	Assignment, Quiz & End Sem Exam
29	Ground water and well hydrology - forms of subsurface water	Lecture	BTCE606.5	Assignment, Quiz & End Sem Exam
30	saturated formation, aquifer properties, geologic formations of aquifers, well hydraulics: steady state flow in wells,	Lecture	BTCE606.5	Assignment, Quiz & End Sem Exam
31	equilibrium equations for confined and unconfined aquifers, aquifer tests. Design of channels- rigid boundary channels, alluvial channels	Lecture	BTCE606.5	Assignment, Quiz & End Sem Exam
32	Kennedy’s and Lacey’s theory of regime channels. Water logging: causes, effects, consumptive use, irrigation requirement,	Lecture	BTCE606.5	Assignment, Quiz & End Sem Exam
33	frequency of irrigation; Methods of applying water to the fields	Lecture	BTCE606.5	Assignment, Quiz & End Sem Exam
34	surface, sub-surface	Lecture	BTCE606.5	Assignment, Quiz & End Sem Exam
35	sprinkler and trickle / drip irrigation.	Lecture	BTCE606.5	Assignment, Quiz & End Sem Exam
36	sprinkler and trickle / drip	Lecture	BTCE606.5	Assignment, Quiz

	irrigation.			& End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE606.1.	Identify the various components of hydrological cycle and the spatial and temporal variation of rainfall.	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
BTCE606.2.	Determine the different methods and hydrological models to estimate the stream flow.	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE606.3.	Examine the different techniques to calculate the probable maximum flood based on different returned period.	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
BTCE606.4	Evaluate the basic aquifer parameters and groundwater resources for different hydro geological boundary conditions.	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**
BTCE606.5 .	Understand the different methods of irrigation and find the optimum methods of	3	3	2	3	3	2	2	-	3	2	3	3	**1**	**2**	**3**

	irrigation for judicious use of water resources.															

Sample Question Paper

<table>
<tr><td colspan="7">Amity School of Engineering and Technology
Department of Civil Engineering
I MID-SEMESTER (SEM–VI) 2017-18</td></tr>
<tr><td colspan="7">Class: B.Tech.(CE) VI Semester</td></tr>
<tr><td colspan="2">Subject Name:
BTCE606 HYDROLOGY & WATER RESOURCES ENGINEERING</td><td colspan="3">Time: 2 Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3</td><td>Q.4</td><td>Q.2,5,6</td><td></td><td></td></tr>
<tr><td colspan="7">Student will be able to
CO1: Identify the various components of hydrological cycle and the spatial and temporal variation of rainfall.
CO2: Determine the different methods and hydrological models to estimate the stream flow.</td></tr>
</table>

<table>
<tr><th>CO Map</th><th>Question No.</th><th>Question</th><th>Marks</th></tr>
<tr><td>CO1</td><td>Q.1</td><td>Explain measurement of Infiltration by Infiltrometer</td><td>3</td></tr>
<tr><td rowspan="2">CO1</td><td>Q.2a</td><td>Explain various climatic factors affecting runoff.</td><td>3</td></tr>
<tr><td>Q.2b</td><td>Define hydrograph and factor affecting it</td><td>3</td></tr>
<tr><td>CO1</td><td>Q.3</td><td>Define following: Divide Line, Concentration Point, Time of concentration, Drainage Density, Form factor, Shape factor</td><td>6</td></tr>
<tr><td>CO2</td><td>Q.4</td><td>Explain S-Hydrograph and construction of it.</td><td>3</td></tr>
<tr><td rowspan="2">CO2</td><td>Q.5a</td><td>What is Darcy’s law? What are its limitations? How will you measure the coefficient of permeability of soil?</td><td>3</td></tr>
<tr><td>Q.5b</td><td>Explain with neat sketch storage zone of a reservoir.</td><td>3</td></tr>
<tr><td>CO2</td><td>Q6</td><td>Explain how to fixed storage capacity of reservoir.</td><td>6</td></tr>
</table>

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

				IRRIGATION ENGINEERING		
Course Code				**BTCE 606**		
Associated Credit Units				**3**		
Ser. No.	**Name**	**Enrollment No.**	**Roll No.**	**30**	**70**	**100**
1	ABHISHEK MODI	A60215815012	AU15UCV8371	14	34	48
2	AJAY SINGH SIKARWAR	A60215815016	AU15UCV8372	14	24	38
3	ANCHAL SHRIVASTAVA	A60215815024	AU15UCV8373	15	28	43
4	ASHUTOSH DAIPURIA	A60215815017	AU15UCV8375	14	30	44
5	AYUSHI GUPTA	A60215815025	AU15UCV8376	21	48	69
6	BRAJMOHAN SINGH KUSHWAH	A60215815013	AU15UCV8377	14	22	36
7	DEEPAK SHRIVASTAVA	A60215815018	AU15UCV8378	22	42	64
8	HIMANSHU GUPTA	A60215815026	AU15UCV8380	14	25	39
9	JAGRATI DHINGRA	A60215815023	AU15UCV8381	11	24	35
10	NAVNEET PATHAK	A60215815003	AU15UCV8383	13	26	39
11	NIKHIL SINGH CHAUHAN	A60215815019	AU15UCV8384	21	57	78
12	PAWAN KUMAR SINGH	A60215815008	AU15UCV8385	19	25	44
13	SHALINI CHAKRABORTY	A60215815001	AU15UCV8386	17	27	44
14	SHISHIR SINGH	A60215815004	AU15UCV8387	24	59	83
15	SHIVAM GURJAR	A60215815009	AU15UCV8388	18	26	44
16	SUSHIL RAI	A60515815001	AU15UCV8389	18	30	48
17	VAIBHAV KANKAR	A60215815010	AU15UCV8390	14	42	56
18	VAIBHAV RAI	A60215815005	AU15UCV8391	16	42	58
19	VAISHNAV SAXENA	A60215815014	AU15UCV8392	20	60	80
20	VIPUL TRIPATHI	A60215815006	AU15UCV8394	17	49	66
21	YASH SONI	A60215815022	AU15UCV8396	15	29	44

				IRRIGATION ENGINEERING
				BTCE 606
				3
No. of students attended the Exam				21
No. of students secure more than 60% marks				6
Percentage of students secure more than 60% marks				28.57
Attainment Level				-

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : Computer Applications Lab
Course Code : BTCE620, Crédits : 01, Session :2017-18(Even Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Imran Ahmad Khan

A. Introduction: The objective of this course is *t*o introduce basic soil properties and their significance to the students and to have a understanding of different soil properties and their uses in engineering.

B. Course Outcomes: At the end of the course, students will be able to:

BTCE620.1.Develop a Application of software's in design and drawings of Civil Engineering structures.

BTCE620.2.Able to proficiency, including the ability to use industry-standard computer software to generate 2D and 3D drawings

BTCE620.3. *U*nderstanding of the theory of orthographic projection and the conventions associated with Civil engineering drawings

BTCE620.4.apply computer-aided design techniques to use computer-aided visualization techniques to prepare.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Practical Work:

Computer applications in civil engineering by using two dimensional and three dimensional modeling through auto Cadd and Stadd Pro.

1 – Introduction of Staad Pro and its applications.
2 – Study of various commands for modelling and analysis of a beam
3 – Modelling and analysis of continuous beams for different loading conditions.
4 - Modelling of frame structure for different loading conditions.
5 – Modelling and analysis of frame structure for different loading conditions.
6 – Seismic Analysis of a frame structure.
7 – Wind Analysis of a frame structure.
8 – Design of beams according to Indian Standards.
9 - Design of columns according to Indian Standards.
10 – Introduction of different software used in various fields of Civil Engineering.
11 – Introduction of Auto cad used in various types of building planning.

G. Examination Scheme:

Components	**IA**				**EE**	
	A	**PR**	**LR**	**V**	**PR**	**V**
Weightage (%)	**5**	**10**	**10**	**5**	**35**	**35**

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

H. Suggested Text/Reference Books:

- Soil Mechanics by Craig R.F., Chapman & Hall
- Fundamentals of Soil Engineering by Taylor, John Wiley & Sons
- An Introduction to Geotechnical Engineering, by Holtz R.D. and Kovacs, W.D., Prentice Hall, NJ

I. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	Introduction of Staad Pro and its applications.	Lecture	BTCE620.1	Internal Assessment, Viva &External Exam
2	Study of various commands for modelling and analysis of a beam	Lecture	BTCE620.1	Internal Assessment, Viva &External Exam
3	Modelling and analysis of continuous beams for different loading conditions.	Lecture	BTCE620.1	Internal Assessment, Viva &External Exam
4	Modelling of frame structure for different loading conditions.	Lecture	BTCE620.1	Internal Assessment, Viva &External Exam
5	Modelling and analysis of frame structure for	Lecture	BTCE620.2	Internal Assessment, Viva

	different loading conditions.			&External Exam
6	Seismic Analysis of a frame structure.	Lecture	BTCE620.2	Internal Assessment, Viva &External Exam
7	Wind Analysis of a frame structure.	Lecture	BTCE620.2	Internal Assessment, Viva &External Exam
8	Design of beams according to Indian Standards.	Lecture	BTCE620.2	Internal Assessment, Viva &External Exam
9	Design of columns according to Indian Standards.	Lecture	BTCE620.3	Internal Assessment, Viva &External Exam
10	Introduction of different software used in various fields of Civil Engineering.	Lecture	BTCE620.3	Internal Assessment, Viva &External Exam
11	Introduction of Auto cad used in various types of building planning.	Lecture	BTCE620.3	Internal Assessment, Viva &External Exam
12	Design of beams according to Indian Standards.	Lecture	BTCE620.3	Internal Assessment, Viva &External Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE620. 1.	Develop a Application of software's in design and drawings of Civil Engineering structures.	3	3	1	3	1	**3**	**2**	**-**	2		2	1	**3**	**1**	**2**
BTCE620. 2.	Able to proficiency, including the ability to use industry-standard computer software to generate 2D and 3D drawings	3	2	2	2	2	**1**	**-**	**-**	2		1	1	**1**	**1**	**3**

BTCE620. 3.	*U*nderstanding of the theory of orthographic projection and the conventions associated with Civil engineering drawings	3	2	2	2	2	**1**	**-**	**1**	3		3	1	**3**	**3**	**2**
BTCE620. 4.	apply computer-aided design techniques to use computer-aided visualization techniques to prepare.	3	3	2	3	2	**-**	**-**	**-**	1		2	1	**1**	**2**	**2**

Sample Question Paper

<table>
<tr><td colspan="7">Amity School of Engineering and Technology
Department of Civil Engineering
I MID-SEMESTER (SEM–VI) 2017-18</td></tr>
<tr><td colspan="7">Class: B.Tech.(CE) VI Semester</td></tr>
<tr><td colspan="2">Subject Name:
BTCE620 COMPUTER APPLICATION LAB</td><td colspan="3">Time: 2 Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3</td><td>Q.4</td><td>Q.2,5,6</td><td></td><td></td></tr>
<tr><td colspan="7">Student will be able to
CO1: Develop a Application of software’s in design and drawings of Civil Engineering structures.
CO2: Able to proficiency, including the ability to use industry-standard computer software to generate 2D and 3D drawings</td></tr>
</table>

CO Map	Question No.	Question	Marks
CO1	Q.1	What is the purpose of auto cad software?	3
CO1	Q.2a	What are the uses of auto cad?	3
	Q.2b	What is the main purpose of auto cad?	3
CO1	Q.3	What is the use of variants in auto cad?	6
CO2	Q.4	What are the differences present in the software's features?	3
CO2	Q.5a	What is the procedure to create user interface?	3
	Q.5b	What is the procedure to remove the empty layers?	3
CO2	Q6	Give features involved in AutoCAD ws?	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

				COMPUTER APPLICATIONS LAB		
Course Code				**BTCE 620**		
Associated Credit Units				**1**		
Ser. No.	**Name**	**Enrollment No.**	**Roll No.**	**30**	**70**	**100**
1	**ABHISHEK MODI**	**A60215815012**	**AU15UCV8371**	**19**	**56**	**75**
2	**AJAY SINGH SIKARWAR**	**A60215815016**	**AU15UCV8372**	**18**	**50**	**68**
3	**ANCHAL SHRIVASTAVA**	**A60215815024**	**AU15UCV8373**	**22**	**58**	**80**
4	**ASHUTOSH DAIPURIA**	**A60215815017**	**AU15UCV8375**	**23**	**56**	**79**
5	**AYUSHI GUPTA**	**A60215815025**	**AU15UCV8376**	**26**	**65**	**91**
6	**BRAJMOHAN SINGH KUSHWAH**	**A60215815013**	**AU15UCV8377**	**22**	**52**	**74**
7	**DEEPAK SHRIVASTAVA**	**A60215815018**	**AU15UCV8378**	**25**	**64**	**89**

8	HIMANSHU GUPTA	A60215815026	AU15UCV8380	19	53	72
9	JAGRATI DHINGRA	A60215815023	AU15UCV8381	19	53	72
10	NAVNEET PATHAK	A60215815003	AU15UCV8383	19	55	74
11	NIKHIL SINGH CHAUHAN	A60215815019	AU15UCV8384	25	64	89
12	PAWAN KUMAR SINGH	A60215815008	AU15UCV8385	24	63	87
13	SHALINI CHAKRABORTY	A60215815001	AU15UCV8386	22	61	83
14	SHISHIR SINGH	A60215815004	AU15UCV8387	25	64	89
15	SHIVAM GURJAR	A60215815009	AU15UCV8388	20	57	77
16	SUSHIL RAI	A60515815001	AU15UCV8389	23	61	84
17	VAIBHAV KANKAR	A60215815010	AU15UCV8390	21	62	83
18	VAIBHAV RAI	A60215815005	AU15UCV8391	20	56	76
19	VAISHNAV SAXENA	A60215815014	AU15UCV8392	25	65	90
20	VIPUL TRIPATHI	A60215815006	AU15UCV8394	21	60	81
21	YASH SONI	A60215815022	AU15UCV8396	19	55	74

				COMPUTER APPLICATIONS LAB
				BTCE 620
				1
No. of students attended the Exam				21
No. of students secure more than 60% marks				21
Percentage of students secure more than 60% marks				100.00
Attainment Level				Level 3

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : GEOTECHNICAL ENGINEERING LAB
Course Code : BTCE621, Crédits : 01, Session :2017-18(Even Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Imran Ahmad Khan

K. Introduction: The objective of this course is *t*o introduce basic soil properties and their significance to the students and to have a understanding of different soil properties and their uses in engineering.

L. Course Outcomes: At the end of the course, students will be able to:

BTCE621.1. *To impart the fundamental concepts of soil mechanics and understand the bearing capacity*

BTCE621.2. *To understand the concept of compaction and consolidation of soils*

BTCE621.3. *To understand the design aspects of foundation*

BTCE621.4. *To evaluate the stress developed in the soil medium*

M. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

N. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

O. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

P. Syllabus

Practical Work:

- Specific gravity of coarse and fine grained soils.
- Grain size analysis (a) Sieve analysis (b) Pipette analysis
- Atterberg's limits and indices

- Determination of field density (a) sand replacement method (b) core cutter method
- Determination of coefficient of permeability by
  - Constant head method (b) Variable head method
- Consolidation test
- Compaction test (a) IS light compaction test (b) IS heavy compaction test
- California Bearing Ratio test
- Direct shear test
- Triaxial shear test
- Unconfined compressive strength test
- *Laboratory vane shear test*

Q. Examination Scheme:

Components	IA				EE	
	A	PR	LR	V	PR	V
Weightage (%)	**5**	**10**	**10**	**5**	**35**	**35**

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

R. Suggested Text/Reference Books:

- Soil Mechanics by Craig R.F., Chapman & Hall
- Fundamentals of Soil Engineering by Taylor, John Wiley & Sons
- An Introduction to Geotechnical Engineering, by Holtz R.D. and Kovacs, W.D., Prentice Hall, NJ

S. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Specific gravity of coarse and fine grained soils.	Lecture	BTCE621.1	Internal Assessment, Viva &External Exam
2	Grain size analysis (a) Sieve analysis (b) Pipette analysis	Lecture	BTCE621.1	Internal Assessment, Viva &External Exam
3	Atterberg's limits and indices	Lecture	BTCE621.1	Internal Assessment, Viva &External Exam
4	Determination of field density (a) sand replacement method (b) core cutter method	Lecture	BTCE621.2	Internal Assessment, Viva &External Exam
5	Determination of coefficient of permeability by	Lecture	BTCE621.2	Internal

	(a) Constant head method (b) Variable head method			Assessment, Viva &External Exam
6	Consolidation test	Lecture	BTCE621.2	Internal Assessment, Viva &External Exam
7	Compaction test (a) IS light compaction test (b) IS heavy compaction test	Lecture	BTCE621.3	Internal Assessment, Viva &External Exam
8	California Bearing Ratio test	Lecture	BTCE621.3	Internal Assessment, Viva &External Exam
9	Direct shear test	Lecture	BTCE621.3	Internal Assessment, Viva &External Exam
10	Triaxial shear test	Lecture	BTCE621.4	Internal Assessment, Viva &External Exam
11	Unconfined compressive strength test	Lecture	BTCE621.4	Internal Assessment, Viva &External Exam
12	Laboratory vane shear test	Lecture	BTCE621.4	Internal Assessment, Viva &External Exam

T. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE621.1.	*To impart the fundamental concepts of soil mechanics and understand the bearing capacity*	3	3	1	3	1	**3**	**2**	**-**	2		2	1	**3**	**1**	**2**
BTCE621.2.	*To understand the concept of compaction and consolidation of soils*	3	2	2	2	2	**1**	**-**	**-**	2		1	1	**1**	**1**	**3**

BTCE621. 3.	*To understand the design aspects of foundation*	3	2	2	2	2	**1**	**-**	**1**	3		3	1	**3**	**3**	**2**
BTCE621. 4.	*To evaluate the stress developed in the soil medium*	3	3	2	3	2	**-**	**-**	**-**	1		2	1	**1**	**2**	**2**

<u>Sample Question Paper</u>

<table>
<tr><td colspan="7" align="center">Amity School of Engineering and Technology
Department of Civil Engineering
I MID-SEMESTER (SEM–VI) 2017-18</td></tr>
<tr><td colspan="7" align="center">Class: B.Tech.(CE) VI Semester</td></tr>
<tr><td colspan="2">Subject Name:
BTCE621 GEOTECHNICAL ENGINEERING LAB</td><td colspan="2">Time: 2 Hrs</td><td colspan="3">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3</td><td>Q.4</td><td>Q.2,5,6</td><td></td><td></td></tr>
<tr><td colspan="7">Student will be able to
CO1: To impart the fundamental concepts of soil mechanics and understand the bearing capacity
CO2: To understand the concept of compaction and consolidation of soils</td></tr>
</table>

CO Map	Question No.	Question	Marks
CO1	Q.1	Define: A) Area ratio B) Inside clearance of a sampler	3
CO1	Q.2a	the different methods of sampling techniques.	3
	Q.2b	Determine the area ratio of a seamless tube sampler of inner diameter 48mm and outer diameter 51mm and comment on the nature of samples to be obtained in the sampler.	3
CO1	Q.3	area ratio for the split barrel soil sampler of outer diameter 51mm and inner diameter 35mm. Comment on the nature of sample?	6
CO2	Q.4	Differentiate between Non representative and undisturbed samples.	3

CO2	Q.5a	ny two Disadvantage of static cone penetration Test.	3
	Q.5b	perform classification tests on a Non representative sample? Justify your answer?	3
CO2	Q6	Explains any one of the sounding test employed for soil exploration.	6

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

				GEOTECHNICAL ENGINEERING LAB		
Course Code				BTCE 621		
Associated Credit Units				1		
Ser. No.	Name	Enrollment No.	Roll No.	30	70	100
1	ABHISHEK MODI	A60215815012	AU15UCV8371	17	44	61
2	AJAY SINGH SIKARWAR	A60215815016	AU15UCV8372	17	42	59
3	ANCHAL SHRIVASTAVA	A60215815024	AU15UCV8373	16	46	62
4	ASHUTOSH DAIPURIA	A60215815017	AU15UCV8375	15	40	55
5	AYUSHI GUPTA	A60215815025	AU15UCV8376	24	62	86
6	BRAJMOHAN SINGH KUSHWAH	A60215815013	AU15UCV8377	15	50	65
7	DEEPAK SHRIVASTAVA	A60215815018	AU15UCV8378	25	65	90
8	HIMANSHU GUPTA	A60215815026	AU15UCV8380	15	45	60
9	JAGRATI DHINGRA	A60215815023	AU15UCV8381	16	46	62
10	NAVNEET PATHAK	A60215815003	AU15UCV8383	16	40	56
11	NIKHIL SINGH CHAUHAN	A60215815019	AU15UCV8384	24	64	88
12	PAWAN KUMAR SINGH	A60215815008	AU15UCV8385	20	55	75
13	SHALINI CHAKRABORTY	A60215815001	AU15UCV8386	21	58	79
14	SHISHIR SINGH	A60215815004	AU15UCV8387	23	65	88
15	SHIVAM GURJAR	A60215815009	AU15UCV8388	16	52	68
16	SUSHIL RAI	A60515815001	AU15UCV8389	17	56	73
17	VAIBHAV KANKAR	A60215815010	AU15UCV8390	16	48	64
18	VAIBHAV RAI	A60215815005	AU15UCV8391	18	50	68

19	VAISHNAV SAXENA	A60215815014	AU15UCV8392	21	65	86
20	VIPUL TRIPATHI	A60215815006	AU15UCV8394	18	51	69
21	YASH SONI	A60215815022	AU15UCV8396	16	48	64

				GEOTECHNICAL ENGINEERING LAB
				BTCE 621
				1
No. of students attended the Exam				21
No. of students secure more than 60% marks				17
Percentage of students secure more than 60% marks				80.95
Attainment Level				Level 3

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **ADVANCED CONCRETE DESIGN**
Course Code : BTCE 801, Crédits : 04, Session : 2017-18 (Even Sem.), Class : B.Tech. 4th Year
Faculty Name : Mr. Sachin Tiwari

A. Introduction

Design is a plan or drawing produced to show the look and function or workings of a building before it is built. It is also the process of selecting the proper materials and proportioning the different elements of the structure according to state-of-the art engineering science and technology.

B. Course Outcomes: At the end of the course, students will be able to:

- **BTCE 801.1**.Estimate the crack width and deflection with regard to the serviceability. .
- **BTCE 801.2**. Analyse and design a grid floor system. Analyse and design a flat slab system. Discuss fire and seismic resistance of concrete structures

C. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentt o be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			100%

F. Course Content

Module I Large span concrete roofs: Introduction– classification- behaviour of flat slabs - direct design and equivalent frame method- codal provisions - waffle slabs.

Module II: Deep beams Analysis of deep beams- design as per BIS - design using strut and tie method.

Chimneys Analysis of stresses in concrete chimneys - uncracked and cracked sections- codal provisions- design of chimney. A project involving the design of a deep beam and concrete chimney is envisaged at this stage.

Module III: Water tanks /Bunkers/Silos: Introduction- rectangular and circular with flat bottom- spherical and conical tank roofs- staging- design as per BIS. A project involving the design and detailing of a water tank is envisaged at this stage.

Module IV: Bridges : Design of slab culvert – R.C box culverts –T-beam bridges – Concept on design of continuous bridges, balanced cantilever bridges, arch bridges and rigid frame bridges. A project involving the design and detailing of a slab culvert/ T-beam bridge is envisaged at this stage.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- Purushothaman. P, Reinforced Concrete Structural Elements-, Tata McGraw Hill, 1986
- G.S. Ramaswamy, Design and Construction of Concrete Shell Roofs-CBS publishers, 1986
- Ashok K Jain, Reinforced Concrete –Nem Chand Bros. Roorkee, 1998
- Jain & Jaikrishna, Plain and Reinforced Concrete – Vol I & II, Nem Chand Bros., Roorkee, 2000.
- Taylor C Pere, Reinforced Concrete Chimneys, Concrete publications, 1960

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Introduction	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
2	classification- behaviour of flat slabs.	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
3	classification- behaviour of flat slabs.	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
4	Design and classification- behaviour of flat slabs.	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
5	direct design and equivalent frame method	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
6	direct design and equivalent frame method	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
7	direct design and equivalent frame method	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
8	direct design and equivalent frame method	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
9	codal provisions for design of	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam

	flat slab			
10	codal provisions for design of flat slab	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
11	Analysis of deep beams- design as per BIS - design using strut and tie method.	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
12	Analysis of deep beams design as per BIS - design using strut and tie method.	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
13	Analysis of deep beams design as per BIS - design using strut and tie method.	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
14	**Chimneys** Analysis of stresses in concrete chimneys	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
15	**Chimneys** Analysis of stresses in concrete chimneys	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
16	**Chimneys** Analysis of stresses in concrete chimneys	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
17	uncracked and cracked sections	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
18	uncracked and cracked sections	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
19	codal provisions- design of chimney. A project involving the design of a deep beam and concrete chimney is envisaged at this stage.	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
20	codal provisions- design of chimney. A project involving the design of a deep beam and concrete chimney is envisaged at this stage.	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
21	codal provisions- design of chimney. A project involving the design of a deep beam and concrete chimney is envisaged at this stage.	Lecture	BTCE 801.1	Mid Term-2, Quiz & End Sem Exam
22	Introduction	Lecture	BTCE 801.1	Mid Term-2, Quiz & End Sem Exam
23	Rectangular and circular with flat bottom- spherical and conical tank roofs- staging- design as per BIS.	Lecture	BTCE 801.1	Mid Term-2, Quiz & End Sem Exam
24	Rectangular and circular with flat bottom- spherical and conical tank roofs- staging- design as per BIS.	Lecture	BTCE 801.1	Mid Term-2, Quiz & End Sem Exam
25	Rectangular and circular with flat bottom- spherical and conical tank roofs- staging- design as per BIS.	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
26	Rectangular and circular with flat bottom- spherical and conical tank	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam

	roofs- staging- design as per BIS.			
27	A project involving the design and detailing of a water tank is envisaged at this stage.	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
28	A project involving the design and detailing of a water tank is envisaged at this stage.	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
29	A project involving the design and detailing of a water tank is envisaged at this stage.	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
30	A project involving the design and detailing of a water tank is envisaged at this stage.	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
31	Design of slab culvert – R.C box culverts –T, balanced cantilever bridges, arch bridges and rigid frame bridges.	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
32	Beam bridges – Concept on design of continuous bridges	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
33	Beam bridges – Concept on design of continuous bridges	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
34	Beam bridges – Concept on design of continuous bridges	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
35	balanced cantilever bridges, arch bridges and rigid frame bridges.	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
36	balanced cantilever bridges, arch bridges and rigid frame bridges	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
37	A project involving the design and detailing of a slab culvert/ T-beam bridge is envisaged at this stage	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
38	A project involving the design and detailing of a slab culvert/ T-beam bridge is envisaged at this stage	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
39	A project involving the design and detailing of a slab culvert/ T-beam bridge is envisaged at this stage	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
40	A project involving the design and detailing of a slab culvert/ T-beam bridge is envisaged at this stage	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
41	Beam bridges – Concept on design of continuous bridges	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
42	Beam bridges – Concept on design of continuous bridges	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
43	balanced cantilever bridges, arch bridges and rigid frame bridges.	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
44	balanced cantilever bridges, arch bridges and rigid frame bridges	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
45	A project involving the design and	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam

	detailing of a slab culvert/ T-beam bridge is envisaged at this stage			
46	A project involving the design and detailing of a slab culvert/ T-beam bridge is envisaged at this stage	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
47	A project involving the design and detailing of a slab culvert/ T-beam bridge is envisaged at this stage	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
48	A project involving the design and detailing of a slab culvert/ T-beam bridge is envisaged at this stage	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam

E. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE 801.1	Estimate the crack width and deflection with regard to the serviceability. .	3	3	1	3	1				2		2	1			
BTCE 801.2	Analyse and design a grid floor system. Analyse and design a flat slab system. Discuss fire and seismic resistance of concrete structures	3	2	2	2	2				2		1	1			

				CONSTRUCTION MANAGEMENT AND QUANTITY SYUVEYING		
Course Code				BTCE 801		
Associated Credit Units				3		
S er. No.	Name	Enrollment No.	Roll No.	30	70	100
1	A. POORNA ANAND	A60215814033	AU14UCV1201	23	53	76
2	ABHISHEK PRATAP SINGH SIKARWAR	A60215814024	AU14UCV1202	27	51	78
3	ABHISHEK SINGH PARMAR	A60215814028	AU14UCV1203	19	43	62
4	ABHISHANK TOMAR	A60215814032	AU14UCV1204	19	43	62
5	ABID KHAN	A60215814019	AU14UCV1205	16	33	49
6	ADITYA GUPTA	A60215814029	AU14UCV1206	20	48	68
7	AKSHAY KUMAR	A60215814008	AU14UCV1207	19	29	48
8	DEEPAK YADAV	A60215814016	AU14UCV1209	22	43	65
9	GAURAV YADAV	A60215814020	AU14UCV1210	17	35	52
10	EKTA BAJPAI	A60215814010	AU14UCV1211	20	32	52
11	GOURANG SHARMA	A60215814012	AU14UCV1212	25	52	77
12	HEMENDRA DABARIYA	A60515814001	AU14UCV1213	23	48	71
13	NIKHIL TYAGI	A60215814022	AU14UCV1215	19	35	54
14	PRASHANT SHARMA	A60215814007	AU14UCV1216	19	52	71
15	RAHUL SINGH	A60215814025	AU14UCV1217	18	48	66
16	RAJAN SINGH DHAKAD	A60215814011	AU14UCV1218	18	39	57
17	RISHABH RATHORE	A60215814023	AU14UCV1219	21	48	69
18	RYENA HAROON	A60215814030	AU14UCV1221	21	50	71
19	SACHIN TRIPATHI	A60215814004	AU14UCV1222	25	51	76
20	SACHINDRA VISHWAKARMA	A60215814018	AU14UCV1223	18	38	56
21	SHASHANK SINGH CHAUHAN	A60215814002	AU14UCV1224	21	47	68
22	SHREYANSH SINGHAL	A60215814014	AU14UCV1225	27	61	88
2	SHUBHAM KUMAR	A60215814013	AU14UCV1226	23	49	72

3						
24	SHUBHAM KUMAR	A60215814031	AU14UCV1227	18	46	64
25	SHUBHAM VERMA	A60215814009	AU14UCV1228	22	53	75
26	VAIBHAV TYAGI	A60215814006	AU14UCV1229	20	58	78
27	VIPUL SINGH YADAV	A60215814017	AU14UCV1230	20	45	65

				CONSTRUCTION MANAGEMENT AND QUANTITY SYUVEYING
				BTCE 801
				3
No. of students attended the Exam				27
No. of students secure more than 60% marks				20
Percentage of students secure more than 60% marks				74.07
Attainment Level				Level 2

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **ENGINEERING ECONOMICS AND MANAGEMENT**
Course Code : BTCE 802, Crédits : 03, Session : 2017-18 (Even Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Ripunjoy Gogoi

A. Introduction

This course aims to enables the Civil Engineering student to become an entrepreneur by understanding the law of economics. To ensure the students to apply different Methods of appraisal of projects and pricing techniques apart from knowing about various Macroeconomics Model.

Course Outcomes: At the end of the course, students will be able to:

- **BTCE 802.1.**Know the Scope and Method of Managerial economics along with Fundamental Economics and help them to develop a thorough understanding on engineering decision making.
- **BTCE 802.2.** Analyse the demand and supply adopting market strategy
- **BTCE 802.3.** Understand the production function and factors affecting it with various economy conditions of the firm.
- **BTCE 802.4.** Study the different types of market structure and strategies

- **Programme Outcomes:**

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

B. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentt	A	5%

	o be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			100%

C. Course Content

Module I: Organisations and their Economic Environment: Definition of Economics and Managerial Economics – Nature and Scope – Definition and Concept of Good, Want, Value, Wealth, Utility – Utility and Demand – Law of Diminishing Marginal Utility – Assumptions and Importance. Demand and Supply – Law of Demand and Law of Supply. Market price and natural price. Standard market forms- Monopoly, Perfect competition. Organisational forms- Proprietorship, partnership, Joint Stock Company – Cooperative organisation.

Module II: Macroeconomics: Money- nature and functions – Inflation and Deflation – Kinds of Banking – commercial banks – Central banking – Credit instrument - Monetary Policy – International trade Balance of trade and Balance of Payments – taxation – Direct and Indirect taxes – Impact and Incidence of tax- Concept of National Income – Features with reference to developing countries.

Module III: Introduction to Management: Management Theory- Characteristics of management – Systems Approach to management –Concepts of goal, objective, strategies, programmes. Decision making under certainty, uncertainty and risk – Introduction to functional areas of management – Operations management, Human resources management, marketing management.

Module IV: Financial and Inventory Management: Need for Financial Management – Types of financing – Short term and long term Borrowing- Equity financing – Analysis of Financial Statement – balance sheet – Profit and Loss account – Fund flow statement – Ratio Analysis . Investment and Financial decision –Financial control and Job control. Functions and objectives of Inventory management – Decision models – Economic Order Quantity (EOQ) model – sensitivity analysis of EOQ model, Economic production lot size model – inventory model with planned shortages – Periodic order quantity – single period Inventory models – Simulation model for inventory analysis.

Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

D. Suggested Books

- Konni, Donnel C.O. and Weighnrich. H., Management, Eight Edition, McGraw Hill International Book Company, 1997.
- Philip Kotler, Marketing Management, Prentice-Hall of India, Edition 1998.
- G.W. Plossl, Production and inventory control by, Prentice Hall.
- Paul A Samuelson and William D Nardhaus, Economics, McGraw Hill International Edition.
- Barthwal R R, Industrial Economics – An Introductory Text Book, New Age International Pvt Ltd, 2000.
- Aninnya Sen, Microeconomics – Theory and Applications, OUP.
- Sharma J.L., Construction management and accounts, Sathya Prakashan, New Delhi, 1994.
- Srinath,L.S. An Introduction to Project Management, Tata McGraw Hill publications, 1995.

E. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO

1	Definition of Economics and—— Assumptions and. Market price and natural price. Standard market forms-	Lecture	BTCE 802.1	Mid Term-1, Quiz & End Sem Exam
2	Managerial Economics – Nature and Scope	Lecture	BTCE 802.1	Mid Term-1, Quiz & End Sem Exam
3	Managerial Economics – Nature and Scope	Lecture	BTCE 802.1	Mid Term-1, Quiz & End Sem Exam
4	Definition and Concept of Good, Want, Value, Wealth, Utility – Utility and Demand	Lecture	BTCE 802.1	Mid Term-1, Quiz & End Sem Exam
5	Definition and Concept of Good, Want, Value, Wealth, Utility – Utility and Demand	Lecture	BTCE 802.1	Mid Term-1, Quiz & End Sem Exam
6	Law of Diminishing Marginal Utility	Lecture	BTCE 802.1	Mid Term-1, Quiz & End Sem Exam
7	Law of Diminishing Marginal Utility	Lecture	BTCE 802.1	Mid Term-1, Quiz & End Sem Exam
8	Importance. Demand and Supply – Law of Demand and Law of Supply	Lecture	BTCE 802.1	Mid Term-1, Quiz & End Sem Exam
9	Importance. Demand and Supply – Law of Demand and Law of Supply	Lecture	BTCE 802.1	Mid Term-1, Quiz & End Sem Exam
10	Monopoly, Perfect competition. Organisational forms-Proprietorship, partnership, Joint	Lecture	BTCE 802.2	Mid Term-1, Quiz & End Sem Exam
11	Stock Company – Cooperative organisation.	Lecture	BTCE 802.2	Mid Term-1, Quiz & End Sem Exam
12	Stock Company – Cooperative organisation.	Lecture	BTCE 802.2	Mid Term-1, Quiz & End Sem Exam
13	Money- nature and functions —— taxation	Lecture	BTCE 802.2	Mid Term-1, Quiz & End Sem Exam
14	Kinds of Banking – commercial banks – Central banking – Credit instrument.	Lecture	BTCE 802.2	Mid Term-1, Quiz & End Sem Exam
15	Kinds of Banking – commercial banks – Central banking – Credit instrument.	Lecture	BTCE 802.2	Mid Term-1, Quiz & End Sem Exam
16	Inflation and Deflation - Monetary Policy	Lecture	BTCE 802.2	Mid Term-1, Quiz & End Sem Exam
17	Inflation and Deflation - Monetary Policy	Lecture	BTCE 802.2	Mid Term-1, Quiz & End Sem Exam
18	International trade Balance of trade and Balance of Payments	Lecture	BTCE 802.2	Mid Term-1, Quiz & End Sem Exam
19	International trade Balance of trade and Balance of Payments	Lecture	BTCE 802.3	Mid Term-1, Quiz & End Sem Exam
20	Direct and Indirect taxes – Impact and Incidence of tax	Lecture	BTCE 802.3	Mid Term-1, Quiz & End Sem Exam
21	Direct and Indirect taxes – Impact and Incidence of tax	Lecture	BTCE 802.3	Mid Term-2, Quiz & End Sem Exam

22	Concept of National Income – Features with reference to developing countries.	Lecture	BTCE 802.3	Mid Term-2, Quiz & End Sem Exam
23	Concept of National Income – Features with reference to developing countries.	Lecture	BTCE 802.3	Mid Term-2, Quiz & End Sem Exam
24	Management Theory-–, programmes. Operations management.	Lecture	BTCE 802.3	Mid Term-2, Quiz & End Sem Exam
25	Characteristics of management – Systems Approach to management	Lecture	BTCE 802.3	Mid Term-2, Quiz & End Sem Exam
26	Characteristics of management – Systems Approach to management	Lecture	BTCE 802.3	Mid Term-2, Quiz & End Sem Exam
27	Concepts of goal, objective, strategies	Lecture	BTCE 802.3	Mid Term-2, Quiz & End Sem Exam
28	Concepts of goal, objective, strategies	Lecture	BTCE 802.4	Mid Term-2, Quiz & End Sem Exam
29	Decision making under certainty, uncertainty and risk – Introduction to functional areas of management	Lecture	BTCE 802.4	Mid Term-2, Quiz & End Sem Exam
30	Decision making under certainty, uncertainty and risk – Introduction to functional areas of management	Lecture	BTCE 802.4	Mid Term-2, Quiz & End Sem Exam
31	Human resources management, marketing management.	Lecture	BTCE 802.4	Mid Term-2, Quiz & End Sem Exam
32	Need for Financial Management – Types of financing – Short term and long term Borrowing– Equity financing .	Lecture	BTCE 802.4	Mid Term-2, Quiz & End Sem Exam
33	Analysis of Financial Statement – balance sheet – Profit and Loss account – Fund flow statement – Ratio Analysis	Lecture	BTCE 802.4	Mid Term-2, Quiz & End Sem Exam
34	Investment and Financial decision –– Economic Order Quantity (EOQ) model – sensitivity analysis of EOQ model, Economic production lot	Lecture	BTCE 802.4	Mid Term-2, Quiz & End Sem Exam
35	Financial control and Job control. Functions and objectives of Inventory management – Decision models	Lecture	BTCE 802.4	Mid Term-2, Quiz & End Sem Exam
36	size model – inventory model with planned shortages – Periodic order quantity – single period Inventory models – Simulation model for inventory analysis.	Lecture	BTCE 802.4	Mid Term-2, Quiz & End Sem Exam

F. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE802.1	Know the Scope and Method of Managerial economics along with Fundamental Economics and help them to develop a thorough understanding on engineering decision making.	3	3	1	3	1				2		2	1			
BTCE802.2	Analyse the demand and supply adopting market strategy	3	2	2	2	2				2		1	1			
BTCE802.3	Understand the production function and factors affecting it with various economy conditions of the firm.	3	3	1	3	1				2		2	1			
BTCE802.4	Study the different types of market structure and strategies	3	2	2	2	2				2		1	1			

				ENGINEERING ECONOMICS AND MANAGEMENT		
Course Code				BTCE 802		
Associated Credit Units				3		
Ser. No.	Name	Enrollment No.	Roll No.	30	70	100
1	A. POORNA ANAND	A60215814033	AU14UCV1201	19	34	53
2	ABHISHEK PRATAP SINGH SIKARWAR	A60215814024	AU14UCV1202	23	35	58
3	ABHISHEK SINGH PARMAR	A60215814028	AU14UCV1203	19	31	50
4	ABHISHANK TOMAR	A60215814032	AU14UCV1204	18	34	52
5	ABID KHAN	A60215814019	AU14UCV1205	18	26	44
6	ADITYA GUPTA	A60215814029	AU14UCV1206	19	37	56
7	AKSHAY KUMAR	A60215814008	AU14UCV1207	21	30	51
8	DEEPAK YADAV	A60215814016	AU14UCV1209	22	36	58
9	GAURAV YADAV	A60215814020	AU14UCV1210	17	22	39
10	EKTA BAJPAI	A60215814010	AU14UCV1211	20	31	51
11	GOURANG SHARMA	A60215814012	AU14UCV1212	20	34	54
12	HEMENDRA DABARIYA	A60515814001	AU14UCV1213	22	31	53
13	NIKHIL TYAGI	A60215814022	AU14UCV1215	17	30	47
14	PRASHANT SHARMA	A60215814007	AU14UCV1216	21	23	44
15	RAHUL SINGH	A60215814025	AU14UCV1217	17	34	51
16	RAJAN SINGH DHAKAD	A60215814011	AU14UCV1218	22	51	73
17	RISHABH RATHORE	A60215814023	AU14UCV1219	21	47	68
18	RYENA HAROON	A60215814030	AU14UCV1221	16	34	50
19	SACHIN TRIPATHI	A60215814004	AU14UCV1222	21	36	57
20	SACHINDRA VISHWAKARMA	A60215814018	AU14UCV1223	16	32	48
21	SHASHANK SINGH CHAUHAN	A60215814002	AU14UCV1224	21	30	51
22	SHREYANSH SINGHAL	A60215814014	AU14UCV1225	25	52	77
23	SHUBHAM KUMAR	A60215814013	AU14UCV1226	26	37	63
24	SHUBHAM KUMAR	A60215814031	AU14UCV1227	17	33	50
25	SHUBHAM VERMA	A60215814009	AU14UCV1228	21	32	53
26	VAIBHAV TYAGI	A60215814006	AU14UCV1229	20	35	55
27	VIPUL SINGH YADAV	A60215814017	AU14UCV1230	19	31	50
No. of students attended the Exam				27		
No. of students secure more than 60% marks				4		
Percentage of students secure more than 60% marks				14.81		
Attainment Level				-		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : TRAFFIC ENGINEERING AND MANAGEMENT
Course Code : BTCE804, Crédits : 04, Session : 2017-18 (Even Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Ripunjoy Gogoi

A. Introduction

To provide understanding on basic traffic characteristics and various models describing the relationship among traffic stream parameters. To train students to collect and analyze traffic data. To prepare students to perform capacity and level of service analysis of a highway. To teach students to perform traffic signal design using IRC guidelines. To make students aware of traffic regulations and measures to manage traffic. To enable students to understand the importance of roadway safety and accident analysis

B. Course Outcomes: At the end of the course, students will be able to:

- **BTCE 804.1**.Describe traffic stream parameters and their relationship
- **BTCE 804.2**.Identify various traffic stream models and their application
- **BTCE 804.3.**Collect the traffic data and analyse it using statistical tools.
- **BTCE 804.4.**Evaluate capacity and level of service for a given highway
- **BTCE 804.5**.Design traffic signal using IRC guidelines

C. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			100%

E. Course Content

F. **Module I: Introduction:** Significance and scope, Characteristics of Vehicles and Road Users, Skid Resistance and Braking Efficiency (Problems), Components of Traffic Engineering- Road, Traffic and Land Use Characteristics

Module II: Traffic Surveys and Analysis: Surveys and Analysis - Volume, Capacity, Speed and Delays, Origin and Destination, Parking, Pedestrian Studies, Accident Studies and Safety Level of Services- Basic principles of Traffic Flow.

Module III: Traffic Control: Traffic signs, Road markings, Design of Traffic signals and Signal co-ordination (Problems),Traffic control aids and Street furniture, Street Lighting, Computer applications in Signal design

Module IV: Geometric Design of Intersections: Conflicts at Intersections, Classification of 'At Grade Intersections, - Channallised Intersections- Principles of Intersection Design, Elements of Intersection Design, Rotary design, GradeSeparation and interchanges - Design principles.

Module V: Traffic Management: Traffic Management- Transportation System Management (TSM) - Travel DemandManagement (TDM), Traffic Forecasting techniques, Restrictions on turning movements, OnewayStreets, Traffic Segregation, Traffic Calming, Tidal flow operations, Exclusive Bus Lanes,Introduction to Intelligent Transportation System (ITS).

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva. V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Kadiyali L R, Traffic Engineering and Transport Planning, Khanna Technical Publications,Delhi, 2000.
- Khanna K and Justo C E G, Highway Engineering, Khanna Publishers, Roorkee, 2001.
- Indian Roads Congress (IRC) specifications: Guidelines and special publications on TrafficPlanning and Management
- Guidelines of Ministry of Road Transport and Highways, Government of India.
- Subhash C.Saxena, A Course in Traffic Planning and Design, Dhanpat Rai Publications,New Delhi, 1989.
- Transportation Engineering – An Introduction, C.Jotin Khisty, B.Kent Lall, Prentice Hall ofIndia Pvt Ltd, 2006.

- **Lecture Plan**

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	**Introduction:**, Skid Resistance and	Lecture	BTCE 804.1	Mid Term-1, Quiz & End Sem Exam
2	Significance and scope, Characteristics of Vehicles and Road Users	Lecture	BTCE 804.1	Mid Term-1, Quiz & End Sem Exam
3	Significance and scope, Characteristics of Vehicles and Road Users	Lecture	BTCE 804.1	Mid Term-1, Quiz & End Sem Exam
4	Significance and scope, Characteristics of Vehicles and Road Users	Lecture	BTCE 804.1	Mid Term-1, Quiz & End Sem Exam
5	Braking Efficiency (Problems), Components of Traffic Engineering- Road, Traffic and Land Use Characteristics	Lecture	BTCE 804.1	Mid Term-1, Quiz & End Sem Exam
6	Braking Efficiency (Problems), Components of Traffic Engineering- Road, Traffic and Land Use Characteristics	Lecture	BTCE 804.1	Mid Term-1, Quiz & End Sem Exam
7	Braking Efficiency (Problems), Components of Traffic Engineering- Road, Traffic and Land Use Characteristics	Lecture	BTCE 804.1	Mid Term-1, Quiz & End Sem Exam
8	Braking Efficiency (Problems), Components of Traffic Engineering- Road, Traffic and Land Use Characteristics	Lecture	BTCE 804.1	Mid Term-1, Quiz & End Sem Exam
9	Braking Efficiency (Problems), Components of Traffic Engineering- Road, Traffic and Land Use Characteristics	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam

10	**Traffic Surveys and Analysis:**, Origin and Destination,	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam
11	Surveys and Analysis - Volume, Capacity, Speed and Delays	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam
12	Surveys and Analysis - Volume, Capacity, Speed and Delays	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam
13	Surveys and Analysis - Volume, Capacity, Speed and Delays	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam
14	Parking, Pedestrian Studies, Accident Studies	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam
15	Safety Level of Services- Basic principles of Traffic Flow	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam
16	Safety Level of Services- Basic principles of Traffic Flow	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam
17	Safety Level of Services- Basic principles of Traffic Flow	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam
18	Traffic signs, Road markings	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam
19	Design of Traffic signals and Signal co-ordination	Lecture	BTCE 804.3	Mid Term-1, Quiz & End Sem Exam
20	Design of Traffic signals and Signal co-ordination	Lecture	BTCE 804.3	Mid Term-1, Quiz & End Sem Exam
21	*Design of Traffic signals and Signal co-ordination*	Lecture	BTCE 804.3	Mid Term-2, Quiz & End Sem Exam
22	*Traffic control aids and Street furniture, Street Lighting*	Lecture	BTCE 804.3	Mid Term-2, Quiz & End Sem Exam
23	*Traffic control aids and Street furniture, Street Lighting*	Lecture	BTCE 804.3	Mid Term-2, Quiz & End Sem Exam
24	(Problems, Computer applications in Signal design	Lecture	BTCE 804.3	Mid Term-2, Quiz & End Sem Exam
25	*(Problems, Computer applications in Signal design*	Lecture	BTCE 804.3	Mid Term-2, Quiz & End Sem Exam
26	**Geometric Design of Intersections:** - Channallised Intersections-, Rotary design,.	Lecture	BTCE 804.3	Mid Term-2, Quiz & End Sem Exam
27	*Conflicts at Intersections, Classification of 'At Grade Intersections,*	Lecture	BTCE 804.3	Mid Term-2, Quiz & End Sem Exam
28	*Conflicts at Intersections, Classification of 'At Grade Intersections,*	Lecture	BTCE 804.3	Mid Term-2, Quiz & End Sem Exam
29	*Conflicts at Intersections, Classification of 'At Grade Intersections,*	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam
30	*Principles of Intersection Design, Elements of Intersection Design*	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam
31	Principles of Intersection Design, Elements of Intersection Design	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam
32	Grade Separation and interchanges - Design principles	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam
33	Traffic Management- Transportation	Lecture	BTCE 804.4	Mid Term-2, Quiz

	System Management (TSM)			& End Sem Exam
34	*Travel Demand Management (TDM), Traffic Forecasting techniques*	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam
35	*Restrictions on turning movements, One way Streets, Traffic Segregation*	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam
36	Traffic Calming, Tidal flow operations, Exclusive Bus Lanes, Introduction to Intelligent Transportation System (ITS).	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam
37	*(Problems, Computer applications in Signal design*	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam
38	**Geometric Design of Intersections:** - Channallised Intersections-, Rotary design,.	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam
39	*Conflicts at Intersections, Classification of 'At Grade Intersections,*	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam
40	*Conflicts at Intersections, Classification of 'At Grade Intersections,*	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam
41	*Conflicts at Intersections, Classification of 'At Grade Intersections,*	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam
42	*Principles of Intersection Design, Elements of Intersection Design*	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam
43	Principles of Intersection Design, Elements of Intersection Design	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam
44	Grade Separation and interchanges - Design principles	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam
45	Traffic Management- Transportation System Management (TSM)	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam
46	*Travel Demand Management (TDM), Traffic Forecasting techniques*	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam
47	*Restrictions on turning movements, One way Streets, Traffic Segregation*	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam
48	Traffic Calming, Tidal flow operations, Exclusive Bus Lanes, Introduction to Intelligent Transportation System (ITS).	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam

- **Course Articulation Matrix (Mapping of COs with POs)**

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

BTCE 804.1	Describe traffic stream parameters and their relationship	3	3	1	3	1				2		2	1			
BTCE 804.2	Identify various traffic stream models and their application	3	2	2	2	2				2		1	1			
BTCE 804.3	Collect the traffic data and analyse it using statistical tools.	3	3	1	3	1				2		2	1			
BTCE 804.4	Evaluate capacity and level of service for a given highway	3	2	2	2	2				2		1	1			
BTCE 804.5	Design traffic signal using IRC guidelines	3	3	1	3	1				2		2	1			

				TRAFFIC ENGINEERING AND MANAGEMENT		
Course Code				**BTCE 804**		
Associated Credit Units				**4**		
Ser. No.	**Name**	**Enrollment No.**	**Roll No.**	**30**	**70**	**100**
1	**A. POORNA ANAND**	**A60215814033**	**AU14UCV1201**	**19**	**40**	**59**
2	**ABHISHEK PRATAP SINGH SIKARWAR**	**A60215814024**	**AU14UCV1202**	**23**	**43**	**66**
3	**ABHISHEK SINGH PARMAR**	**A60215814028**	**AU14UCV1203**	**18**	**35**	**53**
4	**ABHISHANK TOMAR**	**A60215814032**	**AU14UCV1204**	**17**	**31**	**48**
5	**ABID KHAN**	**A60215814019**	**AU14UCV1205**	**23**	**33**	**56**
6	**ADITYA GUPTA**	**A60215814029**	**AU14UCV1206**	**19**	**41**	**60**
7	**AKSHAY KUMAR**	**A60215814008**	**AU14UCV1207**	**18**	**37**	**55**
8	**DEEPAK YADAV**	**A60215814016**	**AU14UCV1209**	**23**	**47**	**70**
9	**GAURAV YADAV**	**A60215814020**	**AU14UCV1210**	**17**	**32**	**49**
10	**EKTA BAJPAI**	**A60215814010**	**AU14UCV1211**	**18**	**30**	**48**
11	**GOURANG SHARMA**	**A60215814012**	**AU14UCV1212**	**22**	**41**	**63**
12	**HEMENDRA DABARIYA**	**A60515814001**	**AU14UCV1213**	**20**	**37**	**57**

13	NIKHIL TYAGI	A60215814022	AU14UCV1215	20	24	44
14	PRASHANT SHARMA	A60215814007	AU14UCV1216	22	40	62
15	RAHUL SINGH	A60215814025	AU14UCV1217	19	41	60
16	RAJAN SINGH DHAKAD	A60215814011	AU14UCV1218	21	39	60
17	RISHABH RATHORE	A60215814023	AU14UCV1219	22	44	66
18	RYENA HAROON	A60215814030	AU14UCV1221	20	47	67
19	SACHIN TRIPATHI	A60215814004	AU14UCV1222	24	41	65
20	SACHINDRA VISHWAKARMA	A60215814018	AU14UCV1223	19	37	56
21	SHASHANK SINGH CHAUHAN	A60215814002	AU14UCV1224	21	32	53
22	SHREYANSH SINGHAL	A60215814014	AU14UCV1225	23	49	72
23	SHUBHAM KUMAR	A60215814013	AU14UCV1226	21	36	57
24	SHUBHAM KUMAR	A60215814031	AU14UCV1227	18	45	63
25	SHUBHAM VERMA	A60215814009	AU14UCV1228	22	42	64
26	VAIBHAV TYAGI	A60215814006	AU14UCV1229	21	51	72
27	VIPUL SINGH YADAV	A60215814017	AU14UCV1230	20	42	62

				TRAFFIC ENGINEERING AND MANAGEMENT
				BTCE 804
				4
No. of students attended the Exam				27
No. of students secure more than 60% marks				12
Percentage of students secure more than 60% marks				44.44
Attainment Level				-

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : Project
Course Code : BTCE860, Crédits : 09, Session : 2017-18 (Even Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Imran Ahmad Khan, Dr. Mohan Kantharia, Dr. P. Mahakavi

A. Introduction

The objective of project is to enable the student to take up investigative study in the broad field of Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the Department on an individual basis or two/three students in a group, under the guidance of a Supervisor.

Course Outcomes: At the end of the course, students will be able to:

BTCE860.1. Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.

BTCE860.2. Design, implement and test the prototype/algorithm in order to solve the conceived problem.

BTCE860.3. Write comprehensive report on project work

B. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

C. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
End Semester Examination	End Semester Examination	EE	100%
Total			**100%**

A. Syllabus

Methodology:

Project is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the project the students are to present a report covering various aspects learnt by them and give a presentation on same.

D. Examination Scheme:

Literature study/ Fabrication/ Experimentation	**40**
Written Report	**20**
Viva	**15**
Presentation	**25**
Total	**100**

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva. V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

A. **Suggested Text/Reference Books: NA**

B. **Lecture Plan : NA**

C. **Course Articulation Matrix (Mapping of COs with POs)**

E. **Course Articulation Matrix (Mapping of COs with POs)**

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE860.1	*Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.*	3	**2**	1	3	1	**-**	**-**	**-**	2		2	1	**1**	**2**	**1**
BTCE860.2	*Design, implement and test the prototype/algorithm in order to solve the conceived problem.*	3	1	2	2	2	**-**	**-**	**-**	2		1	1	**3**	**2**	**3**
BTCE860.3	*Write comprehensive report on project work*	2	2	2	2	2	**-**	**-**	**-**	3		3	1	**3**	**3**	**2**

				PROJECT (DISSERTAION)
Course Code				BTCE 860
Associated Credit Units				9
Ser. No.	Name	Enrollment No.	Roll No.	100
1	A. POORNA ANAND	A60215814033	AU14UCV1201	87
2	ABHISHEK PRATAP SINGH SIKARWAR	A60215814024	AU14UCV1202	88
3	ABHISHEK SINGH PARMAR	A60215814028	AU14UCV1203	76
4	ABHISHANK TOMAR	A60215814032	AU14UCV1204	72
5	ABID KHAN	A60215814019	AU14UCV1205	80
6	ADITYA GUPTA	A60215814029	AU14UCV1206	78
7	AKSHAY KUMAR	A60215814008	AU14UCV1207	82
8	DEEPAK YADAV	A60215814016	AU14UCV1209	84
9	GAURAV YADAV	A60215814020	AU14UCV1210	76
10	EKTA BAJPAI	A60215814010	AU14UCV1211	72
11	GOURANG SHARMA	A60215814012	AU14UCV1212	73
12	HEMENDRA DABARIYA	A60515814001	AU14UCV1213	84
13	NIKHIL TYAGI	A60215814022	AU14UCV1215	75
14	PRASHANT SHARMA	A60215814007	AU14UCV1216	80
15	RAHUL SINGH	A60215814025	AU14UCV1217	84
16	RAJAN SINGH DHAKAD	A60215814011	AU14UCV1218	75
17	RISHABH RATHORE	A60215814023	AU14UCV1219	82
18	RYENA HAROON	A60215814030	AU14UCV1221	82
19	SACHIN TRIPATHI	A60215814004	AU14UCV1222	88
20	SACHINDRA VISHWAKARMA	A60215814018	AU14UCV1223	74
21	SHASHANK SINGH CHAUHAN	A60215814002	AU14UCV1224	81
22	SHREYANSH SINGHAL	A60215814014	AU14UCV1225	90
23	SHUBHAM KUMAR	A60215814013	AU14UCV1226	85
24	SHUBHAM KUMAR	A60215814031	AU14UCV1227	81
25	SHUBHAM VERMA	A60215814009	AU14UCV1228	86
26	VAIBHAV TYAGI	A60215814006	AU14UCV1229	78
27	VIPUL SINGH YADAV	A60215814017	AU14UCV1230	70
No. of students attended the Exam				27
No. of students secure more than 60% marks				27
Percentage of students secure more than 60% marks				100.00
Attainment Level				Level 3

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR
AMITY SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF CIVIL ENGINEERING

PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Bachelor of Technology (B. Tech.) CEAcademic Year – 2018-19

Graduates of the programme B Tech (Civil Engineering) will

PEO 1: Gain knowledge and skills in Civil engineering which will enable them to have a career and professional accomplishment in the public or private sector organizations

PEO 2: Become consultants on complex real life Civil Engineering problems related to Infrastructure development especially housing, construction, water supply, sewerage, transport, spatial planning.

PEO 3: Become entrepreneurs and develop processes and technologies to meet desired infrastructure needs of society and formulate solutions that are technically sound, Economically feasible, and socially acceptable.

PEO 4: Perform investigation for solving Civil Engineering problems by conducting research using modern equipment and software tools.

PEO 5: Function in multi-disciplinary teams and advocate policies, systems, processes and equipment to support civil engineering

Programme Outcomes:

[PO. 1]. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

[PO. 2]. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

[PO. 3]. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

[PO. 4]. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

[PO. 5]. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

[PO. 6]. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

[PO. 7]. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

[PO. 8]. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

[PO. 9]. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

[PO. 10]. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

[PO. 11]. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

[PO. 12]. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

Note: - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put "- "

PROGRAMMEARTICULATIONMATRIX																
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ISEM	MAT101	3	2	3	3	3	-	-	-	2	-	2	3	-	-	-
	CHE101	3	3	3	3	-	3	3	3	3	3	3	3	-	-	-
	CSE104	3	3	3	2	-	-	-	-	-	-	-	3	3	3	3
	BME101	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2
	CIV101	3	2	2	2	-		-	-	1	1	1	2	2	-	-
	CHE121	3	3	2	-	-	-	-	-	-	-	-	2	3	-	2
	CSE124	3	3	3	2	-	-	-	-	-	-	-	3	3	3	3
	BME121	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2
	BCU141	3	2	2	2	-		-	-	1	1	1	2	2	-	-
	EVS142	3	3	2	-	-	-	-	-	-	-	-	2	3	-	2
	BSU143	3	3	2	-	-	-	-	-	-	-	-	2	3	-	2
	FLU144	3	3	3	2	-	-	-	-	-	-	-	3	3	3	3
IISEM	MAT201	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2
	PHY101	3	2	2	2	-		-	-	1	1	1	2	2	-	-
	ECE101	3	3	2	-	-	-	-	-	-	-	-	2	3	-	2
	CSE204	3	3	3	2	-	-	-	-	-	-	-	3	3	3	3
	BME102	3	2	2	-	2	-	-	3	2	-	-	2	3	-	2
	PHY121	3	2	2	-	2	-	-	3	2	-	-	2	3	-	2
	ECE121	3	2	2	-	-	-	1	-	-	-	-	2	3	-	2
	CSE224	3	2	2	-	2	-	1	-	-	-	-	2	3	-	2
	BME122	3	2	2	-	2	-	-	3	2	-	-	2	3	-	2
	BCU241	3	2	2	-	2	-	1	3	2	-	1	2	3	-	2
	EVS242	3	2	2	1	2	-	-	3	2	-	2	2	3	-	2
	BSU243	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2
	FLU244	3	2	2	-	2	-	1	-	-	-	-	2	3	-	2

PROGRAMMEARTICULATIONM ATRIX																
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
2nd Year																
IIISEM	BTCE 301	3	2	1	-	-	-	-	-	-	-	-	2	1	1	1
	BTCE 302	3	3	3	2	-	-	-	-	-	-	-	3	3	3	3
	BTCE 303	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2
	BTCE 304	3	2	2	2	-		-	-	1	1	1	2	2	-	-
	BTCE 305	3	3	2	-	-	-	-	-	-	-	-	2	3	-	2
	BTCE 306	1	2	2	1	1	-	-	-	-	-	-	-	2	-	-
	BTCE 320	3	3	2	-	-	-	-	-	-	-	-	2	3	-	2
	BTCE 321	1	2	2	1	1	-	-	-	-	-	-	-	2	-	-
	BTCE 322	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2
IVSEM	BTCE 401	3	2	2	-	2	-	-	3	2	-	-	2	3	-	2
	BTCE 402	3	2	2	-	-	-	1	-	-	-	-	2	3	-	2
	BTCE 403	3	2	2	-	2	-	1	-	-	-	-	2	3	-	2
	BTCE 404	3	2	2	-	2	-	-	3	2	-	-	2	3	-	2
	BTCE 405	3	2	2	-	2	-	1	3	2	-	1	2	3	-	2
	BTCE 406	3	2	2	1	2	-	-	3	2	-	2	2	3	-	2
	BTCE 420	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2
	BTCE 421	3	2	2	1	2	-	-	3	2	-	2	2	3	-	2
	BTCE 422	3	2	2	1	2	-	-	3	2	-	2	2	3	-	2

PROGRAMME ARTICULATION MATRIX																
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
VSEM	BTCE501	3	3	2	3	3	2	2	-	3	2	3	3	3	3	3
	BTCE502	2	2	2	-	3	-	3	2	-	3	-	3	1	2	1
	BTCE503	3	3	1	2	3	3	3	3	3	-	1	3	3	2	2
	BTCE504	2	-	2	-	3	-	3	2	-	3	-	3	3	2	2
	BTCE505	3	3	3	2	2	1	1	-	-	-	-	3	3	3	3
	BTCE506	2	2	2	-	3	-	3	2	-	3	-	3	1	2	1

	BTCE520	2	-	2	-	3	-	3	2	-	3	-	3	3	2	2
	BTCE521	3	3	1	2	3	3	3	3	3	-	1	3	3	2	2
	BTCE550	3	3	2	3	3	2	2	-	3	2	3	3	3	3	3
VISE M	BTCE601	3	3	2	3	3	2	2	-	3	2	3	3	1	2	1
	BTCE602	2	2	2	-	3	-	3	2	-	3	-	3	3	2	2
	BTCE603	3	3	1	2	3	3	3	3	3	-	1	3	3	2	2
	BTCE604	2	2	2	-	3	-	3	2	-	3	-	3	3	3	3
	BTCE605	3	3	1	2	3	3	3	3	3	-	1	3	1	2	1
	BTCE606	2	-	2	-	3	-	3	2	-	3	-	3	3	2	2
	BTCE620	3	3	1	2	3	3	3	3	3	-	1	3	3	3	3
	BTCE621	2	2	2	-	3	-	3	2	-	3	-	3	1	2	1

PROGRAMME ARTICULATION MATRIX

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
VII SEM	BTCE 701	3	3	2	3	3	2	2	-	3	2	3	3	3	3	3
	BTCE 702	2	2	2	-	3	-	3	2	-	3	-	3	1	2	1
	BTCE 703	2	2	2	-	3	-	3	2	-	3	-	3	1	2	1
	BTCE 707	3	3	2	3	3	2	2	-	3	2	3	3	3	3	3
	BTCE 720	3	2	1		1	2	1	-	2	-	1	3	3	3	3
	BTCE 721	3	2	1		1	2	1	-	2	-	1	3	3	3	3
	BTCE 760	3	2	1		1	2	1	-	2	-	1	3	3	3	3
	BTCE 750	3	2	1		1	2	1	-	2	-	1	3	3	3	3
VIII SEM	BTCE 801	3	3	2	3	3	2	2	-	3	2	3	3	1	2	1
	BTCE 802	2	2	2	-	3	-	3	2	-	3	-	3	3	2	2
	BTCE 804	3	3	1	2	3	3	3	3	3	-	1	3	3	2	2
	BTCE 860	2	-	2	-	3	-	3	2	-	3	-	3	3	2	2

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AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF MECHANICAL ENGINEERING
Course Handout
Course : Mechanics
Course Code : BTCE 202, Crédits : 4, Session :2018-19(EvenSem.), Class : B.Tech. 1st Year
Faculty Name : Dr. Manisha Singh, Dr. Pankaj Kumar Mishra, Dr. Snehal Jani

A. **Introduction:**The objective of this course is to familiarize the prospective engineers with practical knowledge of oscillations, waves and mechanics. The course aims to educate the students with concept of mechanics that will help them in further development of novel mechanical instrumentation.

B. **Course Outcomes:**After successful completion of the course students will have the knowledge and skill to:

BTCE2*02*.1. Transformation of scalars and vectors under Rotation transformation; Forces in Nature; Newton's laws and its completeness in describing particle motion; Form invariance of Newton's Second Law; Solving Newton's equations of motion in polar coordinates; Problems including constraints and friction; Extension to cylindrical and spherical coordinates

BTCE2*02*.2. Potential energy function; F = - Grad V, equi-potential surfaces and meaning of gradient; Conservative and non-conservative forces, curl of a force field; Central forces; Conservation of Angular Momentum; Energy equation and energy diagrams; Elliptical, parabolic and hyperbolic orbits; Kepler problem; Application: Satellite manoeuvres;

BTCE2*02*.3. Non-inertial frames of reference; Rotating coordinate system: Five-term acceleration formula- Centripetal and Coriolis accelerations; Applications: Weather systems, Foucault pendulum;

BTCE2*02*.4. Harmonic oscillator; Damped harmonic motion – over-damped, critically damped and lightly-damped oscillators; Forced oscillations and resonance

BTCE2*02*.5. Definition and motion of a rigid body in the plane; Rotation in the plane; Kinematics in a coordinate system rotating and translating in the plane; Angular momentum about a point of a rigid body in planar motion; Euler's laws of motion, their independence from Newton's laws, and their necessity in describing rigid body motion; Examples

BTCE2*02*.6 Introduction to three-dimensional rigid body motion — only need to highlight the distinction from two-dimensional motion in terms of (a) Angular velocity vector, and its rate of change and (b) Moment of inertia tensor; Three-dimensional motion of a rigid body wherein all points move in a coplanar manner: e.g. Rod executing conical motion with center of mass fixed — only need to show that this motion looks two-dimensional but is three-dimensional, and two dimensional formulation fails.

Programme Outcomes:

[PO.1].**Engineeringknowledge**:Applytheknowledgeofmathematics,science,engineeringfundamentals,andanengineeringspecializationtothesolutionofcomplexengineeringproblems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineeringproblems reaching substantiated conclusions using first principles of mathematics, natural sciences,andengineeringsciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and designsystem components or processes that meet the specified needs with appropriate consideration for thepublichealthandsafety,andthecultural,societal,andenvironmentalconsiderations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of theinformationtoprovidevalidconclusions

[PO.5].**Moderntoolusage**:Create,select,andapplyappropriatetechniques,resources,andmodernengineering and IT tools including prediction and modeling to complex engineering activities with anunderstandingofthelimitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to theprofessionalengineeringpractice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societalandenvironmentalcontexts,anddemonstratetheknowledgeof,andneedforsustainabledevelopment

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities andnorms oftheengineeringpractices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverseteams,andinmultidisciplinarysettings

[PO.10].**Communication**:Communicateeffectivelyoncomplexengineeringactivitieswith theengineeringcommunity and with society at large, such as, being able to comprehend and write effective reports anddesigndocumentation,makeeffectivepresentations,andgiveandreceiveclearinstructions

[PO.11].**Projectmanagementandfinance**:Demonstrateknowledgeandunderstandingof theengineeringandmanagementprinciplesandapplythesetoone’sownwork,asamember andleaderinateam,tomanageprojectsandinmultidisciplinaryenvironments

[PO.12].**Life-longlearning**:Recognizetheneedfor,andhavethepreparationandabilityto engageinindependent andlife-longlearninginthebroadestcontextoftechnologicalchange

C. Programme Specific Outcomes:

A graduate of Mechanical Engineering Program will demonstrate:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment, and management tools so as to complete the civil engineering project within specified time and funds.

D. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudent to be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

E. Syllabus

MECHANICS

Course Code: BTCE -202 **Credit Units: 04**

Course Objective:

Aim of this course is to introduce the fundamentals of Mechanics and to develop problem solving approach of the engineering/technology

Course Contents:

Module 1: (**8**)

Transformation of scalars and vectors under Rotation transformation; Forces in Nature; Newton's laws and its completeness in describing particle motion; Form invariance of Newton's Second Law; Solving Newton's equations of motion in polar coordinates; Problems including constraints and friction; Extension to cylindrical and spherical coordinates

Module 2: (**7**)

Potential energy function; F = - Grad V, equi-potential surfaces and meaning of gradient; Conservative and non-conservative forces, curl of a force field; Central forces; Conservation of Angular Momentum; Energy equation and energy diagrams; Elliptical, parabolic and hyperbolic orbits; Kepler problem; Application: Satellite manoeuvres;

Module 3: (**5**)

Non-inertial frames of reference; Rotating coordinate system: Five-term acceleration formula- Centripetal and Coriolis accelerations; Applications: Weather systems, Foucault pendulum;

Module 4: (**6**)

Harmonic oscillator; Damped harmonic motion – over-damped, critically damped and lightly-damped oscillators; Forced oscillations and resonance

Module 5: (5)

Definition and motion of a rigid body in the plane; Rotation in the plane; Kinematics in a coordinate system rotating and translating in the plane; Angular momentum about a point of a rigid body in planar motion; Euler's laws of motion, their independence from Newton's laws, and their necessity in describing rigid body motion; Examples

Module 6: (7)

Introduction to three-dimensional rigid body motion — only need to highlight the distinction from two-dimensional motion in terms of (a) Angular velocity vector, and its rate of change and (b) Moment of inertia tensor; Three-dimensional motion of a rigid body wherein all points move in a coplanar manner: e.g. Rod executing conical motion with center of mass fixed — only need to show that this motion looks two-dimensional but is three-dimensional, and two dimensional formulation fails.

Course Outcomes:

Upon completion of this course students will have the knowledge and skills to

- Identify and manipulate forces and their resultant in one, two and three dimensions
- Recognise and classify moments and couples created by them.
- Analyse and demonstrate the stability conditions of mechanical strain.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance,CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination;

Text & References:

F. Suggested Text/Reference Books:

References:

1. Engineering Mechanics, 2nd ed. — MK Harbola
2. Introduction to Mechanics — MK Verma
3. An Introduction to Mechanics — D Kleppner & R Kolenkow
4. Principles of Mechanics — JL Synge & BA Griffiths

G. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Transformation of scalars and vectors under Rotation transformation;	Lecture/ Tutorial	BTCE202.1	Mid Term Exam, Assignment& End Sem Exam
2	Forces in Nature; Newton's laws and its completeness in describing particle motion;	Lecture/ Tutorial	BTCE202.1	Mid Term Exam, Assignment& End Sem Exam
3	Form invariance of Newton's Second Law; Solving Newton's equations of motion in polar coordinates	Lecture/ Tutorial	BTCE202.1	Mid Term Exam, Assignment& End Sem Exam
4	Problems including constraints and friction; Extension to cylindrical and spherical coordinates	Lecture	BTCE202.1	Mid Term Exam, Assignment& End Sem Exam
5	Potential energy function; F = - Grad V, equi-potential surfaces and meaning of gradient	Lecture/ Tutorial	BTCE202.1	Mid Term Exam, Assignment& End Sem Exam
6	Conservative and non-conservative forces, curl of a force field; Central forces	Lecture/ Tutorial	BTCE202.1	Mid Term Exam, Assignment& End Sem Exam
7	Conservation of Angular Momentum; Energy equation and energy diagrams	Lecture/ Tutorial	BTCE202.1	Mid Term Exam, Assignment& End Sem Exam
8	Elliptical, parabolic and hyperbolic orbits;	Lecture/ Tutorial	BTCE202.2	Mid Term Exam, Assignment& End Sem Exam
9	Kepler problem; Application: Satellite manoeuvres;	Lecture/ Tutorial	BTCE202.2	Mid Term Exam, Assignment& End Sem Exam
10	Non-inertial frames of reference; Rotating coordinate system	Lecture/ Tutorial	BTCE202.2	Mid Term Exam, Assignment& End Sem Exam
11	Five-term acceleration formula- Centripetal and Coriolis accelerations;	Lecture/ Tutorial	BTCE202.2	Mid Term Exam, Assignment&

				End Sem Exam
12	Applications: Weather systems, Foucault pendulum	Lecture/ Tutorial	BTCE202.2	Mid Term Exam, Assignment& End Sem Exam
13	Harmonic oscillator; Damped harmonic motion – over-damped	Lecture/ Tutorial	BTCE202.2	Mid Term Exam, Assignment& End Sem Exam
14	critically damped and lightly-damped oscillators; Forced oscillations and resonance	Lecture/ Tutorial	BTCE202.2	Mid Term Exam, Assignment& End Sem Exam
15	Definition and motion of a rigid body in the plane; Rotation in the plane	Lecture/ Tutorial	BTCE202.3	Assignment & End Sem Exam
16	Kinematics in a coordinate system rotating and translating in the plane	Lecture/ Tutorial	BTCE202.3	Assignment & End Sem Exam
17	Angular momentum about a point of a rigid body in planar motion	Lecture/ Tutorial	BTCE202.3	Assignment & End Sem Exam
18	Euler's laws of motion, their independence from Newton's laws	Lecture/ Tutorial	BTCE202.3	Assignment &End Sem Exam
19	evanescentand their necessity in describing rigid body motion;, phenomena of iridescence	Lecture/ Tutorial	BTCE202.3	Assignment & End Sem Exam
20	Introduction to three-dimensional rigid body motion	Lecture/ Tutorial	BTCE202.3	Assignment & End Sem Exam
21	(a) Angular velocity vector, and its rate of change and (b) Moment of inertia tensor;	Lecture/ Tutorial	BTCE202.3	Assignment & End Sem Exam
22	Three-dimensional motion of a rigid body wherein all points move in a coplanar manner: e.g. Rod executing conical motion with center of mass fixed	Lecture/ Tutorial	BTCE202.4	Assignment & End Sem Exam
23	only need to show that this motion looks two-dimensional but is three-dimensional, and two dimensional formulation fails.	Lecture/ Tutorial	BTCE202.4	Assignment & End Sem Exam
24	Young's double slit experiment, Newton's rings	Lecture/ Tutorial	BTCE202.4	Assignment & End Sem Exam
25	Michelson interferometer	Lecture/ Tutorial	BTCE202.4	Assignment & End Sem Exam
26	Mach-Zehnder interferometer	Lecture/ Tutorial	BTCE202.4	Assignment & End Sem Exam
27	Farunhofer diffraction from a single slit and a circular aperture, the Rayleigh criterion for limit of resolution and its application to vision	Lecture/ Tutorial	BTCE202.4	Assignment & End Sem Exam
28	Diffraction gratings and their resolving power	Lecture/ Tutorial	BTCE202.4	Assignment & End Sem Exam
29	Einstein's theory of matter	Lecture/	BTCE202.5	Assignment &

	radiation interaction and A and B coefficients	Tutorial		End Sem Exam
30	amplification of light by population inversion	Lecture/ Tutorial	BTCE202.5	Assignment & End Sem Exam
31	different types of lasers: gas lasers (He-Ne, CO_2)	Lecture/ Tutorial	BTCE202.5	Assignment & End Sem Exam
32	solid-state lasers(ruby Neodymium), dye lasers;	Lecture/ Tutorial	BTCE202.6	Assignment & End Sem Exam
33	Properties of laser beams: mono-chromaticity	Lecture/ Tutorial	BTCE202.6	Assignment & End Sem Exam
34	coherence, directionality and brightness	Lecture/ Tutorial	BTCE202.6	Assignment & End Sem Exam
35	laser speckles, applications of lasers in science	Lecture/ Tutorial	BTCE202.6	Assignment & End Sem Exam
36	engineering and medicine	Assessm ent	BTCE202.1 /2/3/4/5	Internal Assessment

H. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE202.1	Transformation of scalars and vectors under Rotation transformation; Forces in Nature; Newton's laws and its completeness in describing particle motion; Form invariance of Newton's Second Law; Solving Newton's equations of motion in polar coordinates; Problems including constraints and friction; Extension to cylindrical and spherical coordinates	3	3	1	1	1	-	-	-	-	-	2	1	-	-	-

BTCE202.2	Potential energy function; F = - Grad V, equi-potential surfaces and meaning of gradient; Conservative and non-conservative forces, curl of a force field; Central forces; Conservation of Angular Momentum; Energy equation and energy diagrams; Elliptical, parabolic and hyperbolic orbits; Kepler problem; Application: Satellite manoeuvres;	3	3	**1**	1	2	-	-	-	-	-	1	2	-	-	-
BTCE202.3	Non-inertial frames of reference; Rotating coordinate system: Five-term acceleration formula- Centripetal and Coriolis accelerations; Applications: Weather systems, Foucault pendulum;	3	3	3	2	2	-	-	-	-	-	3	3	-	-	-
BTCE202.4	Harmonic oscillator; Damped harmonic motion – over-damped, critically damped and lightly-damped oscillators; Forced oscillations and resonance	3	3	2	1	2	-	-	-	-	-	2	3	-	-	-
BTCE202.5	Definition and motion of a rigid body in the plane; Rotation in the plane; Kinematics in a coordinate system rotating and translating in the plane; Angular momentum about a point of a rigid body in planar motion; Euler's laws of motion, their independence from Newton's laws, and their necessity in describing rigid body motion; Examples	3	3	3	**3**	3	-	-	-	-	-	2	**3**	-	-	-
BTCE202.6	Introduction to three-dimensional rigid body motion — only need to highlight the distinction from two-dimensional motion in terms of (a) Angular velocity vector, and its rate of change and (b) Moment of	3	3	1	1	1	-	-	-	-	-	2	1	-	-	-

	inertia tensor; Three-dimensional motion of a rigid body wherein all points move in a coplanar manner: e.g. Rod executing conical motion with center of mass fixed — only need to show that this motion looks two-dimensional but is three-dimensional, and two dimensional formulation fails.														

Course Title				WRITTEN PAPERS Chemistry - I		
Course Code				BTCE 102		
Associated Credit Units				4		
Ser. No.	Name	Enrollment No.	Roll No.	30	70	100
1	NAMAN GOYAL	A60215818001	AU18UCV8101	23	30	53
2	SADAV KHAN	A60215818003	AU18UCV8102	17	22	39
3	SHASHWAT MOHANTY	A60215818004	AU18UCV8103	25	36	61

				Chemistry - I
				BTCE 102
				4
No. of students attended the Exam				3
No. of students secure more than 60% marks				1
Percentage of students secure more than 60% marks				33.33
Attainment Level				-

AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : Mechanics
Course Code : BTCE 220, Crédits : 1.5, Session :2018-19(Even Sem.), Class : B.Tech. 1st Year
Faculty Name : Dr. Manisha Singh, Dr. Pankaj Kumar Mishra, Dr.SnehalJani

A. Introduction: The objective of this course is to familiarize the prospective engineers with practical knowledge of oscillations, waves and mechanics. The course aims to educate the students with concept of mechanics that will help them in further development of novel mechanical instrumentation.

B. Course Outcomes: After successful completion of the course students will have the knowledge and skill to:

BTCE220.1. To determine the frequency of an electrically maintained tunning fork by Melde's method.

BTCE220.2. To determine the frequency of AC mains using sonometer.

BTCE220.3. To determine the acceleration due to gravity ("g") using Keter's reversible pendulum.

BTCE220.4. To determine the value of acceleration due to gravity ("g") in the laboratory using bar pendulum.

BTCE220.5. To determine the moment of inertia of a flywheel about its own axis of rotation.

BTCE220.6. To determine the density of material of the given wire with the help of sonometer.

BTCE220.7.Determination of Modulus of rigidity 'η' of rod by Searle's method.

BTCE220.8.Measurement of Young's modulus by bending of beam method.

BTCE220.9.To determine the coefficient of viscosity of a liquid by poiseuille's method.

BTCE220.10.To determine the rigidity modulus of the suspension wire using torsion pendulum.

BTCE220.11. To determine the frequency of an electrically maintained tunning fork by Melde's method.

BTCE220.12.To determine the surface tension of a liquid (water) by Searle's apparatus

BTCE220.13.To study a series /parallel resonant LCR circuit, its resonate frequency and quality factor.

BTCE220.14.To observe the wave-form of (i) a.c. mains supply and (ii) an oscillator using cathode ray oscilloscope.

Programme Outcomes:

[PO.1].**Engineeringknowledge**:Applytheknowledgeofmathematics,science,engineeringfundamentals,andanengineeringspecializationtothesolutionofcomplexengineeringproblems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineeringproblems reaching substantiated conclusions using first principles of mathematics, natural sciences,andengineeringsciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and designsystem components or processes that meet the specified needs with appropriate consideration for thepublichealthandsafety,andthecultural,societal,andenvironmentalconsiderations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of theinformationtoprovidevalidconclusions

[PO.5].**Moderntoolusage**:Create,select,andapplyappropriatetechniques,resources,andmodernengineering and IT tools including prediction and modeling to complex engineering activities with anunderstandingofthelimitations
[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to theprofessionalengineeringpractice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societalandenvironmentalcontexts,anddemonstratetheknowledgeof,andneedforsustainabledevelopment

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities andnorms oftheengineeringpractices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverseteams,andinmultidisciplinarysettings

[PO.10].**Communication**:Communicateeffectivelyoncomplexengineeringactivitieswith theengineeringcommunity and with society at large, such as, being able to comprehend and write effective reports anddesigndocumentation,makeeffectivepresentations,andgiveandreceiveclearinstructions

[PO.11].**Projectmanagementandfinance**:Demonstrateknowledgeandunderstandingof theengineeringandmanagementprinciplesandapplythesetoone’sownwork,asamember andleaderinateam,tomanageprojectsandinmultidisciplinaryenvironments

[PO.12].**Life-longlearning**:Recognizetheneedfor,andhavethepreparationandabilityto engageinindependent andlife-longlearninginthebroadestcontextoftechnologicalchange

C. Programme Specific Outcomes:

A graduate of Civil Engineering Program will demonstrate:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds..

D. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudent to be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

E. Syllabus

Course Code: BTCE 220 **Credit Units: 01.5**

Total hours: 20

Course Objectives

To developexperimental skills, analysis/interpretation of data, and synthesis of the information to provide valid conclusions towards theoretical concepts of applied mechanics.

List of Experiments

1. To determine the frequency of an electrically maintained tunning fork by Melde's method.
2. To determine the frequency of AC mains using sonometer.
3. To determine the acceleration due to gravity ("g") using Keter's reversible pendulum.
4. To determine the value of acceleration due to gravity ("g") in the laboratory using bar pendulum.
5. To determine the moment of inertia of a flywheel about its own axis of rotation.
6. To determine the density of material of the given wire with the help of sonometer.
7. Determination of Modulus of rigidity 'η' of rod by Searle's method.
8. Measurement of Young's modulus by bending of beam method.
9. To determine the coefficient of viscosity of a liquid by poiseuille's method.
10. To determine the rigidity modulus of the suspension wire using torsion pendulum.
11. To determine the surface tension of a liquid (water) by Jaeger's method.
12. To determine the surface tension of a liquid (water) by Searle's apparatus
13. To study a series /parallel resonant LCR circuit, its resonate frequency and quality factor.
14. To observe the wave-form of (i) a.c. mains supply and (ii) an oscillator using cathode ray oscilloscope.

Course Outcomes:

Upon completion of the experiments students will develop understanding to:

- Elasticity and modulus of elasticity.
- concept of resonance and its application
- C.G.and its importance in different engineering problems

F. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

G. Suggested Text/Reference Books:

- Physics of waves, W. C. Elmore & M. A. Heald
- Introduction to Electrodynamics, D. J. Griffith
- Engineering Physics, Satya Prakash
- Concept of Modern Physics, A. Beiser
- Solid State Physics, S. O. Pallai

H. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	To determine the frequency of an electrically maintained tunning fork by Melde's method.	Practical	BTCE220.1	Mid Term Exam, Assignment& End Sem Exam
2	To determine the frequency of AC mains using sonometer.	Practical	BTCE220.2	Mid Term Exam, Assignment& End Sem Exam
3	To determine the acceleration due to gravity ("g") using Keter's reversible pendulum. .	Practical	BTCE220.3	Mid Term Exam, Assignment& End Sem Exam
4	To determine the moment of inertia	Practi	BTCE220.4	Mid Term Exam,

	of a flywheel about its own axis of rotation.	cal		Assignment& End Sem Exam
5	To determine the value of acceleration due to gravity (“g”) in the laboratory using bar pendulum.	Practi cal	BTCE220.5	Mid Term Exam, Assignment& End Sem Exam
6	To determine the density of material of the given wire with the help of sonometer.	Practi cal	BTCE220.6	Mid Term Exam, Assignment& End Sem Exam
7	Determination of Modulus of rigidity ‘η’ of rod by Searle’s method.	Practi cal	BTCE220.7	Mid Term Exam, Assignment& End Sem Exam
8	Measurement of Young’s modulus by bending of beam method.	Practi cal	BTCE220.8	Mid Term Exam, Assignment& End Sem Exam
9	Measurement of Young’s modulus by bending of beam method.	Practi cal	BTCE220.9	Mid Term Exam, Assignment& End Sem Exam
10	To determine the rigidity modulus of the suspension wire using torsion pendulum.	Practi cal	BTCE220.10	Mid Term Exam, Assignment& End Sem Exam
11	To determine the surface tension of a liquid (water) by Jaeger’s method.	Practi cal	BTCE220.11	Mid Term Exam, Assignment& End Sem Exam
12	To determine the surface tension of a liquid (water) by Searle’s apparatus	Practi cal	BTCE220.12	Mid Term Exam, Assignment& End Sem Exam
13	To study a series /parallel resonant LCR circuit, its resonate frequency and quality factor.	Practi cal	BTCE220.13	Mid Term Exam, Assignment& End Sem Exam
14	To observe the wave-form of (i) a.c. mains supply and (ii) an oscillator using cathode ray oscilloscope.	Practi cal	BTCE220.14	Mid Term Exam, Assignment& End Sem Exam

I. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

BTCE220. 1	To determine the wavelength of sodium light by Newton's rings method.	3	3	1	1	1	-	-	-	-	-	2	1	-	-	-
BTCE220. 2	To determine the dispersive power of the material of prism with the help of a spectrometer.	3	3	1	1	2	-	-	-	-	-	1	2	-	-	-
BTCE220. 3	To determine the specific rotation of sugar by Bi-quartz or Laurent half shade polarimeter.	3	3	3	2	2	-	-	-	-	-	3	3	-	-	-
BTCE220. 4	To determine the speed of ultrasonic waves in liquid by diffraction method.	3	3	2	1	2	-	-	-	-	-	2	3	-	-	-
BTCE220. 5	To determine the width of a narrow slit using diffraction phenomena.	3	3	3	3	3	-	-	-	-	-	2	3	-	-	-
BTCE220. 6	To determine the density of material of the given wire with the help of sonometer.	3	3	1	1	1	-	-	-	-	-	2	1	-	-	-
BTCE220. 7	To determine the value of acceleration due to gravity ('g') in the laboratory using bar pendulum.	3	3	1	1	1	-	-	-	-	-	2	1	-	-	-
BTCE220. 8	To determine the moment of inertia of a flywheel about its own axis of rotation.	3	3	1	1	1	-	-	-	-	-	2	1	-	-	-
BTCE220. 9	To determine the frequency of an electrically maintained tunning fork by Melde's method.	3	3	1	1	1	-	-	-	-	-	2	1	-	-	-
BTCE220. 10	To measure the frequency of a signal by comparing the frequencies of oscillations using Lissajous figures	3	3	1	1	1	-	-	-	-	-	2	1	-	-	-

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				Physics (Mechanics) Lab		
Course Code				BTCE 220		
Associated Credit Units				2		
Ser. No.	**Name**	**Enrollment No.**	**Roll No.**	**30**	**70**	**100**
1	NAMAN GOYAL	A60215818001	AU18UCV8101	23	58	81
2	SADAV KHAN	A60215818003	AU18UCV8102	18	47	65
3	SHASHWAT MOHANTY	A60215818004	AU18UCV8103	24	60	84

				Physics (Mechanics) Lab
				BTCE 222
				2
No. of students attended the Exam				3
No. of students secure more than 60% marks				3
Percentage of students secure more than 60% marks				100.00
Attainment Level				Level 3

AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : Applied mathematics - III probability, statistics and numerical methods
Course Code : BTCE301, Crédits : 03, Session : 2018-19(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mrs. Sonia Shivhare, Dr. Alok Jain

A. Introduction

The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

B. Course Outcomes: At the end of the course, students will be able to:

- **BTCE301.1**.The students will learn: The ideas of probability and random variables and various discrete and continuous probability distributions and their properties.
- **BTCE301.2**.The basic ideas of statistics including measures of central tendency, correlation and regression.
- **BTCE301.3**. Numerical techniques to solve simultaneous linear equations, interpolation and extrapolation.
- **BTCE301.4**.Numerical techniques of differential and integral. Solution of ordinary differential equation by numerical techniques.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			100%

F. Course Content

Module I: Partial Differential Equations

Formation of PDE, Equations solvable by direct integration, Linear equations of the first order, Non-linear equations of the first order, Charpit's method, Homogeneous linear equations with constant coefficients, Non homogeneous linear equations.

Module II: Fourier Series Periodic Functions, Fourier Series, Functions having points of discontinuity, Even or Odd Functions, Change of Interval, Half-range series, Parseval's Formula, Complex form of Fourier series, Practical Harmonic Analysis, Fourier Transforms, Sine and Cosine Transforms.

Module III: Laplace Transformation Definition, Transforms of elementary functions, Properties of Laplace transforms, Existence conditions, Transforms of derivatives, Transforms of integrals, Evaluation of integrals by Laplace transform, Inverse transforms, Other methods of finding inverse transforms, Convolution theorem, Application to differential equations, Simultaneous linear equations with constant coefficients, Unit step functions, Periodic functions.

Module IV: Linear Programming Formulation of the problem, Graphical method, Canonical and Standard forms of L.P.P. Simplex Method, Artificial variable Techniques-M-method, Two phase method, Degeneracy, Dual simplex method.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- Differential Calculus by Shanti Narain
- Integral Calculus by Shanti Narai
- Higher Engineering Mathematics by B.S. Grewal

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Formation of PDE, Equations solvable by direct integration,	Lecture	BTCE301.1	Mid Term-1, Quiz & End Sem Exam
2	Linear equations of the first order,	Lecture	BTCE301.1	Mid Term-1, Quiz & End Sem Exam
3	Non-linear equations of the first order,	Lecture	BTCE301.1	Mid Term-1, Quiz & End Sem Exam
4	Charpit's method	Lecture	BTCE301.1	Mid Term-1, Quiz & End Sem Exam
5	Homogeneous linear equations with constant	Lecture	BTCE301.1	Mid Term-1, Quiz & End Sem Exam

	coefficients			
6	Non homogeneous linear equations.	Lecture	BTCE301.1	Mid Term-1, Quiz & End Sem Exam
7	Periodic Functions,	Lecture	BTCE301.1	Mid Term-1, Quiz & End Sem Exam
8	Fourier Series	Lecture	BTCE301.1	Mid Term-1, Quiz & End Sem Exam
9	Functions having points of discontinuity	Lecture	BTCE301.1	Mid Term-1, Quiz & End Sem Exam
10	Even or Odd Functions	Lecture	BTCE301.1	Mid Term-1, Quiz & End Sem Exam
11	Change of Interval, Half-range series	Lecture	BTCE301.1	Mid Term-1, Quiz & End Sem Exam
12	Parseval's Formula,	Lecture	BTCE301.1	Mid Term-1, Quiz & End Sem Exam
13	Complex form of Fourier series	Lecture	BTCE301.1	Mid Term-1, Quiz & End Sem Exam
14	Practical Harmonic Analysis	Lecture	BTCE301.1	Mid Term-1, Quiz & End Sem Exam
15	Fourier Transforms	Lecture	BTCE301.1	Mid Term-1, Quiz & End Sem Exam
16	Sine and Cosine Transforms.	Lecture	BTCE301.1	Mid Term-1, Quiz & End Sem Exam
17	Definition,s Inverse transforms	Lecture	BTCE301.1	Mid Term-1, Quiz & End Sem Exam
18	Transforms of elementary functions	Lecture	BTCE301.1	Mid Term-1, Quiz & End Sem Exam
19	Properties of Laplace transforms	Lecture	BTCE301.1	Mid Term-1, Quiz & End Sem Exam
20	Existence conditions, Transforms of derivative	Lecture	BTCE301.1	Mid Term-1, Quiz & End Sem Exam
21	Transforms of integrals	Lecture	BTCE301.1	Mid Term-2, Quiz & End Sem Exam
22	Evaluation of integrals by Laplace transform	Lecture	BTCE301.1	Mid Term-2, Quiz & End Sem Exam
23	Other methods of finding inverse transforms	Lecture	BTCE301.1	Mid Term-2, Quiz & End Sem Exam
24	Convolution theorem, Application to differential equations	Lecture	BTCE301.1	Mid Term-2, Quiz & End Sem Exam
25	linear equations with constant coefficients	Lecture	BTCE301.1	Mid Term-2, Quiz & End Sem Exam
26	Simultaneous, Unit step functions	Lecture	BTCE301.1	Mid Term-2, Quiz & End Sem Exam
27	Periodic functions	Lecture	BTCE301.1	Mid Term-2, Quiz & End Sem Exam
28	Formulation of the problem	Lecture	BTCE301.1	Mid Term-2, Quiz & End Sem Exam
29	Graphical method	Lecture	BTCE301.1	Mid Term-2, Quiz & End Sem Exam
30	Canonical and Standard	Lecture	BTCE301.1	Mid Term-2, Quiz

	forms of L.P.P.			& End Sem Exam
31	Simplex Method	Lecture	BTCE301.1	Mid Term-2, Quiz & End Sem Exam
32	Artificial variable Techniques-M-method,	Lecture	BTCE301.1	Mid Term-2, Quiz & End Sem Exam
33	Two phase method,	Lecture	BTCE301.1	Mid Term-2, Quiz & End Sem Exam
34	Degeneracy	Lecture	BTCE301.1	Mid Term-2, Quiz & End Sem Exam
35	Dual simplex method.	Lecture	BTCE301.1	Mid Term-2, Quiz & End Sem Exam
36	Dual simplex method.	Lecture	BTCE301.1	Mid Term-2, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE301.1	Solve the problem based on the Probability and have depth of knowledge to apply this idea in any field.	3	3	1	3	1				2		2	1			
BTCE301.2	Come to know the applications of partial differential equation.	3	2	2	2	2				2		1	1			
BTCE301.3	Idea about numerical techniques to solve problems based on integration and differentiation.	3	2	2	2	2				3		3	1			
BTCE301.4	Able to solve qualitative problems based on	3	3	2	3	2				1		2	1			

	graphical method.														

APPLIED MATHEMATICS - III						
Course Code				BTCE 301		
Associated Credit Units				4		
Ser. No.	**Name**	**Enrollment No.**	**Roll No.**	**30**	**70**	**100**
1	DHANANJAY CHAUHAN	A60515817003	AU17UCV8101	17	44	61
2	KARAN SINGH SIKARWAR	A60515817001	AU17UCV8102	14	44	58
3	NEHA KARAIYA	A60215817003	AU17UCV8103	20	44	64
4	RAHUL PINGLE	A60215817005	AU17UCV8104	12	14	26
5	UDDESHYA UPADHYAY	A60215817001	AU17UCV8105	12	10	22

				APPLIED MATHEMATICS - III
				BTCE 301
				4
No. of students attended the Exam				5
No. of students secure more than 60% marks				2
Percentage of students secure more than 60% marks				40.00
Attainment Level				-

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : BUILDING DESIGN AND DRAWING
Course Code : BTCE302, Crédits : 03, Session : 2018-19(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Mohan Khantharia, Mr. Shashank Gupta

A. Introduction

The objective of the course is to develop the capability for carrying out independent design. Information in the form of sketch and images to be illustrated as a part of discussion.

B. Course Outcomes: At the end of the course, students will be able to:

- **BTCE302.1**. Application of software's in design and drawings of Civil Engineering structures.
- **BTCE302.2**. Able to proficiency, including the ability to use industry-standard computer software to generate 2D and 3D drawings
- **BTCE302.3**. Understanding of the theory of orthographic projection and the conventions associated with Civil engineering drawings.

C. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

E. Course Content

Module 1 Drawing of Building Elements –various types of footing, open foundation, raft, grillage, pile and well foundation, Drawing detailing of frames of doors, window, various types of door, window and ventilator, lintels and arches, stairs and staircase, flooring, roofs etc. Empirical design of foundations and stairs.

Module 2 Building Bye-laws -Building Planning – Provisions of National Building Code, open area, setbacks, FAR terminology, principles of planning, orientation. site selection, types of drawings. Types of buildings. Classification of structure, Load bearing structure, Framed structure, Composite structure.

Module 3 Building Services – Introduction of Building Services like water supply and drainage, ventilation and lightening and staircases, thermal insulation, acoustics of buildings.

Module 4 Design and Drawing of Building – Design and preparation of detailed drawings of various types of buildings like residential building, School , institutional buildings and commercial buildings etc., plan , elevation , section of a Building

Module 5 Perspective Drawing – Elements of perspective drawing involving simple problems, one point and two point perspectives. Principle of architectural composition (i.e. Unity, Contrast, Proportion Balance etc.), Examples of architectural styles. Indian Architecture examples , Buddhist, Jain, indo-Islamic architecture, Modern architecture . comparison of old and modern architecture.

F. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/ HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

G. Suggested Books

- Building Drawing Shah M. G. Kale C. M, Tata McGraw-Hill Education
- Planning & Designing of Building Sane Y. S, Allies Book Stall
- Architectural Design Ernest Pickering, J. Wiley & Sons
- National Building Code-2005

H. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	Drawing of Building Elements,	Lecture	BTCE302.1	Mid Term-1, Quiz & End Sem Exam
2	various types of footing	Lecture	BTCE302.1	Mid Term-1, Quiz & End Sem Exam
3	open foundation, raft, grillage.	Lecture	BTCE302.1	Mid Term-1, Quiz & End Sem Exam

4	pile and well foundation	Lecture	BTCE302.1	Mid Term-1, Quiz & End Sem Exam
5	Drawing detailing of frames of doors, window	Lecture	BTCE302.1	Mid Term-1, Quiz & End Sem Exam
6	various types of door, window and ventilator,	Lecture	BTCE302.1	Mid Term-1, Quiz & End Sem Exam
7	lintels and arches, stairs and staircase	Lecture	BTCE302.1	Mid Term-1, Quiz & End Sem Exam
8	Flooring, roofs etc. Empirical design of foundations and stairs.	Lecture	BTCE302.1	Mid Term-1, Quiz & End Sem Exam
9	Building Bye-laws terminology, types of drawings.	Lecture	BTCE302.1	Mid Term-1, Quiz & End Sem Exam
10	Building Planning – Provisions of National Building Code	Lecture	BTCE302.1	Mid Term-1, Quiz & End Sem Exam
11	open area, setbacks, FAR	Lecture	BTCE302.1	Mid Term-1, Quiz & End Sem Exam
12	principles of planning, orientation. site selection	Lecture	BTCE302.1	Mid Term-1, Quiz & End Sem Exam
13	Types of buildings.	Lecture	BTCE302.1	Mid Term-1, Quiz & End Sem Exam
14	Classification of structure	Lecture	BTCE302.1	Mid Term-1, Quiz & End Sem Exam
15	Load bearing structure, Framed structure	Lecture	BTCE302.1	Mid Term-1, Quiz & End Sem Exam
16	Composite structure.	Lecture	BTCE302.1	Mid Term-1, Quiz & End Sem Exam
17	Building Services thermal insulation	Lecture	BTCE302.1	Mid Term-1, Quiz & End Sem Exam
18	Introduction of Building Services like water supply and drainage	Lecture	BTCE302.1	Mid Term-1, Quiz & End Sem Exam
19	ventilation and lightening and staircases	Lecture	BTCE302.1	Mid Term-1, Quiz & End Sem Exam
20	Acoustics of buildings.	Lecture	BTCE302.1	Mid Term-1, Quiz & End Sem Exam
21	Design and–like	Lecture	BTCE302.1	Mid Term-2, Quiz & End Sem Exam
22	Drawing of Building	Lecture	BTCE302.1	Mid Term-2, Quiz & End Sem Exam
23	Design and preparation of detailed drawings of various types of buildings	Lecture	BTCE302.1	Mid Term-2, Quiz & End Sem Exam
24	residential building, School , institutional buildings	Lecture	BTCE302.1	Mid Term-2, Quiz & End Sem Exam
25	commercial buildings etc., plan	Lecture	BTCE302.1	Mid Term-2, Quiz & End Sem Exam
26	elevation , section of a Building	Lecture	BTCE302.1	Mid Term-2, Quiz & End Sem Exam
27	Perspective Drawing –, (i.e.	Lecture	BTCE302.1	Mid Term-2, Quiz

	Unity, Contrast, Proportion Balance etc.),. ,			& End Sem Exam
28	Elements of perspective drawing involving simple problems	Lecture	BTCE302.1	Mid Term-2, Quiz & End Sem Exam
29	one point and two point perspectives.	Lecture	BTCE302.1	Mid Term-2, Quiz & End Sem Exam
30	Principle of architectural composition	Lecture	BTCE302.1	Mid Term-2, Quiz & End Sem Exam
31	Examples of architectural styles	Lecture	BTCE302.1	Mid Term-2, Quiz & End Sem Exam
32	Indian Architecture examples	Lecture	BTCE302.1	Mid Term-2, Quiz & End Sem Exam
33	Buddhist,.	Lecture	BTCE302.1	Mid Term-2, Quiz & End Sem Exam
34	indo-Islamic architecture,	Lecture	BTCE302.1	Mid Term-2, Quiz & End Sem Exam
35	Jain Modern architecture comparison of old and modern architecture	Lecture	BTCE302.1	Mid Term-2, Quiz & End Sem Exam
36	Jain Modern architecture comparison of old and modern architecture	Lecture	BTCE302.1	Mid Term-2, Quiz & End Sem Exam

I.

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE302.1	Application of software's in design and drawings of Civil Engineering structures.	3	3	1	3	1				2		2	1			
BTCE302.2	Able to proficiency, including the ability to use industry-standard computer software to generate 2D and 3D drawings	3	2	2	2	2				2		1	1			
BTCE302.3	Understanding of the theory of orthographic projection and the conventions associated with	3	2	2	2	2				3		3	1			

	Civil engineering drawings.															

Sample Question Paper

<table>
<tr><td colspan="7">Amity School of Engineering and Technology
Department of CIVIL Engineering
MID-SEMESTER(SEM–III)2018-19</td></tr>
<tr><td colspan="7">Class: B.Tech (CE) 3rd Semester</td></tr>
<tr><td colspan="2">Subject Name:
BTCE 302 Building Design and Drawing</td><td colspan="3">Time:1.5Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3,6</td><td>Q.4</td><td>Q.2,5</td><td></td><td></td></tr>
<tr><td colspan="7">Student will be able to
CO1: Using the software for the design of buildings, making plans.
CO2: Applying the basic concept of drawing
CO3: Understanding the various projections.</td></tr>
</table>

CO Map	Question No.	Question	Marks
CO1	Q.1	Use paneled door and windows	3
CO1	Q.2a	What are various software used for the design of building.	3
	Q.2b	Write down steps involved in site selection for building design.	3
CO1	Q.3	What do you mean by orientation of building?	6
CO2	Q.4	Discuss various types of projections.	3
CO2	Q.5a	Draw orthographic projections.	3
	Q.5b	Discuss various types of elements of building drawing.	3
CO3	Q6	What do you mean by 2-d and 3-d projections.	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

BUILDING DESIGN & DRAWING						
Course Code				BTCE 302		
Associated Credit Units				3		
Ser. No.	Name	Enrollment No.	Roll No.	30	130	160
1	DHANANJAY CHAUHAN	A60515817003	AU17UCV8101	20	81	101
2	KARAN SINGH SIKARWAR	A60515817001	AU17UCV8102	16	74	90
3	NEHA KARAIYA	A60215817003	AU17UCV8103	16	80	96
4	RAHUL PINGLE	A60215817005	AU17UCV8104	17	43	60
5	UDDESHYA UPADHYAY	A60215817001	AU17UCV8105	14	36	50

				BUILDING DESIGN & DRAWING
				BTCE 302
				3
No. of students attended the Exam				5
No. of students secure more than 60% marks				3
Percentage of students secure more than 60% marks				60.00
Attainment Level				Level 1

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **MECHANICS OF SOLIDS**
Course Code : BTCE303, Credits : 03, Session : 2018-19(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Mohan Khantharia, Mr. Shashank Gupta, Mr. Sachin Tiwari

A. Introduction

The course also covers the simple and compound stresses due to forces, stresses and deflection in beams due to bending, torsion in circular section, strain energy, different theories of failure, stress in thin cylinder thick cylinder and spheres due to external and internal pressure.

B. Course Outcomes: At the end of the course, students will be able to:

- **BTCE303.1** Able to know the importance of seismic activity consideration in terrain.
- **BTCE303.2** Able to understand various techniques to determine engineering properties of rocks and distinguish different types of rocks and minerals.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects.

D.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

E.

Module I: Simple stresses and strains Concept of stress and strain; Hooke's law, Young's modulus, Poisson ratio, stress at a point, stress and strains in bars subjected to axial loading. Modulus of elasticity, stress produced in compound bars subject to axial loading. Temperature stress and strain calculations due to applications of axial loads and variation of temperature in single and compound walls. Impact loading.

Module II: Compound stress and strains The two dimensional system; stress at a point on a plane, principal stresses and principal planes; Mohr's circle of stress. Graphical and Analytical methods for stresses on oblique section of body. Shear force and bending moment diagrams for cantilever, simply supported and overhanging beams.

Module III Theory of bending stresses in beams due to bending, assumptions in the simple bending theory, derivation of formula: its application to beams of rectangular, circular and channel sections, composite / flitched beams, bending and shear stresses in composite beams.

Module IV: Torsion Derivation of torsion equation and its assumptions. Applications of the equation of the hollow and solid circular shafts torsional rigidity, combined torsion and bending of circular shafts principal stress and maximum shear stresses under combined loading of bending and torsion, analysis of close-coiled-helical springs.

Module V: Thin cylinders and spheres Derivation of formulae and calculation of hoop stress, longitudinal stress in a cylinder and sphere subjected to internal pressure.

Module VI: Columns and struts Columns and failure of columns, Euler's formulas; Rankine-Gordon's formula, Johnson's empirical formula for axially loaded columns and their applications.

Module VII: Slope and deflection Relationship between moment, slope and deflection, Mohr's theorem; Moment area method; method of integration; Macaulay's method: Use of all these methods to calculate slope and deflection for the following:

- Cantilevers
- Simply supported beams with or without overhang
- Under concentrated loads, uniformly distributed loads or combination of concentrated and uniformly distributed loads.

F. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/ HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

G.

- Jindal U.C., "Strength of Materials", Galgotia Publication, New Delhi, 1998.
- Ryder G.H., "Strength of Materials", Macmillan, Delhi, 2003.
- R.K. Bansal, "Strength of Materials", Laxmi Publication, New Delhi, 2001.
- Sadhu Singh, "Strength of Materials", Khanna Publishers, New Delhi, 2000.
- Timoshenko S.P., "Elements of Strength of Materials", East-West affiliated, New Delhi, 2000.
- Hibbler R.C., "Mechanics of Materials", Prentice Hall, New Delhi, 1994.

H.

Lecture	**Topics**	**Mode**	**Correspon**	**Mode of**

		of Delivery	ding CO	Assessing CO
1	Concept of stress and strain	Lecture	BTCE303.1	Mid Term-1, Quiz & End Sem Exam
2	Hooke's law, Young's modulus, Poisson ratio, stress at a point	Lecture	BTCE303.1	Mid Term-1, Quiz & End Sem Exam
3	stress and strains in bars subjected to axial loading	Lecture	BTCE303.1	Mid Term-1, Quiz & End Sem Exam
4	Modulus of elasticity, stress produced in compound bars subject to axial loading.	Lecture	BTCE303.1	Mid Term-1, Quiz & End Sem Exam
5	Temperature stress and strain calculations due to applications of axial loads	Lecture	BTCE303.1	Mid Term-1, Quiz & End Sem Exam
6	variation of temperature in single and compound walls	Lecture	BTCE303.1	Mid Term-1, Quiz & End Sem Exam
7	Impact loading.	Lecture	BTCE303.1	Mid Term-1, Quiz & End Sem Exam
8	The two dimensional system., simply supported and overhanging beams	Lecture	BTCE303.1	Mid Term-1, Quiz & End Sem Exam
9	stress at a point on a plane	Lecture	BTCE303.1	Mid Term-1, Quiz & End Sem Exam
10	Principal stresses and principal planes	Lecture	BTCE303.1	Mid Term-1, Quiz & End Sem Exam
11	Mohr's circle of stress.	Lecture	BTCE303.1	Mid Term-1, Quiz & End Sem Exam
12	Graphical and Analytical methods for stresses on oblique section of body	Lecture	BTCE303.1	Mid Term-1, Quiz & End Sem Exam
13	Shear force and bending moment diagrams for cantilever	Lecture	BTCE303.1	Mid Term-1, Quiz & End Sem Exam
14	Shear force and bending moment diagrams overhanging beams	Lecture	BTCE303.1	Mid Term-1, Quiz & End Sem Exam
15	Theory of bending stresses in beams due to bending,	Lecture	BTCE303.1	Mid Term-1, Quiz & End Sem Exam
16	Theory of bending stresses in beams assumption	Lecture	BTCE303.1	Mid Term-1, Quiz & End Sem Exam
17	In the simple bending theory	Lecture	BTCE303.1	Mid Term-1, Quiz & End Sem Exam
18	Derivation of formula: its application to beams of rectangular	Lecture	BTCE303.1	Mid Term-1, Quiz & End Sem Exam
19	circular and channel sections, composite / flitched	Lecture	BTCE303.1	Mid Term-1, Quiz & End Sem Exam
20	Beams, bending and shear	Lecture	BTCE303.1	Mid Term-1, Quiz

	stresses in composite beams.			& End Sem Exam
21	Derivation of torsion equation . torsional and torsion.	Lecture	BTCE303.1	Mid Term-2, Quiz & End Sem Exam
22	Derivation of torsion assumptions	Lecture	BTCE303.1	Mid Term-2, Quiz & End Sem Exam
23	Applications of the equation of the hollow and solid circular shafts	Lecture	BTCE303.1	Mid Term-2, Quiz & End Sem Exam
24	Rigidity, combined torsion and bending of circular shafts	Lecture	BTCE303.1	Mid Term-2, Quiz & End Sem Exam
25	Principal stress	Lecture	BTCE303.1	Mid Term-2, Quiz & End Sem Exam
26	Maximum shear stresses under combined loading of bending	Lecture	BTCE303.1	Mid Term-2, Quiz & End Sem Exam
27	Analysis of close-coiled-helical springs	Lecture	BTCE303.1	Mid Term-2, Quiz & End Sem Exam
28	Derivation of formulae and calculation of hoop stress.	Lecture	BTCE303.1	Mid Term-2, Quiz & End Sem Exam
29	Longitudinal stress in a cylinder	Lecture	BTCE303.1	Mid Term-2, Quiz & End Sem Exam
30	Sphere subjected to internal pressure.	Lecture	BTCE303.1	Mid Term-2, Quiz & End Sem Exam
31	Columns and failure of columns.	Lecture	BTCE303.1	Mid Term-2, Quiz & End Sem Exam
32	Euler's formulas	Lecture	BTCE303.1	Mid Term-2, Quiz & End Sem Exam
33	Rankine-Gordon's formula.	Lecture	BTCE303.1	Mid Term-2, Quiz & End Sem Exam
34	Johnson's empirical formula	Lecture	BTCE303.1	Mid Term-2, Quiz & End Sem Exam
35	For axially loaded columns and their applications	Lecture	BTCE303.1	Mid Term-2, Quiz & End Sem Exam
36	For axially loaded columns and their applications	Lecture	BTCE303.1	Mid Term-2, Quiz & End Sem Exam

I.

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE302.1	Able to know the importance of seismic activity consideration in	3	3	1	3	1				2		2	1			

	terrain.															
BTCE302.2	Able to understand various techniques to determine engineering properties of rocks and distinguish different types of rocks and minerals	3	2	2	2	2				2		1	1			

Sample Question Paper

<table>
<tr><td colspan="7">Amity School of Engineering and Technology
Department of CIVIL Engineering
MID-SEMESTER(SEM–III)2018-19</td></tr>
<tr><td colspan="7">Class: B.Tech (CE) 3rd Semester</td></tr>
<tr><td colspan="2">Subject t Name:
BTCE 303 Mechanics of Solids</td><td colspan="3">Time:1.5Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3,6</td><td>Q.4</td><td>Q.2,5</td><td></td><td></td></tr>
<tr><td colspan="7">Student will be able to
CO1: Understand the basic concept of stress and strain
CO2: Analyze the basic properties of different materials.</td></tr>
</table>

<table>
<tr><td>CO Map</td><td>Question No.</td><td>Question</td><td>Marks</td></tr>
<tr><td>CO1</td><td>Q.1</td><td>What is force and it system?</td><td>3</td></tr>
<tr><td rowspan="2">CO1</td><td>Q.2a</td><td>What is torsion?</td><td>3</td></tr>
<tr><td>Q.2b</td><td>What do you mean by free body diagram?</td><td>3</td></tr>
<tr><td>CO1</td><td>Q.3</td><td>What is stress and strain?</td><td>6</td></tr>
<tr><td>CO2</td><td>Q.4</td><td>What is Kinetics of rigid body and also Review of particle dynamics.</td><td>3</td></tr>
<tr><td rowspan="2">CO2</td><td>Q.5a</td><td>What is centre of gravity.</td><td>3</td></tr>
<tr><td>Q.5b</td><td>What is principle stress and strain?</td><td>3</td></tr>
<tr><td>CO2</td><td>Q6</td><td>What is Newton’s 2nd law (rectangular, path, and polar coordinates).</td><td>6</td></tr>
</table>

Attainments	**Rubric**

Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

MECHANICS OF SOLIDS						
Course Code				BTCE 303		
Associated Credit Units				**3**		
Ser. No.	**Name**	**Enrollment No.**	**Roll No.**	**30**	**70**	**100**
1	**DHANANJAY CHAUHAN**	**A60515817003**	**AU17UCV8101**	**21**	**46**	**67**
2	**KARAN SINGH SIKARWAR**	**A60515817001**	**AU17UCV8102**	**25**	**45**	**70**
3	**NEHA KARAIYA**	**A60215817003**	**AU17UCV8103**	**24**	**57**	**81**
4	**RAHUL PINGLE**	**A60215817005**	**AU17UCV8104**	**19**	**40**	**59**
5	**UDDESHYA UPADHYAY**	**A60215817001**	**AU17UCV8105**	**18**	**38**	**56**

				MECHANICS OF SOLIDS
				BTCE 303
				3
No. of students attended the Exam				5
No. of students secure more than 60% marks				3
Percentage of students secure more than 60% marks				60.00
Attainment Level				Level 1

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **MECHANICS OF FLUIDS**
Course Code : BTCE304, Credits : 04, Session : 2018-19(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Mohan Khantharia, Mr. Shashank Gupta, Mr. Sachin Tiwari

A. Introduction

Fluid mechanics is the study of fluids either in motion (fluid dynamics) or at rest (fluid statics). Both liquids and gases are classified as fluids. There is a theory available for fluid flow problems, but in all cases it should be backed up by experiment. It is a highly visual subject with good instrumentation.

B. Course Outcomes: At the end of the course students will be able to learn

- **BTCE304.1** properties of fluids, pressure measurement devices, hydraulic forces on surfaces, bouncy and flotation in fluids, kinematics and static behavior of fluids.
- **BTCE304.2** dimension and model analysis, laminar and turbulent flow, flow through pipes and orifices, boundary layer theory.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects.

D. Programme Specific Outcomes:

PSO1: Students will be able to understand the different types of fluids exists in nature their properties and behavior.

PSO2: Students will able to apply all the concepts of fluid mechanics for different types of floating and submerged vessels and different types of forces acting on it.

PSO3: It will help students to analyze different types of flows and their characteristics.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25%includesalltypesofleaves Including medical leaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F.

Module I: Basic Concepts and Definitions: Distinction between a fluid and a solid; Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; variation of viscosity with temperature, Newton law of viscosity; vapour pressure, boiling point, cavitation; surface tension, capillarity, Bulk modulus of elasticity,compressibility.

Module II: Fluid Statics: Fluid Pressure: Pressure at a point, Pascals law, pressure variation with temperature, density and altitude. Piezometer, U-Tube Manometer, Single Column Manometer, U-Tube Differential Manometer, Micromanometers. pressure gauges, Hydrostatic pressure and force: horizontal, vertical and inclined surfaces. Buoyancy and stability of floating bodies.

Module III: Fluid Kinematics: Classification of fluid flow: steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one, two and three dimensional flows; Stream line, path line, streak line and stream tube; stream function, velocity potential function. One-, two- and three -dimensional continuity equations in Cartesian coordinates

Module III: Fluid Dynamics: Surface and body forces; Equations of motion - Euler's equation; Bernoulli's equation – derivation; Energy Principle; Practical applications of Bernoulli's equation: venturimeter, orifice meter and pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend; Vortex Flow – Free and Forced; Dimensional Analysis and Dynamic Similitude - Definitions of Reynolds Number, Froude Number, Mach Number, Weber *Number and Euler Number; Buckingham's* π-Theorem. Notches and Weirs.

Module IV: Fluid Dynamics: Boundary layer theory, drag and lift force, drag on a sphere, rough and smooth boundaries, concept of mixing length, boundary layer distribution for various shapes and for various Reynold's number.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- R.K. Bansal, "Fluid Mechanics & Hydraulic Machines", Laxmi Publications (P) Ltd., 2002.
- Gupta, S. C., Fluid Mechanics and Hydraulic Machines, Pearson Education, 2007
- D.S. Kumar, "Fluid Mechanics and Fluid Power Engineering", S.K. Kataria & Sons, 2000.
- F. M. White, Introduction to Fluid Mechanics, McGraw Hill
- I.H. Shames, "Mechanics of Fluids", Tata McGraw Hill

I. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	Distinction between a fluid and a solid.	Lecture	BTCE304.1	Mid Term-1, Quiz & End Sem Exam
2	Density, Specific weight, Specific gravity, Kinematic	Lecture	BTCE304.1	Mid Term-1, Quiz & End Sem Exam

	and dynamic viscosity			
3	Variation of viscosity with temperature,	Lecture	BTCE304.1	Mid Term-1, Quiz & End Sem Exam
4	vapour pressure, boiling point, cavitation	Lecture	BTCE304.1	Mid Term-1, Quiz & End Sem Exam
5	surface tension, capillarity,	Lecture	BTCE304.1	Mid Term-1, Quiz & End Sem Exam
6	Bulk modulus of elasticity,compressibility.	Lecture	BTCE304.1	Mid Term-1, Quiz & End Sem Exam
7	Newton law of viscosity	Lecture	BTCE304.1	Mid Term-1, Quiz & End Sem Exam
8	Fluid Pressure: Pressure at a point, U-Tube, Hydrostatic pressure and force.	Lecture	BTCE304.1	Mid Term-1, Quiz & End Sem Exam
9	Pascals law, pressure variation with temperature Single Column Manometer	Lecture	BTCE304.1	Mid Term-1, Quiz & End Sem Exam
10	Density and altitude. Piezometer, U-Tube Manometer	Lecture	BTCE304.1	Mid Term-1, Quiz & End Sem Exam
11	Differential Manometer, Micromanometers. pressure gauges	Lecture	BTCE304.1	Mid Term-1, Quiz & End Sem Exam
12	Horizontal, vertical and inclined surfaces.	Lecture	BTCE304.1	Mid Term-1, Quiz & End Sem Exam
13	Buoyancy and stability of floating bodies.	Lecture	BTCE304.1	Mid Term-1, Quiz & End Sem Exam
14	Classification of fluid flow: steady and unsteady flow; and incompressible flow; ideal and, path line.	Lecture	BTCE304.1	Mid Term-1, Quiz & End Sem Exam
15	uniform and non-uniform flow; laminar and turbulent flow	Lecture	BTCE304.1	Mid Term-1, Quiz & End Sem Exam
16	Rotational and irrotational flow; compressible.	Lecture	BTCE304.1	Mid Term-1, Quiz & End Sem Exam
17	Real fluid flow; one, two and three dimensional flows; Stream line	Lecture	BTCE304.1	Mid Term-1, Quiz & End Sem Exam
18	Streak line and stream tube; stream function, velocity potential function	Lecture	BTCE304.1	Mid Term-1, Quiz & End Sem Exam
19	One-, two- and three - dimensional continuity equations in Cartesian coordinates	Lecture	BTCE304.1	Mid Term-1, Quiz & End Sem Exam
20	Surface and body forces; Equations of motion,;	Lecture	BTCE304.1	Mid Term-1, Quiz & End Sem Exam
21	Euler's equation; Bernoulli's	Lecture	BTCE304.1	Mid Term-2, Quiz

	equation – derivation			& End Sem Exam
22	Energy Principle; Practical applications of Bernoulli's equation	Lecture	BTCE304.1	Mid Term-2, Quiz & End Sem Exam
23	Venturimeter, orifice meter and pitot tube; Momentum principle	Lecture	BTCE304.1	Mid Term-2, Quiz & End Sem Exam
24	Forces exerted by fluid flow on pipe bend	Lecture	BTCE304.1	Mid Term-2, Quiz & End Sem Exam
25	Vortex Flow – Free and Forced	Lecture	BTCE304.1	Mid Term-2, Quiz & End Sem Exam
26	Dimensional Analysis and Dynamic Similitude	Lecture	BTCE304.1	Mid Term-2, Quiz & End Sem Exam
27	Definitions of Reynolds Number	Lecture	BTCE304.1	Mid Term-2, Quiz & End Sem Exam
28	Froude Number, Mach Number, Weber Number and Euler Number	Lecture	BTCE304.1	Mid Term-2, Quiz & End Sem Exam
29	Buckingham's π-Theorem. Notches and Weirs.	Lecture	BTCE304.1	Mid Term-2, Quiz & End Sem Exam
30	Boundary layer theory	Lecture	BTCE304.1	Mid Term-2, Quiz & End Sem Exam
31	Drag and lift force	Lecture	BTCE304.1	Mid Term-2, Quiz & End Sem Exam
32	Drag on a sphere, concept of mixing length.	Lecture	BTCE304.1	Mid Term-2, Quiz & End Sem Exam
33	Rough and smooth boundaries,	Lecture	BTCE304.1	Mid Term-2, Quiz & End Sem Exam
34	Boundary layer distribution for various shapes	Lecture	BTCE304.1	Mid Term-2, Quiz & End Sem Exam
35	boundary layer distribution for various shapes for various Reynold's number.	Lecture	BTCE304.1	Mid Term-2, Quiz & End Sem Exam
36	For various Reynold's number.	Lecture	BTCE304.1	Mid Term-2, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

BTCE304.1	Solve the problem based on the different types of fluid exists in nature and for real time fluid flow.	3	3	1	3	1				2		2	1			
BTCE304.2	Come to know the fundamentals of different types of pressure measuring and flow measuring devices stability of different bodies floating and submerged in the fluid.	3	2	2	2	2				2		1	1			

Sample Question Paper

<table>
<tr><td colspan="7">Amity School of Engineering and Technology
Department of CIVIL Engineering
MID-SEMESTER(SEM–IV)2018-19</td></tr>
<tr><td colspan="7">Class: B.Tech (CE) III Semester</td></tr>
<tr><td colspan="2">SubjectName:
BTCE 304 Fluid Mechanics</td><td colspan="3">Time:1.5Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of thequestions as perBloomsTaxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>QuestionMapping</td><td>Q.1,4</td><td>Q.2,3</td><td>Q.4</td><td>Q.2,5,6</td><td></td><td></td></tr>
<tr><td colspan="7">Student willbeableto
CO1:Understand the different types of fluid and their nature
CO2: Use of different types of pressure measuring devices</td></tr>
</table>

COMap	QuestionNo.	Question	Marks
CO1	Q.1	Discuss different types of fluid	3
CO1	Q.2a	What are different types of flow	3
	Q.2b	Discuss Newton’s law of viscosity	3
CO1	Q.3	What is Rehology?	6
CO2	Q.4	What do you mean by Barometer?	3
CO2	Q.5a	What is kinematic and dynamic viscosity	3
	Q.5b	Write different flow conditions.	3

CO2	Q6	Different types of manometers	6

Attainments		Rubric
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

MECHANICS OF FLUIDS						
Course Code				BTCE 304		
Associated Credit Units				**4**		
Ser. No.	**Name**	**Enrollment No.**	**Roll No.**	**30**	**70**	**100**
1	**DHANANJAY CHAUHAN**	**A60515817003**	**AU17UCV8101**	**27**	**52**	**79**
2	**KARAN SINGH SIKARWAR**	**A60515817001**	**AU17UCV8102**	**26**	**51**	**77**
3	**NEHA KARAIYA**	**A60215817003**	**AU17UCV8103**	**25**	**66**	**91**
4	**RAHUL PINGLE**	**A60215817005**	**AU17UCV8104**	**25**	**44**	**69**
5	**UDDESHYA UPADHYAY**	**A60215817001**	**AU17UCV8105**	**17**	**47**	**64**

	MECHANICS OF FLUIDS
	BTCE 304
	4
No. of students attended the Exam	5
No. of students secure more than 60% marks	5
Percentage of students secure more than 60% marks	100.00
Attainment Level	Level 3

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **BUILDING TECHNOLOGY**
Course Code : BTCE305, Credits : 04, Session : 2018-19(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Mohan Khantharia, Mr. Shashank Gupta, Mr. Sachin Tiwari

A. Introduction

The course covers building materials and their testing, cement and its applications foundation and structural members of building. Different areas and utilities of building like floors, doors etc.

B. Course Outcomes: At the end of the course students will be able to learn

- **BTCE305.1** Able to Impart the knowledge about the characteristics, sources and defects in various materials used for construction purposes.
- **BTCE305.2** Able to design and test the materials either in the laboratory or in the field before their actual use at the site.
- **BTCE305.3** Able to attain the knowledge of different components of building, their classification, materials and methods of construction and causes of their failures.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects.

D. Programme Specific Outcomes:

PSO1: Students will be able to understand the different types of rocks and materials exists in nature.

PSO2: Students will able to apply all the concepts of material design and their characteristics in real time construction practices.

PSO3: It will help students to analyze different types of buildings and structure.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/ HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25%includesalltypesofleaves Including medical leaves.	A	5%

End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module I: Building stones - Classification of rocks - Quarrying - Dressing - Properties and uses of common type of stones; Timber - Defects - Seasoning - Decay - Preservation - Plywood, fibre board, particle board; Clay products - Bricks - Manufacture - IS classifications - Properties and testing - Types of bricks - Tiles - Manufacture, properties and uses - Types of tiles; Ceramic products - Lime - Classification - Manufacture, properties and uses.

Module II: Cement - Ingredients - Manufacture - Types of cement - Properties and testing - Uses; Mortar - Sand - Properties - Types of mortar and uses; Concrete - Properties of fresh concrete and tests - Proportioning of concrete mixes - Properties of hardened concrete and tests – Recent developments in concrete; Iron and steel - Structural sections - Properties and uses of structural steel - Recent developments; Miscellaneous materials - Glass - Plastics -A.C.sheets – Thermocole.

Module III: Foundation - Timbering of foundation trenches - Bearing capacity of soils - Improvement of bearing capacity - Settlement of foundation - Description of spread, grillage, raft and pile foundations; Brick and stone masonry - Bonds in brick work - Types of stone masonry -Cavity walls - Lintels and arches; concrete construction - Batching, mixing, placing, compacting and curing of concrete - form work - Precast concrete - Prestressed concrete - Recent developments in concreting; Partition walls - Types and features.

Module IV: Floors and flooring – Different types and applications; Doors, windows and ventilators - Different types; Finishing works; Building Failures - Concrete failure - Steel failure -Foundation failure - Other types of failures – Causes and Remedial measures – Building repairs - Shoring - Underpinning – Scaffolding; Tall buildings - Framed structures - Steel and concrete frames – Joints in steel and concrete frames - Introduction to prefabrication – Slip form and lift slab constructions; Fire proof construction – Fire load - Fire resisting properties of building materials – Fire extinguishing methods – Fire proof construction methods.

Module V: Industrial Visit At least one visit to local industry in the field of civil Engineering of one day duration.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- Punmia B. C, Ashok Kr. Jain, Arun Kr. Jain, Building Construction, Laxmi Publications, New Delhi. (2008).
- Shetty M. S, Concrete Technology, S. Chand & Co., New Delhi (2008).

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Building stones Timber Defects Clay products Bricks	Lecture	BTCE305.1	Mid Term-1, Quiz & End Sem Exam
2	Classification of rocks - Quarrying - Dressing - Properties and uses of common type of stones	Lecture	BTCE305.1	Mid Term-1, Quiz & End Sem Exam
3	Seasoning - Decay - Preservation - Plywood, fibre board, particle board	Lecture	BTCE305.1	Mid Term-1, Quiz & End Sem Exam
4	Manufacture - IS classifications	Lecture	BTCE305.1	Mid Term-1, Quiz & End Sem Exam
5	Properties and testing - Types of bricks	Lecture	BTCE305.1	Mid Term-1, Quiz & End Sem Exam
6	Tiles - Manufacture, properties and use	Lecture	BTCE305.1	Mid Term-1, Quiz & End Sem Exam
7	Types of tiles; Ceramic products	Lecture	BTCE305.1	Mid Term-1, Quiz & End Sem Exam
8	Lime - Classification - Manufacture, properties and uses.	Lecture	BTCE305.1	Mid Term-1, Quiz & End Sem Exam
9	Cement - Ingredients - - Uses; Mortar - Sand -; - -; Iron and steel -	Lecture	BTCE305.1	Mid Term-1, Quiz & End Sem Exam
10	Manufacture - Types of cement - Properties and testing	Lecture	BTCE305.1	Mid Term-1, Quiz & End Sem Exam
11	Properties - Types of mortar and uses	Lecture	BTCE305.1	Mid Term-1, Quiz & End Sem Exam
12	Concrete - Properties of fresh concrete and tests	Lecture	BTCE305.1	Mid Term-1, Quiz & End Sem Exam
13	Proportioning of concrete mixes	Lecture	BTCE305.1	Mid Term-1, Quiz & End Sem Exam
14	Properties of hardened concrete and tests – Recent developments in concrete	Lecture	BTCE305.1	Mid Term-1, Quiz & End Sem Exam
15	Structural sections - Properties and uses of structural steel	Lecture	BTCE305.1	Mid Term-1, Quiz & End Sem Exam
16	Recent developments; Miscellaneous materials Glass Plastics A.C.sheets Thermocole.	Lecture	BTCE305.1	Mid Term-1, Quiz & End Sem Exam
17	Foundation - Timbering of	Lecture	BTCE305.1	Mid Term-1, Quiz

	Foundation trenches Bonds in brick work			& End Sem Exam
18	Bearing capacity of soils Improvement of bearing capacity	Lecture	BTCE305.1	Mid Term-1, Quiz & End Sem Exam
19	Settlement of foundation - Description of spread	Lecture	BTCE305.1	Mid Term-1, Quiz & End Sem Exam
20	Grillage, raft and pile foundations; Brick and stone masonry	Lecture	BTCE305.1	Mid Term-1, Quiz & End Sem Exam
21	Types of stone masonry -Cavity walls - Lintels and arches	Lecture	BTCE305.1	Mid Term-2, Quiz & End Sem Exam
22	concrete construction - Batching, mixing, placing, compacting and curing of concrete	Lecture	BTCE305.1	Mid Term-2, Quiz & End Sem Exam
23	Form work - Precast concrete	Lecture	BTCE305.1	Mid Term-2, Quiz & End Sem Exam
24	Prestressed concrete - Recent developments in concreting	Lecture	BTCE305.1	Mid Term-2, Quiz & End Sem Exam
25	Partition walls - Types and features.	Lecture	BTCE305.1	Mid Term-2, Quiz & End Sem Exam
26	Floors and flooring Fire extinguishing methods Fire proof construction methods.	Lecture	BTCE305.1	Mid Term-2, Quiz & End Sem Exam
27	Different types and applications	Lecture	BTCE305.1	Mid Term-2, Quiz & End Sem Exam
28	Doors, windows and ventilators.	Lecture	BTCE305.1	Mid Term-2, Quiz & End Sem Exam
29	Different types; Finishing works	Lecture	BTCE305.1	Mid Term-2, Quiz & End Sem Exam
30	Building Failures - Concrete failure	Lecture	BTCE305.1	Mid Term-2, Quiz & End Sem Exam
31	Steel failure -Foundation failure Other types of failures – Causes and Remedial measures	Lecture	BTCE305.1	Mid Term-2, Quiz & End Sem Exam
32	Building repairs – Shoring Underpinning – Scaffolding; Tall buildings - Framed structures	Lecture	BTCE305.1	Mid Term-2, Quiz & End Sem Exam
33	Steel and concrete frames – Joints in steel and concrete frames	Lecture	BTCE305.1	Mid Term-2, Quiz & End Sem Exam
34	Introduction to prefabrication – Slip form and lift slab constructions	Lecture	BTCE305.1	Mid Term-2, Quiz & End Sem Exam
35	Fire proof construction – Fire load - Fire resisting properties of building materials	Lecture	BTCE305.1	Mid Term-2, Quiz & End Sem Exam
36	Industrial Visit At least one visit	Lecture	BTCE305.1	Mid Term-2, Quiz

	to local industry in the field of civil Engineering of one day duration.			& End Sem Exam

Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE305.1	Students will be able to understand the different types of rocks and materials exists in nature. .	3	3	1	3	1				2		2	1	1	2	1
BTCE305.2	Students will able to apply all the concepts of material design and their characteristics in real time construction practices.	3	2	2	2	2				2		1	1	2	2	1
BTCE305.3	It will help students to analyze different types of buildings and structure.	2	1	1	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER 2018-19						
Class: B.Tech (CE) III Semester						
SubjectName: BTCE 305 Building Technology		Time:1.5Hrs			Max.Marks:30	
Levels of thequestions as perBloomsTaxo	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

nomy						
QuestionM apping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to
CO1:Understand the different types building materials.
CO2: understand various types of design method.

CO Map	Question No.	Question	Marks
CO1	Q.1	How steel is classified based on its carbon content?	3
CO1	Q.2a	Discuss the important types of glasses and their uses in construction industry	3
	Q.2b	How will you classify sand on the basis of its source?	3
CO1	Q.3	Explain the methods used for compaction.	6
CO2	Q.4	What are admixtures? Explain its types and uses	3
CO2	Q.5a	What are the factors affecting workability of concrete?	3
	Q.5b	Explain the mix proportioning of concrete by BIS method	3
CO2	Q6	Why is it necessary to compact freshly laid concrete?	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

BUILDING TECHNOLOGY						
Course Code				BTCE 305		
Associated Credit Units				3		
Ser. No.	**Name**	**Enrollment No.**	**Roll No.**	**30**	**70**	**100**
1	**DHANANJAY CHAUHAN**	**A60515817003**	**AU17UCV8101**	**26**	**62**	**88**
2	**KARAN SINGH SIKARWAR**	**A60515817001**	**AU17UCV8102**	**22**	**49**	**71**
3	**NEHA KARAIYA**	**A60215817003**	**AU17UCV8103**	**24**	**55**	**79**
4	**RAHUL PINGLE**	**A60215817005**	**AU17UCV8104**	**23**	**53**	**76**
5	**UDDESHYA UPADHYAY**	**A60215817001**	**AU17UCV8105**	**21**	**48**	**69**

				BUILDING TECHNOLOGY
				BTCE 305
				3
No. of students attended the Exam				5
No. of students secure more than 60% marks				5
Percentage of students secure more than 60% marks				100.00
Attainment Level				Level 3

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : GEO INFORMATICS - I
Course Code : BTCE306, Credits : 04, Session : 2018-19(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Mohan Khantharia, Mr. Shashank Gupta, Dr. Ripunjoy Gogoi

A. Introduction

Surveying is the basic element of mapping areas for civil engineering construction. Methods of surveying including leveling, and leveling methods, contours, estimation of volumes etc are covered.

B. Course Outcomes: At the end of the course students will be able to learn

- **BTCE306.1** Able to understand the basic principles of aerial photogrammetry and its instrumental knowledge.
- **BTCE306.2** Able to illustrate different types of satellites and their characteristics and to analyze the data based on GIS system and their characteristics.
- **BTCE306.3** Able to analysis the data based on GIS Systems and GIS errors.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects.

D. Programme Specific Outcomes:

PSO1: Students will be able to understand the different types of satellite and their uses in environmental protection

PSO2: Students will able to apply all the concepts of imagining and GIS data structure.

PSO3: It will help students to observe the different data obtained by GIS and GPS

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/ HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25%includesalltypesofleaves Including medical leaves.	A	5%

End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module I: Introduction - classification of surveys - plane surveying - geodetic surveying – topographic surveying - reconnaissance - principle of working from whole to part - provision of control -conventional signs - chain survey - instruments - principles of chain survey - field book - plotting - tie line and check line - chaining and ranging - obstacles - chaining on sloping ground - errors in chain survey - uses of cross staff and optical square.

Module II: Compass survey - prismatic compass - surveyor's compass - whole circle and reduced bearing- true and magnetic bearing - dip and declination - local attraction - traversing - plotting - error of closure - graphical and analytical adjustments - plane table survey - instruments and accessories - different methods - orientation - advantages and disadvantages of plane tabling -two point problem - three point problem - errors in plane tabling - minor instruments – hand levels - clinometer - Ceylon ghat tracer - hypsometer - pantagraph -ediograph - box sextant - telescopic alidade

Module III: Levelling - definition of level surfaces - mean sea level - reduced level - bench marks - levelling instruments - temporary and permanent adjustments - fly leveling - booking - reduction of levels - corrections for refraction and curvature - reciprocal leveling - longitudinal levelling and cross sectioning - contour survey - definition - characteristics of contour - uses of contour - methods of contouring - direct and indirect interpolation – plotting - areas and volumes - trapezoidal rule - Simpson's rule - area from latitude and departure - uses of planimeter - volumes - trapezoidal and prismoidal formula

Module IV: Theodolite surveying - study of theodolite - temporary and permanent adjustments -measurement of horizontal angles - method of repetition and reiteration - measurement of vertical angles - theodolite traverse - calculation of co ordinates - corrections - traverse table -omitted measurements - tacheometric surveying - stadia system - fixed and movable hair methods - staff held vertical and normal - instrument constants - analytic lens – tangential system - direct reading tacheometer - subtense bar – trigonometric leveling – various methods– E.D.M – total station.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att Attendance

H. Suggested Books:

- S.K Duggal, Surveying Vol 1 and II, 2nd ed., Tata - McGraw Hill, New Delhi (2004).
- Arora K.R., Surveying Vol I &II, Standard Book House, New Delhi (2008)

- Punmia, B.C., Ashok Kr. Jain, Arun Kr. Jain, Surveying Vol I & II, Laxmi Publications, New Delhi (2008).

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction - classification of surveys	Lecture	BTCE306.1	Mid Term-1, Quiz & End Sem Exam
2	Plane surveying - geodetic surveying	Lecture	BTCE306.1	Mid Term-1, Quiz & End Sem Exam
3	Topographic surveying - reconnaissance	Lecture	BTCE306.1	Mid Term-1, Quiz & End Sem Exam
4	Principle of working from whole to part	Lecture	BTCE306.1	Mid Term-1, Quiz & End Sem Exam
5	Provision of control - conventional signs	Lecture	BTCE306.1	Mid Term-1, Quiz & End Sem Exam
6	Chain survey - instruments - principles of chain survey - field book	Lecture	BTCE306.1	Mid Term-1, Quiz & End Sem Exam
7	Plotting - tie line and check line chaining and ranging - obstacles	Lecture	BTCE306.1	Mid Term-1, Quiz & End Sem Exam
8	Chaining on sloping ground - errors in chain survey - uses of cross staff and optical square.	Lecture	BTCE306.1	Mid Term-1, Quiz & End Sem Exam
9	Compass survey - prismatic compass instruments and accessories	Lecture	BTCE306.1	Mid Term-1, Quiz & End Sem Exam
10	Surveyor’s compass - whole circle and reduced bearing-	Lecture	BTCE306.1	Mid Term-1, Quiz & End Sem Exam
11	True and magnetic bearing	Lecture	BTCE306.1	Mid Term-1, Quiz & End Sem Exam
12	Dip and declination - local attraction	Lecture	BTCE306.1	Mid Term-1, Quiz & End Sem Exam
13	Traversing - plotting - error of closure	Lecture	BTCE306.1	Mid Term-1, Quiz & End Sem Exam
14	Graphical and analytical adjustments - plane table survey	Lecture	BTCE306.1	Mid Term-1, Quiz & End Sem Exam
15	Different methods - orientation - advantages and disadvantages of plane tabling -two point problem	Lecture	BTCE306.1	Mid Term-1, Quiz & End Sem Exam
16	Three point problem - errors in plane tabling - minor instruments – hand levels	Lecture	BTCE306.1	Mid Term-1, Quiz & End Sem Exam
17	Clinometer - Ceylon ghat tracer hypsometer - pantagraph	Lecture	BTCE306.1	Mid Term-1, Quiz & End Sem Exam

18	Ediograph - box sextant - telescopic alidade	Lecture	BTCE306.1	Mid Term-1, Quiz & End Sem Exam
19	Levelling temporary and permanent - - direct and	Lecture	BTCE306.1	Mid Term-1, Quiz & End Sem Exam
20	Definition of level surfaces bench marks - levelling instruments	Lecture	BTCE306.1	Mid Term-1, Quiz & End Sem Exam
21	Mean sea level - reduced level fly leveling - booking - reduction of levels - corrections for refraction and curvature	Lecture	BTCE306.1	Mid Term-2, Quiz & End Sem Exam
22	Longitudinal levelling and cross sectioning - contour survey.	Lecture	BTCE306.1	Mid Term-2, Quiz & End Sem Exam
23	Definition - characteristics of contour - uses of contour - methods of contouring	Lecture	BTCE306.1	Mid Term-2, Quiz & End Sem Exam
24	Adjustments - reciprocal leveling	Lecture	BTCE306.1	Mid Term-2, Quiz & End Sem Exam
25	Indirect interpolation – plotting - areas and volumes -	Lecture	BTCE306.1	Mid Term-2, Quiz & End Sem Exam
26	Trapezoidal rule - Simpson's rule area from latitude and departure.	Lecture	BTCE306.1	Mid Term-2, Quiz & End Sem Exam
27	Uses of planimeter - volumes	Lecture	BTCE306.1	Mid Term-2, Quiz & End Sem Exam
28	Trapezoidal and prismoidal formula	Lecture	BTCE306.1	Mid Term-2, Quiz & End Sem Exam
29	Theodolite surveying measurement of vertical angles traverse table omitted measurements analytic lens	Lecture	BTCE306.1	Mid Term-2, Quiz & End Sem Exam
30	Temporary and permanent adjustments	Lecture	BTCE306.1	Mid Term-2, Quiz & End Sem Exam
31	Theodolite - -measurement of horizontal angles	Lecture	BTCE306.1	Mid Term-2, Quiz & End Sem Exam
32	Study of - method of repetition and reiteration	Lecture	BTCE306.1	Mid Term-2, Quiz & End Sem Exam
33	Theodolite traverse - calculation of co ordinates - corrections	Lecture	BTCE306.1	Mid Term-2, Quiz & End Sem Exam
34	Tacheometric surveying - stadia system - fixed and movable hair methods	Lecture	BTCE306.1	Mid Term-2, Quiz & End Sem Exam
35	Staff held vertical and normal - instrument constants	Lecture	BTCE306.1	Mid Term-2, Quiz & End Sem Exam
36	Tangential system - direct reading tacheometer - subtense bar – trigonometric leveling –	Lecture	BTCE306.1	Mid Term-2, Quiz & End Sem Exam

	various methods– E.D.M – total station.			

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE306.1	Able to understand the basic principles of aerial photogrammetry and its instrumental knowledge.	3	3	1	3	1				2		2	1	1	2	1
BTCE306.2	Able to illustrate different types of satellites and their characteristics and to analyze the data based on GIS system and their characteristics.	3	2	2	2	2				2		1	1	2	2	1
BTCE306.3	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex Able to analysis the data based on GIS Systems and GIS errors	2	1	1	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–IV)2018-19

Class: B.Tech (CE) III Semester						
Subject Name: BTCE 306 Geoinformatics		Time:1.5Hrs			Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: Able to understand the basic principles of aerial photogrammetry and its instrumental knowledge.

CO2 : Able to illustrate different types of satellites and their characteristics and to analyze the data based on GIS system and their characteristics.

CO Map	Question No.	Question	Marks
CO1	Q.1	Distinguish Data and Information.	3
CO1	Q.2a	What do you mean by Teamwork? 4. What is the Epistemology.	3
	Q.2b	What is the use of Public Hearing?	3
CO1	Q.3	What are all the characteristics of G- Governance planning?	6
CO2	Q.4	Differentiate Accuracy Vs Precison. What is RMSE?	3
CO2	Q.5a	What do you mean by Engineering Philosophy?	3
	Q.5b	What is Professional Equality?	3
CO2	Q6	Define Geomatics	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **MECHANICS OF SOLIDS AND FLUIDS LAB**
Course Code : BTCE320, Credits : 01, Session : 2018-19(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Shashank Gupta, Mr. Sachin Tiwari, Mr. P. Mahakavi

A. Introduction

Solid Mechanics Laboratory is well equipped with destructive testing machineries. This lab is offered for the second-year students of various departments like Mechanical engineering, Aerospace and Civil Engineering. The Fluid Mechanics laboratory is designed to examine the properties of fluids and to conduct experiments involving both incompressible and compressible flow.

B. Course Outcomes: At the end of the course students will be able to learn

- **BTCE320.1** Able to calibrate various flow measuring devices in pipe and open channel flow Able to determine various losses and velocity in pipe flow in field.
- **BTCE320.2** Able to study the stress-strain curves of different materials used in the field under different loading conditions.
- **BTCE320.3** Able to differentiate between properties of materials affect strength under various conditions.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects.

D. Programme Specific Outcomes:

PSO1: Students will be able to understand the different types of fluids exists in nature their properties and behaviour.

PSO2: Students will able to apply all the concepts of fluid mechanics for different types of floating and submerged vessels and different types of forces acting on it.

PSO3: It will help students to analyze different types of flows and their characteristics.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/ HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25%includesalltypesofleaves Including medical leaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

MECHANICS OF SOLIDS LAB

List of Experiments

- Universal Testing Machine
- Tensile Test (MS)

- Double Shear Test (MS)
- Compression Test (CI)
- Brinell Hardness No.
- Izod Impact
- Testing Machine
- Rockwell Hardness Tester
- Spring Stiffness (Spring Compression Testing machine)
- Torsion testing machine

FLUID MECHANICS LAB
List of Experiments

- Verification of Bernoulli’s Theorem
- Experiment using Venturimeter
- Determination of coefficient of Discharge C_d, C_c, $C_!$ Using
- Circular/triangular/rectangular orifice
- To find major head losses in a pipe line
- To find minor head losses in a pipe line (sudden expansion/contraction/bend)

G. Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Books

- R.K. Bansal, “Fluid Mechanics & Hydraulic Machines”, Laxmi Publications (P) Ltd., 2002.
- Gupta, S. C., Fluid Mechanics and Hydraulic Machines, Pearson Education, 2007
- D.S. Kumar, “Fluid Mechanics and Fluid Power Engineering”, S.K. Kataria & Sons, 2000.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Universal Testing Machine Tensile Test (MS)	Practical	BTCE320.1	Mid Term-1, Quiz & End Sem Exam
2	Double Shear Test (MS) Compression Test (CI)	Practical	BTCE320.1	Mid Term-1, Quiz & End Sem Exam
3	Brinell Hardness No. Izod Impact	Practical	BTCE320.1	Mid Term-1, Quiz & End Sem Exam
4	Testing Machine Rockwell Hardness Tester	Practical	BTCE320.1	Mid Term-1, Quiz & End Sem Exam
5	Compression Testing machine) Torsion testing machine	Practical	BTCE320.1	Mid Term-1, Quiz & End Sem Exam
6	Spring Stiffness (Spring	Practical	BTCE320.1	Mid Term-1, Quiz & End Sem Exam
7	Verification of Bernoulli’s	Practical	BTCE320.1	Mid Term-1, Quiz

	Theorem			& End Sem Exam
8	Experiment using Venturimeter Determination of coefficient of Discharge C_d, C_c	Practical	BTCE320.1	Mid Term-1, Quiz & End Sem Exam
9	Circular/triangular/rectangular orifice	Practical	BTCE320.1	Mid Term-1, Quiz & End Sem Exam
10	To find major head losses in a pipe line	Practical	BTCE320.1	Mid Term-1, Quiz & End Sem Exam
11	To find minor head losses in a pipe line (sudden	Practical	BTCE320.1	Mid Term-1, Quiz & End Sem Exam
12	expansion/contraction/bend)	Practical	BTCE320.1	Mid Term-1, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE320.1	Students will be able to understand the different types of fluids exists in nature their properties and behaviour.	3	3	1	3	1				2		2	1	1	2	1
BTCE320.2	Students will able to apply all the concepts of fluid mechanics for different types of floating and submerged vessels and different types of forces acting on it.	3	2	2	2	2				2		1	1	2	2	1
BTCE320.3	It will help students to analyze different types of flows and their characteristics.	2	1	1	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology
Department of Electronics and Communication Engineering
MID-SEMESTER(SEM–III)2018-19

Class: B.Tech.(CE) IV Semester						
Subject Name: BTCE 320 Mechanics of Solids and Fluid Lab		Time:2 Hrs			Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1, 2	Q.1, 2	Q. 1,2	Q.1,2	Q.1,2	Q.1,2
Student will be able to attain CO1 to 4						

COMap	QuestionNo.	Question	Marks
CO1-4	Q.1	• Testing Machine • Rockwell Hardness Tester • Spring Stiffness (Spring Compression Testing machine) • Torsion testing machine	15
CO1-4	Q2	• Circular/triangular/rectangular orifice • To find major head losses in a pipe line • To find minor head losses in a pipe line (sudden expansion/contraction/bend)	15

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

GEO INFORMATICS - I						
Course Code				BTCE 306		
Associated Credit Units				3		
Ser. No.	**Name**	**Enrollment No.**	**Roll No.**	**30**	**70**	**100**
1	DHANANJAY CHAUHAN	A60515817003	AU17UCV8101	19	52	71
2	KARAN SINGH SIKARWAR	A60515817001	AU17UCV8102	25	33	58
3	NEHA KARAIYA	A60215817003	AU17UCV8103	23	51	74
4	RAHUL PINGLE	A60215817005	AU17UCV8104	18	24	42
5	UDDESHYA UPADHYAY	A60215817001	AU17UCV8105	15	44	59

				GEO INFORMATICS - I
				BTCE 306
				3
No. of students attended the Exam				5
No. of students secure more than 60% marks				2
Percentage of students secure more than 60% marks				40.00
Attainment Level				-

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **CIVIL ENGINEERING DRAWING LAB**
Course Code : BTCE321, Credits : 01, Session : 2018-19(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Shashank Gupta, Mr. Sachin Tiwari, Mr. Mohan Kantharia

A. Introduction

Engineering drawing, most commonly referred to as engineering graphics, is the art of manipulation of designs of a variety of components, especially those related to engineering.

B. Course Outcomes: At the end of the course, students will be able to:

- **BTCE321.1**. Application of software's in design and drawings of Civil Engineering structures.
- **BTCE321.2**. Able to proficiency, including the ability to use industry-standard computer software to generate 2D and 3D drawings

- **BTCE321.3**. Understanding of the theory of orthographic projection and the conventions associated with Civil engineering drawings.

C. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Function as design consultants in construction industry for the design of civil engineering structures.

PSO2: Provide sustainable solutions to the Civil Engineering Problems

PSO3: It. will help students to analyze and Provide concrete solution to environmental problem

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

- Paneled, doors, windows and ventilators in wood,. Glazed paneled, wooden doors,
- Residential building- flat and pitched roof, -RC and Tiled
- Public building-, schools, offices, libraries, hostels, restaurants, commercial complexes, factories etc.
- Reinforced concrete staircase.
- Plumbing, water supply and drainage for buildings
- Septic Tank and Soak Pit – detailed drawings.
- Preparation of site plans and service plans as per Building Rules
- Roof trusses. Industrial buildings.
- Foundation Detailing:– Strip ,RCC footing, Pile, Raft, Grillage footing, combined footing

G. Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Books

- National Building Code of India
- Local Building Bye-laws
- Callender, John Hancock, Time Saver Standards for Architectural design Data, Tata McGraw Hill.
- Chiara, Callender, John Hancock, Time Saver Standards for Building Type, McGraw Hill

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Paneled, doors, windows and ventilators in wood,. Glazed paneled, wooden doors,	Practical	BTCE321.1	Mid Term-1, Quiz & End Sem Exam
2	Residential building- flat and pitched roof, -RC and Tiled	Practical	BTCE321.1	Mid Term-1, Quiz & End Sem Exam
3	Public building-, schools, offices, libraries, hostels, restaurants, commercial complexes, factories etc.	Practical	BTCE321.1	Mid Term-1, Quiz & End Sem Exam
4	Reinforced concrete staircase.	Practical	BTCE321.1	Mid Term-1, Quiz & End Sem Exam
5	Plumbing, water supply and drainage for buildings	Practical	BTCE321.1	Mid Term-1, Quiz & End Sem Exam
6	Septic Tank and Soak Pit – detailed drawings.	Practical	BTCE321.1	Mid Term-1, Quiz & End Sem Exam
7	Preparation of site plans and service plans as per Building Rules	Practical	BTCE321.1	Mid Term-1, Quiz & End Sem Exam
8	Roof trusses. Industrial buildings	Practical	BTCE321.1	Mid Term-1, Quiz & End Sem Exam
9	Foundation Detailing:– Strip ,RCC footing, Pile, Raft, Grillage footing, combined footing	Practical	BTCE321.1	Mid Term-1, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

BTCE320.1	Function as design consultants in construction industry for the design of civil engineering structures.	3	3	1	3	1				2		2	1	1	2	1
BTCE320.2	Provide sustainable solutions to the Civil Engineering Problems	3	2	2	2	2				2		1	1	2	2	1

Sample Question Paper

<table>
<tr><td colspan="8" align="center">Amity School of Engineering and Technology
Department of CIVIL Engineering
MID-SEMESTER(SEM–III)2018-19</td></tr>
<tr><td colspan="8" align="center">Class: B.Tech (CE) 3rd Semester</td></tr>
<tr><td colspan="2">Subject Name:
BTCE 321 CIVIL ENGINEERING DRAWING LAB</td><td colspan="3">Time:1.5Hrs</td><td colspan="3">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td colspan="2">Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3,6</td><td>Q.4</td><td>Q.2,5</td><td></td><td colspan="2"></td></tr>
<tr><td colspan="8">Student will be able to
CO1: Using the software for the design of buildings, making plans.
CO2: Applying the basic concept of drawing
CO3: Understanding the various projections.</td></tr>
</table>

CO Map	Question No.	Question	Marks
CO1	Q.1	Use Auto CADD to make 2-D plan of building	3
CO1	Q.2a	Discuss various key elements for building design.	3
	Q.2b	Write down various commands in Auto-CADD	3
CO1	Q.3	Discuss different building bye law in detail.	6
CO2	Q.4	Discuss drawing detail of single storey R.C.C building.	3
CO2	Q.5a	Draw orthographic projections.	3
	Q.5b	Discuss drawing detail of different types of paneled doors.	3
CO3	Q6	What do you mean by 2-d and 3-d projections. Discuss orthographic projection.	6

CIVIL ENGINEERING DRAWING LAB						
Course Code				BTCE 321		
Associated Credit Units				1		
Ser. No.	Name	Enrollment No.	Roll No.	30	70	100
1	DHANANJAY CHAUHAN	A60515817003	AU17UCV8101	28	58	86
2	KARAN SINGH SIKARWAR	A60515817001	AU17UCV8102	19	56	75
3	NEHA KARAIYA	A60215817003	AU17UCV8103	19	53	72
4	RAHUL PINGLE	A60215817005	AU17UCV8104	19	52	71
5	UDDESHYA UPADHYAY	A60215817001	AU17UCV8105	20	50	70

				CIVIL ENGINEERING DRAWING LAB
				BTCE 321
				1
No. of students attended the Exam				5
No. of students secure more than 60% marks				5
Percentage of students secure more than 60% marks				100.00
Attainment Level				Level 3

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **SURVEYING-I LAB**
Course Code : BTCE322, Credits : 01, Session : 2018-19(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Shashank Gupta, Mr. Sachin Tiwari, Mr. Mohan Kantharia

A. Introduction

Surveying is the art of determining the relative positions of different features on, above or beneath the surface of the earth by means of direct or indirect measures of distance, direction and elevation and finally representing them on a sheet of paper known as plan or map.

B. Course Outcomes: At the end of the course, students will be able to:

- **BTCE322.1** Able to Prepare the survey sheet according to the method used
- **BTCE322.2** Able to apply theoretical considerations in field and other engineering projects.
- **BTCE322.3** Able to survey the area using different methods of plane tabling and compasssurvey and to adjust the compass traverse graphically.
- **BTCE322.4** Able to record the reduced levels using various methods of levelling and measurement of horizontal & vertical angles by Theodolite.

C. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Function as design consultants in construction industry for the design of civil engineering structures.

PSO2: Provide sustainable solutions to the Civil Engineering Problems

PSO3: It. will help students to analyze and Provide concrete solution to environmental problem.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

- Chain survey - Traversing and plotting of details.
- Chain survey – Measurement of Area by offsetting.
- Compass survey - Traversing with compass and calculation of Interior angles .
- Plane table survey – Method of Radiation

- Plane table survey -. Method of Intersection.
- Levelling Fly leveling – Plane of collimation method.
- Levelling Fly leveling – Rise and Fall method.
- Levelling Longitudinal and cross sectioning.
- Levelling Contour surveying.
- Theodolite surveying – Measurement of horizontal angle by method of repetition and reiteration.

G. Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

H. Suggested Books

- Vazirani V.N. & Chandola S.P., Heavy Construction, 1978.
- Jha J. & Sinha S.K., Construction & Foundation Engineering, Khanna Publications
- Verma L.C., Standardisation - A New Discipline

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Chain survey - Traversing and plotting of details	Practical	BTCE322.1	Mid Term-1, Quiz & End Sem Exam
2	Chain survey – Measurement of Area by offsetting.	Practical	BTCE322.1	Mid Term-1, Quiz & End Sem Exam
3	Compass survey - Traversing with compass and calculation of Interior angles	Practical	BTCE322.1	Mid Term-1, Quiz & End Sem Exam
4	Plane table survey – Method of Radiation	Practical	BTCE322.1	Mid Term-1, Quiz & End Sem Exam
5	Plane table survey -. Method of Intersection	Practical	BTCE322.1	Mid Term-1, Quiz & End Sem Exam
6	Levelling Fly leveling – Plane of collimation method	Practical	BTCE322.1	Mid Term-1, Quiz & End Sem Exam
7	Levelling Fly leveling – Rise and Fall method. Levelling Longitudinal and cross sectioning.	Practical	BTCE322.1	Mid Term-1, Quiz & End Sem Exam
8	Levelling Contour surveying.	Practical	BTCE322.1	Mid Term-1, Quiz & End Sem Exam
9	Theodolite surveying – Measurement of horizontal angle by method of repetition and reiteration	Practical	BTCE322.1	Mid Term-1, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE322.1	Function as design consultants in construction industry for the design of civil engineering structures.	3	3	1	3	1				2		2	1	1	2	1
BTCE322.2	Provide sustainable solutions to the Civil Engineering Problems It. will help students to analyze and Provide concrete solution to environmental problem	3	2	2	2	2				2		1	1	2	2	1

Sample Question Paper

<table>
<tr><td colspan="7">Amity School of Engineering and Technology
Department of Electronics and Communication Engineering
MID-SEMESTER(SEM–III)2018-19</td></tr>
<tr><td colspan="7">Class: B.Tech.(CE) III Semester</td></tr>
<tr><td colspan="2">Subject Name:
BTCE 322 Surveying Lab</td><td colspan="3">Time:2 Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1, 2</td><td>Q.1, 2</td><td>Q. 1,2</td><td>Q.1,2</td><td>Q.1,2</td><td>Q.1,2</td></tr>
<tr><td colspan="7">Student will be able to attain CO1 to 3</td></tr>
</table>

CO Map	Question No.	Question	Marks
CO1-2	Q.1	• Chain survey-Traversing and plotting of details • Chain survey-Measurement of Area by offsetting	15
CO1-2	Q2	• Compass survey - Traversing with compass and calculation of Interior angles	15

		• Plane table survey-Method of Radiation • Plane table survey-Method of Intersection	

Attainments		Rubric
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

SURVEYING PRACTICAL - I

Course Code				BTCE 322		
Associated Credit Units				**1**		
Ser. No.	**Name**	**Enrollment No.**	**Roll No.**	**30**	**70**	**100**
1	**DHANANJAY CHAUHAN**	**A60515817003**	**AU17UCV8101**	**21**	**57**	**78**
2	**KARAN SINGH SIKARWAR**	**A60515817001**	**AU17UCV8102**	**26**	**50**	**76**
3	**NEHA KARAIYA**	**A60215817003**	**AU17UCV8103**	**25**	**53**	**78**
4	**RAHUL PINGLE**	**A60215817005**	**AU17UCV8104**	**20**	**50**	**70**
5	**UDDESHYA UPADHYAY**	**A60215817001**	**AU17UCV8105**	**15**	**40**	**55**
				SURVEYING PRACTICAL - I		
				BTCE 322		
				1		
No. of students attended the Exam				5		
No. of students secure more than 60% marks				4		
Percentage of students secure more than 60% marks				80.00		
Attainment Level				Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **NUMERICAL ANALYSIS AND PROGRAMMING**
Course Code : BTCE 401, Credits : 03, Session : 2018-19(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Shashank Gupta, Mr. Mohan Kantharia

A. Introduction This course deals with the techniques of numerical analysis, which gives the solution to applied problem when ordinary analytical method fails. Emphasis is given on computer programming also so that the given techniques can be used in design of engineering and scientific problems.

B. At the end of the course students will able to learn:

- **BTCE401.1** Able to apply finite element method for the analysis of complex Civil Engineering structures using advanced techniques.
- **BTCE401.2** Understand the mathematical and statistical knowledge and skills applying invarious civil engineering structures.
- **BTCE401.3** Able to proficient in the application of the laws of logic to mathematicalstatements.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write

effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Function as design consultants in construction industry for the design of civil engineering structures.

PSO2: Provide sustainable solutions to the Civil Engineering Problems

PSO3: It. will help students to analyze and Provide concrete solution to environmental problem.

E.

Component of Evaluation	**Description**	**Code**	**Weightag e %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/H A	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastu dentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module I: Solution of Algebraic and Transcendental Equation
Error in a series approximation, Bisection Method, Iteration method, Method of false position, Newton-Raphson method **Solutions of Simultaneous equation** Gauss elimination method, Jacobi iteration method, Gauss Seidal method

Module II: Interpolation Finite Differences, Difference tables Polynomial Interpolation**:** Newton's forward and backward formula Central Difference Formulae: Gauss forward and backward formula. Interpolation with unequal intervals: Lagrange's Interpolation, Newton Divided difference formula

Module III: Numerical Integration and Differentiation Introduction, Numerical differentiation Numerical Integration: Trapezoidal rule, Simpson's 1/3 and 3/8 rules.

Module IV: Solution of differential Equations: Euler's Method, Runga-Kutta Methods.

Module V: Statistical Computation: Frequency chart, Curve fitting by method of least squares, fitting of straight lines, polynomials, exponential curves etc, Data fitting with Cubic disciplines.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- Rajaraman V, "Computer Oriented Numerical Methods", Pearson Education
- Gerald & Whealey, "Applied Numerical Analyses", AW
- Jain, Iyengar and Jain, "Numerical Methods for Scientific and Engineering Computations", New Age Int.
- Grewal B S, "Numerical methods in Engineering and Science", Khanna Publishers, Delhi **I.**

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Error in a series approximation	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
2	Bisection Method	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
3	Iteration method	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
4	Method of false position	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
5	Newton-Raphson method	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
6	Solutions of Simultaneous equation Gauss elimination method	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
7	Jacobi iteration method	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
8	Gauss Seidal method	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
9	Gauss Seidal method	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
10	Finite Differences.	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
11	Difference tables Polynomial Interpolation	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
12	Difference tables Polynomial Interpolation	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam

13	Newton's forward and backward formula	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
14	Newton's forward and backward formula	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
15	Central Difference Formulae	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
16	Gauss forward and backward formula	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
17	Gauss forward and backward formula	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
18	Interpolation with unequal intervals	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
19	Interpolation with unequal intervals	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
20	Lagrange's Interpolation,	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
21	Newton Divided difference formula	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam
22	Introduction, Numerical differentiation,	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam
23	Numerical Integration	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam
24	Trapezoidal rule	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam
25	Simpson's 1/3 rules	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam
26	Simpson's 3/8 rules	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam
27	Euler's Method,	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam
28	Runga-Kutta Methods.	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam
29	Runga-Kutta Methods.	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam
30	Frequency chart	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam
31	Curve fitting by method of least squares	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam
32	fitting of straight lines	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam
33	Polynomials	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam
34	Exponential curves etc	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam
35	Data fitting with Cubic disciplines	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam
36	Data fitting with Cubic disciplines	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam

J.Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE401.1	Function as design consultants in construction industry for the design of civil engineering structures.	3	3	1	3	1				2		2	1	1	2	1
BTCE401.2	Provide sustainable solutions to the Civil Engineering Problem	3	2	2	2	2				2		1	1	2	2	1
BTCE401.3	It will help students to analyze and Provide concrete solution to environmental problem.	2	1	1	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–IV)2018-19		
Class: B.Tech (CE) 4th Semester		
Subject t Name: BTCE 401 Numerical analysis and Programming Lab	Time:1.5Hrs	Max.Marks:30

Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		

Student will be able to
CO1: Able to apply finite element method for the analysis of complex Civil Engineering structures using advanced techniques.
CO2: Understand the mathematical and statistical knowledge and skills applying invarious civil engineering structures.
CO3: Able to proficient in the application of the laws of logic to mathematicalstatements.

CO Map	Question No.	Question	Marks
CO1	Q.1	Solve the following equation by gauss elimination method. $2x + y + z = 10$ $3x + 2y + 3z = 18$ $x + 4y + 9z = 16$	3
CO1	Q.2a	What is Runge- Kutte Method?	3
	Q.2b	Use Runge – Kutta method to solve = xy for x = 1.4 initially x =1, y = 2 (take h= 0.2)	3
CO1	Q.3	What is bisection method?	6
CO2	Q.4	What is Simpson's 1/3 rd rule	3
CO2	Q.5a	What is trapezoidal rule?	3
	Q.5b	Discuss Finite difference.	3
CO3	Q6	Discuss Newton's forward and backward formula Central Difference Formulae	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

NUMERICAL ANALYSIS & PROGRAMMING						
Course Code				BTCE 401		
Associated Credit Units				3		
Ser. No.	Name	Enrollment No.	Roll No.	30	70	100
1	DHANANJAY CHAUHAN	A60515817003	AU17UCV8101	26	58	84
2	KARAN SINGH SIKARWAR	A60515817001	AU17UCV8102	12	46	58
3	NEHA KARAIYA	A60215817003	AU17UCV8103	21	63	84
4	RAHUL PINGLE	A60215817005	AU17UCV8104	14	22	36
5	UDDESHYA UPADHYAY	A60215817001	AU17UCV8105	13	27	40
				NUMERICAL ANALYSIS & PROGRAMMING		
				BTCE 401		
				3		
No. of students attended the Exam				5		
No. of students secure more than 60% marks				2		
Percentage of students secure more than 60% marks				40.00		
Attainment Level				-		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **STRUCTURAL ANALYSIS-I**
Course Code : BTCE 402, Credits : 04, Session : 2018-19(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Shashank Gupta, Mr. Mohan Kantharia, Mr. Sachin Tiwari

A. Introduction

Structural analysis is a branch of Solid Mechanics which uses simplified models for solids like bars, beams and shells for engineering decision making. It's main objective is to determine the effect of loads on the physical structures and their components.

B. At the end of the course students will able to learn:

- **BTCE402.1** Able to analysis various type of loads by influence line diagram method.
- **BTCE402.2** To understand develop computer program for the analysis of structures. Able to identify determinate, indeterminate, stable and unstable structures.
- **BTCE402.3** Able to use slope defection method and rotation contribution method

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

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PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Function as design consultants in construction industry for the design of civil engineering structures.

PSO2: Provide sustainable solutions to the Civil Engineering Problems

PSO3: It. will help students to analyze and Provide concrete solution to environmental problem.

E.

Component of Evaluation	**Description**	**Code**	**Weightag e %**

Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module I: Deflection of beams: Differential equation of the elastic curve - slope and deflection of beams by method of successive integration - Macaulay's method - Moment area method - Conjugate beam method - Deflection due to shear.

Module II: Elastic theorems and energy principles: Strain energy and complementary energy - review of strain energy due to axial load - bending, shear and torsion - principle of superposition - principle of virtual work - Castigliano's theorem for deflection - theorem of complementary energy - Betti's theorem - Maxwell's law of reciprocal deflections - principle of least work - application of method of virtual work (unit load method) and strain energy method for determination of deflections of statically determinate beams - pin-joined trusses and rigid frames - temperature effects.

Module III: Fixed and continuous beams: Statically indeterminate structures - degree of static and kinematic indeterminacies – brief introduction to force and displacement methods - fixed and continuous beams - force method - analysis by consistent deformation method - application of moment area and conjugate beam methods for fixed beams - theorem of three moments for continuous beams - shear force and bending moment diagrams - deflection and support settlement.

Module IV: Beams curved in plan: Analysis of cantilever beam curved in plan - analysis of circular beams over simple supports

Theory of columns V: Axial loading of short strut - long columns - Euler's Formula - Rankine Formula – Secant Formula - eccentric loading - direct and bending stresses – Buckling Load as an eigen value problem.

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**

Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- R. Vaidyanathan, P. Perumal, Comprehensive Structural Analysis Vol. I & II, Laxmi Publications, New Delhi
- Reddy C.S., Basic Structural Analysis, 2nd ed., Tata McGraw Hill, New Delhi (2004).

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Differential equation of the elastic curve	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
2	Slope and deflection of beams by method of successive integration	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
3	Macaulay's method	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
4	Moment area method	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
5	Conjugate beam method	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
6	Deflection due to shear.	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
7	Strain energy and complementary energy Castigliano's theorem for (unit load method)	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
8	Review of strain energy due to axial load	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
9	Bending, shear and torsion strain energy	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
10	Principle of superposition	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
11	Principle of virtual work	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
12	Deflection - theorem of complementary energy	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
13	Maxwell's law of reciprocal deflections - principle of least work	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
14	Betti's theorem - application of method of virtual work	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
15	Method for determination of deflections of statically determinate beams - pin-	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam

	joined trusses			
16	Rigid frames - temperature effects.	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
17	Statically indeterminate structures	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
18	Degree of static and kinematic indeterminacies	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
19	Degree of static and kinematic indeterminacies	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
20	Degree of static and kinematic indeterminacies	Lecture	BTCE402.1	Mid Term-1, Quiz & End Sem Exam
21	brief introduction to force and displacement methods - fixed and continuous beams	Lecture	BTCE402.1	Mid Term-2, Quiz & End Sem Exam
22	Force method - analysis by consistent deformation method	Lecture	BTCE402.1	Mid Term-2, Quiz & End Sem Exam
23	Application of moment area and conjugate beam methods for fixed beams	Lecture	BTCE402.1	Mid Term-2, Quiz & End Sem Exam
24	Theorem of three moments for continuous beams - shear force and bending moment diagrams	Lecture	BTCE402.1	Mid Term-2, Quiz & End Sem Exam
25	Deflection and support settlement.	Lecture	BTCE402.1	Mid Term-2, Quiz & End Sem Exam
26	Analysis of cantilever beam curved in plan	Lecture	BTCE402.1	Mid Term-2, Quiz & End Sem Exam
27	Analysis of circular beams over simple supports	Lecture	BTCE402.1	Mid Term-2, Quiz & End Sem Exam
28	Analysis of circular beams over simple supports	Lecture	BTCE402.1	Mid Term-2, Quiz & End Sem Exam
29	Analysis of circular beams over simple supports	Lecture	BTCE402.1	Mid Term-2, Quiz & End Sem Exam
30	Axial loading of short strut	Lecture	BTCE402.1	Mid Term-2, Quiz & End Sem Exam
31	Axial loading of short strut	Lecture	BTCE402.1	Mid Term-2, Quiz & End Sem Exam
32	Rankine Formula	Lecture	BTCE402.1	Mid Term-2, Quiz & End Sem Exam
33	Long columns - Euler's Formula -– Secant Formula	Lecture	BTCE402.1	Mid Term-2, Quiz & End Sem Exam
34	Eccentric loading - direct and bending stresses	Lecture	BTCE402.1	Mid Term-2, Quiz & End Sem Exam
35	Buckling Load as an eigen value problem	Lecture	BTCE402.1	Mid Term-2, Quiz & End Sem Exam
36	Buckling Load as an eigen value problem	Lecture	BTCE402.1	Mid Term-2, Quiz & End Sem Exam

J.Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE402.1	Able to analysis various type of loads by influence line diagram method.	3	3	1	3	1				2		2	1	1	2	1
BTCE402.2	To understand develop computer program for the analysis of structures. Able to identify determinate, indeterminate, stable and unstable structures.	3	2	2	2	2				2		1	1	2	2	1
BTCE402.3	Able to use slope defection method and rotation contribution method	2	1	1	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–IV)2018-19						
Class: B.Tech (CE) 4th Semester						
Subject t Name: BTCE 402 Structural Analysis I		Time:1.5Hrs		Max.Marks:30		
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		
Student will be able to CO1: Able to analysis various type of loads by influence line diagram method. CO2: To understand develop computer program for the analysis of structures. Able to identify determinate, indeterminate, stable and unstable structures. CO3: Able to use slope defection method and rotation contribution method.						

CO Map	Question No.	Question	Marks
CO1	Q.1	Define Muller Breslau Principle. What is retaining wall?	3
CO1	Q.2a	What do you understand from a determinate structure?	3
	Q.2b	What is method of Joint and Section?	3
CO1	Q.3	Describe in brief the significance of influence line diagram.	6
CO2	Q.4	What is middle third rule? Describe in brief.	3
CO2	Q.5a	Write down different types of retaining walls	3
	Q.5b	How behaviour of an arch is different from a beam, explain?	3
CO3	Q6	What will be the value of horizontal thrust if a cable supported at same level with dip ‘d’ is subjected to udl of intensity ‘w’ throughout its length ‘L’.	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

Course Code				BTCE 402		
Associated Credit Units				**4**		
Ser. No.	**Name**	**Enrollment No.**	**Roll No.**	**30**	**70**	**100**
1	**DHANANJAY CHAUHAN**	**A60515817003**	**AU17UCV8101**	**23**	**54**	**77**
2	**KARAN SINGH SIKARWAR**	**A60515817001**	**AU17UCV8102**	**20**	**43**	**63**
3	**NEHA KARAIYA**	**A60215817003**	**AU17UCV8103**	**22**	**52**	**74**
4	**RAHUL PINGLE**	**A60215817005**	**AU17UCV8104**	**16**	**33**	**49**
5	**UDDESHYA UPADHYAY**	**A60215817001**	**AU17UCV8105**	**10**	**25**	**35**
				STRUCTURAL ANALYSIS-I		
				BTCE 402		
				4		
No. of students attended the Exam				5		
No. of students secure more than 60% marks				3		
Percentage of students secure more than 60% marks				60.00		
Attainment Level				Level 1		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **CONCRETE TECHNOLOGY**
Course Code : BTCE 403, Credits : 03, Session : 2018-19(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Shashank Gupta, Mr. Mohan Kantharia, Mr. Sachin Tiwari, Dr. Ripunjoy Gogoi

A. Introduction

Concrete is the most commonly used man-made material on earth. It is an important construction material used extensively in buildings, bridges, roads and dams. Its uses range from structural applications, to kerbs, pipes and drains.

B. At the end of the course students will able to learn:

- **BTCE403.1** Understand the theoretical concept of Concrete material which includes Cement, Admixtures and Aggregates.
- **BTCE403.2** Learn different types of aggregates, admixtures & know the mechanism of hydration of cement.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write

effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Function as design consultants in construction industry for the design of civil engineering structures.

PSO2: Provide sustainable solutions to the Civil Engineering Problems

PSO3: It. will help students to analyze and Provide concrete solution to environmental problem.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module I: Materials: Materials: cement - different types - chemical composition and physical properties - tests on cement - I.S. specifications - aggregates - classification - mechanical properties and tests as per I.S. - alkali aggregate reaction - grading requirements - heavy weight - light weight - normal weight - aggregate - sampling of aggregate - water - quality of water - permissible impurities as per I.S - admixtures - accelerators - retarders - water reducing agents – super plasticizers- use of silica fumes.

Module II: Manufacture: Manufacture of concrete - measurement of materials - storage and handling - batching plant and equipment - mixing - types of mixers - transportation of concrete - pumping of concrete - placing of concrete - under water concreting - compaction of concrete - curing of concrete - ready mixed concrete - mix design - nominal mixes - design mixes - factors influencing mix design - A.C.I method - I.S method - design for high strength mixes.

Module III: Properties of Concrete: Properties of concrete - fresh concrete - workability - factors affecting workability - tests for workability - segregation and bleeding - hardened concrete - factors affecting strength of concrete - strength of concrete in compression, tension and flexure - stress-strain characteristics and elastic properties - shrinkage and creep - durability of concrete - permeability - chemical attack - sulphate attack - resistance to abrasion and cavitaion - resistance to freezing and thawing - resistance to fire - marine atmosphere - quality control - frequency of sampling - test specimens - statistical analysis of test results - standard deviation - acceptance criteria

Module IV: Special Concretes: Special concrete - light weight concrete - high density concrete - vacuum concrete - shotcrete - Fibre reinforced concrete-polymer concrete - ferrocement - high performance concrete - self compacting concrete - types of failure - diagnosis of distress in concrete - crack control - leak proofing - guniting and jacketing techniques.

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/ HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- Neville A.M., Properties of Concrete, Pitman
- Shetty M.S., Concrete Technology, S I Chand & Company, 1993.
- Gambhir M.L., Concrete Technology, Tata McGraw Hill, 1995.
- Orchard D.F., Concrete Technology Vol. I & II, 1968.

I. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	Materials: cement aggregates - -	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
2	Different types - chemical composition and physical properties	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
3	Tests on cement - I.S. specifications	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
4	Classification - mechanical properties and tests as per I.S.	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
5	Alkali aggregate reaction - grading requirements	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
6	Heavy weight - light weight normal weight - aggregate	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam

7	Sampling of aggregate - water - quality of water	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
8	Permissible impurities as per I.S - admixtures - accelerators	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
9	Retarders - water reducing agents – super plasticizers- use of silica fumes	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
10	Manufacture of concrete - - ready mixed concrete A.C.I method	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
11	Measurement of materials	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
12	storage and handling - batching	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
13	Batching plant and equipment - mixing - types of mixers	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
14	Transportation of concrete - pumping of concrete	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
15	Placing of concrete - under water concreting	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
16	Compaction of concrete - curing of concrete	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
17	Mix design - nominal mixes - design mixes	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
18	Factors influencing mix design	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
19	I.S method - design for high strength mixes	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
20	Properties of concrete - fresh concrete - workability, tension and flexure - stress- strain characteristics and - resistance to abrasion and	Lecture	BTCE403.1	Mid Term-1, Quiz & End Sem Exam
21	Tests for workability - segregation and bleeding - hardened concrete - factors affecting strength of concrete	Lecture	BTCE403.1	Mid Term-2, Quiz & End Sem Exam
22	Factors affecting workability - - strength of concrete in compression	Lecture	BTCE403.1	Mid Term-2, Quiz & End Sem Exam
23	Elastic properties - shrinkage and creep - durability of concrete -	Lecture	BTCE403.1	Mid Term-2, Quiz & End Sem Exam
24	cavitaion resistance to freezing and thawing - -	Lecture	BTCE403.1	Mid Term-2, Quiz & End Sem Exam
25	resistance to fire marine atmosphere	Lecture	BTCE403.1	Mid Term-2, Quiz & End Sem Exam
26	resistance to fire marine	Lecture	BTCE403.1	Mid Term-2, Quiz

	atmosphere			& End Sem Exam
27	quality control - frequency of sampling test specimens - statistical	Lecture	BTCE403.1	Mid Term-2, Quiz & End Sem Exam
28	permeability - chemical attack - sulphate attack	Lecture	BTCE403.1	Mid Term-2, Quiz & End Sem Exam
29	Analysis of test results - standard deviation - acceptance criteria	Lecture	BTCE403.1	Mid Term-2, Quiz & End Sem Exam
30	Special concrete high performance concrete self .	Lecture	BTCE403.1	Mid Term-2, Quiz & End Sem Exam
31	Light weight concrete - high density concrete	Lecture	BTCE403.1	Mid Term-2, Quiz & End Sem Exam
32	vacuum concrete - shotcrete	Lecture	BTCE403.1	Mid Term-2, Quiz & End Sem Exam
33	Fibre reinforced concrete- polymer concrete - ferrocement -	Lecture	BTCE403.1	Mid Term-2, Quiz & End Sem Exam
34	compacting concrete - types of failure - diagnosis of distress in concrete	Lecture	BTCE403.1	Mid Term-2, Quiz & End Sem Exam
35	crack control - leak proofing - guniting	Lecture	BTCE403.1	Mid Term-2, Quiz & End Sem Exam
36	jacketing techniques	Lecture	BTCE403.1	Mid Term-2, Quiz & End Sem Exam

J.Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE402.1	Understand the theoretical concept of Concrete material which includes Cement, Admixtures and Aggregates.	3	3	1	3	1				2		2	1	1	2	1
BTCE402.2	Learn different types of aggregates, admixtures & know the mechanism of hydration of cement	3	2	2	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–IV)2018-19		
Class: B.Tech (CE) 4th Semester		
Subject t Name: BTCE 403 Concrete Technology	Time:1.5Hrs	Max.Marks:30

Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		

Student will be able to

CO1: Understand the theoretical concept of Concrete material which includes Cement, Admixtures and Aggregates.

CO2: Learn different types of aggregates, admixtures & know the mechanism of hydration of cement

CO Map	Question No.	Question	Marks
CO1	Q.1	How are super plasticizers classified? Explain in detail.	3
CO1	Q.2a	Write the oxide composition limits of OPC and explain their necessity.	3
	Q.2b	Explain the field tests for cement and what do you conclude from them	3
CO1	Q.3	What are BOGUE'S compounds.	6
CO2	Q.4	Classify the types of admixtures and write a short note on them	3
CO2	Q.5a	Write about the laboratory tests of cement	3
	Q.5b	which test do you choose to find strength of cement in laboratory.explain	3
CO2	Q6	List out various mineral admixtures and explain about them in detail	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

CONCRETE TECHNOLOGY						
Course Code				BTCE 403		
Associated Credit Units				3		
Ser. No.	Name	Enrollment No.	Roll No.	30	70	100
1	DHANANJAY CHAUHAN	A60515817003	AU17UCV8101	26	58	84
2	KARAN SINGH SIKARWAR	A60515817001	AU17UCV8102	23	51	74
3	NEHA KARAIYA	A60215817003	AU17UCV8103	26	58	84
4	RAHUL PINGLE	A60215817005	AU17UCV8104	22	49	71
5	UDDESHYA UPADHYAY	A60215817001	AU17UCV8105	21	33	54
				CONCRETE TECHNOLOGY		
				BTCE 403		
				3		
No. of students attended the Exam				5		
No. of students secure more than 60% marks				4		
Percentage of students secure more than 60% marks				80.00		
Attainment Level				Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **GEOINFORMATICS-II**
Course Code : BTCE 404, Credits : 03, Session : 2018-19(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Shashank Gupta, Mr. Mohan Kantharia, Dr. Ripunjoy Gogoi

A. Introduction

Geoinformatics is the integration of different disciplines dealing with spatial information. The advent of Satellite Remote Sensing and subsequent development of Global Positioning System (GPS) and Geographical Information System (GIS) have made significant changes in surveying and map making.

B. Students will be able to learn after completion of this course

- **BTCE404.1** Explore mapped data Relate GIS with remote sensing technologies
- **BTCE404.2** Analyze spatial data, using GIS analysis tools Develop and manage geo databases
- **BTCE404.3** Apply Python as a GIS computer language Create maps, images and apps to communicate spatial data in a meaningful way to other.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Function as design consultants in construction industry for the design of civil engineering structures.

PSO2: Provide sustainable solutions to the Civil Engineering Problems

PSO3: It. will help students to analyze and Provide concrete solution to environmental problem.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**

Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module I: Triangulation - principle - reconnaissance - selection of site for base line - selection of stations - orders of triangulation - triangulation figures - scaffolds and signals - marking of stations - intervisibility and heights of stations - satellite stations - base line measurement - equipment and corrections - adjustment of observations.

Module II: Survey adjustments and theory of errors – introduction – laws of accidental errors – probability curve – principle of least squares – laws of weights – probable error – normal equation – most probable value – method of correlates – angle adjustment – station adjustment – figure adjustment – adjustment of triangles – adjustment of a geodetic quadrilateral.

Module III: Curves - types of curves - elements of a curve - simple curves - different methods of setting out – introduction to compound curves - reverse curves, transition curves, vertical curves - hydrographic survey - scope - shoreline survey - river survey - soundings – sounding equipment - methods - ranges - locating sounding - plotting - three point problem.

Module IV: Photogrammetry – terrestrial and aerial photogrammetry – heights and distances from Photographs – flight planning – elements of stereoscopy – photo mosaic – photo interpretation – applications of photogrammetry. GNSS – GPS – differential GPS.

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- S.K Duggal, Sruveying Vol. I and II, 2nd ed., Tata McGraw Hill, New Delhi (2004).
- Arora K.R., Surveying Vol. I & II, Standard Book House, New Delhi (2008)
- Punmia B.C., Ashok Kr. Jain, Arun Kr. Jain, Surveying Vol. I &II, Laxmi Pub, New Delhi (2004)

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Triangulation - s - - marking of stations	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
2	Principle - reconnaissance	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
3	Selection of site for base line	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
4	selection of stations - orders of triangulation	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
5	Triangulation figures - scaffolds and signals	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
6	Intervisibility and heights of stations	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
7	Satellite stations - base line	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
8	Measurement - equipment and corrections	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
9	Adjustment of observations	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
10	Survey adjustments and theory of errors figure adjustment	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
11	introduction – laws of accidental errors	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
12	probability curve	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
13	principle of least squares – laws of weights	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
14	probable error – normal equation	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
15	most probable value – method of correlates – angle adjustment	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
16	station adjustment	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
17	adjustment of triangles	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
18	Adjustment of a geodetic quadrilateral.	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
19	Curves - types of curves hydrographic	Lecture	BTCE404.1	Mid Term-1, Quiz & End Sem Exam
20	elements of a curve - simple	Lecture	BTCE404.1	Mid Term-1, Quiz

	curves			& End Sem Exam
21	elements of a curve - simple curves	Lecture	BTCE404.1	Mid Term-2, Quiz & End Sem Exam
22	different methods of setting out –	Lecture	BTCE404.1	Mid Term-2, Quiz & End Sem Exam
23	different methods of setting out – introduction to compound curves	Lecture	BTCE404.1	Mid Term-2, Quiz & End Sem Exam
24	reverse curves, transition curves, vertical curves	Lecture	BTCE404.1	Mid Term-2, Quiz & End Sem Exam
25	reverse curves, transition curves, vertical curves	Lecture	BTCE404.1	Mid Term-2, Quiz & End Sem Exam
26	scope - shoreline survey - river survey - soundings	Lecture	BTCE404.1	Mid Term-2, Quiz & End Sem Exam
27	survey - – sounding equipment - methods - ranges	Lecture	BTCE404.1	Mid Term-2, Quiz & End Sem Exam
28	locating sounding - plotting - three point problem.	Lecture	BTCE404.1	Mid Term-2, Quiz & End Sem Exam
29	introduction to compound curves	Lecture	BTCE404.1	Mid Term-2, Quiz & End Sem Exam
30	Photogrammetry– flight planning —–	Lecture	BTCE404.1	Mid Term-2, Quiz & End Sem Exam
31	terrestrial and aerial photogrammetry	Lecture	BTCE404.1	Mid Term-2, Quiz & End Sem Exam
32	heights and distances from Photographs	Lecture	BTCE404.1	Mid Term-2, Quiz & End Sem Exam
33	elements of stereoscopy	Lecture	BTCE404.1	Mid Term-2, Quiz & End Sem Exam
34	interpretation – applications of photogrammetry.	Lecture	BTCE404.1	Mid Term-2, Quiz & End Sem Exam
35	photo mosaic – photo GNSS	Lecture	BTCE404.1	Mid Term-2, Quiz & End Sem Exam
36	GPS – differential GPS	Lecture	BTCE404.1	Mid Term-2, Quiz & End Sem Exam

J.Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

BTCE402.1	Analyze spatial data, using GIS analysis tools Develop and manage geo databases.	3	3	1	3	1				2		2	1	1	2	1
BTCE402.2	Apply Python as a GIS computer language Create maps, images and apps to communicate spatial data in a meaningful way to other.	3	2	2	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology
Department of CIVIL Engineering
MID-SEMESTER(SEM–IV)2018-19

Class: B.Tech (CE) 4th Semester

Subject t Name: BTCE 404 Geoinformatics II	Time:1.5Hrs	Max.Marks:30

Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		

Student will be able to

CO1: Explore mapped data Relate GIS with remote sensing technologies

CO2: Apply Python as a GIS computer language Create maps, images and apps to communicate spatial data in a meaningful way to other.

CO3: Analyze spatial data, using GIS analysis tools Develop and manage geo databases

CO Map	Question No.	Question	Marks
CO1	Q.1	What is remote sensing?	3
CO1	Q.2a	Discuss application of remote sensing?	3
	Q.2b	Discuss elements of a curve - simple curves	3
CO1	Q.3	different methods of setting out – different methods of setting out – introduction to compound curves	6
CO2	Q.4	Discuss scope - shoreline survey - river survey - soundings	3
	Q.5a	Discuss GIS and its application	3

CO2	Q.5b	Discuss GPS and its application	3
CO2	Q6	Discuss reverse curves, transition curves, vertical curves	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

GEO INFORMATICS- II						
Course Code				BTCE 404		
Associated Credit Units				**3**		
Ser. No.	**Name**	**Enrollment No.**	**Roll No.**	**30**	**70**	**100**
1	**DHANANJAY CHAUHAN**	**A60515817003**	**AU17UCV8101**	**23**	**49**	**72**
2	**KARAN SINGH SIKARWAR**	**A60515817001**	**AU17UCV8102**	**20**	**38**	**58**
3	**NEHA KARAIYA**	**A60215817003**	**AU17UCV8103**	**23**	**48**	**71**
4	**RAHUL PINGLE**	**A60215817005**	**AU17UCV8104**	**19**	**44**	**63**
5	**UDDESHYA UPADHYAY**	**A60215817001**	**AU17UCV8105**	**17**	**35**	**52**
				GEO INFORMATICS- II		
				BTCE 404		
				3		
No. of students attended the Exam				5		
No. of students secure more than 60% marks				3		
Percentage of students secure more than 60% marks				60.00		
Attainment Level				Level 1		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **CONSTRUCTION MANAGEMENT AND QUANTITY SURVEYING**
Course Code : BTCE 405, Credits : 03, Session : 2018-19(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Shashank Gupta, Mr. Mohan Kantharia, Dr. Ripunjoy Gogoi, Dr. Imran Ahmad Khan

A. Introduction

Before starting any construction project, the quantity surveyor analyzes the drawing and specifications of the new building that architects or engineers provide. The surveyors calculate the quantity of the material used in the building. Also, they must calculate the actual work or labor cost.

B. At the end of this course students will able to learn:

- **BTCE405.1** Able to describe the requirement of planning and management to recognize the critical path and pert suitability for research projects.
- **BTCE405.2** Able to determine projects schedule and estimate the activity time of CPM to discuss resource scheduling and planning of civil engineering.
- **BTCE405.3** Projects Able to illustrate various construction equipments, machinery and their utility.

C. P**rogramme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Function as design consultants in construction industry for the design of civil engineering structures.

PSO2: Provide sustainable solutions to the Civil Engineering Problems

PSO3: It. will help students to analyze and Provide concrete solution to environmental problem.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module I: Construction Management – Network techniques – introduction – Bar charts – use of CPM and PERT for planning – time estimates – critical path – updating – crashing – resource smoothing – resource leveling – computer applications **Construction planning:** Preparation of job layout – labour schedule – material schedule – equipment schedule

Module II: Project Implementation **–** Tender – earnest money deposit – security deposit – contract – contract documents – measurements – completion certificate – inspection and quality control – standardization – organisations at national and international level (BIS & ISO) – role of certification

Module III: Quantity surveying - preparation of detailed estimates for: buildings - reinforced concrete structures - sanitary and water supply works

Module IV: Preparation of specification for common materials of construction and items of work as per IS - analysis of rates and preparation of abstract of estimate Introduction to valuation of real properties: Depreciation – Sinking fund – methods of valuation

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- Vazirani V.N. & Chandola S.P., Heavy Construction, 1978.
- Jha J. & Sinha S.K., Construction & Foundation Engine.

I. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	Network techniques—— labour schedule	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
2	Introduction – Bar charts	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
3	use of CPM and PERT for planning	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
4	time estimates – critical path	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
5	updating – crashing – resource	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
6	smoothing – resource leveling – computer applications	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
7	**Construction planning:** Preparation of job layout	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
8	material schedule – equipment schedule	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
9	Project Implementation	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam

10	Tender earnest money deposit – security deposit	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
11	Tender – earnest money deposit – security deposit	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
12	contract – contract documents measurements	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
13	completion certificate	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
14	inspection and quality control – standardization	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
15	Organisations at national and international level	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
16	(BIS & ISO) – role of certification	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
17	preparation of detailed estimate	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
18	buildings - reinforced	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
19	sanitary and water supply works	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
20	sanitary and water supply works	Lecture	BTCE405.1	Mid Term-1, Quiz & End Sem Exam
21	sanitary and water supply works	Lecture	BTCE405.1	Mid Term-2, Quiz & End Sem Exam
22	concrete structures	Lecture	BTCE405.1	Mid Term-2, Quiz & End Sem Exam
23	concrete structures	Lecture	BTCE405.1	Mid Term-2, Quiz & End Sem Exam
24	concrete structures	Lecture	BTCE405.1	Mid Term-2, Quiz & End Sem Exam
25	Preparation of specification for common	Lecture	BTCE405.1	Mid Term-2, Quiz & End Sem Exam
26	analysis of rates and	Lecture	BTCE405.1	Mid Term-2, Quiz & End Sem Exam
27	materials of construction and items of work as per IS -	Lecture	BTCE405.1	Mid Term-2, Quiz & End Sem Exam
28	materials of construction and items of work as per IS -	Lecture	BTCE405.1	Mid Term-2, Quiz & End Sem Exam
29	materials of construction and items of work as per IS -	Lecture	BTCE405.1	Mid Term-2, Quiz & End Sem Exam
30	preparation of abstract of estimate	Lecture	BTCE405.1	Mid Term-2, Quiz & End Sem Exam
31	preparation of abstract of estimate	Lecture	BTCE405.1	Mid Term-2, Quiz & End Sem Exam
32	Introduction to valuation of real properties	Lecture	BTCE405.1	Mid Term-2, Quiz & End Sem Exam
33	Introduction to valuation of real properties	Lecture	BTCE405.1	Mid Term-2, Quiz & End Sem Exam
34	Depreciation – Sinking fund	Lecture	BTCE405.1	Mid Term-2, Quiz

				& End Sem Exam
35	methods of valuation	Lecture	BTCE405.1	Mid Term-2, Quiz & End Sem Exam
36	materials of construction and items of work as per IS -	Lecture	BTCE405.1	Mid Term-2, Quiz & End Sem Exam

J.Course Articulation Matrix (Mapping of COs with POs

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE405.1	Able to describe the requirement of planning and management to recognize the critical path and pert suitability for research projects. .	3	3	1	3	1				2		2	1	1	2	1
BTCE405.2	Projects Able to illustrate various construction equipments, machinery and their utility.	3	2	2	2	2				2		1	1	2	2	1
BTCE405.3	Able to determine projects schedule and estimate the activity time of CPM to discuss resource scheduling and planning of civil engineering		2	1	3	2				2		1	1	2	1	

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–IV)2018-19
Class: B.Tech (CE) 4th Semester

Subject t Name: BTCE 405 Construction management and Quality Surveying			Time:1.5Hrs		Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		

Student will be able to

CO1: Able to describe the requirement of planning and management to recognize the critical path and pert suitability for research projects.

CO2: Able to determine projects schedule and estimate the activity time of CPM to discuss resource scheduling and planning of civil engineering.

CO3: Projects Able to illustrate various construction equipments, machinery and their utility.

CO Map	Question No.	Question	Marks
CO1	Q.1	Discuss Network techniques—— labour schedule.	3
CO1	Q.2a	Discuss Bar charts use of CPM and PERT for planning.	3
	Q.2b	Discuss tender earnest money deposit – security deposit.	3
CO1	Q.3	Discuss material schedule – equipment schedule Project Implementation.	6
CO2	Q.4	Discuss various materials of construction and items of work.	3
CO2	Q.5a	What is valuation of real properties?	3
	Q.5b	Discuss Depreciation and Sinking fund	3
CO3	Q6	Discuss concrete structures.	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

CONSTRUCTION MANAGEMENT AND QUANTITY SURVEYING						
Course Code				BTCE 405		
Associated Credit Units				3		
Ser. No.	Name	Enrollment No.	Roll No.	30	70	100
1	DHANANJAY CHAUHAN	A60515817003	AU17UCV8101	25	41	66
2	KARAN SINGH SIKARWAR	A60515817001	AU17UCV8102	21	36	57
3	NEHA KARAIYA	A60215817003	AU17UCV8103	23	52	75
4	RAHUL PINGLE	A60215817005	AU17UCV8104	21	27	48
5	UDDESHYA UPADHYAY	A60215817001	AU17UCV8105	14	31	45
				CONSTRUCTION MANAGEMENT AND QUANTITY SURVEYING		
				BTCE 405		
				3		
No. of students attended the Exam				5		
No. of students secure more than 60% marks				2		
Percentage of students secure more than 60% marks				40.00		
Attainment Level				-		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **TRANSPORTATION ENGINEERING - I**
Course Code : BTCE 406, Credits : 04, Session : 2018-19(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Shashank Gupta, Mr. Mohan Kantharia, Dr. Ripunjoy Gogoi

A. Introduction

Transportation engineering or transport engineering is the application of technology and scientific principles to the planning, functional design, operation and management of facilities for any mode of transportation in order to provide for the safe, efficient, rapid, comfortable, convenient, economical.

B. After completion of this course students will able to learn

- **BTCE406.1** Able to calculate traffic flow parameters, to Judge the properties of various pavement materials and their applications.
- **BTCE406.2** Able to design the flexible and rigid pavements and to compute road vehicle characteristics
- **BTCE406.3** Estimate braking and stopping distances based on vehicle and human factors

- P**rogramme Outcomes:**

  PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

  PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

  PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

  PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

  PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

  PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

  PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

  PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

  PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

  PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

  PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

  PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects
- **Programme Specific Outcomes:**

  PSO1: Function as design consultants in construction industry for the design of civil engineering structures.

  PSO2: Provide sustainable solutions to the Civil Engineering Problems

  PSO3: It. will help students to analyze and Provide concrete solution to environmental problem.
-

Component of Evaluation	**Description**	**Code**	**Weightag**

			e %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module I: Components & Geometric Design of Railways: Introduction. Typical cross-sections. Various gauges. Coning of wheels and tilting of rails. Functions and requirements of component parts of a railway track. Creep of rails. Geometrical design of railway track. Horizontal curves, radius, superelevation, cant deficiency, transition curves, safe speed on curves, different types of gradients, grade compensation. Worked out problems.

Module II: Railway Operation and Control: Points and crossings and their design. Track junctions and simple track layouts. Details of different types of stations and yards. Signaling and interlocking. Control of train movements. Absolute block . Automatic block system and CTC system. Railway Construction and Maintenance: Construction of railway track: earthwork, plate laying and packing. Maintenance of track-alignment, gauge, renewal of component parts and drainage, modern methods of track maintenance.

Module III: Tunneling: Tunnel alignment and grade. Size and shape of a tunnel. Methods of tunneling in hard rocks. Full face method, heading and bench method, drift method. Methods of tunneling in soft soils. Compressed air and shield tunneling Shafts in tunnels. Ventilation of tunnel and various methods. Lining of tunnels. Drainage and lighting of . Micro Tunneling. Trenchless technology.

Module IV: Elements of bridge design: General – IRC Bridge code –loading standards–impact effect – wind load – longitudinal forces – centrifugal forces – force due to water currents – buoyancy effect – temperature effects – secondary stresses – erection – seismic force

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- Antia K.F, Railway Track, New Book Company Pvt. Ltd, 1960.
- Agarwal M.M., Railway Engineering, Prabha and Co
- Khanna S.K & Arora M.G., Airport Planning and Design, Nemchand & Bros.
- Horonjeff R., Planning and Design of Airports, Mc Graw Hill
- Mundrey J.S, Railway Track Engineering, TMGS, 1988.

I.Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Introduction Creep of rails., transition curves, safe speed on curves	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
2	Typical cross-sections.	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
3	Various gauges	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
4	Coning of wheels and tilting of rails. Functions and requirements of component parts of a railway track.	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
5	Geometrical design of railway track. Horizontal curves	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
6	Different types of gradients	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
7	Grade compensation. Worked out problems.	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
8	Radius, superelevation, cant deficiency	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
9	Points and crossings and their design.. . ..	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
10	Track junctions and simple track layouts	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
11	Details of different types of stations and yards	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
12	Signaling and interlocking. Control of train movements	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
13	Absolute block . Automatic block system and CTC system.	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
14	Construction and Maintenance: Construction of railway track: earthwork.	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
15	Railway, plate laying and packing	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
16	Methods of track maintenance.	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam

17	Maintenance of track-alignment.	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
18	Gauge, renewal of component parts and drainage, modern	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
19	Tunnel alignment and grade.., drift method.Micro Tunneling	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
20	Size and shape of a tunnel	Lecture	BTCE406.1	Mid Term-1, Quiz & End Sem Exam
21	Methods of tunneling in hard rocks.	Lecture	BTCE406.1	Mid Term-2, Quiz & End Sem Exam
22	Full face method, heading and bench method	Lecture	BTCE406.1	Mid Term-2, Quiz & End Sem Exam
23	Methods of tunneling in soft soils	Lecture	BTCE406.1	Mid Term-2, Quiz & End Sem Exam
24	Compressed air and shield tunneling Shafts in tunnels	Lecture	BTCE406.1	Mid Term-2, Quiz & End Sem Exam
25	Ventilation of tunnel and various methods	Lecture	BTCE406.1	Mid Term-2, Quiz & End Sem Exam
26	Lining of tunnels. Drainage and lighting	Lecture	BTCE406.1	Mid Term-2, Quiz & End Sem Exam
27	Trenchless technology .impact effect – wind load longitudinal forces centrifugal forces	Lecture	BTCE406.1	Mid Term-2, Quiz & End Sem Exam
28	force due to water currents – buoyancy effect – temperature effects	Lecture	BTCE406.1	Mid Term-2, Quiz & End Sem Exam
29	secondary stresses – erection – seismic force	Lecture	BTCE406.1	Mid Term-2, Quiz & End Sem Exam
30	General – IRC Bridge code – loading standards.	Lecture	BTCE406.1	Mid Term-2, Quiz & End Sem Exam
31	General – IRC Bridge code – loading	Lecture	BTCE406.1	Mid Term-2, Quiz & End Sem Exam
32	wind load – longitudinal forces – centrifugal forces	Lecture	BTCE406.1	Mid Term-2, Quiz & End Sem Exam
33	impact effect –– force due to water currents	Lecture	BTCE406.1	Mid Term-2, Quiz & End Sem Exam
34	buoyancy effect – temperature effects	Lecture	BTCE406.1	Mid Term-2, Quiz & End Sem Exam
35	Standards secondary stresses – erection – seismic force	Lecture	BTCE406.1	Mid Term-2, Quiz & End Sem Exam
36	Standards econdary stresses – erection – seismic force	Lecture	BTCE406.1	Mid Term-2, Quiz & End Sem Exam

J.Course Articulation Matrix (Mapping of COs with POs

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE406.1	Able to calculate traffic flow parameters, to Judge the properties of various pavement materials and their applications.	3	3	1	3	1				2		2	1	1	2	1
BTCE406.2	Able to design the flexible and rigid pavements and to compute road vehicle characteristics	3	2	2	2	2				2		1	1	2	2	1
BTCE406.3	Estimate braking and stopping distances based on vehicle and human factor		2	1	3	2				2		1	1	2	1	

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–IV)2018-19		
Class: B.Tech (CE) 4th Semester		
Subject t Name: BTCE 406 **TRANSPORTATION ENGINEERING - I**	Time:1.5Hrs	Max.Marks:30

Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		

Student will be able to
CO1: Able to calculate traffic flow parameters, to Judge the properties of various pavement materials and their applications.
CO2: Estimate braking and stopping distances based on vehicle and human factors.
CO3: Able to design the flexible and rigid pavements and to compute road vehicle characteristics

CO Map	Question No.	Question	Marks
CO1	Q.1	Explain with sketches the various factors controlling the alignment of roads. Discuss the special care to be taken	3

		while aligning hill roads.	
CO1	Q.2a	Derive an expression for finding the stopping sight distance at level and at grades	3
	Q.2b	With sketches explain different types of failures in flexible pavements. Also discuss their causes.	3
CO1	Q.3	Explain how spot speed data are presented and the results used in traffic engineering.	6
CO2	Q.4	Explain the desirable properties of aggregates to be used in different types of pavement construction	3
CO2	Q.5a	What is wind rose diagram?	3
	Q.5b	Explain various types of road markings commonly used with the uses of each markings	3
CO3	Q6	Explain wind rose diagram and how it is being used for determination of runway orientation.	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

TRANSPORTATION ENGINEERING-I						
Course Code				BTCE 406		
Associated Credit Units				**4**		
Ser. No.	**Name**	**Enrollment No.**	**Roll No.**	**30**	**70**	**100**
1	**DHANANJAY CHAUHAN**	**A60515817003**	**AU17UCV8101**	**21**	**52**	**73**
2	**KARAN SINGH SIKARWAR**	**A60515817001**	**AU17UCV8102**	**17**	**47**	**64**
3	**NEHA KARAIYA**	**A60215817003**	**AU17UCV8103**	**19**	**57**	**76**
4	**RAHUL PINGLE**	**A60215817005**	**AU17UCV8104**	**18**	**35**	**53**
5	**UDDESHYA UPADHYAY**	**A60215817001**	**AU17UCV8105**	**14**	**24**	**38**
No. of students attended the Exam				5		
No. of students secure more than 60% marks				3		
Percentage of students secure more than 60% marks				60.00		
Attainment Level				Level 1		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **Geology LAB**
Course Code : BTCE 420, Credits : 04, Session : 2018-19(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Shashank Gupta, Mr. Mohan Kantharia, Dr. Ripunjoy Gogoi

A. Introduction The course is designed to provide the students a knowledge of geology mineral properties

B. After completion of this course students will able to learn

- **BTCE420.1** Identification of rocks (Igneous Petrology)
- **BTCE420.2** Identification of rocks (Sedimentary Petrology
- **BTCE420.3** Identification of rocks (Metamorphic Petrolody)
- **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

- **Programme Specific Outcomes:**
  PSO1: Function as design consultants in construction industry for the design of civil engineering structures.
  PSO2: Provide sustainable solutions to the Civil Engineering Problems
  PSO3: It. will help students to analyze and Provide concrete solution to environmental problem.
-

Component of Evaluation	**Description**	**Code**	**Weightag e %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/H A	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

Course Content

1. Study of physical properties ofminerals:(2Hour)
2. Study of spgravity of minerals and rocks (2 hour)
3. Study of different group ofminerals:(2Hour)
4. Study of Crystal and Crystalsystem: (2Hour)
5. Identification of minerals: Silica group: Quartz, Amethyst, Opal; Feldspar group: Orthoclase, Plagioclase; Cryptocrystalline group: Jasper; Carbonate group: Calcite; Element group: Graphite; Pyroxene group: Talc; Mica group: Muscovite; Amphibole group: Asbestos, Olivine, Hornblende, Magnetite, Hematite, Corundum, Kyanite, Garnet, Galena,Gypsum: (2 Hour)
6. Identification of rocks (Igneous Petrology): Acidic Igneous rock: Granite and its varieties, Syenite, Rhyolite, Pumice, Obsidian, Scoria, Pegmatite, Volcanic Tuff. Basic rock: Gabbro, Dolerite, Basalt and its varieties,Trachyte. (2 Hour)
7. Identification of rocks (Sedimentary Petrology): Conglomerate, Breccia, Sandstone and its varieties, Laterite, Limestone and its varieties, Shales and itsvarieties. (2Hour)

8. Identification of rocks (Metamorphic Petrolody): Marble, slate, Gneiss and its varieties, Schist and its varieties. Quartzite,Phyllite.(2Hour)
9. Study of topographical features from Geological maps. Identification of symbols inmaps :(2Hour)
10. Field study of foulds and faults (2 hour)

Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

Question Paper

<table>
<tr><td colspan="7">Amity School of Engineering and Technology
Department of CIVIL Engineering
MID-SEMESTER(SEM–IV)2018-19</td></tr>
<tr><td colspan="7">Class: B.Tech (CE) 4th Semester</td></tr>
<tr><td colspan="2">Subject t Name: Geology Lab
BTCE 420</td><td colspan="3">Time:1.5Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3,6</td><td>Q.4</td><td>Q.2,5</td><td></td><td></td></tr>
<tr><td colspan="7">Student will be able to
CO1:
CO2:
CO3:</td></tr>
</table>

CO Map	Question No.	Question	Marks
CO1	Q.1	*1. Study of physical properties ofminerals:(2Hour)*	3
CO1	Q.2a	*2. Study of spgravity of minerals and rocks (2 hour)*	3
	Q.2b	*Breccia, Sandstone and its varieties, Laterite, Limestone and its varieties, Shales and itsvarieties*	3
CO1	Q.3	*3. Study of different group ofminerals:(2Hour)*	6
CO2	Q.4	*Identification of rocks (Metamorphic Petrolody):* Field study of foulds and faults	3
CO2	Q.5a	Study of topographical features from Geological maps. Identification of symbols in maps	3

	Q.5b	Marble, slate, Gneiss and its varieties, Schist and its varieties. Quartzite	3
CO3	Q6	Identification of rocks (Sedimentary Petrology): Conglomerate,	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

NUMERICAL ANALYSIS LAB (PROGRAMMING LAB)						
Course Code				BTCE 420		
Associated Credit Units				**1**		
Ser. No.	**Name**	**Enrollment No.**	**Roll No.**	**30**	**70**	**100**
1	**DHANANJAY CHAUHAN**	**A60515817003**	**AU17UCV8101**	**23**	**62**	**85**
2	**KARAN SINGH SIKARWAR**	**A60515817001**	**AU17UCV8102**	**18**	**59**	**77**
3	**NEHA KARAIYA**	**A60215817003**	**AU17UCV8103**	**22**	**58**	**80**
4	**RAHUL PINGLE**	**A60215817005**	**AU17UCV8104**	**18**	**58**	**76**
5	**UDDESHYA UPADHYAY**	**A60215817001**	**AU17UCV8105**	**22**	**55**	**77**
				NUMERICAL ANALYSIS LAB (PROGRAMMING LAB)		
				BTCE 422		
				1		
No. of students attended the Exam				5		
No. of students secure more than 60% marks				5		
Percentage of students secure more than 60% marks				100.00		
Attainment Level				Level 3		

PROGRAMME ARTICULATION MATRIX																
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
VSEM	BTCE501	3	3	2	3	3	2	2	-	3	2	3	3	3	3	3
	BTCE502	2	2	2	-	3	-	3	2	-	3	-	3	1	2	1
	BTCE503	3	3	1	2	3	3	3	3	3	-	1	3	3	2	2
	BTCE504	2	-	2	-	3	-	3	2	-	3	-	3	3	2	2
	BTCE505	3	3	3	2	2	1	1	-	-	-	-	3	3	3	3
	BTCE506	2	2	2	-	3	-	3	2	-	3	-	3	1	2	1
	BTCE520	2	-	2	-	3	-	3	2	-	3	-	3	3	2	2
	BTCE521	3	3	1	2	3	3	3	3	3	-	1	3	3	2	2
	BTCE550	3	3	2	3	3	2	2	-	3	2	3	3	3	3	3
VISE M	BTCE601	3	3	2	3	3	2	2	-	3	2	3	3	1	2	1
	BTCE602	2	2	2	-	3	-	3	2	-	3	-	3	3	2	2
	BTCE603	3	3	1	2	3	3	3	3	3	-	1	3	3	2	2
	BTCE604	2	2	2	-	3	-	3	2	-	3	-	3	3	3	3
	BTCE605	3	3	1	2	3	3	3	3	3	-	1	3	1	2	1
	BTCE606	2	-	2	-	3	-	3	2	-	3	-	3	3	2	2
	BTCE620	3	3	1	2	3	3	3	3	3	-	1	3	3	3	3
	BTCE621	2	2	2	-	3	-	3	2	-	3	-	3	1	2	1

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : STRUCTURAL ANALYSIS - II
Course Code : BTCE501, Crédits : 03, Session :2018-19 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name :Dr. Mohan Kantharia, Dr. P. Mahakavi, Mr. Sachin Tiwari

J. **Introduction:**The objective of this course is to *provide the basic concepts and principles of strength of materials.* It aims to equip the students *to give an ability to calculate stresses and deformations of objects under external loadings and also to give an ability to apply the knowledge of strength of materials on engineering applications and design problems.*

K. Course Outcomes: At the end of the course, students will be able to:

BTCE501.1. Understand the fundamental force method of analysis of indeterminate structures
BTCE501.2. Evaluate the problems relating to Displacement method of analysis of indeterminate structures
BTCE501.3. Examine the deflection of beams under Moving Loads & Influence Lines.
BTCE501.4. Understand the concept of Cables, suspension bridges and arches

L. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

M. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems
PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment
PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

N. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves Includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

O. Syllabus

Module I: Force method of analysis of indeterminate structures Analysis of rigid frames of different geometry by consistent deformation method – settlement effects - analysis of pin-jointed trusses by consistent deformation method - externally and internally redundant trusses - effects of settlement and prestrains.

Module II: Displacement method of analysis of indeterminate structures Slope deflection method - analysis of continuous beams - beams with overhang - analysis of rigid frames - frames with sloping legs - gabled frames - frames without sway and with sway - settlement effects - moment distribution method as successive approximation of slope deflection equations - analysis of beams and frames - non-sway and sway analyses - Kani's method as iterative method of analysis of frames (outline only)

Module III: Moving Loads & Influence Lines
Introduction to moving loads - concept of influence lines - influence lines for reaction, shear force and bending moment in simply supported beams - influence lines for forces in trusses – analysis for different types of moving loads - single concentrated load - several concentrated loads - uniformly distributed load shorter and longer than the span.

Module IV: Cables, suspension bridges and arches
Analysis of forces in cables - suspension bridges with three-hinged and two-hinged stiffening girders - theory of arches - Eddy's theorem - analysis of three-hinged and two-hinged arches - settlement and temperature effects.

P. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**

Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Q. Suggested Text/Reference Books:

- Wang C.K., Statically Indeterminate Structures, McGraw Hill, New York, 1983.
- Wilbur J.B. & Norris C.H., Elementary Structural Analysis, McGraw Hill, 1960.
- Wang C.K., Intermediate Structural Analysis, McGraw Hill, 1983.
- Timoshenko S.P. & Young D.H., Theory of Structures, McGraw Hill, 1965.
- Kinney S.J., Indeterminate Structural Analysis, Oxford & IBH, 1985.
- Matheson J.A.L., Hyperstatic Structures, John Wiley and Sons, 1996.
- Reddy C.S., Basic Structural Analysis, Tata McGraw Hill
- Negi L.S. & Jangid R.S, Structural Analysis, Tata McGraw Hill
- Rajasekaran S. & Sankarasubramanian G., Computational Structural Mechanics, PHI
-

R. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Analysis of rigid frames of different geometry by consistent deformation method	Lecture	BTCE501.1	Mid Term-1, Quiz & End Sem Exam
2	settlement effects	Lecture	BTCE501.1	Mid Term-1, Quiz & End Sem Exam
3	analysis of pin-jointed trusses by consistent deformation method;	Lecture	BTCE501.1	Mid Term-1, Quiz & End Sem Exam
4	externally and internally redundant trusses	Lecture	BTCE501.1	Mid Term-1, Quiz & End Sem Exam
5	effects of settlement and prestrains	Lecture	BTCE501.1	Mid Term-1, Quiz & End Sem Exam
6	Slope deflection method	Lecture	BTCE501.1	Mid Term-1, Quiz & End Sem Exam
7	analysis of continuous beams	Lecture	BTCE501.1	Mid Term-1, Quiz & End Sem Exam
8	beams with overhang	Lecture	BTCE501.1	Mid Term-1, Quiz & End Sem Exam
9	analysis of rigid frames	Lecture	BTCE501.2	Mid Term-1, Quiz & End Sem Exam
10	frames with sloping legs	Lecture	BTCE501.2	Mid Term-1, Quiz & End Sem Exam
11	gabled frames - frames without sway and with sway	Lecture	BTCE501.2	Mid Term-1, Quiz & End Sem Exam
12	settlement effects	Lecture	BTCE501.2	Mid Term-1, Quiz & End Sem Exam
13	moment distribution method	Lecture	BTCE501.2	Mid Term-1, Quiz & End Sem Exam
14	approximation of slope	Lecture	BTCE501.2	Mid Term-1, Quiz

	deflection equations			& End Sem Exam
15	analysis of beams and frames	Lecture	BTCE501.2	Mid Term-1, Quiz & End Sem Exam
16	non-sway and sway analyses	Lecture	BTCE501.2	Mid Term-1, Quiz & End Sem Exam
17	Kani's method as iterative method of analysis of frames	Lecture	BTCE501.3	Mid Term-1, Quiz & End Sem Exam
18	Introduction to moving loads	Lecture	BTCE501.3	Mid Term-1, Quiz & End Sem Exam
19	concept of influence lines	Lecture	BTCE501.3	Mid Term-1, Quiz & End Sem Exam
20	influence lines for reaction	Lecture	BTCE501.3	Mid Term-1, Quiz & End Sem Exam
21	shear force and bending moment in simply supported beams	Lecture	BTCE501.3	Assignment, Quiz & End Sem Exam
22	influence lines for forces in trusses	Lecture	BTCE501.3	Assignment, Quiz & End Sem Exam
23	analysis for different types of moving loads	Lecture	BTCE501.3	Assignment, Quiz & End Sem Exam
25	Static Indeterminacy	Lecture	BTCE501.3	Assignment, Quiz & End Sem Exam
26	Uniaxial Loading and Material Properties	Lecture	BTCE501.3	Assignment, Quiz & End Sem Exam
27	single concentrated load	Lecture	BTCE501.3	Assignment, Quiz & End Sem Exam
28	several concentrated loads	Lecture	BTCE501.3	Assignment, Quiz & End Sem Exam
29	uniformly distributed load shorter and longer than the span.	Lecture	BTCE501.4	Assignment, Quiz & End Sem Exam
30	**Cables, suspension bridges and arches**	Lecture	BTCE501.4	Assignment, Quiz & End Sem Exam
31	Analysis of forces in cables	Lecture	BTCE501.4	Assignment, Quiz & End Sem Exam
32	suspension bridges with three-hinged and two-hinged stiffening girders	Lecture	BTCE501.4	Assignment, Quiz & End Sem Exam
33	theory of arches - Eddy's theorem	Lecture	BTCE501.4	Assignment, Quiz & End Sem Exam
34	Principal Stress	Lecture	BTCE501.4	Assignment, Quiz & End Sem Exam
35	analysis of three-hinged and two-hinged arches -	Lecture	BTCE501.4	Assignment, Quiz & End Sem Exam
36	settlement and temperature effects.	Lecture	BTCE501.4	Assignment, Quiz & End Sem Exam

S. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE501.1.	*Understand the fundamental force method of analysis of indeterminate structures*	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
BTCE501.2	*Evaluate the problems relating to Displacement method of analysis of indeterminate structures*	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
BTCE501.3.	*Examine the deflection of beams under Moving Loads & Influence Lines.*	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**
BTCE501.4.	*Understand the concept of Cables, suspension bridges and arches*	3	3	2	3	3	2	2	-	3	2	3	3	**1**	**2**	**3**

Sample Question Paper

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–V) 2018-19		
Class: B.Tech.(CE) V Semester		
Subject Name: BTCE501 Structural Analysis II	Time: 2 Hrs	Max.Marks:30

Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: Understand the fundamental force method of analysis of indeterminate structures

CO2: Evaluate the problems relating to Displacement method of analysis of indeterminate structures

CO Map	Question No.	Question	Marks
CO1	Q.1	Define kinematic redundancy. Give the mathematical expression for the degree of static indeterminacy of rigid jointed plane frames.	3
CO1	Q.2a	Mention any two methods of determining the joint deflection of a perfect frame	3
	Q.2b	Briefly mention the two types of matrix methods of analysis of indeterminate structures	3
CO1	Q.3	Define flexibility coefficient. Define the Force Transformation Matrix. What are the requirements to be satisfied while analyzing a structure?	6
CO2	Q.4	Define static indeterminacy. Define flexibility of a structure.	3
CO2	Q.5a	Write down the equation of element stiffness matrix as applied to 2D plane element.	3
	Q.5b	What are the basic unknowns in stiffness matrix method?	3
CO2	Q6	What is the basic aim of the stiffness method? What is the displacement transformation matrix? How are the basic equations of stiffness matrix obtained?	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

STRUCTURAL ANALYSIS - II						
Course Code				BTCE 501		
Associated Credit Units				3		
Ser. No.	Name	Enrollment No.	Roll No.	30	70	100
1	AMAN PARASHAR	A60515816004	AU16UCV8601	20	34	54
2	ANUJ BANSAL	A60215816013	AU16UCV8602	18	31	49
3	ANUJ PRATAP SINGH PARMAR	A60215816011	AU16UCV8603	21	47	68
4	ANUJ SHARMA	A60515816006	AU16UCV8604	22	42	64
5	ANUJ SINGH BHADORIA	A60515816001	AU16UCV8605	25	54	79
6	DAMODAR SINGH CHAUHAN	A60215816008	AU16UCV8606	17	36	53
7	DEEPAK SHARMA	A60515816005	AU16UCV8607	14	44	58
8	HIMANSHU MAHLI	A60215816012	AU16UCV8609	15	38	53
9	KUNAL KUMAR	A60515816002	AU16UCV8611	20	42	62
10	KUNAL MUKHARIYA	A60215816007	AU16UCV8612	22	50	72
11	MONUSHA DHAKAD	A60515816003	AU16UCV8613	26	57	83
12	RAHUL SINGH BAGHEL	A60215816015	AU16UCV8614	26	53	79
13	ROHIT BHADORIA	A60215816016	AU16UCV8616	21	34	55
14	SATENDRA SINGH KUSHWAH	A60215816009	AU16UCV8617	17	26	43
15	SHIVAM SHRIVASTAVA	A60215816014	AU16UCV8618	21	40	61
16	UTKARSH TOMAR	A60215816004	AU16UCV8619	22	49	71

				STRUCTURAL ANALYSIS - II
				BTCE 501
				3
No. of students attended the Exam				16
No. of students secure more than 60% marks				9
Percentage of students secure more than 60% marks				56.25
Attainment Level				-

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : Principles of Structural Design
Course Code : BTCE502, Crédits : 04, Session :2018-19 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. P. Mahakavi, Mr. Sachin Tiwari

A. Introduction: The objective of this course is to understand the basic concepts of Limit state design and to obtain the knowledge of using Indian standard codes and special publication. It aims to equip the students to know the design concepts of all the structural members and learn economical design for materials saving and to know the design methodologies by limit state design for the beams, slabs, column and footings. The objective of this course is to learn the design of structural members such as prestress concrete members.

B. Course Outcomes: At the end of the course, students will be able to:

BTCE502.1. Apply the usage of IS codes in design of reinforced concrete structures and Identify the types and design of beams and slabs

BTCE502.2 Design the uniaxial and biaxial bending of column. and Design the simple footings and combined footings

BTCE502.3 Develop skills in design of different types of steel connections and design of compression and tension member

BTCE502.4 Design the timber member

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%

Total			100%

F. Syllabus

Module I: Design Philosophy

Introduction –Structures and structural systems–Internal forces in different types of structural systems such as Trusses, Cables, Arches, Beams and Slabs, Frames. – stability criteria – design considerations – loading standards – working stress method(WSM) – ultimate load method – probabilistic analysis and design – uncertainties in design – classical reliability models – reliability analysis and design – levels of reliability methods – limit state method(LSM) – limit states – multiple safety factor formats – load and resistance factor design format – partial safety factor format.

Module II: Reinforced Concrete

Introduction – materials – mix design by IS method – basic properties of concrete and reinforcement – basic design concepts of working stress method (WSM) – analysis of sections by WSM – flexure, shear, torsion and bond – singly reinforced, doubly reinforced and flanged sections – deflection criteria.

Module III: Steel

Steel - introduction to connections - analysis and design of riveted, bolted and welded joints for direct force and moment - struts and ties made of single and double angles.

A design project involving the design and detailing of a typical connection is envisaged at this stage.

Module IV: Timber

Classification and allowable stresses - design of beams for flexure, shear & bearing – deflection criteria - design of solid and built-up columns-flitched beam – formwork design.

A design project involving the design and specification of the formwork for a typical concrete structure is envisaged at this stage.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Pillai S.U. & Menon D, Reinforced Concrete Design Tata McGraw Hill, 2003.
- Varghese P.C., Limit State Design of Reinforced Concrete, Prentice Hall of India, 2003.
- Mallick S.K. & Gupta A.K., Reinforced Concrete, Oxford & IBH, 1982.
- Jain A.K., Reinforced Concrete - Limit State Design, Standard Book House, 1998.
- Shetty M.S., Concrete Technology, S. Chand, 1988.
- Punmia B.C., Reinforced Concrete Structures Vol. I, Standard Book House, 2005
- Jain & Jaikrishna, Plain & Reinforced Concrete Vol. I, Nemchand, 2000.
- Sinha S.N., Reinforced Concrete Design, Tata McGraw Hill, 2005.
- Ram Chandra, Design of Steel Structures Vol. I, Standard Book House, 2005.
- Negi L.S., Design of Steel Structures Vol. I, Tata McGraw Hill, 2005.
- BIS Codes (IS 875, IS 10262, SP 23, IS 456, IS 800, SP 6, IS 883, IS 2750).

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO

1	Introduction- concepts of energy principles, safety	Lecture	BTCE502.1	Mid Term-1, Quiz & End Sem Exam
2	sustainable development in performance	Lecture	BTCE502.1	Mid Term-1, Quiz & End Sem Exam
3	what makes a structure; principles of stability	Lecture	BTCE502.1	Mid Term-1, Quiz & End Sem Exam
4	architect, user, builder;	Lecture	BTCE502.1	Mid Term-1, Quiz & End Sem Exam
5	*what are the functions'*	Lecture	BTCE502.1	Mid Term-1, Quiz & End Sem Exam
6	equilibrium; what is a structural engineer, role of engineer	Lecture	BTCE502.1	Mid Term-1, Quiz & End Sem Exam
7	what do the engineers design, first principles of process of design	Lecture	BTCE502.1	Mid Term-1, Quiz & End Sem Exam
8	Planning and Design Process	Lecture	BTCE502.2	Mid Term-1, Quiz & End Sem Exam
9	Materials, Loads, and Design Safety	Lecture	BTCE502.2	Mid Term-1, Quiz & End Sem Exam
10	Behaviour and Properties of Concrete	Lecture	BTCE502.2	Mid Term-1, Quiz & End Sem Exam
11	Behaviour and Properties of Concrete	Lecture	BTCE502.2	Mid Term-1, Quiz & End Sem Exam
12	Behaviour and Properties of Steel	Lecture	BTCE502.2	Mid Term-1, Quiz & End Sem Exam
13	Wind and Earthquake Loads.	Lecture	BTCE502.2	Mid Term-1, Quiz & End Sem Exam
14	Wind and Earthquake Loads.	Lecture	BTCE502.2	Mid Term-1, Quiz & End Sem Exam
15	Materials and Structural Design Criteria	Lecture	BTCE502.3	Mid Term-1, Quiz & End Sem Exam
16	Introduction to the analysis and design of structural systems	Lecture	BTCE502.3	Mid Term-1, Quiz & End Sem Exam
17	Analyses of determinate and indeterminate trusse	Lecture	BTCE502.3	Mid Term-1, Quiz & End Sem Exam
18	beams, and frames, and design philosophies for structural engineering	Lecture	BTCE502.3	Mid Term-1, Quiz & End Sem Exam
19	philosophies for structural engineering	Lecture	BTCE502.3	Mid Term-1, Quiz & End Sem Exam
20	analysis of determinate structures	Lecture	BTCE502.3	Mid Term-1, Quiz & End Sem Exam
21	Laboratory experiments dealing with the analysis of indeterminate structures	Lecture	BTCE502.3	Assignment, Quiz & End Sem Exam
22	Design of Structural Elements; Concrete	Lecture	BTCE502.3	Assignment, Quiz & End Sem Exam

	Elements, Steel Elements, Structural Joints;			
23	Theories and concepts of both concrete and steel design and analysis both at the element and system levels	Lecture	BTCE502.3	Assignment, Quiz & End Sem Exam
24	Approximate Analysis Methods as a Basis for Design	Lecture	BTCE502.3	Assignment, Quiz & End Sem Exam
25	Reinforced Concrete Beams for Flexure; Design of Reinforced Concrete Beams for Shear; Bond, Anchorage, and Serviceability	Lecture	BTCE502.3	Assignment, Quiz & End Sem Exam
26	Reinforced Concrete Columns; Reinforced Concrete Slabs; Introduction to Steel Design	Lecture	BTCE502.3	Assignment, Quiz & End Sem Exam
27	Tension Members and Connections; Bending Members;	Lecture	BTCE502.4	Assignment, Quiz & End Sem Exam
28	Classification and allowable stresses	Lecture	BTCE502.4	Assignment, Quiz & End Sem Exam
29	design of beams for flexure, shear & bearing	Lecture	BTCE502.4	Assignment, Quiz & End Sem Exam
30	deflection criteria - design of solid and built-up columns-flitched beam	Lecture	BTCE502.4	Assignment, Quiz & End Sem Exam
31	formwork design.	Lecture	BTCE502.4	Assignment, Quiz & End Sem Exam
32	A design project involving the design and detailing of a typical connection is envisaged at this stage	Lecture	BTCE502.4	Assignment, Quiz & End Sem Exam
33	design of beams for flexure, shear & bearing	Lecture	BTCE502.4	Assignment, Quiz & End Sem Exam
34	deflection criteria - design of solid and built-up columns-flitched beam	Lecture	BTCE502.4	Assignment, Quiz & End Sem Exam
35	formwork design.	Lecture	BTCE502.4	Assignment, Quiz & End Sem Exam
36	A design project involving the design and specification of the formwork typical concrete structure is envisaged at this stage.	Lecture	BTCE502.4	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE502.1	Apply the usage of IS codes in design of reinforced concrete structures and Identify the types and design of beams and slabs	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
BTCE502.2	Design the uniaxial and biaxial bending of column. and Design the simple footings and combined footings	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
BTCE502.3	Develop skills in design of different types of steel connections and design of compression and tension member	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**
BTCE502.4	Design the timber member	3	3	2	3	3	2	2	-	3	2	3	3	**1**	**2**	**3**

Sample Question Paper

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–V) 2018-19		
Class: B.Tech.(CE) V Semester		
Subject Name: BTCE502 Principles of Structural Design	Time: 2 Hrs	Max.Marks:30

Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: Apply the usage of IS codes in design of reinforced concrete structures and Identify the types and design of beams and slabs

CO2: Design the uniaxial and biaxial bending of column. and Design the simple footings and combined footings

CO Map	Question No.	Question	Marks
CO1	Q.1	Write short note on ultimate load method of design of reinforced concrete structural elements?	3
CO1	Q.2a	Give four reasons to justify the design of structures by limit state method.	3
	Q.2b	What are the various differences between working stress method and limit state method.	3
CO1	Q.3	What is the difference between deterministic design and probabilistic design?	6
CO2	Q.4	Explain with suitable diagram design stress-strain curve for concrete.	3
CO2	Q.5a	Enumerate the steps involved in the Indian Standard method of mix design.	3
	Q.5b	Consider the beam section shown above. Assuming M 20 grade concrete and Fe 415 grade steel, compute the stresses in concrete and steel under a service load moment of 140 kNm.	3
CO2	Q6	(a) Define characteristic strength. (b) Determine the 'mean target strength' required for the mix design of M25 concrete, assuming moderate quality control.	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

PRINCIPLES OF STRUCTURAL DESIGN						
Course Code				BTCE 502		
Associated Credit Units				4		
Ser. No.	Name	Enrollment No.	Roll No.	30	70	100
1	AMAN PARASHAR	A60515816004	AU16UCV8601	19	37	56
2	ANUJ BANSAL	A60215816013	AU16UCV8602	19	45	64
3	ANUJ PRATAP SINGH PARMAR	A60215816011	AU16UCV8603	16	37	53
4	ANUJ SHARMA	A60515816006	AU16UCV8604	18	45	63
5	ANUJ SINGH BHADORIA	A60515816001	AU16UCV8605	19	47	66
6	DAMODAR SINGH CHAUHAN	A60215816008	AU16UCV8606	14	34	48
7	DEEPAK SHARMA	A60515816005	AU16UCV8607	15	51	66
8	HIMANSHU MAHLI	A60215816012	AU16UCV8609	14	49	63
9	KUNAL KUMAR	A60515816002	AU16UCV8611	17	34	51
10	KUNAL MUKHARIYA	A60215816007	AU16UCV8612	16	48	64
11	MONUSHA DHAKAD	A60515816003	AU16UCV8613	21	44	65
12	RAHUL SINGH BAGHEL	A60215816015	AU16UCV8614	24	46	70
13	ROHIT BHADORIA	A60215816016	AU16UCV8616	17	37	54
14	SATENDRA SINGH KUSHWAH	A60215816009	AU16UCV8617	17	46	63
15	SHIVAM SHRIVASTAVA	A60215816014	AU16UCV8618	15	UFM	#VALUE!
16	UTKARSH TOMAR	A60215816004	AU16UCV8619	14	53	67

				PRINCIPLES OF STRUCTURAL DESIGN
				BTCE 502
				4
No. of students attended the Exam				16
No. of students secure more than 60% marks				10
Percentage of students secure more than 60% marks				62.50
Attainment Level				Level 1

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : GEOTECHNICAL ENGINEERING I
Course Code : BTCE503, Crédits : 02, Session :2018-19 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name :Dr. Imran Ahmad Khan

A. **Introduction:** The objective of this course is to impart the fundamental concepts of soil mechanics and understand the bearing capacity and to understand the concept of compaction and consolidation of soils. It aims to understand the design aspects of foundation and to evaluate the stress developed in the soil medium.

B. **Course Outcomes:** At the end of the course, students will be able to:

BTCE503.1*Compare the various engineering and index properties of soil.*

BTCE503.2 *Explain the hydraulic conductivity of the soil and seepage actions*

BTCE503.3. E*xamine the stress distribution at any point below the ground level.*

BTCE503.4 *Evaluate the shear strength of the soil using Mohr Soil.*

C. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Nature of soil and functional relationships

Soil type -Concepts of single grained, honey combed and flocculent structure and their effects on the basic soil properties - 3 phase system - void ratio - specific gravity - dry density - porosity - water content - saturated unit weight - submerged unit weight - degree of saturation. Laboratory and field identification of soils:Determination of water content by oven drying -Specific gravity using pycnometer and specific gravity bottle - Grain size analysis by sieve analysis, hydrometer analysis and pipette analysis - Atterberg limits and indices – Visual identification by simple field tests - Field density by core cutter, sand replacement and wax coating methods. Classification of soils:Necessity - Principles of classification - I.S. classification – Plasticity charts - Group index.

Module II: Soil Water, Permeability and Stress Distribution

Soil water: Types - Effective stress - Total stress - Pore pressure - Pressure diagrams. Permeability: Definition - Darcy's law - Factors affecting permeability – Laboratory determination - Stratified soils: average permeability. Stress distribution:Boussinesq's equations for vertical pressure due to point loads- Assumptions and limitations - pressure bulb – Influence diagram - Vertical pressure due to uniformly distributed loads, line loads and strip loads - Newmark charts and their use - Westergaard's solution.

Module III: Consolidation and Compa tion

Consolidation: Definition - Concepts of coefficient of compressibility - Coefficient of volume change and compression index - e-log p curves - Terzaghi's theory of one dimensional consolidation – Determination of coefficient of consolidation- pre-consolidation pressure difference between consolidation and compaction. Compaction:Definition and objectives of compaction - Proctor test and modified proctor test - Concept of OMC and maximum dry density - Zero air voids line -Factors influencing compaction.- Effect of compaction on soil properties - Field compaction methods - Proctor needle for field control.

Module IV: Shear Strength and Stability of Slopes

Shear Strength:Definition - Mohr's strength and stress circles - origin of planes - Mohr's envelope - Mohr-Coulomb strength theory -Direct, triaxial and UCC tests - Drainage conditions - Measurement of pore pressure - Vane shear tests - Total and effective stress -strength parameters – Stress path, Liquefaction of sand - Choice of test conditions for field problems. Stability of slopes:Slope failure, base failure and toe failure - Swedish circle method - $\phi=0$ analysis and $c=0$ analysis - Friction circle method - Taylor's stability number -Stability charts - Sliding block analysis.

Module V: Industrial Visit

At least one visit to industry in the field of Civil Engineering max two working days duration.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Soil Mechanics by Craig R.F., Chapman & Hall
- Fundamentals of Soil Engineering by Taylor, John Wiley & Sons
- An Introduction to Geotechnical Engineering, by Holtz R.D. and Kovacs, W.D., Prentice Hall, NJ 4. Principles of Geotechnical Engineering, by Braja M. Das, Cengage Learning

- Principles of Foundation Engineering, by Braja M. Das, Cengage Learning

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction–Types of soils, their formation and deposition	Lecture	BTCE503.1	Mid Term-1, Quiz & End Sem Exam
2	Definitions: soil mechanics, soil engineering, rock mechanics, geotechnical engineering.	Lecture	BTCE503.1	Mid Term-1, Quiz & End Sem Exam
3	Scope of soil engineering. Comparison and difference between soil and rock	Lecture	BTCE503.1	Mid Term-1, Quiz & End Sem Exam
4	*Basic Definitions and Relationships-Soil as three-phase system in terms of weight, volume, voids ratio*	Lecture	BTCE503.1	Mid Term-1, Quiz & End Sem Exam
5	Definitions: moisture content, unit weights, degree of saturation, voids ratio, porosity, specific gravity, mass specific gravity.	Lecture	BTCE503.1	Mid Term-1, Quiz & End Sem Exam
6	Plasticity Characteristics of Soil - Introduction to definitions of: plasticity of soil,	Lecture	BTCE503.2	Mid Term-1, Quiz & End Sem Exam
7	consistency limits-liquid limit, plastic limit, shrinkage limit, plasticity, liquidity and consistency indices, flow & toughness indices	Lecture	BTCE503.2	Mid Term-1, Quiz & End Sem Exam
8	definitions of activity and sensitivity. Determination of: liquid limit, plastic limit and shrinkage limit. Use of consistency units	Lecture	BTCE503.2	Mid Term-1, Quiz & End Sem Exam
9	Classification of Soils-Introduction of soil classification: particle size classification, textural classification, unified soil classification system, Indian standard soil classification system.	Lecture	BTCE503.2	Mid Term-1, Quiz & End Sem Exam
10	Permeability of Soil - Darcy’s law, validity of	Lecture	BTCE503.3	Mid Term-1, Quiz & End Sem Exam

	Darcy's law			
11	Determination of coefficient of permeability: Laboratory method: constant-head method, falling-head method	Lecture	BTCE503.3	Mid Term-1, Quiz & End Sem Exam
12	Field method: pumping- in test, pumping- out test. Permeability aspects: permeability of stratified soils, factors affecting permeability of soil	Lecture	BTCE503.3	Mid Term-1, Quiz & End Sem Exam
13	Seepage Analysis- Introduction, stream and potential functions, characteristics of flow nets.	Lecture	BTCE503.3	Mid Term-1, Quiz & End Sem Exam
14	Effective Stress Principle -	Lecture	BTCE503.3	Mid Term-1, Quiz & End Sem Exam
15	Introduction, effective stress principle, nature of effective stress	Lecture	BTCE503.3	Mid Term-1, Quiz & End Sem Exam
16	effect of water table. Fluctuations of effective stress	Lecture	BTCE503.3	Mid Term-1, Quiz & End Sem Exam
17	effective stress in soils saturated by capillary action	Lecture	BTCE503.3	Mid Term-1, Quiz & End Sem Exam
18	seepage pressure, quick sand condition.	Lecture	BTCE503.3	Mid Term-1, Quiz & End Sem Exam
19	Compaction of Soil- Introduction, theory of compaction	Lecture	BTCE503.3	Mid Term-1, Quiz & End Sem Exam
20	laboratory determination of optimum moisture content ; maximum dry density. Compaction in field,	Lecture	BTCE503.4	Mid Term-1, Quiz & End Sem Exam
21	compaction specifications and field control	Lecture	BTCE503.4	Assignment, Quiz & End Sem Exam
22	Consolidation of Soil - Introduction, comparison between compaction and consolidation, initial, primary & secondary consolidation, spring analogy for primary consolidation, interpretation of consolidation test results,	Lecture	BTCE503.4	Assignment, Quiz & End Sem Exam
23	Terzaghi's theory of consolidation, final	Lecture	BTCE503.4	Assignment, Quiz & End Sem Exam

	settlement of soil deposits, computation of consolidation settlement and secondary consolidation. Introduction, stresses due to point load, line load, strip load, uniformly loaded circular area, rectangular loaded area			
24	Influence factors, Isobars, Boussinesq's equation, Newmark's Influence Chart.	Lecture	BTCE503.4	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE503.1	Compare the various engineering and index properties of soil.	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
BTCE503.2	Explain the hydraulic conductivity of the soil and seepage actions	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE503.3 .	Examine the stress distribution at any point below the ground level.	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
BTCE503.4	Evaluate the shear strength of the soil using Mohr Soil.	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**

Sample Question Paper

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–V) 2018-19						
Class: B.Tech.(CE) V Semester						
Subject Name: BTCE503 Geotechnical Engineering I		Time: 2 Hrs			Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: Compare the various engineering and index properties of soil.

CO2: *Explain the hydraulic conductivity of the soil and seepage actions*

CO Map	Question No.	Question	Marks
CO1	Q.1	Explain in detail with neat sketches: Three phase diagram of soil.	3
CO1	Q.2a	Explain: Chemical weathering.	3
	Q.2b	What do you mean by Consistency limits?	3
CO1	Q.3	Define following terms: 1. Water content of soil, 2. Bulk unit weight, 3. Specific Gravity, 4. Void ratio, 5. Density Index.	6
CO2	Q.4	What do you mean by Relative Compaction?	3
CO2	Q.5a	List out all factors affecting Compaction. Explain each in detail.	3
	Q.5b	Explain: Effects of Compaction on Properties of Soil.	3
CO2	Q6	Explain in detail: Standard Proctor Test with neat sketches.	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

GEOTECHNICAL ENGINEERING - I						
Course Code				BTCE 503		
Associated Credit Units				3		
Ser. No.	Name	Enrollment No.	Roll No.	30	70	100
1	AMAN PARASHAR	A60515816004	AU16UCV8601	21	32	53
2	ANUJ BANSAL	A60215816013	AU16UCV8602	22	40	62
3	ANUJ PRATAP SINGH PARMAR	A60215816011	AU16UCV8603	21	31	52
4	ANUJ SHARMA	A60515816006	AU16UCV8604	26	47	73
5	ANUJ SINGH BHADORIA	A60515816001	AU16UCV8605	26	58	84
6	DAMODAR SINGH CHAUHAN	A60215816008	AU16UCV8606	17	33	50
7	DEEPAK SHARMA	A60515816005	AU16UCV8607	12	52	64
8	HIMANSHU MAHLI	A60215816012	AU16UCV8609	19	28	47
9	KUNAL KUMAR	A60515816002	AU16UCV8611	20	49	69
10	KUNAL MUKHARIYA	A60215816007	AU16UCV8612	24	59	83
11	MONUSHA DHAKAD	A60515816003	AU16UCV8613	25	43	68
12	RAHUL SINGH BAGHEL	A60215816015	AU16UCV8614	25	61	86
13	ROHIT BHADORIA	A60215816016	AU16UCV8616	20	24	44
14	SATENDRA SINGH KUSHWAH	A60215816009	AU16UCV8617	18	27	45
15	SHIVAM SHRIVASTAVA	A60215816014	AU16UCV8618	18	32	50
16	UTKARSH TOMAR	A60215816004	AU16UCV8619	18	60	78
				GEOTECHNICAL ENGINEERING - I		
				BTCE 503		
				3		
No. of students attended the Exam				16		
No. of students secure more than 60% marks				9		
Percentage of students secure more than 60% marks				56.25		
Attainment Level				-		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : TRANSPORTATION ENGINEERING II
Course Code : BTCE504, Crédits : 03, Session :2018-19 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Ripunjoy Gogoi, Dr. P. Mahakavi

A. **Introduction:** The objective of this course is to expose the students with various transportation modes and their advantages and disadvantages and to facilitate students to decide highway alignment and design highway geometry. It aims to enable students to select suitable materials for highway pavements and design the pavement and to explain students with various components of a railway track.

B. **Course Outcomes:** At the end of the course, students will be able to:

BTCE504.1. Classify basic design of highway geometry according to the design specifications.

BTCE504.2. Design a flexible pavement using IRC method and Describe various components of railways and their functions.

BTCE504.3. Design a railway geometry according to the design specifications.

BTCE504.4. Classify various components of an airport and identify the alignment and the required length of a runway.

C. **Programme Outcomes:**

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Highway Classification, Alignment and Geometrical Design

Introduction – Highway development in India - Classification of roads - Typical cross sections of roads in urban and rural area - Requirements and factors controlling alignment of roads - Engineering surveys for highway location - Pavement surface characteristics - Camber and width requirements – Sight distances - stopping and overtaking sight distances, overtaking zone requirements - Design of horizontal alignment - speed, radius, super elevation, methods of providing super elevation, extra widening of pavements, transition curves - Design of vertical alignment - gradient, grade compensation, summit curves and valley curves - worked out problems on all the above topics.

Module II: Traffic engineering

Introduction - Road user, vehicle and traffic characteristics - Speed and volume studies - Simple worked out problems - Principles of design of at-grade intersections -Simple layouts - Objectives, classification and uses of traffic signs and markings - Design of isolated signals by Webster's method.

Module III: Pavement Materials and Design

Desirable properties and testing of highway materials: road aggregates, bituminous materials and subgrade soil - Factors influencing the design of pavements - CBR method and IRC guidelines of flexible pavements design - Design of rigid pavements using IRC charts - worked out problems.

Module IV: Airport planning and Design

Introduction. Aircraft characteristics and their influence on planning of airports. Airport obstructions and zoning. Component parts of airport and site selection. Runway design. Orientation, basic runway length, corrections and geometric.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Khanna, S.K., Justo, C.E.G and Veeraragavan, A, 'Highway Engineering', Revised 10th Edition, Nem Chand & Bros, 2017
- Kadiyalai, L.R., ' Traffic Engineering and Transport Planning', Khanna Publishers.
- Partha Chakraborty, ' Principles Of Transportation Engineering, PHI Learning,
- Papacostas, C.S., Transportation Engineering and Planning, 3rd ed., Pearson Education, New Delhi (2008)
- O' Flaherty Coleman. A., Transport Planning and Traffic Engineering, Elsevier, New Delhi (2008).
- Slinn, Mike, Traffic Engineering Design (Principles and Practice), Elsevier, New Delhi (2008), O'Flaherty, Coleman A., Highways (The Location, Design, Construction and Maintenance of Pavement) 4th ed, Elsevier, New Delhi (2008).

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Highway development and	Lecture	BTCE504.1	Mid Term-1, Quiz

	planning			& End Sem Exam
2	Classification of roads, road development in India,	Lecture	BTCE504.1	Mid Term-1, Quiz & End Sem Exam
3	Current road projects in India	Lecture	BTCE504.1	Mid Term-1, Quiz & End Sem Exam
4	*highway alignment and project preparation*	Lecture	BTCE504.1	Mid Term-1, Quiz & End Sem Exam
5	Geometric design of highways	Lecture	BTCE504.1	Mid Term-1, Quiz & End Sem Exam
6	Introduction; highway cross section elements	Lecture	BTCE504.1	Mid Term-1, Quiz & End Sem Exam
7	sight distance, design of horizontal alignment	Lecture	BTCE504.1	Mid Term-1, Quiz & End Sem Exam
8	design of vertical alignment	Lecture	BTCE504.1	Mid Term-1, Quiz & End Sem Exam
9	; design of intersections, problems	Lecture	BTCE504.2	Mid Term-1, Quiz & End Sem Exam
10	Traffic engineering & control	Lecture	BTCE504.2	Mid Term-1, Quiz & End Sem Exam
11	Traffic Characteristics, traffic engineering studies	Lecture	BTCE504.2	Mid Term-1, Quiz & End Sem Exam
12	traffic flow and capacity	Lecture	BTCE504.2	Mid Term-1, Quiz & End Sem Exam
13	traffic regulation and control	Lecture	BTCE504.2	Mid Term-1, Quiz & End Sem Exam
14	design of road intersections	Lecture	BTCE504.2	Mid Term-1, Quiz & End Sem Exam
15	design of parking facilities; highway lighting; problems	Lecture	BTCE504.2	Mid Term-1, Quiz & End Sem Exam
16	Pavement materials	Lecture	BTCE504.3	Mid Term-1, Quiz & End Sem Exam
17	Materials used in Highway Construction	Lecture	BTCE504.3	Mid Term-1, Quiz & End Sem Exam
18	Soils, Stone aggregates	Lecture	BTCE504.3	Mid Term-1, Quiz & End Sem Exam
19	bituminous binders,	Lecture	BTCE504.3	Mid Term-1, Quiz & End Sem Exam
20	Portland cement and cement concrete: desirable properties,	Lecture	BTCE504.3	Mid Term-1, Quiz & End Sem Exam
21	tests, requirements for different types of pavements. Problems	Lecture	BTCE504.3	Assignment, Quiz & End Sem Exam
22	Design of pavements- Introduction; flexible pavements,	Lecture	BTCE504.3	Assignment, Quiz & End Sem Exam
23	design of flexible pavements as per IRC; rigid	Lecture	BTCE504.4	Assignment, Quiz & End Sem Exam

	pavements- components and functions;			
24	stresses in rigid pavements;	Lecture	BTCE504.4	Assignment, Quiz & End Sem Exam
25	factors affecting design and performance of CC pavements	Lecture	BTCE504.4	Assignment, Quiz & End Sem Exam
26	design of concrete pavements as per IRC; problems.	Lecture	BTCE504.4	Assignment, Quiz & End Sem Exam
27	factors affecting design and performance;	Lecture	BTCE504.4	Assignment, Quiz & End Sem Exam
28	stresses in flexible pavements	Lecture	BTCE504.4	Assignment, Quiz & End Sem Exam
29	bituminous paving mixes;	Lecture	BTCE504.4	Assignment, Quiz & End Sem Exam
30	Introduction. Aircraft characteristics	Lecture	BTCE504.4	Assignment, Quiz & End Sem Exam
31	and their influence on planning of airports	Lecture	BTCE504.4	Assignment, Quiz & End Sem Exam
32	Airport obstructions and zoning.	Lecture	BTCE504.4	Assignment, Quiz & End Sem Exam
33	Component parts of airport and site selection	Lecture	BTCE504.4	Assignment, Quiz & End Sem Exam
34	Runway design	Lecture	BTCE504.4	Assignment, Quiz & End Sem Exam
35	Orientation, basic runway length,	Lecture	BTCE504.4	Assignment, Quiz & End Sem Exam
36	corrections and geometric.	Lecture	BTCE504.4	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE504.1.	Classify basic design of highway geometry according to the design specifications.	3	3	2	2	3	-	1	2	-	2	3	3	**2**	**2**	**1**

BTCE504.2 .	Design a flexible pavement using IRC method and Describe various components of railways and their functions.	3	3	2	1	1	2	1	-	1	2	3	3	**3**	**2**	**1**
BTCE504.3 .	Design a railway geometry according to the design specifications.	3	3	2	3	3	2	2	-	2	2	3	3	**3**	**2**	**3**
BTCE504.4 .	Classify various components of an airport and identify the alignment and the required length of a runway.	3	2	3	1	2	-	1	-	3	2	3	3	**3**	**2**	**1**
BTCE504.5 .	Identify various components of a harbor and their functions.	3	3	2	2	3	2	2	-	3	2	3	3	**3**	**1**	**2**

<u>Sample Question Paper</u>

<table>
<tr><td colspan="7" align="center">Amity School of Engineering and Technology
Department of Civil Engineering
I MID-SEMESTER (SEM–V) 2018-19</td></tr>
<tr><td colspan="7" align="center">Class: B.Tech.(CE) V Semester</td></tr>
<tr><td colspan="2">Subject Name:
BTCE504 TRANSPORTATION ENGINEERING II</td><td colspan="3">Time: 2 Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3</td><td>Q.4</td><td>Q.2,5,6</td><td></td><td></td></tr>
<tr><td colspan="7">Student will be able to
CO1: Classify basic design of highway geometry according to the design specifications.
CO2: Design a flexible pavement using IRC method and Describe various components of railways and their functions.</td></tr>
<tr><td>CO Map</td><td>Question No.</td><td colspan="4" align="center">Question</td><td>Marks</td></tr>
</table>

CO1	Q.1	What is the purpose of Turnout? Give various types with neat diagram.	3
CO1	Q.2a	What are the objectives of Signaling in Railways?	3
	Q.2b	Write about maintenance of Airfield Pavement.	3
CO1	Q.3	How ports are classified? What are various design factors of Runway?	6
CO2	Q.4	What is Wind rose diagram?	3
CO2	Q.5a	Write about various components of Turnout.	3
	Q.5b	What are various Gradients in Railways? Explain Grade Compensation.	3
CO2	Q6	Write about characteristics of Aircraft.	6

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

TRANSPORTATI ON ENGINEERING - II						
Course Code				BTCE 504		
Associated Credit Units				3		
Ser. No.	Name	Enrollment No.	Roll No.	30	70	100
1	AMAN PARASHAR	A60515816004	AU16UCV8601	21	52	73
2	ANUJ BANSAL	A60215816013	AU16UCV8602	20	49	69
3	ANUJ PRATAP SINGH PARMAR	A60215816011	AU16UCV8603	22	45	67
4	ANUJ SHARMA	A60515816006	AU16UCV8604	13	52	65
5	ANUJ SINGH BHADORIA	A60515816001	AU16UCV8605	25	64	89
6	DAMODAR SINGH CHAUHAN	A60215816008	AU16UCV8606	16	41	57
7	DEEPAK SHARMA	A60515816005	AU16UCV8607	20	57	77
8	HIMANSHU MAHLI	A60215816012	AU16UCV8609	18	36	54
9	KUNAL KUMAR	A60515816002	AU16UCV8611	23	52	75
10	KUNAL MUKHARIYA	A60215816007	AU16UCV8612	20	55	75
11	MONUSHA DHAKAD	A60515816003	AU16UCV8613	25	52	77
12	RAHUL SINGH BAGHEL	A60215816015	AU16UCV8614	23	50	73
13	ROHIT BHADORIA	A60215816016	AU16UCV8616	21	44	65
14	SATENDRA SINGH KUSHWAH	A60215816009	AU16UCV8617	21	36	57
15	SHIVAM SHRIVASTAVA	A60215816014	AU16UCV8618	20	44	64
16	UTKARSH TOMAR	A60215816004	AU16UCV8619	20	63	83

				TRANSPORTATI ON ENGINEERING - II
				BTCE 504
				3
No. of students attended the Exam				16
No. of students secure more than 60% marks				13
Percentage of students secure more than 60% marks				81.25
Attainment Level				Level 3

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : HYDRAULIC MACHINES
Course Code : BTCE505, Crédits : 03, Session :2018-19 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Mr. Sachin Tiwari

A. **Introduction:** The objective of this course is to provide and train students of hydraulic engineering. The course will introduce students to various fluid properties, and their behavior under different condition.

B. **Course Outcomes:** At the end of the course, students will be able to:
BTCE505.1. Analyse various hydraulic systems, turbo machines and jet propulsion
BTCE505.2. Develop the knowledge on pelton, francis, propeller and Kaplan turbines
BTCE505.3. Evaluate Centrifugal pumps, velocity triangles, efficiency, turbine pumps
BTCE505.4. Perform dimensional analysis on specific speed, unit quantities; characteristic curves; use of models
BTCE505.5.determine the Transmission of hydraulic power through pipe lines; water hammer and hydraulic power and pumps

C. **Programme Outcomes:**
PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I:Introduction

Euler's equations for turbo machines; impulse and reaction forces due to fluid systems on stationery and moving system of vanes; jet propulsion.

Module II: WaterTurbines

Classification: Pelton, Francis, Propeller and Kaplan turbines; velocity triangles; efficiency; draft tubes, governing.

Module III: Pumps

Centrifugal pumps, velocity triangles, efficiency, turbine pumps, axial and mixed flow pumps.

Module IV: Performance of Fluid Machines

Similarity laws applied to rotodynamic machines; specific speed, unit quantities; characteristic curves; use of models; cavitations and attendant problems in turbo machines; selection of turbines hydroelectric plants.

Module V: HydraulicPower Transmission

Transmission of hydraulic power through pipe lines; water hammer; precautions against water hammer in turbine and pump installations: hydraulic ram.(added to FM-1)

Module VI: PowerHydraulics

Positive pumps: gear, vane, screw, pump, variable delivery valves: flow control, pressure control, direction control, solenoid operated valve, hydraulic circuits, fluid coupling and torque converter.

Pneumatic Power: Basic principles, comparison of pneumatic and hydraulic Systems.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Gupta, S. C., Fluid Mechanics and Hydraulic Machines, Pearson Education, 2007
- R.K. Bansal, "Fluid Mechanics & Hydraulic Machines", Laxmi Publications (P) Ltd., 2002.
- Dr. D.S. Kumar, "Fluid Mechanics & Fluid Power Engineering", S.K. Kataria & Sons,2001
- D.R. Malhotra & N.K. Malhotra, "The Fluid Mech. & Hydraulics", Satya Prakashan, 2001
- V.P. Gupta, Alam Singh, Manish Gupta, "Fluid Mechanics, Fluid Mechanics & Hydraulics", CBS Publishers; 1999

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Euler's equations for turbo machines	Lecture	BTCE505.1	Mid Term-1, Quiz & End Sem Exam
2	impulse and reaction forces due to fluid systems on stationery and moving system of vanes	Lecture	BTCE505.1	Mid Term-1, Quiz & End Sem Exam
3	jet propulsion.	Lecture	BTCE505.1	Mid Term-1, Quiz

				& End Sem Exam
4	*Turbulent Flow- Reynolds experiment, Transition from laminar to turbulent flow*	Lecture	BTCE505.2	Mid Term-1, Quiz & End Sem Exam
5	Definition of turbulence, scale and intensity, Causes of turbulence, instability, mechanism of turbulence and effect of turbulent flow in pipes	Lecture	BTCE505.2	Mid Term-1, Quiz & End Sem Exam
6	Classification: Pelton, Francis	Lecture	BTCE505.2	Mid Term-1, Quiz & End Sem Exam
7	Propeller and Kaplan turbines	Lecture	BTCE505.2	Mid Term-1, Quiz & End Sem Exam
8	velocity triangles; efficiency	Lecture	BTCE505.2	Mid Term-1, Quiz & End Sem Exam
9	draft tubes, governing.	Lecture	BTCE505.3	Mid Term-1, Quiz & End Sem Exam
10	Boundary-layer thickness, displacement, momentum & energy thickness	Lecture	BTCE505.3	Mid Term-1, Quiz & End Sem Exam
11	laminar and Turbulent boundary layers on a flat plate	Lecture	BTCE505.3	Mid Term-1, Quiz & End Sem Exam
12	Laminar sub-layer, smooth and rough boundaries	Lecture	BTCE505.3	Mid Term-1, Quiz & End Sem Exam
13	Centrifugal pumps,	Lecture	BTCE505.3	Mid Term-1, Quiz & End Sem Exam
14	velocity triangles	Lecture	BTCE505.4	Mid Term-1, Quiz & End Sem Exam
15	efficiency,	Lecture	BTCE505.4	Mid Term-1, Quiz & End Sem Exam
16	turbine pumps	Lecture	BTCE505.4	Mid Term-1, Quiz & End Sem Exam
17	axial and mixed flow pumps.	Lecture	BTCE505.4	Mid Term-1, Quiz & End Sem Exam
18	Similarity laws applied to rotodynamic machines;	Lecture	BTCE505.4	Mid Term-1, Quiz & End Sem Exam
19	specific speed, unit quantities; characteristic curves;	Lecture	BTCE505.4	Mid Term-1, Quiz & End Sem Exam
20	use of models; cavitations and attendant problems in turbo machines;	Lecture	BTCE505.4	Mid Term-1, Quiz & End Sem Exam
21	selection of turbines hydroelectric plants.	Lecture	BTCE505.4	Assignment, Quiz & End Sem Exam
22	Transmission of hydraulic power through pipe lines;	Lecture	BTCE505.5	Assignment, Quiz & End Sem Exam
23	water hammer; precautions against water hammer in	Lecture	BTCE505.5	Assignment, Quiz

	turbine			& End Sem Exam
24	pump installations:	Lecture	BTCE505.5	Assignment, Quiz & End Sem Exam
25	hydraulic ram.	Lecture		Assignment, Quiz & End Sem Exam
26	**PowerHydraulics**	Lecture	BTCE505.5	Assignment, Quiz & End Sem Exam
27	Positive pumps	Lecture	BTCE505.5	Assignment, Quiz & End Sem Exam
28	gear, vane	Lecture	BTCE505.5	Assignment, Quiz & End Sem Exam
29	screw, pump	Lecture	BTCE505.5	Assignment, Quiz & End Sem Exam
30	variable delivery valves	Lecture	BTCE505.5	Assignment, Quiz & End Sem Exam
31	flow control	Lecture	BTCE505.5	Assignment, Quiz & End Sem Exam
32	pressure control, direction control	Lecture	BTCE505.5	Assignment, Quiz & End Sem Exam
33	, solenoid operated valve, hydraulic circuits	Lecture	BTCE505.5	Assignment, Quiz & End Sem Exam
34	fluid coupling and torque converter	Lecture	BTCE505.5	Assignment, Quiz & End Sem Exam
35	Pneumatic Power: Basic principles	Lecture	BTCE505.5	Assignment, Quiz & End Sem Exam
36	comparison of pneumatic and hydraulic Systems	Lecture	BTCE505.5	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE505.1.	Analyse various hydraulic systems, turbo machines and jet propulsion	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**

BTCE505.2 .	Develop the knowledge on pelton, francis, propeller and Kaplan turbines	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE505.3 .	Evaluate Centrifugal pumps, velocity triangles, efficiency, turbine pumps	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
BTCE505.4 .	Perform dimensional analysis on specific speed, unit quantities; characteristic curves; use of models	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**
BTCE505.5 .	determine the Transmission of hydraulic power through pipe lines; water hammer and hydraulic power and pumps .	3	3	2	3	3	2	2	-	3	2	3	3	**1**	**2**	**3**

Sample Question Paper

<table>
<tr><td colspan="7">Amity School of Engineering and Technology
Department of Civil Engineering
I MID-SEMESTER (SEM–V) 2018-19</td></tr>
<tr><td colspan="7">Class: B.Tech.(CE) V Semester</td></tr>
<tr><td colspan="2">Subject Name:
BTCE505 HYDRAULIC MACHINES</td><td colspan="3">Time: 2 Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question</td><td>Q.1,4</td><td>Q.2,3</td><td>Q.4</td><td>Q.2,5,6</td><td></td><td></td></tr>
</table>

Mapping						

Student will be able to

CO1: Analyse various hydraulic systems, turbo machines and jet propulsion

CO2: Develop the knowledge on pelton, francis, propeller and Kaplan turbines

CO Map	Question No.	Question	Marks
CO1	Q.1	Explain briefly the following: Surface tension, compressibility and bulk modulus	3
CO1	Q.2a	What is capillarity? Derive expression for height of capillary rise	3
	Q.2b	Define pressure. State Pascal's law.Calculate atmospheric pressure at 760 mm of mercury	3
CO1	Q.3	Derive an expression for the meta-centric height of a floating body.	6
CO2	Q.4	Explain briefly the following terms: Potential head, Velocity head and Datum head.	3
CO2	Q.5a	List of assumptions which are made while deriving Bernoulli's equation.	3
	Q.5b	Define laminar boundary layer, turbulent boundary layer and boundary layer thickness.	3
CO2	Q6	Discuss on various major and minor losses in pipe flow	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

HYDRAULIC MACHINES						
Course Code				BTCE 505		
Associated Credit Units				3		
Ser. No.	Name	Enrollment No.	Roll No.	30	70	100
1	AMAN PARASHAR	A60515816004	AU16UCV8601	19	31	50
2	ANUJ BANSAL	A60215816013	AU16UCV8602	18	41	59
3	ANUJ PRATAP SINGH PARMAR	A60215816011	AU16UCV8603	18	45	63
4	ANUJ SHARMA	A60515816006	AU16UCV8604	21	40	61
5	ANUJ SINGH BHADORIA	A60515816001	AU16UCV8605	29	52	81
6	DAMODAR SINGH CHAUHAN	A60215816008	AU16UCV8606	14	42	56
7	DEEPAK SHARMA	A60515816005	AU16UCV8607	19	53	72
8	HIMANSHU MAHLI	A60215816012	AU16UCV8609	15	23	38
9	KUNAL KUMAR	A60515816002	AU16UCV8611	21	35	56
10	KUNAL MUKHARIYA	A60215816007	AU16UCV8612	23	50	73
11	MONUSHA DHAKAD	A60515816003	AU16UCV8613	24	58	82
12	RAHUL SINGH BAGHEL	A60215816015	AU16UCV8614	24	57	81
13	ROHIT BHADORIA	A60215816016	AU16UCV8616	15	21	36
14	SATENDRA SINGH KUSHWAH	A60215816009	AU16UCV8617	15	42	57
15	SHIVAM SHRIVASTAVA	A60215816014	AU16UCV8618	17	42	59
16	UTKARSH TOMAR	A60215816004	AU16UCV8619	22	49	71
				HYDRAULIC MACHINES		
				BTCE 505		
				3		
No. of students attended the Exam				16		
No. of students secure more than 60% marks				8		
Percentage of students secure more than 60% marks				50.00		
Attainment Level				-		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : HYDRO SYSTEMS
Course Code : BTCE 506 Crédits : 03, Session :2018-19 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Mr. Sachin Tiwari

A. **Introduction:** The objective of this course is *to motivate the students to identify, formulate, solve the complex problem to manage the water resource related issues and to prepare the students to synthesize data and technical concepts to apply in water resources engineering. It aims to develop the ability of the students to conduct appropriate experiments, analyse and interpret data and use engineering judgement to draw conclusions in water resources problems.*

B. **Course Outcomes:** At the end of the course, students will be able to:

BTCE 506.1. Analyse various hydraulic systems by applying the fundamental laws of fluid statics.

BTCE 506.2. Solve the fluid flow governing equations by taking suitable constraints and assumptions

BTCE 506.3. Evaluate major and minor losses in pipes

BTCE 506.4. Analyse the practical significance of open channel flows and Perform dimensional analysis on any real life problems

BTCE 506.5. Interpret the boundary layer aspects of laminar and turbulent flows and experimentally determine the fluid properties and flow parameters using various experimental setups.

C. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves	A	5%

	includingmedicalleaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I

Open channel flow in rigid boundary channels- Comparison with pipe flow, Classification of flow, uniform flow – Equations for uniform flow such as Chezy's and Manning's formula, Most efficient channel section – Circular. Rectangular, and Trapezoidal channel sections, Velocity distribution in open channels, Conveyance, Normal depth, Hydraulic exponent for uniform flow, Determination of normal depth and velocity, Specific energy and Specific force diagrams, Critical flow, Hydraulic exponent for critical flow, Channel transitions, Venturi, Standing wave and Parshall flumes.

Module II

Non-uniform flow, Basic assumptions, Gradually Varied Flow, Dynamic equation for gradually varied flow, Different forms of the dynamic equation, Flow profiles in prismatic channels, Computation of the length of the backwater curve - Graphical Integration and Direct Step Methods. Rapidly Varied Flow- Hydraulic Jump, Hydraulic jump equations for a rectangular channel, Practical applications, Energy loss and efficiency of a jump, Stilling Basins, Selection of Stilling Basins, Rapidly varied unsteady flow – Surges.

Module III

Distribution works - Classification of canals, Canal alignment, Considerations for fixing longitudinal slope, Typical canal cross sections in embankment and filling, Cross sections of irrigation canals as per BIS codes, Maintenance of canals, Canals in alluvial soils – Regime Theory - Kennedy's and Lacey's Theories, Silting in canals, Scour and protection against scour. Canal lining - losses in irrigation canals, Advantages and disadvantages of lining, Types of lining. Water logging-Causes & preventive measures. Drainage – Open and Closed Drains.

Module IV

Components of a distribution system (no detailed design) - Head and Cross Regulator, Canal Falls, Canal Outlets, Cross Drainage Works, Canal Escapes- Surplussing arrangements in minor irrigation tanks.

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- K. Subramanya, Flow in Open Channels, 3rd ed., Tata McGraw Hill, New Delhi (2008).
- P. N. Modi, Irrigation, Water Resources &Water Power Engineering, 2nd ed., Standard Book House, New Delhi (2009)
- Srivastava, Flow through Open Channels, Oxford University Press, New Delhi (2008).
- Todd, D.K., Ground Water Hydrology, 2nd ed., Wiley India, New Delhi (2008)

I. Lecture Plan

Lecture	**Topics**	**Mode of**	**Correspon ding CO**	**Mode of Assessing CO**

		Delivery		
1	Open channel flow in rigid boundary channels	Lecture	BTCE506.1	Mid Term-1, Quiz & End Sem Exam
2	Comparison with pipe flow,	Lecture	BTCE506.1	Mid Term-1, Quiz & End Sem Exam
3	Classification of flow, uniform flow	Lecture	BTCE506.1	Mid Term-1, Quiz & End Sem Exam
4	Equations for uniform flow such as	Lecture	BTCE506.1	Mid Term-1, Quiz & End Sem Exam
5	Chezy's and Manning's formula,	Lecture	BTCE506.1	Mid Term-1, Quiz & End Sem Exam
6	Most efficient channel section – Circular. Rectangular, and Trapezoidal channel sections,	Lecture	BTCE506.1	Mid Term-1, Quiz & End Sem Exam
7	Velocity distribution in open channels,	Lecture	BTCE506.1	Mid Term-1, Quiz & End Sem Exam
8	Conveyance, Normal depth, Hydraulic exponent for uniform flow	Lecture	BTCE506.2	Mid Term-1, Quiz & End Sem Exam
9	Determination of normal depth and velocity	Lecture	BTCE506.2	Mid Term-1, Quiz & End Sem Exam
10	Specific energy and Specific force diagrams	Lecture	BTCE506.2	Mid Term-1, Quiz & End Sem Exam
11	Critical flow, Hydraulic exponent for critical flow	Lecture	BTCE506.2	Mid Term-1, Quiz & End Sem Exam
12	Channel transitions, Venturi	Lecture	BTCE506.2	Mid Term-1, Quiz & End Sem Exam
13	Standing wave and Parshall flumes	Lecture	BTCE506.2	Mid Term-1, Quiz & End Sem Exam
14	Non-uniform flow, Basic assumptions	Lecture	BTCE506.2	Mid Term-1, Quiz & End Sem Exam
15	Gradually Varied Flow, Dynamic equation for gradually varied flow	Lecture	BTCE506.2	Mid Term-1, Quiz & End Sem Exam
16	Different forms of the dynamic equation, Flow profiles in prismatic channels	Lecture	BTCE506.2	Mid Term-1, Quiz & End Sem Exam
17	Computation of the length of the backwater curve	Lecture	BTCE506.2	Mid Term-1, Quiz & End Sem Exam
18	Graphical Integration and Direct Step Methods	Lecture	BTCE506.2	Mid Term-1, Quiz & End Sem Exam
19	actual evapotranspiration, interception	Lecture	BTCE506.2	Mid Term-1, Quiz & End Sem Exam
20	Rapidly Varied Flow- Hydraulic Jump	Lecture	BTCE506.2	Mid Term-1, Quiz & End Sem Exam
21	Hydraulic jump equations for a rectangular channel	Lecture	BTCE506.2	Assignment, Quiz & End Sem Exam
22	Practical applications, Energy loss and efficiency of a jump	Lecture	BTCE506.2	Assignment, Quiz & End Sem Exam
23	Stilling Basins, Selection of Stilling Basins	Lecture	BTCE506.2	Assignment, Quiz & End Sem Exam

24	Rapidly varied unsteady flow - Surges	Lecture	BTCE506.3	Assignment, Quiz & End Sem Exam
25	Distribution works - Classification of canals, Canal alignment	Lecture	BTCE506.3	Assignment, Quiz & End Sem Exam
26	Considerations for fixing longitudinal slope, Typical canal cross sections in embankment and filling	Lecture	BTCE506.4	Assignment, Quiz & End Sem Exam
27	Cross sections of irrigation canals as per BIS codes, Maintenance of canals	Lecture	BTCE506.4	Assignment, Quiz & End Sem Exam
28	Canals in alluvial soils - Regime Theory	Lecture	BTCE506.4	Assignment, Quiz & End Sem Exam
29	Kennedy's and Lacey's Theories, Silting in canals	Lecture	BTCE506.4	Assignment, Quiz & End Sem Exam
30	Scour and protection against scour. Canal lining	Lecture	BTCE506.4	Assignment, Quiz & End Sem Exam
31	losses in irrigation canals, Advantages and disadvantages of lining	Lecture	BTCE506.5	Assignment, Quiz & End Sem Exam
32	Types of lining. Water logging- Causes & preventive measures	Lecture	BTCE506.5	Assignment, Quiz & End Sem Exam
33	Drainage – Open and Closed Drains.	Lecture	BTCE506.5	Assignment, Quiz & End Sem Exam
34	Components of a distribution system (no detailed design	Lecture	BTCE506.5	Assignment, Quiz & End Sem Exam
35	Head and Cross Regulator, Canal Falls, Canal Outlets, Cross Drainage Works	Lecture	BTCE506.5	Assignment, Quiz & End Sem Exam
36	Canal Escapes- Surplussing arrangements in minor irrigation tanks	Lecture	BTCE506.5	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE506.1 .	Analyse various hydraulic systems by applying the fundamental laws of fluid statics.	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**

BTCE506.2.	Solve the fluid flow governing equations by taking suitable constraints and assumptions	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE506.3.	Evaluate major and minor losses in pipes	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
BTCE506.4	Analyse the practical significance of open channel flows and Perform dimensional analysis on any real life problems	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**
BTCE506.5 .	Interpret the boundary layer aspects of laminar and turbulent flows and experimentally determine the fluid properties and flow parameters using various experimental setups.	3	3	2	3	3	2	2	-	3	2	3	3	**1**	**2**	**3**

<u>Sample Question Paper</u>

<table>
<tr><td colspan="7">Amity School of Engineering and Technology
Department of Civil Engineering
I MID-SEMESTER (SEM–V) 2018-19</td></tr>
<tr><td colspan="7">Class: B.Tech.(CE) V Semester</td></tr>
<tr><td colspan="2">Subject Name:
BTCE506 HYDRO SYSTEMS</td><td colspan="2">Time: 2 Hrs</td><td colspan="3">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
</table>

Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: Analyse various hydraulic systems by applying the fundamental laws of fluid statics.

CO2 : Solve the fluid flow governing equations by taking suitable constraints and assumptions

CO Map	Question No.	Question	Marks
CO1	Q.1	State and discuss the assumptions made in the derivation of the dynamic equation for gradually varied flow	3
CO1	Q.2a	Starting from first principle, derive equation for the slope of the water surface in GVF.	3
	Q.2b	write down the dynamic equation for wide rectangular channels if (i) Manning's formula is used, and (ii) Chezy's formula is used	3
CO1	Q.3	Discuss the graphical integration method in detail for working out water surface profile in an open channel flow	6
CO2	Q.4	What is Darcy-weisbach frication factor?	3
CO2	Q.5a	What is backwater curve?	3
	Q.5b	What is sequent depth ratio?	3
CO2	Q6	Write short notes on any two of the following (i) Types of open channel flow (ii) Velocity distribution in open channel flow (iii) Exponential and non-exponential channels (iv) Roughness coefficient	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

.

HYDRO SYSTEMS						
Course Code				BTCE 506		
Associated Credit Units				3		
Ser. No.	Name	Enrollment No.	Roll No.	30	70	100
1	AMAN PARASHAR	A60515816004	AU16UCV8601	18	32	50
2	ANUJ BANSAL	A60215816013	AU16UCV8602	18	35	53
3	ANUJ PRATAP SINGH PARMAR	A60215816011	AU16UCV8603	19	42	61
4	ANUJ SHARMA	A60515816006	AU16UCV8604	19	37	56
5	ANUJ SINGH BHADORIA	A60515816001	AU16UCV8605	19	43	62
6	DAMODAR SINGH CHAUHAN	A60215816008	AU16UCV8606	15	36	51
7	DEEPAK SHARMA	A60515816005	AU16UCV8607	17	40	57
8	HIMANSHU MAHLI	A60215816012	AU16UCV8609	17	40	57
9	KUNAL KUMAR	A60515816002	AU16UCV8611	18	35	53
10	KUNAL MUKHARIYA	A60215816007	AU16UCV8612	16	42	58
11	MONUSHA DHAKAD	A60515816003	AU16UCV8613	17	43	60
12	RAHUL SINGH BAGHEL	A60215816015	AU16UCV8614	22	48	70
13	ROHIT BHADORIA	A60215816016	AU16UCV8616	19	35	54
14	SATENDRA SINGH KUSHWAH	A60215816009	AU16UCV8617	16	42	58
15	SHIVAM SHRIVASTAVA	A60215816014	AU16UCV8618	17	37	54
16	UTKARSH TOMAR	A60215816004	AU16UCV8619	13	43	56

				HYDRO SYSTEMS
				BTCE 506
				3
No. of students attended the Exam				16
No. of students secure more than 60% marks				3
Percentage of students secure more than 60% marks				18.75
Attainment Level				-

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : HIGHWAY ENGINEERING LAB
Course Code : BTCE 520, Crédits : 01, Session :2019-20 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Mr. Sachin Tiwari

A. Introduction**:** T*he objective of this course is to introduce the students to various hydraulic engineering machines like centrifugal pump, pelton turbine and francis turbine etc.. At the completion of the course, the student sho*

B. *ld be able to relate the theory and practice of problems in hydraulic machines.*

C. Course Outcomes: At the end of the course, students will be able to:
BTCE520.1. Conduct test on aggregate and bitumen
BTCE520.2. Plot the characteristics of penetration test value of bitumen and CBR value
BTCE520.3. Evaluate viscosity, ductility, flash point and fire point of bitumen

D. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

E. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

F. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

G. Syllabus

Practical Work:

1.Determination of Aggregates crushing value test

2. Determination of Aggregates impact value

3. Determination of Los Angles Abrasion value

4. Determination of Calefornia Bearing Ratio value

5.Determination of Shape test on aggregates.

6. Determination of Penetration test value of Bitumen

7. Determination of Softneing point of Bitumen

8. Determination of Viscosity of Bitumen

9. Determination of Ductility of the Bitumen

10. Determination of flash point and fire point of bitumen.

11. Determination of Bitumen content by Centrifuge extractor

12. Determination of Stripping value of Bituminous Mix

13. Determination of Marshal stability of bituminous Mix.

H. Examination Scheme:

Components	IA				EE	
	A	PR	LR	V	PR	V
Weightage (%)	5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

I. Suggested Text/Reference Books:

- Hydraulics and Fluid Mechanics, P.M. Modi and S.M. Seth, Standard Book House
- Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill.
- Open channel Flow, K. Subramanya, Tata McGraw Hill.

J. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Determination of Aggregates crushing value test	Lecture	BTCE520.1	Internal Assessment, Viva &External Exam
2	Determination of Aggregates impact value	Lecture	BTCE520.1	Internal Assessment, Viva &External Exam

3	Determination of Los Angles Abrasion value	Lecture	BTCE520.1	Internal Assessment, Viva &External Exam
4	Determination of Calefornia Bearing Ratio value	Lecture	BTCE520.1	Internal Assessment, Viva &External Exam
5	Determination of Shape test on aggregates.	Lecture	BTCE520.2	Internal Assessment, Viva &External Exam
6	*Determination of Penetration test value of Bitumen*	Lecture	BTCE520.2	Internal Assessment, Viva &External Exam
7	*Determination of Softneing point of Bitumen*	Lecture	BTCE520.2	Internal Assessment, Viva &External Exam
8	Determination of Viscosity of Bitumen	Lecture	BTCE520.2	Internal Assessment, Viva &External Exam
9	Determination of Ductility of the Bitumen	Lecture	BTCE520.3	Internal Assessment, Viva &External Exam
10	Determination of flash point and fire point of bitumen.	Lecture	BTCE520.3	Internal Assessment, Viva &External Exam
11	*Determination of Bitumen content by Centrifuge extractor*	Lecture	BTCE520.3	Internal Assessment, Viva &External Exam
12	*Determination of Stripping value of Bituminous Mix* Determination of Marshal stability of bituminous Mix.	Lecture	BTCE520.3	Internal Assessment, Viva &External Exam

K. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE520 .1	Conduct test on aggregate and bitumen	3	3	2	2	3	2	2	-	3	2	3	3	**3**	**1**	**2**

BTCE520 .2	Plot the characteristics of penetration test value of bitumen and CBR value	3	3	2	3	3	2	2	-	2	2	3	3	**3**	**2**	**3**
BTCE520 .3	Evaluate viscosity, ductility, flash point and fire point of bitumen	3	2	3	1	2	-	1	-	3	2	3	3	**3**	**2**	**1**

Sample Question Paper

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–V) 2017-18		
Class: B.Tech.(CE) V Semester		
Subject Name: BTCE520 Highway Engineering Lab	Time: 2 Hrs	Max.Marks:30

Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: Conduct test on aggregate and bitumen

CO2: Plot the characteristics of penetration test value of bitumen and CBR value

CO Map	Question No.	Question	Marks
CO1	Q.1	Write down the definition of a gauge of a railway track.	3
CO1	Q.2a	Explain the reasons for train derailments	3
	Q.2b	Explain how airport pavements are damaged due to frost action.	3
CO1	Q.3	Draw a neat sketch of the line diagram of the fixed heel type switch	6
CO2	Q.4	Explain briefly about the requirements of an ideal permanent way	3
CO2	Q.5a	Evaluate different types of gradients used in railway tracks.	3
	Q.5b	Describe the sleeper density and spacing of sleepers	3
CO2	Q6	Enumerate the factors affecting site selection for an	6

		airport	

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

HIGHWAY ENGINEERING LAB						
Course Code				BTCE 520		
Associated Credit Units				1		
Ser. No.	Name	Enrollment No.	Roll No.	30	70	100
1	AMAN PARASHAR	A60515816004	AU16UCV8601	22	50	72
2	ANUJ BANSAL	A60215816013	AU16UCV8602	25	47	72
3	ANUJ PRATAP SINGH PARMAR	A60215816011	AU16UCV8603	23	46	69
4	ANUJ SHARMA	A60515816006	AU16UCV8604	26	59	85
5	ANUJ SINGH BHADORIA	A60515816001	AU16UCV8605	28	58	86
6	DAMODAR SINGH CHAUHAN	A60215816008	AU16UCV8606	22	58	80
7	DEEPAK SHARMA	A60515816005	AU16UCV8607	24	57	81
8	HIMANSHU MAHLI	A60215816012	AU16UCV8609	24	57	81
9	KUNAL KUMAR	A60515816002	AU16UCV8611	27	50	77
10	KUNAL MUKHARIYA	A60215816007	AU16UCV8612	26	57	83
11	MONUSHA DHAKAD	A60515816003	AU16UCV8613	27	61	88
12	RAHUL SINGH BAGHEL	A60215816015	AU16UCV8614	27	64	91
13	ROHIT BHADORIA	A60215816016	AU16UCV8616	22	52	74
14	SATENDRA SINGH KUSHWAH	A60215816009	AU16UCV8617	22	52	74
15	SHIVAM SHRIVASTAVA	A60215816014	AU16UCV8618	22	60	82
16	UTKARSH TOMAR	A60215816004	AU16UCV8619	26	54	80

HIGHWAY ENGINEERING LAB				
				BTCE 520
				1
No. of students attended the Exam				16
No. of students secure more than 60% marks				16
Percentage of students secure more than 60% marks				100.00
Attainment Level				Level 3

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : HYDRAULIC MACHINES LAB
Course Code : BTCE 521, Crédits : 01, Session :2019-20 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Mr. Sachin Tiwari

L. Introduction**:** T*he objective of this course is to introduce the students to various hydraulic engineering machines like centrifugal pump, pelton turbine and francis turbine etc.. At the completion of the course, the student should be able to relate the theory and practice of problems in hydraulic machines.*

M. Course Outcomes: At the end of the course, students will be able to:
BTCE521.1. Conduct test on centrifugal pump and pelton turbine
BTCE521.2. Plot the characteristics of pelton and franics turbine
BTCE521.3. Evaluate effect of a draft tube on reaction turbines, model law and flow through pipes

N. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

O. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

P. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

Q. Syllabus

Practical Work:

- To conduct a test on Centrifugal Pump and plot its characteristics.
- To Plot the characteristics of Pelton turbine.
- To conducts an experiment on Francis turbine.
- To study the effect of a draft tube on reaction turbines.
- To find the friction factor for flow through pipes.
- To study the hydraulic controls rig.
- To conduct an experiment for verifying model laws.
- To study the cavitations phenomenon in turbines.
- Study of hydraulic couplings and torque converters.

R. Examination Scheme:

Components	IA				EE	
	A	PR	LR	V	PR	V
Weightage (%)	5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

S. Suggested Text/Reference Books:

- Hydraulics and Fluid Mechanics, P.M. Modi and S.M. Seth, Standard Book House
- Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill.
- Open channel Flow, K. Subramanya, Tata McGraw Hill.

T. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	To conduct a test on Centrifugal Pump and plot its characteristics.	Lecture	BTCE521.1	Internal Assessment, Viva &External Exam
2	To Plot the characteristics of Pelton turbine	Lecture	BTCE521.1	Internal Assessment, Viva &External Exam
3	To conducts an experiment on Francis turbine	Lecture	BTCE521.1	Internal Assessment, Viva &External Exam
4	To study the effect of a draft tube on reaction turbines.	Lecture	BTCE521.1	Internal Assessment, Viva &External Exam
5	To find the friction factor for flow through pipes.	Lecture	BTCE521.2	Internal Assessment, Viva &External Exam
6	To study the hydraulic controls rig.	Lecture	BTCE521.2	Internal Assessment, Viva

				&External Exam
7	To conduct an experiment for verifying model laws.	Lecture	BTCE521.2	Internal Assessment, Viva &External Exam
8	To study the cavitations phenomenon in turbines.	Lecture	BTCE521.2	Internal Assessment, Viva &External Exam
9	Study of hydraulic couplings and torque converters.	Lecture	BTCE521.3	Internal Assessment, Viva &External Exam
10	To find the friction factor for flow through pipes.	Lecture	BTCE521.3	Internal Assessment, Viva &External Exam
11	To study the hydraulic controls rig.	Lecture	BTCE521.3	Internal Assessment, Viva &External Exam
12	To conduct an experiment for verifying model laws.	Lecture	BTCE521.3	Internal Assessment, Viva &External Exam

U. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE521.1	Conduct test on centrifugal pump and pelton turbine	3	3	2	2	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE521.2	Plot thecharacteristics of pelton and franics turbine	3	3	2	3	3	2	2	-	2	2	3	3	**3**	**2**	**3**
BTCE521.3	Evaluate effect of a draft tube on reaction turbines, model law and flow through pipes	3	2	3	1	2	-	1	-	3	2	3	3	**3**	**2**	**1**

<u>Sample Question Paper</u>

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–V) 2017-18		
Class: B.Tech.(CE) V Semester		
Subject Name: BTCE521 Hydraulic Machines Lab	Time: 2 Hrs	Max.Marks:30

Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: Conduct test on centrifugal pump and pelton turbine

CO2: Plot the characteristics of pelton and franics turbine

CO Map	Question No.	Question	Marks
CO1	Q.1	What do you understand by specific speed of a turbine? What is its use?	3
CO1	Q.2a	State and explain Bazin's formula for determining the constant C.	3
	Q.2b	Discuss critically, how you plan a power house.	3
CO1	Q.3	Derive the expression for the force exerted by a jet of water on an inclined fixed plate in the direction of the jet	6
CO2	Q.4	Write short note on integration method of solving GVF equation	3
CO2	Q.5a	Define cavitation. What are the effects of cavitation? Give the necessary precautions against cavitation	3
	Q.5b	What is the principle behind a centrifugal pump and derive an expression for the minimum starting speed of a centrifugal pump.	3
CO2	Q6	Explain in detail about Rayleigh's method of dimensional analysis. What are the practical uses?	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

HYDRAULIC MACHINES LAB						
Course Code				BTCE 521		
Associated Credit Units				1		
Ser. No.	Name	Enrollment No.	Roll No.	30	70	100
1	AMAN PARASHAR	A60515816004	AU16UCV8601	23	48	71
2	ANUJ BANSAL	A60215816013	AU16UCV8602	22	46	68
3	ANUJ PRATAP SINGH PARMAR	A60215816011	AU16UCV8603	22	50	72
4	ANUJ SHARMA	A60515816006	AU16UCV8604	22	46	68
5	ANUJ SINGH BHADORIA	A60515816001	AU16UCV8605	26	55	81
6	DAMODAR SINGH CHAUHAN	A60215816008	AU16UCV8606	22	40	62
7	DEEPAK SHARMA	A60515816005	AU16UCV8607	22	47	69
8	HIMANSHU MAHLI	A60215816012	AU16UCV8609	22	47	69
9	KUNAL KUMAR	A60515816002	AU16UCV8611	23	52	75
10	KUNAL MUKHARIYA	A60215816007	AU16UCV8612	23	49	72
11	MONUSHA DHAKAD	A60515816003	AU16UCV8613	25	52	77
12	RAHUL SINGH BAGHEL	A60215816015	AU16UCV8614	24	50	74
13	ROHIT BHADORIA	A60215816016	AU16UCV8616	22	45	67
14	SATENDRA SINGH KUSHWAH	A60215816009	AU16UCV8617	21	48	69
15	SHIVAM SHRIVASTAVA	A60215816014	AU16UCV8618	23	43	66
16	UTKARSH TOMAR	A60215816004	AU16UCV8619	25	51	76

				HYDRAULIC MACHINES LAB
				BTCE 521
				1
No. of students attended the Exam				16
No. of students secure more than 60% marks				16
Percentage of students secure more than 60% marks				100.00
Attainment Level				Level 3

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **INDUSTRIAL PRACTICAL TRAINING – I**
Course Code : BTCE550, Crédits : 03, Session :2018-19 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia, Dr. Imran Ahmad Khan, Dr. Ripunjoy Gogoi, Dr. P. Mahakavi, Mr. Sachin Tiwari

A. Introduction: The objective of this course is to enable the students to explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills. It will help them to manage the technical content and work. It will also help them to prepare and present technical report..

B. Course Outcomes: At the end of the course, students will be able to:

BTCE550.1. Explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills.

BTCE550.2. Manage the technical content and work.

BTCE550.3. Learn the various administrative process followed in industry and prepare and present technical report.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
End Semester Examination	End Semester Examination	EE	100%
Total			**100%**

F. Syllabus

Methodology:

Practical training is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the practical

training the students are to present a report covering various aspects learnt by them and give a presentation on same.

G. Examination Scheme:

Feedback from industry/work place	20
Training Report	40
Viva	15
Presentation	25
Total	**100**

H. Suggested Text/Reference Books: NA

I. Lecture Plan : NA

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE550.1	Explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills.	3	**2**	1	3	1	-	-	-	2		2	1	**1**	**2**	**1**
BTCE550.2	Manage the technical content and work.	3	1	2	2	2	-	-	-	2		1	1	**3**	**2**	**3**
BTCE550.3	Learn the various administrative process followed in industry.	2	2	2	2	2	-	-	-	3		3	1	**3**	**3**	**2**
BTCE550.4	Prepare and present technical report.	1	2	1	-	-	-	-	-	-	-	-	-	**1**	**2**	**3**

INDUSTRIAL PRACTICAL TRAINING				
Course Code				BTCE 550
Associated Credit Units				4
Ser. No.	Name	Enrollment No.	Roll No.	100
1	AMAN PARASHAR	A60515816004	AU16UCV8601	65
2	ANUJ BANSAL	A60215816013	AU16UCV8602	80
3	ANUJ PRATAP SINGH PARMAR	A60215816011	AU16UCV8603	75
4	ANUJ SHARMA	A60515816006	AU16UCV8604	75
5	ANUJ SINGH BHADORIA	A60515816001	AU16UCV8605	85
6	DAMODAR SINGH CHAUHAN	A60215816008	AU16UCV8606	65
7	DEEPAK SHARMA	A60515816005	AU16UCV8607	70
8	HIMANSHU MAHLI	A60215816012	AU16UCV8609	80
9	KUNAL KUMAR	A60515816002	AU16UCV8611	85
10	KUNAL MUKHARIYA	A60215816007	AU16UCV8612	80
11	MONUSHA DHAKAD	A60515816003	AU16UCV8613	85
12	RAHUL SINGH BAGHEL	A60215816015	AU16UCV8614	90
13	ROHIT BHADORIA	A60215816016	AU16UCV8616	80
14	SATENDRA SINGH KUSHWAH	A60215816009	AU16UCV8617	70
15	SHIVAM SHRIVASTAVA	A60215816014	AU16UCV8618	70
16	UTKARSH TOMAR	A60215816004	AU16UCV8619	85
				SIP
				BTCE 750
				6
No. of students attended the Exam				16
No. of students secure more than 60% marks				16
Percentage of students secure more than 60% marks				100
Attainment Level				Level 3

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : Environmental Engineering – I
Course Code : BTCE601, Crédits : 03, Session : 2018-19 (Even Sem.), Class : B.Tech. 3rd Year
Faculty Name : DDr. Mohan Kantharia, Dr. Imran Ahmad Khan,

A. Introduction: The objective of this course is to teach students the basic principles and concepts of unit operations and processes involved in water and wastewater treatment and to develop a student's skill in the basic design of unit operations and processes involved in water and wastewater treatment. It aims to develop a student's skill in evaluating the performance of water and wastewater treatment plants and to teach students the various methods of sludge management.

B. Course Outcomes: At the end of the course, students will be able to:

BTCE601.1. Examine the Quantity of water, calculate the demand of water and design period

BTCE601.2. Estimate the various ground water sources and water quality parameters.

BTCE601.3. Able to identify the type of unit operations and processes involved in water and wastewater treatment plants based on the water quality

BTCE601.4. Prepare the layout of water and water treatment plants and evaluate the distribution system and its maintenance

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Scope of Environmental Engineering

Water Supply Engineering. Quantity of water. Types of water demand. Fluctuation in demand. Factors affecting consumption. Forecasting population. Design period.

Module II: Sources of water

Surface water sources. Intakes. Ground water Sources. Estimation of yield from various ground water sources. Quality of water. Drinking water standards – Water quality parameters- effects on human health- Methods of Physical, Chemical and Bacteriological analysis of water.

Module III: Treatment of water

Process details and design considerations. Aeration. Coagulation. Flocculation. Sedimentation. Filtration. Disinfection. Miscellaneous and advanced treatments. Iron and manganese removal. Fluoridation and defluoridation. Water Softening. Arsenic removal. Desalination. Membrane filtration.

Module IV: Water supply schemes

Gravitational, pumping and combined schemes. Pumps. Pumping stations. Transmission of water. Materials of water supply pipes. Design of gravity and pumping main. Distribution systems. Different layout of pipe networks.House connection from mains. Different valves, meters and hydrants. Storage reservoirs. Balancing reservoir. Detection and prevention of leaks in the distribution systems. Maintenance of distribution systems.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Garg S. K, Environmental Engineering, Vol. I, Khanna Publications, 2001, New Delhi.
- Birdie G.S & Birdie J.S, Water Supply and Sanitary Engineering, Dhanpat Rai & Sons, 1998, New Delhi.
- Duggal, K.N., Elements of Environmental Engineering, S Chand & Co. Ltd., 2000, New Delhi.
- Mark J. Hammer & Mark J. Hammer Jr., Water and Waste Water Technology, Prentice Hall of India Pvt. Ltd., 1998, New Delhi.
- Fair, Geyer & Okun, Water & Waste Water Engineering, John Wiley, 1966, New York.
- Ernest W. Steel & Terence J. Mc Ghee, Water Supply & Sewage, McGraw Hill, 1990, New York.
- Relevant BIS Codes.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Water Supply Engineering	Lecture	BTCE601.1	Mid Term-1, Quiz & End Sem Exam
2	Quantity of water	Lecture	BTCE601.1	Mid Term-1, Quiz & End Sem Exam
3	Types of water demand	Lecture	BTCE601.1	Mid Term-1, Quiz & End Sem Exam

4	*Fluctuation in demand*	Lecture	BTCE601.1	Mid Term-1, Quiz & End Sem Exam
5	Factors affecting consumption. Forecasting population	Lecture	BTCE601.1	Mid Term-1, Quiz & End Sem Exam
6	Design period.	Lecture	BTCE601.1	Mid Term-1, Quiz & End Sem Exam
7	Surface water sources	Lecture	BTCE601.2	Mid Term-1, Quiz & End Sem Exam
8	Intakes. Ground water Sources	Lecture	BTCE601.2	Mid Term-1, Quiz & End Sem Exam
9	Estimation of yield from various ground water sources.	Lecture	BTCE601.2	Mid Term-1, Quiz & End Sem Exam
10	Quality of water	Lecture	BTCE601.2	Mid Term-1, Quiz & End Sem Exam
11	Drinking water standards	Lecture	BTCE601.2	Mid Term-1, Quiz & End Sem Exam
12	Water quality parameters	Lecture	BTCE601.2	Mid Term-1, Quiz & End Sem Exam
13	effects on human health	Lecture	BTCE601.3	Mid Term-1, Quiz & End Sem Exam
14	Methods of Physical, Chemical and Bacteriological analysis of water	Lecture	BTCE601.3	Mid Term-1, Quiz & End Sem Exam
15	**Treatment of water**	Lecture	BTCE601.3	Mid Term-1, Quiz & End Sem Exam
16	Process details and design considerations	Lecture	BTCE601.3	Mid Term-1, Quiz & End Sem Exam
17	Aeration. Coagulation	Lecture	BTCE601.3	Mid Term-1, Quiz & End Sem Exam
18	Flocculation. Sedimentation	Lecture	BTCE601.3	Mid Term-1, Quiz & End Sem Exam
19	Filtration. Disinfection	Lecture	BTCE601.3	Mid Term-1, Quiz & End Sem Exam
20	Miscellaneous and advanced treatments	Lecture	BTCE601.3	Mid Term-1, Quiz & End Sem Exam
21	Iron and manganese removal.	Lecture	BTCE601.3	Assignment, Quiz & End Sem Exam
22	Fluoridation and defluoridation.	Lecture	BTCE601.3	Assignment, Quiz & End Sem Exam
23	Water Softening. Arsenic removal	Lecture	BTCE601.3	Assignment, Quiz & End Sem Exam
24	Desalination. Membrane filtration	Lecture	BTCE601.3	Assignment, Quiz & End Sem Exam
25	Gravitational, pumping and combined schemes	Lecture	BTCE601.4	Assignment, Quiz & End Sem Exam
26	Pumps. Pumping stations	Lecture	BTCE601.4	Assignment, Quiz & End Sem Exam
27	Transmission of water. Materials of water supply pipes	Lecture	BTCE601.4	Assignment, Quiz & End Sem Exam

28	Design of gravity and pumping main. Distribution systems	Lecture	BTCE601.4	Assignment, Quiz & End Sem Exam
29	Different layout of pipe networks	Lecture	BTCE601.4	Assignment, Quiz & End Sem Exam
30	House connection from mains	Lecture	BTCE601.4	Assignment, Quiz & End Sem Exam
31	Different valves, meters and hydrants	Lecture	BTCE601.4	Assignment, Quiz & End Sem Exam
32	Storage reservoirs	Lecture	BTCE601.4	Assignment, Quiz & End Sem Exam
33	Balancing reservoir	Lecture	BTCE601.4	Assignment, Quiz & End Sem Exam
34	Detection and prevention of leaks in the distribution systems	Lecture	BTCE601.4	Assignment, Quiz & End Sem Exam
35	Maintenance of distribution systems	Lecture	BTCE601.4	Assignment, Quiz & End Sem Exam
36	Gravitational, pumping and combined schemes	Lecture	BTCE601.4	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE601.1.	Examine the Quantity of water, calculate the demand of water and design period	3	2	3	1	2	-	1	-	3	2	3	3	**3**	**2**	**1**
BTCE601.2.	Estimate the various ground water sources and water quality parameters.	3	3	2	2	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE601.3.	Able to identify the type of unit operations and processes involved in water and	3	3	2	2	3	-	1	2	-	2	3	3	**2**	**2**	**1**

	wastewater treatment plants based on the water quality															
BTCE601.4 .	*Prepare the layout of water and* water treatment plants and evaluate the *distribution system and its maintenance*	3	3	2	1	1	2	1	-	1	2	3	3	**3**	**2**	**1**

Sample Question Paper

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–VI) 2018-19		
Class: B.Tech.(CE) VI Semester		
Subject Name: BTCE601 Environmental Engineering - I	Time: 2 Hrs	Max.Marks:30

Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: Examine the Quantity of water, calculate the demand of water and design period

CO2: Estimate the various ground water sources and water quality parameters.

CO Map	Question No.	Question	Marks
CO1	Q.1	What is meant by per capita rate at water demand?	3
CO1	Q.2a	What is the significance of rainfall index?	3
	Q.2b	State any two water quality parameters that can be analysed by titrometric method?	3

CO1	Q.3	Sketch and Explain logistic curve used for forecasting the population?	6
CO2	Q.4	Name any two water borne disease?	3
CO2	Q.5a	Give the maximum acceptable limit of the following for the public drinking water?	3
	Q.5b	State the purpose of carrying out water quality characterization?	3
CO2	Q6	What are the common sources for a water supply scheme?	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

Course Code				**BTCE 601**		
Associated Credit Units				**3**		
Ser. No.	**Name**	**Enrollment No.**	**Roll No.**	**30**	**70**	**100**
1	AMAN PARASHAR	A60515816004	AU16UCV8601	16	32	48
2	ANUJ BANSAL	A60215816013	AU16UCV8602	18	35	53
3	ANUJ PRATAP SINGH PARMAR	A60215816011	AU16UCV8603	16	50	66
4	ANUJ SHARMA	A60515816006	AU16UCV8604	20	38	58
5	ANUJ SINGH BHADORIA	A60515816001	AU16UCV8605	20	47	67
6	DAMODAR SINGH CHAUHAN	A60215816008	AU16UCV8606	12	35	47
7	DEEPAK SHARMA	A60515816005	AU16UCV8607	13	39	52
8	HIMANSHU MAHLI	A60215816012	AU16UCV8609	12	42	54
9	KUNAL KUMAR	A60515816002	AU16UCV8611	13	28	41
10	KUNAL MUKHARIYA	A60215816007	AU16UCV8612	15	45	60
11	MONUSHA DHAKAD	A60515816003	AU16UCV8613	18	32	50
12	RAHUL SINGH BAGHEL	A60215816015	AU16UCV8614	21	44	65
13	ROHIT BHADORIA	A60215816016	AU16UCV8616	15	30	45
14	SATENDRA SINGH KUSHWAH	A60215816009	AU16UCV8617	10	31	41
15	SHIVAM SHRIVASTAVA	A60215816014	AU16UCV8618	12	30	42
16	UTKARSH TOMAR	A60215816004	AU16UCV8619	17	47	64
No. of students attended the Exam				16		
No. of students secure more than 60% marks				4		
Percentage of students secure more than 60% marks				25.00		
Attainment Level				-		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : Structural Concrete Design
Course Code : BTCE602, Crédits : 03, Session : 2018-19 (Even Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Mr. P Mahakavi, Mr. Sachin Tiwari

A. Introduction: The objective of this course is to teach students the basic principles and concepts of design concept of RCC and Steel structure. and to develop a have knowledge of principal of structural design. It aims to develop a student's skill in evaluating the performance of design of elements.

B. Course Outcomes: At the end of the course, students will be able to:

BTCE602.1.design, analysis, and proportioning of reinforced concrete members and structures.

BTCE602.2.design different type of foundations..

BTCE602.3.effective use of latest industry standard formula, table, design aids used for design of Reinforced concrete Structure.

BTCE602.4. Prepare the layout of building evaluate the RCC elements

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Introduction to limit state method of design

Review of partial safety factors. Limit state of collapse. Limit state of serviceability.

Limit State of Collapse: Flexure. Limit state of collapse for flexure as per IS. Assumptions. Moment capacity of rectangular and flanged sections. Singly and doubly reinforced sections. Design tables and charts. Critical sections for bending in important structural elements such as slabs, beams, retaining
wall, footings, staircase etc. Design project for the design and detailing of a floor slab system and staircase of aresidence (load bearing masonry walls).

Module II: Shear and Torsion

Limit State of Collapse: Shear. Nominal shear stress. Design shear strength of concrete. Design of shear reinforcement. Use of SP16 for shear design. Critical sections for shear in important structural elements such as slabs, beams, retaining walls, footings etc. Design project for the design and detailing the beams of a framed system.

Limit State of Collapse: Torsion. General. Critical section.Shear and torsion. Equivalent . Reinforcement for torsion. Equivalent longitudinal moment. Design project for the design and detailing of a water tank with curved beams.

Module III: Compression

Limit State of Collapse: Compression. Analysis and design of columns of rectangular and circular cross sections. Axially loaded columns Columns with uniaxial and biaxial eccentricity using SP 16 design charts. Short and slender columns. Design project for the design and detailing the columns of a framed system and isolated and combined footings.

Module IV: Limit State of Serviceability

Deflection. Short term deflection. Long term deflection. Cracking. Control of cracking. Estimation of width of cracks

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Pillai S.U. & Menon D., Reinforced Concrete Design Tata McGraw Hill, 2003
- Varghese P.C., Limit State Design of Reinforced Concrete, Prentice Hall of India, 2003
- Mallick S.K. & Gupta A.K., Reinforced Concrete, Oxford & IBH, 1982
- Jain A.K., Reinforced Concrete - Limit State Design, Standard Book House, 1998
- Punmia B.C., Reinforced Concrete Structures Vol. I, Standard Book House,2005
- Jain & Jaikrishna, Plain & Reinforced Concrete Vol. I, Nemchand, 2000
- Sinha S.N., Reinforced Concrete Design, Tata McGraw Hill, 2005
- BIS codes (IS 456, SP 16, SP 24, SP 34)

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Review of partial safety factors	Lecture	BTCE602.1	Mid Term-1, Quiz & End Sem Exam

2	Limit state of collapse	Lecture	BTCE602.1	Mid Term-1, Quiz & End Sem Exam
3	Limit state of serviceability.	Lecture	BTCE602.1	Mid Term-1, Quiz & End Sem Exam
4	***Limit State of Collapse: Flexure***	Lecture	BTCE602.1	Mid Term-1, Quiz & End Sem Exam
5	Limit state of collapse for flexure as per IS	Lecture	BTCE602.1	Mid Term-1, Quiz & End Sem Exam
6	Assumptions. Moment capacity of rectangular and flanged sections	Lecture	BTCE602.1	Mid Term-1, Quiz & End Sem Exam
7	Singly and doubly reinforced sections	Lecture	BTCE602.2	Mid Term-1, Quiz & End Sem Exam
8	Design tables and charts	Lecture	BTCE602.2	Mid Term-1, Quiz & End Sem Exam
9	Critical sections for bending in important structural elements such as slabs, beams, retaining	Lecture	BTCE602.2	Mid Term-1, Quiz & End Sem Exam
10	wall, footings, staircase	Lecture	BTCE602.2	Mid Term-1, Quiz & End Sem Exam
11	Design project for the design and detailing of a floor slab system	Lecture	BTCE602.2	Mid Term-1, Quiz & End Sem Exam
12	Nominal shear stress	Lecture	BTCE602.2	Mid Term-1, Quiz & End Sem Exam
13	Design shear strength of concrete	Lecture	BTCE602.3	Mid Term-1, Quiz & End Sem Exam
14	Design of shear reinforcement.	Lecture	BTCE602.3	Mid Term-1, Quiz & End Sem Exam
15	Use of SP16 for shear design.	Lecture	BTCE602.3	Mid Term-1, Quiz & End Sem Exam
16	Critical sections for shear in important structural elements such as slabs, beams, retaining walls, footings etc	Lecture	BTCE602.3	Mid Term-1, Quiz & End Sem Exam
17	**Limit State of Collapse: Torsion.**	Lecture	BTCE602.3	Mid Term-1, Quiz & End Sem Exam
18	General. Critical section.Shear and torsion. Equivalent	Lecture	BTCE602.3	Mid Term-1, Quiz & End Sem Exam
19	Reinforcement for torsion. Equivalent longitudinal moment	Lecture	BTCE602.3	Mid Term-1, Quiz & End Sem Exam
20	Miscellaneous and advanced treatments	Lecture	BTCE602.3	Mid Term-1, Quiz & End Sem Exam
21	Design project for the design and detailing of a water tank with curved beams.	Lecture	BTCE602.3	Assignment, Quiz & End Sem Exam
22	Analysis and design of columns of rectangular and circular cross sections.	Lecture	BTCE602.3	Assignment, Quiz & End Sem Exam
23	Axially loaded columns Columns with uniaxial and biaxial eccentricity using SP 16 design charts	Lecture	BTCE602.3	Assignment, Quiz & End Sem Exam

24	Short and slender columns	Lecture	BTCE602.3	Assignment, Quiz & End Sem Exam
25	Design project for the design and detailing the columns of a framed system and isolated and combined footing	Lecture	BTCE602.4	Assignment, Quiz & End Sem Exam
26	**Limit State of Serviceability**	Lecture	BTCE602.4	Assignment, Quiz & End Sem Exam
27	Deflection. Short term deflection	Lecture	BTCE602.4	Assignment, Quiz & End Sem Exam
28	Long term deflection.	Lecture	BTCE602.4	Assignment, Quiz & End Sem Exam
29	Cracking. Control of cracking.	Lecture	BTCE602.4	Assignment, Quiz & End Sem Exam
30	Estimation of width of cracks.	Lecture	BTCE602.4	Assignment, Quiz & End Sem Exam
31	Reinforcement for torsion. Equivalent longitudinal moment	Lecture	BTCE602.4	Assignment, Quiz & End Sem Exam
32	Miscellaneous and advanced treatments	Lecture	BTCE602.4	Assignment, Quiz & End Sem Exam
33	Design project for the design and detailing of a water tank with curved beams.	Lecture	BTCE602.4	Assignment, Quiz & End Sem Exam
34	Analysis and design of columns of circular cross sections.	Lecture	BTCE602.4	Assignment, Quiz & End Sem Exam
35	Estimation of width of cracks.	Lecture	BTCE602.4	Assignment, Quiz & End Sem Exam
36	Reinforcement for torsion. Equivalent longitudinal moment	Lecture	BTCE602.4	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE602.1.	*Able to design, analysis, and proportioning of reinforced concrete members and structures*	3	2	3	1	2	-	1	-	3	2	3	3	**3**	**2**	**1**

BTCE602.2 .	Able to design different type of foundations.	3	3	2	2	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE602.3 .	effective use of latest industry standard formula, table, design aids used for design of Reinforced concrete Structure	3	3	2	2	3	-	1	2	-	2	3	3	**2**	**2**	**1**
BTCE602.4 .	Prepare the layout of *building* evaluate the *RCC elements*	3	3	2	1	1	2	1	-	1	2	3	3	**3**	**2**	**1**

Sample Question Paper

<table>
<tr><td colspan="7">Amity School of Engineering and Technology
Department of Civil Engineering
I MID-SEMESTER (SEM–VI) 2018-19</td></tr>
<tr><td colspan="7">Class: B.Tech.(CE) VI Semester</td></tr>
<tr><td colspan="3">Subject Name:
BTCE602 Structural Concrete Design</td><td colspan="3">Time: 2 Hrs</td><td>Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3</td><td>Q.4</td><td>Q.2,5,6</td><td></td><td></td></tr>
<tr><td colspan="7">Student will be able to
CO1: design, analysis, and proportioning of reinforced concrete members and structures.
CO2: design different type of foundations..</td></tr>
</table>

CO Map	Question No.	Question	Marks
CO1	Q.1	How is the area of distribution bars of Fe 250 grade calculated?	3
	Q.2a	What is permissible tensile stress of high strength deformed	3

CO1		bar?	
	Q.2b	State the conditions for a slab to be designed as a continuous slab	3
CO1	Q.3	Draw stress-strain curve for various grade of steel.	6
CO2	Q.4	What are the assumptions made in the elastic theory of reinforced concrete structures?	3
CO2	Q.5a	List down the types of shear failures observed in reinforced concrete member.	3
	Q.5b	What are the advantages of limit state method?	3
CO2	Q6	What are the methods involved in the design of reinforced concrete structures?	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

Course Code				BTCE 602		
Associated Credit Units				3		
Ser. No.	Name	Enrollment No.	Roll No.	30	70	100
1	AMAN PARASHAR	A60515816004	AU16UCV8601	15	37	52
2	ANUJ BANSAL	A60215816013	AU16UCV8602	18	30	48
3	ANUJ PRATAP SINGH PARMAR	A60215816011	AU16UCV8603	17	39	56
4	ANUJ SHARMA	A60515816006	AU16UCV8604	20	40	60
5	ANUJ SINGH BHADORIA	A60515816001	AU16UCV8605	26	42	68
6	DAMODAR SINGH CHAUHAN	A60215816008	AU16UCV8606	17	37	54
7	DEEPAK SHARMA	A60515816005	AU16UCV8607	17	40	57
8	HIMANSHU MAHLI	A60215816012	AU16UCV8609	14	28	42
9	KUNAL KUMAR	A60515816002	AU16UCV8611	21	28	49
10	KUNAL MUKHARIYA	A60215816007	AU16UCV8612	21	45	66
11	MONUSHA DHAKAD	A60515816003	AU16UCV8613	21	43	64
12	RAHUL SINGH BAGHEL	A60215816015	AU16UCV8614	24	43	67
13	ROHIT BHADORIA	A60215816016	AU16UCV8616	17	31	48
14	SATENDRA SINGH KUSHWAH	A60215816009	AU16UCV8617	15	27	42
15	SHIVAM SHRIVASTAVA	A60215816014	AU16UCV8618	18	38	56
16	UTKARSH TOMAR	A60215816004	AU16UCV8619	21	54	75

				STRUCTURAL CONCRETE DESIGN
				BTCE 602
				3
No. of students attended the Exam				16
No. of students secure more than 60% marks				5
Percentage of students secure more than 60% marks				31.25
Attainment Level				-

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : Geotechnical Engineering II
Course Code : BTCE603, Crédits : 03, Session : 2018-19 (Even Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Mr. P Mahakavi, Mr. Sachin Tiwari

K. **Introduction:** The objective of this course is to teach students the basic principles and concepts of design concept of RCC and Steel structure. and to develop a have knowledge of principal of structural design. It aims to develop a student's skill in evaluating the performance of design of elements.

L. **Course Outcomes:**At the end of the course, students will be able to:
BTCE603.1.apply the knowledge of concepts of Soil Mechanics and to describe the objectives and methods of soil investigation.
BTCE603.2apply the various earth pressure theories
BTCE603.3design various kinds of foundations and to perform various required tests for foundation.
BTCE603.4apply the utility of caissons and wells in the different conditions.

M. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

N. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

O. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

P. Syllabus

Module I: Earth pressure

Earth pressure at rest. Active and passive earth pressure for cohesionless and cohesive soils. Coulomb's and Rankine's theories. Point of application of earth pressure for cases of with and without surcharge in cohesionless and cohesive soils. Culmann's and Rebhan's graphical construction for active earth pressure. Friction circle method for active earth pressure. **Site investigation and soil exploration:** Objectives. Planning. Reconnaissance. Depth of exploration. Methods of subsurface exploration. Test pits. Auger borings. Wash boring. Rotary drilling. Percussion drilling. Core drilling. Sampling. Types of soil samples. Splitspoon sampler. Thin walled sampler. Piston sampler. Denison sampler. Hand cut samples. Location of water table. S.P.T. Field vane shear test. Introduction to geophysical methods. Boring log. Soil profile.

Module II: Bearing capacity

Ultimate and allowable bearing capacity. Terzaghi's equation for bearing capacity for continuous circular and square footings. Types of shear failures. Bearing capacity factors and charts. Effect of water table on bearing capacity. Meyerhoff's bearing capacity heory. Skempton's formulae. Bearing capacity from field tests. Bearing capacity from building codes. Net bearing pressure. Methods of improvement of soil bearing capacity: vibro flotation and sand drains.

Settlement analysis: Distribution of contact pressure. Immediate and consolidation settlement. Estimation of initial and final settlement under building loads. Limitations in settlement computation. Causes of . Permissible, total and differential settlements. Cracks and effects of settlement.

Module III: Foundations

General considerations: Functions of foundations. Requisites of satisfactory foundations. Different types of foundations. Definition of shallow and deep foundation. Selection of type of foundation. Advantages and limitations of various types of foundations. Design considerations . Footings subjected to eccentric loading. Conventional procedure for proportioning footings for equal settlements.

Open excavation: Open foundation excavations with unsupported slopes. Supports for shallow and deep excavations. Stress distribution in sheeting and bracing of shallow and deep excavations. Stability of bottom of excavations. **Raft foundations**: Bearing capacity equations. Design considerations. Conventional design procedure for rigid mat. Uplift pressures. Methods of resisting uplift. Floating foundations.

Module IV: Pile foundations

Uses of piles. Classification of piles based on purpose and material. Determination of type and length of piles. Determination of bearing capacity of axially loaded. Single vertical pile. Static and dynamic formulae. Determination of bearing capacity by penetration tests and pile load tests (IS methods). Negative skin friction. Group action and pile spacing. Analysis of pile groups. Load distribution by Culmann's method. **Caissons and piers:** Open (well) caissons. Box (floating) caissons. Pneumatic caissons. Construction details and design considerations of well foundations. Drilled piers and theirconstruction details.

Q. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

R. Suggested Text/Reference Books:

- Joseph E. & Bowles, *Foundation Analysis & Design*, McGraw Hill
- Leonards G.A., *Foundation Engineering*, McGraw Hill

- Teng W.C., Foundation Design, PHI, 1984
- Tomlinson M.J., Foundation Design & Construction, Pitman, 1963.
- Terzaghi & Peck, Soil Mechanics in Engineering Practice, Asia Publishing
- Arora K.R., *Soil Mechanics & Foundation Engg.,* Standard Publications, 1987.
- Murthy V.N.S., Soil Mechanics & Foundations.
- Punmia B.C., Soil Mechanics & Foundations, Laxmi, 1988.

S. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Earth pressure at rest. Active and passive earth pressure for cohesionless and cohesive soils	Lecture	BTCE603.1	Mid Term-1, Quiz & End Sem Exam
2	Coulomb's and Rankine's theories	Lecture	BTCE603.1	Mid Term-1, Quiz & End Sem Exam
3	Point of application of earth pressure for cases of with and without surcharge in cohesionless	Lecture	BTCE603.1	Mid Term-1, Quiz & End Sem Exam
4	*Culmann's and Rebhan's graphical construction for active earth pressure*	Lecture	BTCE603.1	Mid Term-1, Quiz & End Sem Exam
5	Friction circle method for active earth pressure	Lecture	BTCE603.1	Mid Term-1, Quiz & End Sem Exam
6	**Site investigation and soil exploration**	Lecture	BTCE603.1	Mid Term-1, Quiz & End Sem Exam
7	Objectives. Planning. Reconnaissance. Depth of exploration	Lecture	BTCE603.2	Mid Term-1, Quiz & End Sem Exam
8	Methods of subsurface exploration. Test pits	Lecture	BTCE603.2	Mid Term-1, Quiz & End Sem Exam
9	Auger borings. Wash boring. Rotary drilling. Percussion drilling	Lecture	BTCE603.2	Mid Term-1, Quiz & End Sem Exam
10	Core drilling. Sampling. Types of soil samples. Splitspoon sampler	Lecture	BTCE603.2	Mid Term-1, Quiz & End Sem Exam
11	Thin walled sampler. Piston sampler. Denison sampler	Lecture	BTCE603.2	Mid Term-1, Quiz & End Sem Exam
12	Hand cut samples. Location of water table	Lecture	BTCE603.2	Mid Term-1, Quiz & End Sem Exam
13	S.P.T. Field vane shear test. Introduction to geophysical methods. Boring log. Soil profile.	Lecture	BTCE603.3	Mid Term-1, Quiz & End Sem Exam
14	Ultimate and allowable bearing capacity	Lecture	BTCE603.3	Mid Term-1, Quiz & End Sem Exam
15	Terzaghi's equation for bearing capacity for continuous circular and square footings. Types of shear failures. Bearing capacity factors and charts	Lecture	BTCE603.3	Mid Term-1, Quiz & End Sem Exam
16	Bearing capacity factors and charts.	Lecture	BTCE603.3	Mid Term-1, Quiz

				& End Sem Exam
17	Skempton’s formulae. Bearing capacity from field tests. Bearing	Lecture	BTCE603.3	Mid Term-1, Quiz & End Sem Exam
18	Net bearing pressure. Methods of improvement of soil bearing capacity: vibro flotation and sand drains.	Lecture	BTCE603.3	Mid Term-1, Quiz & End Sem Exam
19	**Settlement analysis:** Distribution of contact pressure.	Lecture	BTCE603.3	Mid Term-1, Quiz & End Sem Exam
20	Immediate and consolidation settlement. Estimation of initial and final settlement under building loads	Lecture	BTCE603.3	Mid Term-1, Quiz & End Sem Exam
21	Limitations in settlement computation. Causes of . Permissible, total and differential settlements. Cracks and effects of settlement	Lecture	BTCE603.3	Assignment, Quiz & End Sem Exam
22	General considerations: Functions of foundations. Requisites of satisfactory foundations	Lecture	BTCE603.3	Assignment, Quiz & End Sem Exam
23	Different types of foundations. Definition of shallow and deep foundation	Lecture	BTCE603.3	Assignment, Quiz & End Sem Exam
24	Selection of type of foundation. Advantages and limitations of various types of foundations. Design considerations	Lecture	BTCE603.3	Assignment, Quiz & End Sem Exam
25	Footings subjected to eccentric loading. Conventional procedure for proportioning footings for equal settlements	Lecture	BTCE603.4	Assignment, Quiz & End Sem Exam
26	**Open excavation:** Open foundation excavations with unsupported slopes	Lecture	BTCE603.4	Assignment, Quiz & End Sem Exam
27	Supports for shallow and deep excavations. Stress distribution in sheeting and bracing of shallow and deep excavations	Lecture	BTCE603.4	Assignment, Quiz & End Sem Exam
28	Stability of bottom of excavations. **Raft foundations**: Bearing capacity equations	Lecture	BTCE603.4	Assignment, Quiz & End Sem Exam
29	Design considerations. Conventional design procedure for rigid mat. Uplift pressures. Methods of resisting uplift. Floating foundations	Lecture	BTCE603.4	Assignment, Quiz & End Sem Exam
30	Uses of piles. Classification of piles based on purpose and material	Lecture	BTCE603.4	Assignment, Quiz & End Sem Exam
31	Determination of type and length of piles. Determination of bearing capacity of axially loaded. Single vertical pile	Lecture	BTCE603.4	Assignment, Quiz & End Sem Exam
32	Static and dynamic formulae. Determination of bearing	Lecture	BTCE603.4	Assignment, Quiz

	capacity by penetration tests and pile load tests (IS methods).			& End Sem Exam
33	Negative skin friction. Group action and pile spacing. Analysis of pile groups. Load distribution by Culmann's method	Lecture	BTCE603.4	Assignment, Quiz & End Sem Exam
34	**Caissons and piers:** Open (well) caissons. Box (floating) caissons	Lecture	BTCE603.4	Assignment, Quiz & End Sem Exam
35	Pneumatic caissons. Construction details and design considerations of well foundations	Lecture	BTCE603.4	Assignment, Quiz & End Sem Exam
36	Drilled piers and theirconstruction details.	Lecture	BTCE603.4	Assignment, Quiz & End Sem Exam

T. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE603.1.	apply the knowledge of concepts of Soil Mechanics and to describe the objectives and methods of soil investigation.	3	2	3	1	2	-	1	-	3	2	3	3	**3**	**2**	**1**
BTCE603.2.	apply the various earth pressure theories	3	3	2	2	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE603.3.	design various kinds of foundations and to perform various required tests for foundation.	3	3	2	2	3	-	1	2	-	2	3	3	**2**	**2**	**1**

BTCE603.4 .	*apply the utility of caissons and wells in the different conditions*	3	3	2	1	1	2	1	-	1	2	3	3	**3**	**2**	**1**

<u>Sample Question Paper</u>

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–VI) 2018-19						
Class: B.Tech.(CE) VI Semester						
Subject Name: BTCE603 Geotechnical Engineering II		Time: 2 Hrs			Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: apply the knowledge of concepts of Soil Mechanics and to describe the objectives and methods of soil investigation.

CO2: apply the various earth pressure theories

CO Map	Question No.	Question	Marks
CO1	Q.1	Define: A) Area ratio B) Inside clearance of a sampler	3
CO1	Q.2a	List out the different methods of sampling techniques.	3
	Q.2b	Determine the area ratio of a seamless tube sampler of inner diameter 48mm and outer diameter 51mm and comment on the nature of samples to be obtained in the sampler.	3
CO1	Q.3	Find the area ratio for the split barrel soil sampler of outer diameter 51mm and inner diameter 35mm. Comment on the nature of sample?	6
CO2	Q.4	Differentiate between Non representative and undisturbed samples.	3
CO2	Q.5a	List any two Disadvantage of static cone penetration Test.	3
	Q.5b	Can you perform classification tests on a Non representative sample? Justify your answer?	3

CO2	Q6	Explains any one of the sounding test employed for soil exploration.	6

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

Course Code				BTCE 603		
Associated Credit Units				4		
Ser. No.	Name	Enrollment No.	Roll No.	30	70	100
1	AMAN PARASHAR	A60515816004	AU16UCV8601	19	44	63
2	ANUJ BANSAL	A60215816013	AU16UCV8602	18	41	59
3	ANUJ PRATAP SINGH PARMAR	A60215816011	AU16UCV8603	22	47	69
4	ANUJ SHARMA	A60515816006	AU16UCV8604	19	45	64
5	ANUJ SINGH BHADORIA	A60515816001	AU16UCV8605	29	62	91
6	DAMODAR SINGH CHAUHAN	A60215816008	AU16UCV8606	18	35	53
7	DEEPAK SHARMA	A60515816005	AU16UCV8607	21	53	74
8	HIMANSHU MAHLI	A60215816012	AU16UCV8609	18	41	59
9	KUNAL KUMAR	A60515816002	AU16UCV8611	27	51	78
10	KUNAL MUKHARIYA	A60215816007	AU16UCV8612	21	47	68
11	MONUSHA DHAKAD	A60515816003	AU16UCV8613	22	55	77
12	RAHUL SINGH BAGHEL	A60215816015	AU16UCV8614	26	61	87
13	ROHIT BHADORIA	A60215816016	AU16UCV8616	21	40	61
14	SATENDRA SINGH KUSHWAH	A60215816009	AU16UCV8617	18	34	52
15	SHIVAM SHRIVASTAVA	A60215816014	AU16UCV8618	17	61	78
16	UTKARSH TOMAR	A60215816004	AU16UCV8619	20	49	69

No. of students attended the Exam	16
No. of students secure more than 60% marks	12
Percentage of students secure more than 60% marks	75.00

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **COMPUTER APPLICATION IN CIVIL ENGINEERING**
Course Code : BTCE604, Crédits : 03, Session : 2018-19 (Even Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Mr. P Mahakavi, Mr. Sachin Tiwari

U. **Introduction:** The objective of this course is to teach students the basic principles and concepts of design concept of RCC and Steel structure. and to develop a have knowledge of principal of structural design. It aims to develop a student's skill in evaluating the performance of design of elements.

V. **Course Outcomes:**At the end of the course, students will be able to:

BTCE604.1.operate softwares related design and drawings of Civil Engineering structures.

BTCE604.2 Design of different component of various structures and representation in different drawings for carrying out construction activity

BTCE604.3produce design calculations and drawings in appropriate professional formats identify and compute the design loads on a typical steel building.

BTCE604.4select the most suitable section shape and size for tension and compression members and beams according to specific design criteria.

W. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

X. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

Y. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

Z. Syllabus

Module I: Introduction of Computer applications in Civil Engineering

Introduction and application of computer in structural engineering, geotechnical engineering, water resources engineering, project management, surveying, highway, estimating and costing, Introduction to MATLAB.

Module II: Introduction to CAD

Computer Aided drafting, 2-D drawings, Introduction to CAD software, Planning and drawing of buildings, 2-D modeling, Problems in civil engineering.

Module III: Auto CAD

Introduction to computer graphics, 3-D drawings, 3-D modeling software and analysis software Learning of civil engineering drawing.

Module IV: Stadd Pro

Introduction to structural Analysis:- Loading system, Dead Load, Live Load, Imposed Load. Design of structural members:- Beam Design, Column Design, Slab Design, Foundation Design
Residential Building, Design of Multistoried Building.\

AA. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

BB. Suggested Text/Reference Books:

- Groover M.P. and Zimmers E.W. Jr., "CAD/CAM, Computer Aided Design and
- Manufacturing", Prentice Hall of India Ltd, New Delhi, 1993.
- Krishnamoorthy C.S. Rajeev S., "Computer Aided Design", Narosa Publishing House, New
- Delhi, 1993, Harrison H.B., "Structural Analysis and Design", Part I and II Pergamon Press,
- Oxford, 1990. Comptter Application in Civil Engineering:Paul D. Spindel, publisher: Van Nostrand
- Reinhold Co.
- AutoCAD Civil 3D 2015 Essentials: Autodesk Official, Eric Chappel
- T.S Sarma, "Stadd Pro V8i for Beginners", Notion Press 2014

CC. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	**Introduction of Computer applications in Civil Engineering**	Lecture	BTCE604.1	Mid Term-1, Quiz & End Sem Exam
2	Introduction and application of computer in structural engineering,	Lecture	BTCE604.1	Mid Term-1, Quiz & End Sem Exam
3	Introduction and application of computer in geotechnical engineering	Lecture	BTCE604.1	Mid Term-1, Quiz & End Sem Exam
4	Introduction and application of computer in water	Lecture	BTCE604.1	Mid Term-1, Quiz & End Sem Exam

	resources engineering			
5	Introduction and application of computer in project management	Lecture	BTCE604.1	Mid Term-1, Quiz & End Sem Exam
6	Introduction and application of computer in surveying	Lecture	BTCE604.1	Mid Term-1, Quiz & End Sem Exam
7	Introduction and application of computer in highway	Lecture	BTCE604.2	Mid Term-1, Quiz & End Sem Exam
8	Introduction and application of computer in estimating and costing	Lecture	BTCE604.2	Mid Term-1, Quiz & End Sem Exam
9	Introduction and application of computer in project management	Lecture	BTCE604.2	Mid Term-1, Quiz & End Sem Exam
10	Introduction to MATLAB	Lecture	BTCE604.2	Mid Term-1, Quiz & End Sem Exam
11	Computer Aided drafting	Lecture	BTCE604.2	Mid Term-1, Quiz & End Sem Exam
12	2-D drawings, Introduction to CAD software	Lecture	BTCE604.2	Mid Term-1, Quiz & End Sem Exam
13	Planning and drawing of buildings	Lecture	BTCE604.3	Mid Term-1, Quiz & End Sem Exam
14	2-D modeling, Problems in civil engineering.	Lecture	BTCE604.3	Mid Term-1, Quiz & End Sem Exam
15	**Auto CAD**	Lecture	BTCE604.3	Mid Term-1, Quiz & End Sem Exam
16	Introduction to computer graphics	Lecture	BTCE604.3	Mid Term-1, Quiz & End Sem Exam
17	3-D drawings	Lecture	BTCE604.3	Mid Term-1, Quiz & End Sem Exam
18	3-D modeling software and analysis software	Lecture	BTCE604.3	Mid Term-1, Quiz & End Sem Exam
19	Learning of civil engineering drawing	Lecture	BTCE604.3	Mid Term-1, Quiz & End Sem Exam
20	**Stadd Pro**	Lecture	BTCE604.3	Mid Term-1, Quiz & End Sem Exam
21	Introduction to structural Analysis	Lecture	BTCE604.3	Assignment, Quiz & End Sem Exam
22	Loading system	Lecture	BTCE604.3	Assignment, Quiz & End Sem Exam
23	Loading system, Dead Load, Live Load, Imposed Load	Lecture	BTCE604.3	Assignment, Quiz & End Sem Exam
24	Design of structural members	Lecture	BTCE604.3	Assignment, Quiz & End Sem Exam
25	Beam Design	Lecture	BTCE604.4	Assignment, Quiz & End Sem Exam
26	Column Design	Lecture	BTCE604.4	Assignment, Quiz & End Sem Exam
27	Slab Design	Lecture	BTCE604.4	Assignment, Quiz & End Sem Exam
28	Foundation Design Residential Building	Lecture	BTCE604.4	Assignment, Quiz

				& End Sem Exam
29	Design of Multistoried Building	Lecture	BTCE604.4	Assignment, Quiz & End Sem Exam
30	Loading system, Dead Load, Live Load, Imposed Load	Lecture	BTCE604.4	Assignment, Quiz & End Sem Exam
31	Design of structural members	Lecture	BTCE604.4	Assignment, Quiz & End Sem Exam
32	Beam Design	Lecture	BTCE604.4	Assignment, Quiz & End Sem Exam
33	Column Design	Lecture	BTCE604.4	Assignment, Quiz & End Sem Exam
34	Slab Design	Lecture	BTCE604.4	Assignment, Quiz & End Sem Exam
35	Foundation Design Residential Building	Lecture	BTCE604.4	Assignment, Quiz & End Sem Exam
36	Design of Multistoried Building	Lecture	BTCE604.4	Assignment, Quiz & End Sem Exam

DD. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE604.1.	operate softwares related design and drawings of Civil Engineering structures.	3	2	3	1	2	-	1	-	3	2	3	3	**3**	**2**	**1**
BTCE604.2.	Design of different component of various structures and representation in different drawings for carrying out construction activity	3	3	2	2	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE604.3.	produce design calculations and drawings in appropriate professional formats identify	3	3	2	2	3	-	1	2	-	2	3	3	**2**	**2**	**1**

	and compute the design loads on a typical steel building.															
BTCE604.4 .	select the most suitable section shape and size for tension and compression members and beams according to specific design criteria.	3	3	2	1	1	2	1	-	1	2	3	3	**3**	**2**	**1**

<u>Sample Question Paper</u>

<table>
<tr><td colspan="7">Amity School of Engineering and Technology
Department of Civil Engineering
I MID-SEMESTER (SEM–VI) 2018-19</td></tr>
<tr><td colspan="7">Class: B.Tech.(CE) VI Semester</td></tr>
<tr><td colspan="2">Subject Name:
BTCE604 COMPUTER APPLICATION IN CIVIL ENGINEERING</td><td colspan="3">Time: 2 Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3</td><td>Q.4</td><td>Q.2,5,6</td><td></td><td></td></tr>
<tr><td colspan="7">Student will be able to
CO1: operate softwares related design and drawings of Civil Engineering structures.
CO2: Design of different component of various structures and representation in different drawings for carrying out construction activity</td></tr>
</table>

CO Map	Question No.	Question	Marks
CO1	Q.1	What is the procedure to create user interface?	3
CO1	Q.2a	What is the procedure to draw a line more than one time and save it automatically?	3
	Q.2b	What are the steps need to be taken to replace the buttons on toolbars with smiley?	3
CO1	Q.3	What are the features being corrected by AutoCAD?	6
CO2	Q.4	What are the steps to enable the drag and drop feature in AutoCAD?	3

CO2	Q.5a	What are the steps involved in setting up the default drawing directory?	3
	Q.5b	Why AutoCAD software is used?	3
CO2	Q6	A house measures 15000 mm x 8000 mm in plan view. When drawing the plan view only which one sets of limits would be best to use?	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

				COMPT.APP. IN CIVIL ENGG.		
Course Code				BTCE 604		
Associated Credit Units				3		
Ser. No.	Name	Enrollment No.	Roll No.	30	70	100
1	AMAN PARASHAR	A60515816004	AU16UCV8601	17	37	54
2	ANUJ BANSAL	A60215816013	AU16UCV8602	16	28	44
3	ANUJ PRATAP SINGH PARMAR	A60215816011	AU16UCV8603	16	34	50
4	ANUJ SHARMA	A60515816006	AU16UCV8604	16	40	56
5	ANUJ SINGH BHADORIA	A60515816001	AU16UCV8605	22	41	63
6	DAMODAR SINGH CHAUHAN	A60215816008	AU16UCV8606	15	41	56
7	DEEPAK SHARMA	A60515816005	AU16UCV8607	17	38	55
8	HIMANSHU MAHLI	A60215816012	AU16UCV8609	16	36	52
9	KUNAL KUMAR	A60515816002	AU16UCV8611	14	28	42
10	KUNAL MUKHARIYA	A60215816007	AU16UCV8612	17	34	51
11	MONUSHA DHAKAD	A60515816003	AU16UCV8613	18	40	58
12	RAHUL SINGH BAGHEL	A60215816015	AU16UCV8614	20	38	58
13	ROHIT BHADORIA	A60215816016	AU16UCV8616	15	26	41
14	SATENDRA SINGH KUSHWAH	A60215816009	AU16UCV8617	14	33	47
15	SHIVAM SHRIVASTAVA	A60215816014	AU16UCV8618	16	31	47
16	UTKARSH TOMAR	A60215816004	AU16UCV8619	17	45	62

				COMPT.APP. IN CIVIL ENGG.
				BTCE 604
				3
No. of students attended the Exam				16
No. of students secure more than 60% marks				2
Percentage of students secure more than 60% marks				12.50
Attainment Level				-

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : ENGINEERING GEOLOGY
Course Code : BTCE605, Crédits : 03, Session :2018-19 (Even Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Mohan Kantharia, Dr. Imran Ahmad Khan

K. Introduction: The objective of this course is to provide and train students of hydraulic engineering. The course will introduce students to various fluid properties, and their behavior under different condition.

L. Course Outcomes: At the end of the course, students will be able to:

BTCE605.1.know the importance of seismic activity considerations in a terrain.

BTCE605.2. learn geology and its types, various structural features like folds, faults, joints, weathering etc., minerals, rocks, and rock formations in relation to civil engineering project

BTCE605.3.understand various techniques to determine engineering properties of rocks etc. and distinguish the different types of rocks and minerals

BTCE605.4.understand various techniques to analyze and to make possible solutions for various Geological Engineering problems

M. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

N. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

O. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

P. Syllabus

Module I: Branches and scope of geology

Physical geology

Geological agents and their action, weathering, volcanism, earthquake and plate tectonics

Module II: Elements of crystallography and mineralogy
Petrology
Types of rocks, genesis and physical and chemical characters, Building stones

Module III: Structural geology
Types of structures and classification and their effect on civil engineering projects and Geological mapping
Hydrogeology
Groundwater and occurrence, investigations, quality, artificial recharge

Module IV: Geology in Civil Engineering
Tunnels, dams, reservoirs, bridges, Runways, Roads and Buildings.
Slope failures and landslides. Investigations, Remote sensing and GIS applications
Geology of India
Types, age and occurrence of rock formations and economic importance
.

Q. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

R. Suggested Text/Reference Books:

- Parbin Singh, Engineering & General Geology, S.K. Kataria & Sons, New Delhi (2008)
- Bangar, K.M., Principles of Engineering Geology, Standard Publishers Distributors, Delhi (2009)
- Billings, Marland P., Structural Geology, 3rd ed., Prentice-Hall India, New Delhi.
- Todd, D.K., Ground Water Hydrology, 2nd ed., Wiley India, New Delhi (2008)

S. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	**Branches and scope of geology**	Lecture	BTCE605.1	Mid Term-1, Quiz & End Sem Exam
2	**Physical geology**	Lecture	BTCE605.1	Mid Term-1, Quiz & End Sem Exam
3	weathering, volcanism	Lecture	BTCE605.1	Mid Term-1, Quiz & End Sem Exam
4	*earthquake and plate tectonics*	Lecture	BTCE605.1	Mid Term-1, Quiz & End Sem Exam
5	**Elements of crystallography and mineralogy Petrology**	Lecture	BTCE605.1	Mid Term-1, Quiz & End Sem Exam
6	Types of rocks	Lecture	BTCE605.1	Mid Term-1, Quiz & End Sem Exam
7	genesis and physical and chemical characters	Lecture	BTCE605.1	Mid Term-1, Quiz & End Sem Exam

8	weathering, volcanism	Lecture	BTCE605.1	Mid Term-1, Quiz & End Sem Exam
9	*earthquake and plate tectonics*	Lecture	BTCE605.2	Mid Term-1, Quiz & End Sem Exam
10	**Elements of crystallography and mineralogy Petrology**	Lecture	BTCE605.2	Mid Term-1, Quiz & End Sem Exam
11	Types of rocks	Lecture	BTCE605.2	Mid Term-1, Quiz & End Sem Exam
12	genesis and physical and chemical characters	Lecture	BTCE605.2	Mid Term-1, Quiz & End Sem Exam
13	weathering, volcanism	Lecture	BTCE605.2	Mid Term-1, Quiz & End Sem Exam
14	**Module III: Structural geology**	Lecture	BTCE605.2	Mid Term-1, Quiz & End Sem Exam
15	Types of structures and classification	Lecture	BTCE605.2	Mid Term-1, Quiz & End Sem Exam
16	effect on civil engineering projects and Geological mapping	Lecture	BTCE605.3	Mid Term-1, Quiz & End Sem Exam
17	**Hydrogeology**	Lecture	BTCE605.3	Mid Term-1, Quiz & End Sem Exam
18	Groundwater and occurrence	Lecture	BTCE605.3	Mid Term-1, Quiz & End Sem Exam
19	investigations, quality, artificial recharge	Lecture	BTCE605.3	Mid Term-1, Quiz & End Sem Exam
20	**Module IV: Geology in Civil Engineering**	Lecture	BTCE605.3	Mid Term-1, Quiz & End Sem Exam
21	selection of turbines hydroelectric plants.	Lecture	BTCE605.3	Assignment, Quiz & End Sem Exam
22	Tunnels, dams, reservoirs, bridges	Lecture	BTCE605.3	Assignment, Quiz & End Sem Exam
23	Runways, Roads and Buildings.	Lecture	BTCE605.3	Assignment, Quiz & End Sem Exam
24	Slope failures and landslides. Investigations	Lecture	BTCE605.3	Assignment, Quiz & End Sem Exam
25	Remote sensing and GIS applications	Lecture	BTCE605.3	Assignment, Quiz & End Sem Exam
26	**Geology of India**	Lecture	BTCE605.4	Assignment, Quiz & End Sem Exam
27	Types, age and occurrence of rock formations and economic importance	Lecture	BTCE605.4	Assignment, Quiz & End Sem Exam
28	Groundwater and occurrence	Lecture	BTCE605.4	Assignment, Quiz & End Sem Exam
29	investigations, quality, artificial recharge	Lecture	BTCE605.4	Assignment, Quiz & End Sem Exam
30	**Module IV: Geology in Civil Engineering**	Lecture	BTCE605.4	Assignment, Quiz & End Sem Exam
31	selection of turbines	Lecture	BTCE605.4	Assignment, Quiz

	hydroelectric plants.			& End Sem Exam
32	Tunnels, dams, reservoirs, bridges	Lecture	BTCE605.4	Assignment, Quiz & End Sem Exam
33	Runways, Roads and Buildings.	Lecture	BTCE605.4	Assignment, Quiz & End Sem Exam
34	Slope failures and landslides. Investigations	Lecture	BTCE605.4	Assignment, Quiz & End Sem Exam
35	Remote sensing and GIS applications	Lecture	BTCE605.4	Assignment, Quiz & End Sem Exam
36	**Geology of India**	Lecture	BTCE605.4	Assignment, Quiz & End Sem Exam

T. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE605.1.	know the importance of seismic activity considerations in a terrain.	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE605.2.	learn geology and its types, various structural features like folds, faults, joints, weathering etc., minerals, rocks, and rock formations in relation to civil engineering project	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
BTCE605.3.	understand various techniques to determine engineering properties of rocks etc. and distinguish the different types of rocks and minerals	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**

BTCE605.4 .	understand various techniques to analyze and to make possible solutions for various Geological Engineering problems	3	3	2	3	3	2	2	-	3	2	3	3	**1**	**2**	**3**

Sample Question Paper

<table>
<tr><td colspan="7">Amity School of Engineering and Technology
Department of Civil Engineering
I MID-SEMESTER (SEM–VI) 2018-19</td></tr>
<tr><td colspan="7">Class: B.Tech.(CE) VI Semester</td></tr>
<tr><td colspan="2">Subject Name:
BTCE605 ENGINEERING GEOLOGY</td><td colspan="3">Time: 2 Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3</td><td>Q.4</td><td>Q.2,5,6</td><td></td><td></td></tr>
<tr><td colspan="7">Student will be able to
CO1: know the importance of seismic activity considerations in a terrain.
CO2: learn geology and its types, various structural features like folds, faults, joints, weathering etc., minerals, rocks, and rock formations in relation to civil engineering project</td></tr>
</table>

CO Map	Question No.	Question	Marks
CO1	Q.1	What are the causes of earthquake?	3
CO1	Q.2a	What do you understand by spheroidal weathering?	3
	Q.2b	Define aquifer and the names the types of aquifers.	3
CO1	Q.3	Explain with neat diagram various features of glacial deposition and describe their engineering significance.	6
CO2	Q.4	What are the movements of the oceans?	3
CO2	Q.5a	Explain the wenner's formula to determine resistance.	3
	Q.5b	Distinguish between magnitude and intensity of the earthquake	3

CO2	Q6	Explain briefly about Branches of geology?	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

				ENGINEERING GEOLOGY		
Course Code				BTCE 605		
Associated Credit Units				3		
Ser. No.	Name	Enrollment No.	Roll No.	30	70	100
1	AMAN PARASHAR	A60515816004	AU16UCV8601	19	32	51
2	ANUJ BANSAL	A60215816013	AU16UCV8602	15	32	47
3	ANUJ PRATAP SINGH PARMAR	A60215816011	AU16UCV8603	17	38	55
4	ANUJ SHARMA	A60515816006	AU16UCV8604	20	40	60
5	ANUJ SINGH BHADORIA	A60515816001	AU16UCV8605	21	41	62
6	DAMODAR SINGH CHAUHAN	A60215816008	AU16UCV8606	13	31	44
7	DEEPAK SHARMA	A60515816005	AU16UCV8607	17	44	61
8	HIMANSHU MAHLI	A60215816012	AU16UCV8609	14	37	51
9	KUNAL KUMAR	A60515816002	AU16UCV8611	11	32	43
10	KUNAL MUKHARIYA	A60215816007	AU16UCV8612	16	42	58
11	MONUSHA DHAKAD	A60515816003	AU16UCV8613	16	45	61
12	RAHUL SINGH BAGHEL	A60215816015	AU16UCV8614	18	45	63
13	ROHIT BHADORIA	A60215816016	AU16UCV8616	14	34	48
14	SATENDRA SINGH KUSHWAH	A60215816009	AU16UCV8617	9	DE	9
15	SHIVAM SHRIVASTAVA	A60215816014	AU16UCV8618	17	38	55
16	UTKARSH TOMAR	A60215816004	AU16UCV8619	18	48	66

				ENGINEERING GEOLOGY
				BTCE 605
				3
No. of students attended the Exam				16
No. of students secure more than 60% marks				5
Percentage of students secure more than 60% marks				31.25
Attainment Level				-

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : HYDROLOGY & WATER RESOURCES ENGINEERING
Course Code : BTCE606 Crédits : 03, Session :2018-19 (Even Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Mr. Sachin Tiwari

K. Introduction: The objective of this course is *to deal with various concepts of water resources engineering. The course introduces the concept of hydrology, ground water and then deals with irrigation engineering. It also deals with design of dam.*

L. Course Outcomes: At the end of the course, students will be able to:

BTCE606.1. Identify the various components of hydrological cycle and the spatial and temporal variation of rainfall.

BTCE606.2. Determine the different methods and hydrological models to estimate the stream flow.

BTCE606.3. Examine the different techniques to calculate the probable maximum flood based on different returned period.

BTCE606.4. Evaluate the basic aquifer parameters and groundwater resources for different hydro geological boundary conditions.

BTCE606.5. Understand the different methods of irrigation and find the optimum methods of irrigation for judicious use of water resources.

M. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

N. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

O. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

P. Syllabus

Moduls I : Precipitation Measurement

Hydrologic cycle- Precipitation, rainfall variations, measurement, presentation of RF data, Mean precipitation, Abstractions from precipitation

Moduls II : Flow Measurement

Runoff-Long term runoff, empirical formulae, short term runoff- hydrograph analysis. Flood-Rational and Empirical methods for prediction – Design floods. Ground water – Aquifer types – flow of ground water – Well hydraulics- Types of wells –Other sources of ground water.

Moduls III : Irrigation

Necessity of irrigation and type of irrigation systems. – Total planning concept- Water requirements of crops- Command area- duty-delta. Consumptive use of water – Irrigation efficiency – Irrigation requirement of crops- Reservoir planning – Site investigation- Zone of storage- Reservoir yield- Reservoir losses and Control- Life of reservoir.

Moduls IV : Reservoir

Reservoir planning – Site investigation – Zone of storage-Reservoir yield- Reservoir losses and Control- Life of reservoir.

Q. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

R. Suggested Text/Reference Books:

- K Subramanya, Engineering Hydrology, Mc-Graw Hill.
- K N Muthreja, Applied Hydrology, Tata Mc-Graw Hill.
- K Subramanya, Water Resources Engineering through Objective Questions, Tata McGraw Hill.
- G L Asawa, Irrigation Engineering, Wiley Eastern

S. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Introduction - hydrologic cycle,	Lecture	BTCE606.1	Mid Term-1, Quiz & End Sem Exam
2	water-budget equation,	Lecture	BTCE606.1	Mid Term-1, Quiz & End Sem Exam
3	history of hydrology,	Lecture	BTCE606.1	Mid Term-1, Quiz & End Sem Exam
4	*world water balance,*	Lecture	BTCE606.1	Mid Term-1, Quiz & End Sem Exam
5	applications in engineering, sources of data.	Lecture	BTCE606.1	Mid Term-1, Quiz & End Sem Exam
6	Precipitation - forms of precipitation,	Lecture	BTCE606.1	Mid Term-1, Quiz & End Sem Exam

	characteristics of precipitation in India			
7	measurement of precipitation	Lecture	BTCE606.1	Mid Term-1, Quiz & End Sem Exam
8	rain gauge network, mean precipitation over an area	Lecture	BTCE606.2	Mid Term-1, Quiz & End Sem Exam
9	deptharea-duration relationships	Lecture	BTCE606.2	Mid Term-1, Quiz & End Sem Exam
10	maximum intensity/depth	Lecture	BTCE606.2	Mid Term-1, Quiz & End Sem Exam
11	duration-frequency relationship	Lecture	BTCE606.2	Mid Term-1, Quiz & End Sem Exam
12	Probable Maximum Precipitation (PMP),	Lecture	BTCE606.2	Mid Term-1, Quiz & End Sem Exam
13	rainfall data in India.	Lecture	BTCE606.2	Mid Term-1, Quiz & End Sem Exam
14	Abstractions from precipitation - evaporation process	Lecture	BTCE606.2	Mid Term-1, Quiz & End Sem Exam
15	evaporimeters, analytical methods of evaporation estimation,	Lecture	BTCE606.3	Mid Term-1, Quiz & End Sem Exam
16	Reservoir evaporation and methods for its reduction	Lecture	BTCE606.3	Mid Term-1, Quiz & End Sem Exam
17	evapotranspiration, measurement of evapotranspiration, evapotranspiration	Lecture	BTCE606.3	Mid Term-1, Quiz & End Sem Exam
18	potential evapotranspiration over India,	Lecture	BTCE606.3	Mid Term-1, Quiz & End Sem Exam
19	actual evapotranspiration, interception	Lecture	BTCE606.3	Mid Term-1, Quiz & End Sem Exam
20	depression storage, infiltration, infiltration capacity, measurement of infiltration,	Lecture	BTCE606.3	Mid Term-1, Quiz & End Sem Exam
21	modelling infiltration capacity, classification of infiltration capacities, infiltration indices	Lecture	BTCE606.3	Assignment, Quiz & End Sem Exam
22	Runoff - runoff volume,	Lecture	BTCE606.4	Assignment, Quiz & End Sem Exam
23	SCS-CN method of estimating runoff volume	Lecture	BTCE606.4	Assignment, Quiz & End Sem Exam
24	flow duration curve, flow-mass curve	Lecture	BTCE606.4	Assignment, Quiz & End Sem Exam
25	hydrograph, factors affecting runoff hydrograph	Lecture	BTCE606.4	Assignment, Quiz & End Sem Exam

26	components of hydrograph, base flow separation	Lecture	BTCE606.4	Assignment, Quiz & End Sem Exam
27	effective rainfall,	Lecture	BTCE606.4	Assignment, Quiz & End Sem Exam
28	unit hydrograph surface water resources of India	Lecture	BTCE606.4	Assignment, Quiz & End Sem Exam
29	Ground water and well hydrology - forms of subsurface water	Lecture	BTCE606.5	Assignment, Quiz & End Sem Exam
30	saturated formation, aquifer properties, geologic formations of aquifers, well hydraulics: steady state flow in wells,	Lecture	BTCE606.5	Assignment, Quiz & End Sem Exam
31	equilibrium equations for confined and unconfined aquifers, aquifer tests. Design of channels- rigid boundary channels, alluvial channels	Lecture	BTCE606.5	Assignment, Quiz & End Sem Exam
32	Kennedy's and Lacey's theory of regime channels. Water logging: causes, effects, consumptive use, irrigation requirement,	Lecture	BTCE606.5	Assignment, Quiz & End Sem Exam
33	frequency of irrigation; Methods of applying water to the fields	Lecture	BTCE606.5	Assignment, Quiz & End Sem Exam
34	surface, sub-surface	Lecture	BTCE606.5	Assignment, Quiz & End Sem Exam
35	sprinkler and trickle / drip irrigation.	Lecture	BTCE606.5	Assignment, Quiz & End Sem Exam
36	sprinkler and trickle / drip irrigation.	Lecture	BTCE606.5	Assignment, Quiz & End Sem Exam

T. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

BTCE606.1 .	Identify the various components of hydrological cycle and the spatial and temporal variation of rainfall.	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
BTCE606.2.	Determine the different methods and hydrological models to estimate the stream flow.	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE606.3.	Examine the different techniques to calculate the probable maximum flood based on different returned period.	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
BTCE606.4	Evaluate the basic aquifer parameters and groundwater resources for different hydro geological boundary conditions.	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**
BTCE606.5 .	Understand the different methods of irrigation and find the optimum methods of irrigation for judicious use of water resources.	3	3	2	3	3	2	2	-	3	2	3	3	**1**	**2**	**3**

Sample Question Paper

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–VI) 2018-19
Class: B.Tech.(CE) VI Semester

Subject Name: BTCE606 HYDROLOGY & WATER RESOURCES ENGINEERING	Time: 2 Hrs	Max.Marks:30

Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: Identify the various components of hydrological cycle and the spatial and temporal variation of rainfall.

CO2: Determine the different methods and hydrological models to estimate the stream flow.

CO Map	Question No.	Question	Marks
CO1	Q.1	Enlist the instruments used to measure transpiration? State Hydrologic equation?	3
CO1	Q.2a	Enumerate the factors affecting infiltration capacity?	3
	Q.2b	Define infiltrometer and mention its types. Write short notes on Horton's equation.	3
CO1	Q.3	Explain all the methods for finding avg. depth of Rainfall.	6
CO2	Q.4	Measurement of rainfall with Non-Recording type Raingauge.	3
CO2	Q.5a	Explain the process of evapotranspiration and its measurement.	3
	Q.5b	Explain Factors affecting Evapotranspiration	3
CO2	Q6	Explain process of infiltration and factor affecting its.	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

Course Code				BTCE 606		
Associated Credit Units				3		
Ser. No.	Name	Enrollment No.	Roll No.	30	70	100
1	AMAN PARASHAR	A60515816004	AU16UCV8601	17	50	67
2	ANUJ BANSAL	A60215816013	AU16UCV8602	20	56	76
3	ANUJ PRATAP SINGH PARMAR	A60215816011	AU16UCV8603	21	48	69
4	ANUJ SHARMA	A60515816006	AU16UCV8604	23	55	78
5	ANUJ SINGH BHADORIA	A60515816001	AU16UCV8605	26	64	90
6	DAMODAR SINGH CHAUHAN	A60215816008	AU16UCV8606	20	49	69
7	DEEPAK SHARMA	A60515816005	AU16UCV8607	22	60	82
8	HIMANSHU MAHLI	A60215816012	AU16UCV8609	17	61	78
9	KUNAL KUMAR	A60515816002	AU16UCV8611	25	63	88
10	KUNAL MUKHARIYA	A60215816007	AU16UCV8612	21	55	76
11	MONUSHA DHAKAD	A60515816003	AU16UCV8613	25	60	85
12	RAHUL SINGH BAGHEL	A60215816015	AU16UCV8614	26	63	89
13	ROHIT BHADORIA	A60215816016	AU16UCV8616	21	61	82
14	SATENDRA SINGH KUSHWAH	A60215816009	AU16UCV8617	20	53	73
15	SHIVAM SHRIVASTAVA	A60215816014	AU16UCV8618	16	43	59
16	UTKARSH TOMAR	A60215816004	AU16UCV8619	23	63	86

				IRRIGATION ENGINEERING
				BTCE 606
				3
No. of students attended the Exam				16
No. of students secure more than 60% marks				15
Percentage of students secure more than 60% marks				93.75
Attainment Level				Level 3

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : Computer Applications Lab
Course Code : BTCE620, Crédits : 01, Session :2018-19 (Even Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Imran Ahmad Khan

A. Introduction: The objective of this course is *t*o introduce basic soil properties and their significance to the students and to have a understanding of different soil properties and their uses in engineering.

B. Course Outcomes: At the end of the course, students will be able to:

BTCE620.1.Develop a Application of software's in design and drawings of Civil Engineering structures.

BTCE620.2.Able to proficiency, including the ability to use industry-standard computer software to generate 2D and 3D drawings

BTCE620.3. *U*nderstanding of the theory of orthographic projection and the conventions associated with Civil engineering drawings

BTCE620.4.apply computer-aided design techniques to use computer-aided visualization techniques to prepare.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Practical Work:

Computer applications in civil engineering by using two dimensional and three dimensional modeling through auto Cadd and Stadd Pro.

1 – Introduction of Staad Pro and its applications.

2 – Study of various commands for modelling and analysis of a beam
3 – Modelling and analysis of continuous beams for different loading conditions.
4 - Modelling of frame structure for different loading conditions.
5 – Modelling and analysis of frame structure for different loading conditions.
6 – Seismic Analysis of a frame structure.
7 – Wind Analysis of a frame structure.
8 – Design of beams according to Indian Standards.
9 - Design of columns according to Indian Standards.
10 – Introduction of different software used in various fields of Civil Engineering.
11 – Introduction of Auto cad used in various types of building planning.

G. Examination Scheme:

Components	**IA**				**EE**	
	A	**PR**	**LR**	**V**	**PR**	**V**
Weightage (%)	**5**	**10**	**10**	**5**	**35**	**35**

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

H. Suggested Text/Reference Books:

- Soil Mechanics by Craig R.F., Chapman & Hall
- Fundamentals of Soil Engineering by Taylor, John Wiley & Sons
- An Introduction to Geotechnical Engineering, by Holtz R.D. and Kovacs, W.D., Prentice Hall, NJ

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Introduction of Staad Pro and its applications.	Lecture	BTCE620.1	Internal Assessment, Viva &External Exam
2	Study of various commands for modelling and analysis of a beam	Lecture	BTCE620.1	Internal Assessment, Viva &External Exam
3	Modelling and analysis of continuous beams for different loading conditions.	Lecture	BTCE620.1	Internal Assessment, Viva &External Exam
4	Modelling of frame structure for different loading conditions.	Lecture	BTCE620.1	Internal Assessment, Viva &External Exam
5	Modelling and analysis of frame structure for different loading conditions.	Lecture	BTCE620.2	Internal Assessment, Viva &External Exam
6	Seismic Analysis of a frame structure.	Lecture	BTCE620.2	Internal Assessment, Viva &External Exam
7	Wind Analysis of a frame	Lecture	BTCE620.2	Internal

	structure.			Assessment, Viva &External Exam
8	Design of beams according to Indian Standards.	Lecture	BTCE620.2	Internal Assessment, Viva &External Exam
9	Design of columns according to Indian Standards.	Lecture	BTCE620.3	Internal Assessment, Viva &External Exam
10	Introduction of different software used in various fields of Civil Engineering.	Lecture	BTCE620.3	Internal Assessment, Viva &External Exam
11	Introduction of Auto cad used in various types of building planning.	Lecture	BTCE620.3	Internal Assessment, Viva &External Exam
12	Design of beams according to Indian Standards.	Lecture	BTCE620.3	Internal Assessment, Viva &External Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE620.1.	Develop a Application of software's in design and drawings of Civil Engineering structures.	3	3	1	3	1	**3**	**2**	**-**	2		2	1	**3**	**1**	**2**
BTCE620.2.	Able to proficiency, including the ability to use industry-standard computer software to generate 2D and 3D drawings	3	2	2	2	2	**1**	**-**	**-**	2		1	1	**1**	**1**	**3**
BTCE620.3.	*U*nderstanding of the theory of orthographic projection and the	3	2	2	2	2	**1**	**-**	**1**	3		3	1	**3**	**3**	**2**

	conventions associated with Civil engineering drawings															
BTCE620. 4.	apply computer-aided design techniques to use computer-aided visualization techniques to prepare.	3	3	2	3	2	-	-	-	1		2	1	**1**	**2**	**2**

<u>Sample Question Paper</u>

<table>
<tr><td colspan="8" align="center">Amity School of Engineering and Technology
Department of Civil Engineering
I MID-SEMESTER (SEM–VI) 2018-19</td></tr>
<tr><td colspan="8" align="center">Class: B.Tech.(CE) VI Semester</td></tr>
<tr><td colspan="3">Subject Name:
BTCE620 COMPUTER APPLICATION LAB</td><td colspan="3">Time: 2 Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td colspan="2">Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td colspan="2">Question Mapping</td><td>Q.1,4</td><td>Q.2,3</td><td>Q.4</td><td>Q.2,5,6</td><td></td><td></td></tr>
<tr><td colspan="8">Student will be able to
CO1: Develop a Application of software’s in design and drawings of Civil Engineering structures.
CO2: Able to proficiency, including the ability to use industry-standard computer software to generate 2D and 3D drawings</td></tr>
<tr><td>CO Map</td><td>Question No.</td><td colspan="5">Question</td><td>Marks</td></tr>
<tr><td>CO1</td><td>Q.1</td><td colspan="5">Which one is a correct statement regarding AutoCAD blocks?</td><td>3</td></tr>
<tr><td rowspan="2">CO1</td><td>Q.2a</td><td colspan="5">what are the differences present in the software’s features? - AutoCAD</td><td>3</td></tr>
<tr><td>Q.2b</td><td colspan="5">Discuss the step by step method of to draw rectangles and polygons in AutoCAD</td><td>3</td></tr>
</table>

CO1	Q.3	Discuss step by step process to draw the beam of size 450mm $\times$ 500 mm and length of 3m in AutoCAD	6
CO2	Q.4	Explain the extend command in AutoCAD. Discuss its use and application.	3
CO2	Q.5a	What are the steps involved in setting up the default drawing directory?	3
	Q.5b	Why AutoCAD software is used?	3
CO2	Q6	What is meant by staad pro? List out the methods of staad pro?	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

				COMPUTER APPLICATION LAB		
Course Code				BTCE 620		
Associated Credit Units				1		
Ser. No.	Name	Enrollment No.	Roll No.	30	70	100
1	AMAN PARASHAR	A60515816004	AU16UCV8601	21	40	61
2	ANUJ BANSAL	A60215816013	AU16UCV8602	20	38	58
3	ANUJ PRATAP SINGH PARMAR	A60215816011	AU16UCV8603	22	40	62
4	ANUJ SHARMA	A60515816006	AU16UCV8604	24	42	66
5	ANUJ SINGH BHADORIA	A60515816001	AU16UCV8605	28	45	73
6	DAMODAR SINGH CHAUHAN	A60215816008	AU16UCV8606	24	39	63
7	DEEPAK SHARMA	A60515816005	AU16UCV8607	22	35	57
8	HIMANSHU MAHLI	A60215816012	AU16UCV8609	20	40	60
9	KUNAL KUMAR	A60515816002	AU16UCV8611	22	41	63
10	KUNAL MUKHARIYA	A60215816007	AU16UCV8612	25	39	64
11	MONUSHA DHAKAD	A60515816003	AU16UCV8613	24	40	64
12	RAHUL SINGH BAGHEL	A60215816015	AU16UCV8614	27	45	72
13	ROHIT BHADORIA	A60215816016	AU16UCV8616	21	32	53
14	SATENDRA SINGH KUSHWAH	A60215816009	AU16UCV8617	22	35	57
15	SHIVAM SHRIVASTAVA	A60215816014	AU16UCV8618	20	38	58
16	UTKARSH TOMAR	A60215816004	AU16UCV8619	26	42	68

				COMPUTER APPLICATION LAB
				BTCE 620
				1
No. of students attended the Exam				16
No. of students secure more than 60% marks				10
Percentage of students secure more than 60% marks				62.50
Attainment Level				Level 1

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : GEOTECHNICAL ENGINEERING LAB
Course Code : BTCE621, Crédits : 01, Session :2018-19 (Even Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Imran Ahmad Khan

K. Introduction: The objective of this course is *t*o introduce basic soil properties and their significance to the students and to have a understanding of different soil properties and their uses in engineering.

L. Course Outcomes: At the end of the course, students will be able to:

BTCE621.1. *To impart the fundamental concepts of soil mechanics and understand the bearing capacity*

BTCE621.2. *To understand the concept of compaction and consolidation of soils*

BTCE621.3. *To understand the design aspects of foundation*

BTCE621.4. *To evaluate the stress developed in the soil medium*

M. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

N. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

O. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

P. Syllabus

Practical Work:

- Specific gravity of coarse and fine grained soils.
- Grain size analysis (a) Sieve analysis (b) Pipette analysis
- Atterberg's limits and indices
- Determination of field density (a) sand replacement method (b) core cutter method

- Determination of coefficient of permeability by
  - Constant head method (b) Variable head method
- Consolidation test
- Compaction test (a) IS light compaction test (b) IS heavy compaction test
- California Bearing Ratio test
- Direct shear test
- Triaxial shear test
- Unconfined compressive strength test
- *Laboratory vane shear test*

Q. Examination Scheme:

Components	IA				EE	
	A	PR	LR	V	PR	V
Weightage (%)	5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

R. Suggested Text/Reference Books:

- Soil Mechanics by Craig R.F., Chapman & Hall
- Fundamentals of Soil Engineering by Taylor, John Wiley & Sons
- An Introduction to Geotechnical Engineering, by Holtz R.D. and Kovacs, W.D., Prentice Hall, NJ

S. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Specific gravity of coarse and fine grained soils.	Lecture	BTCE621.1	Internal Assessment, Viva &External Exam
2	Grain size analysis (a) Sieve analysis (b) Pipette analysis	Lecture	BTCE621.1	Internal Assessment, Viva &External Exam
3	Atterberg's limits and indices	Lecture	BTCE621.1	Internal Assessment, Viva &External Exam
4	Determination of field density (a) sand replacement method (b) core cutter method	Lecture	BTCE621.2	Internal Assessment, Viva &External Exam
5	Determination of coefficient of	Lecture	BTCE621.2	Internal

	permeability by (a) Constant head method (b) Variable head method			Assessment, Viva &External Exam
6	Consolidation test	Lecture	BTCE621.2	Internal Assessment, Viva &External Exam
7	Compaction test (a) IS light compaction test (b) IS heavy compaction test	Lecture	BTCE621.3	Internal Assessment, Viva &External Exam
8	California Bearing Ratio test	Lecture	BTCE621.3	Internal Assessment, Viva &External Exam
9	Direct shear test	Lecture	BTCE621.3	Internal Assessment, Viva &External Exam
10	Triaxial shear test	Lecture	BTCE621.4	Internal Assessment, Viva &External Exam
11	Unconfined compressive strength test	Lecture	BTCE621.4	Internal Assessment, Viva &External Exam
12	Laboratory vane shear test	Lecture	BTCE621.4	Internal Assessment, Viva &External Exam

T. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE621.1.	*To impart the fundamental concepts of soil mechanics and understand the bearing capacity*	3	3	1	3	1	**3**	**2**	**-**	2		2	1	**3**	**1**	**2**

BTCE621. 2.	*To understand the concept of compaction and consolidation of soils*	3	2	2	2	2	**1**	**-**	**-**	2		1	1	**1**	**1**	**3**
BTCE621. 3.	*To understand the design aspects of foundation*	3	2	2	2	2	**1**	**-**	**1**	3		3	1	**3**	**3**	**2**
BTCE621. 4.	*To evaluate the stress developed in the soil medium*	3	3	2	3	2	**-**	**-**	**-**	1		2	1	**1**	**2**	**2**

<u>Sample Question Paper</u>

<table>
<tr><td colspan="7">Amity School of Engineering and Technology
Department of Civil Engineering
I MID-SEMESTER (SEM–VI) 2018-19</td></tr>
<tr><td colspan="7">Class: B.Tech.(CE) VI Semester</td></tr>
<tr><td colspan="2">Subject Name:
BTCE621 GEOTECHNICAL ENGINEERING LAB</td><td colspan="3">Time: 2 Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3</td><td>Q.4</td><td>Q.2,5,6</td><td></td><td></td></tr>
<tr><td colspan="7">Student will be able to
CO1: To impart the fundamental concepts of soil mechanics and understand the bearing capacity
CO2: To understand the concept of compaction and consolidation of soils</td></tr>
</table>

CO Map	Question No.	Question	Marks
CO1	Q.1	Differentiate between representative and undisturbed samples	3
CO1	Q.2a	List any two Disadvantage of static cone penetration Test.	3
	Q.2b	Can you perform classification tests on a Non representative sample? Justify your answer?	3
CO1	Q.3	Explain the corrections that are to be carried out to the observed N-value	6
CO2	Q.4	Give the two corrections to find corrected SPT value	3

CO2	Q.5a	Explain in detail the geographical methods of soil explorations with neat sketch.	3
	Q.5b	Explain the electrical resistivity method in detail.	3
CO2	Q6	What is SPT 'N' value? Discuss in detail how is it interpreted to arrive at the bearing capacity of soil	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

				GEOTECHNICAL ENGINEERING LAB		
Course Code				BTCE 621		
Associated Credit Units				1		
Ser. No.	Name	Enrollment No.	Roll No.	30	70	100
1	AMAN PARASHAR	A60515816004	AU16UCV8601	21	45	66
2	ANUJ BANSAL	A60215816013	AU16UCV8602	18	46	64
3	ANUJ PRATAP SINGH PARMAR	A60215816011	AU16UCV8603	24	54	78
4	ANUJ SHARMA	A60515816006	AU16UCV8604	24	55	79
5	ANUJ SINGH BHADORIA	A60515816001	AU16UCV8605	28	63	91
6	DAMODAR SINGH CHAUHAN	A60215816008	AU16UCV8606	21	44	65
7	DEEPAK SHARMA	A60515816005	AU16UCV8607	25	53	78
8	HIMANSHU MAHLI	A60215816012	AU16UCV8609	18	48	66
9	KUNAL KUMAR	A60515816002	AU16UCV8611	25	60	85
10	KUNAL MUKHARIYA	A60215816007	AU16UCV8612	21	52	73
11	MONUSHA DHAKAD	A60515816003	AU16UCV8613	26	59	85
12	RAHUL SINGH BAGHEL	A60215816015	AU16UCV8614	27	60	87
13	ROHIT BHADORIA	A60215816016	AU16UCV8616	22	48	70
14	SATENDRA SINGH KUSHWAH	A60215816009	AU16UCV8617	22	44	66
15	SHIVAM SHRIVASTAVA	A60215816014	AU16UCV8618	21	45	66
16	UTKARSH TOMAR	A60215816004	AU16UCV8619	24	58	82

				GEOTECHNICAL ENGINEERING LAB
				BTCE 621
				1
No. of students attended the Exam				16
No. of students secure more than 60% marks				16
Percentage of students secure more than 60% marks				100.00
Attainment Level				Level 3

AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : STRUCTURAL STEEL DESIGN
Course Code : BTCE 701, Crédits : 04, Session :2018-19 (Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. P. Mahakavi

T. ***Introduction:*** *The objective of this course is to* to learn the behavior and design of structural steel.To gain an educational and comprehensive experience in the design of steel structures.To apply the principles, procedures and current code requirements to the design of steelstructural members.

U. **Course Outcomes:** At the end of the course, students will be able to:
BTCE701.1.*Understand the behavior and design the framed steel structures*
BTCE701.2.*Identify and compute the design loads for industrial structures*
BTCE701.3.*Understand the design of steel-concrete composite structures*
BTCE701.4.*Develop complete drawings of steel structures including all details of sections and connections.*

V. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

W. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

X. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%

Total			100%

Y. Syllabus

Module I: Design of steel girders

Analysis and design of laterally restrained – unrestrained – simple and compound beams – open web girders – castellated beams–deflection criteria - check for shear.

Module II: Design of compression members

Axially and eccentrically loaded compression members - built up columns - lacings and battens - design of column bases.

A project involving the design and detailing of a Mill bent is envisaged at this stage.

Module III: Roof truss

Introduction to steel roof systems - design of roof trusses – design of roofing elements and purlin – wind bracings.

A project involving the design and detailing of a roof truss is envisaged at this stage.

Module IV: Plastic Analysis

Plastic theory: introduction - plastic hinge concept - plastic modulus - shape factor - redistribution of moments - collapse mechanism - plastic analysis of beams and portal frames by equilibrium and mechanism methods

Z. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

AA. Suggested Text/Reference Books:

- Ramchandra, Design of Steel Structures Vol I and II, Standard book house, 1991
- P. Dayaratnam, Design of Steel Structures, (Wheeler), 1998
- M. Raghupathi, Design of Steel Structures, Tata McGraw Hill, 1985
- Lin & Breslar, Design of Steel Structures, John Wiley & Sons, 1963
- BIS codes (IS 800, SP: 6 – Part 1 to 6).

BB. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Analysis and design of laterally restrained	Lecture	BTCE701.1	Mid Term-1, Quiz & End Sem Exam
2	Analysis and design of laterally restrained	Lecture	BTCE701.1	Mid Term-1, Quiz & End Sem Exam
3	unrestrained	Lecture	BTCE701.1	Mid Term-1, Quiz & End Sem Exam

4	unrestrained	Lecture	BTCE701.1	Mid Term-1, Quiz & End Sem Exam
5	simple and compound beams	Lecture	BTCE701.1	Mid Term-1, Quiz & End Sem Exam
6	simple and compound beams	Lecture	BTCE701.1	Mid Term-1, Quiz & End Sem Exam
7	open web girders	Lecture	BTCE701.1	Mid Term-1, Quiz & End Sem Exam
8	open web girders	Lecture	BTCE701.1	Mid Term-1, Quiz & End Sem Exam
9	castellated beams	Lecture	BTCE701.1	Mid Term-1, Quiz & End Sem Exam
10	castellated beams	Lecture	BTCE701.1	Mid Term-1, Quiz & End Sem Exam
11	deflection criteria	Lecture	BTCE701.1	Mid Term-1, Quiz & End Sem Exam
12	check for shear	Lecture	BTCE701.1	Mid Term-1, Quiz & End Sem Exam
13	Axially and eccentrically loaded compression members	Lecture	BTCE701.2	Mid Term-1, Quiz & End Sem Exam
14	Axially and eccentrically loaded compression members	Lecture	BTCE701.2	Mid Term-1, Quiz & End Sem Exam
15	Axially and eccentrically loaded compression members	Lecture	BTCE701.2	Mid Term-1, Quiz & End Sem Exam
16	built up columns	Lecture	BTCE701.2	Mid Term-1, Quiz & End Sem Exam
17	built up columns	Lecture	BTCE701.2	Mid Term-1, Quiz & End Sem Exam
18	built up columns	Lecture	BTCE701.2	Mid Term-1, Quiz & End Sem Exam
19	lacings and battens	Lecture	BTCE701.2	Mid Term-1, Quiz & End Sem Exam
20	lacings and battens	Lecture	BTCE701.2	Mid Term-1, Quiz & End Sem Exam
21	lacings and battens	Lecture	BTCE701.2	Assignment, Quiz & End Sem Exam
22	design of column bases	Lecture	BTCE701.2	Assignment, Quiz & End Sem Exam
23	design of column bases	Lecture	BTCE701.2	Assignment, Quiz & End Sem Exam
24	design of column bases	Lecture	BTCE701.2	Assignment, Quiz & End Sem Exam
25	Introduction to steel roof systems	Lecture	BTCE701.3	Assignment, Quiz & End Sem Exam
26	Introduction to steel roof systems	Lecture	BTCE701.3	Assignment, Quiz & End Sem Exam
27	Introduction to steel roof systems	Lecture	BTCE701.3	Assignment, Quiz & End Sem Exam
28	design of roof trusses	Lecture	BTCE701.3	Assignment, Quiz

				& End Sem Exam
29	design of roof trusses	Lecture	BTCE701.3	Assignment, Quiz & End Sem Exam
30	design of roof trusses	Lecture	BTCE701.3	Assignment, Quiz & End Sem Exam
31	design of roofing elements and purlin	Lecture	BTCE701.3	Assignment, Quiz & End Sem Exam
32	design of roofing elements and purlin	Lecture	BTCE701.3	Assignment, Quiz & End Sem Exam
33	design of roofing elements and purlin	Lecture	BTCE701.3	Assignment, Quiz & End Sem Exam
34	wind bracings	Lecture	BTCE701.3	Assignment, Quiz & End Sem Exam
35	wind bracings	Lecture	BTCE701.3	Assignment, Quiz & End Sem Exam
36	wind bracings	Lecture	BTCE701.3	Mid Term-1, Quiz & End Sem Exam
37	Plastic theory	Lecture	BTCE701.4	Mid Term-1, Quiz & End Sem Exam
38	introduction	Lecture	BTCE701.4	Mid Term-1, Quiz & End Sem Exam
39	plastic hinge concept	Lecture	BTCE701.4	Mid Term-1, Quiz & End Sem Exam
40	plastic modulus	Lecture	BTCE701.4	Mid Term-1, Quiz & End Sem Exam
41	shape factor	Lecture	BTCE701.4	Mid Term-1, Quiz & End Sem Exam
42	redistribution of moments	Lecture	BTCE701.4	Mid Term-1, Quiz & End Sem Exam
43	collapse mechanism	Lecture	BTCE701.4	Mid Term-1, Quiz & End Sem Exam
44	plastic analysis of beams	Lecture	BTCE701.4	Mid Term-1, Quiz & End Sem Exam
45	portal frames by equilibrium	Lecture	BTCE701.4	Mid Term-1, Quiz & End Sem Exam
46	portal frames by equilibrium	Lecture	BTCE701.4	Mid Term-1, Quiz & End Sem Exam
47	mechanism methods	Lecture	BTCE701.4	Mid Term-1, Quiz & End Sem Exam
48	mechanism methods	Lecture	BTCE701.4	Mid Term-1, Quiz & End Sem Exam

CC. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES	CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE701.1.	Understand the behavior and design the framed steel structures	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
BTCE701.2.	Identify and compute the design loads for industrial structures	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE701.3.	Understand the design of steel-concrete composite structures	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
BTCE701.4.	Develop complete drawings of steel structures including all details of sections and connections.	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**

				STRUCTURAL STEEL DESIGN		
Course Code				BTCE 701		
Credit Units		Associated		4		
Ser. No.	Name	Enrollment No.	Roll No.	30	70	100
1	A. POORNA ANAND	A60215814033	AU14UCV1201	12	51	63
2	ABHISHEK PRATAP SINGH SIKARWAR	A60215814024	AU14UCV1202	22	49	71
3	ABHISHEK SINGH PARMAR	A60215814028	AU14UCV1203	18	54	72
4	ABHISHANK TOMAR	A60215814032	AU14UCV1204	16	37	53
5	ABID KHAN	A60215814019	AU14UCV1205	17	48	65
6	ADITYA GUPTA	A60215814029	AU14UCV1206	18	53	71
7	AKSHAY KUMAR	A60215814008	AU14UCV1207	15	49	64
8	DEEPAK YADAV	A60215814016	AU14UCV1209	23	52	75
9	GAURAV YADAV	A60215814020	AU14UCV1210	13	39	52
10	EKTA BAJPAI	A60215814010	AU14UCV1211	13	46	59
11	GOURANG SHARMA	A60215814012	AU14UCV1212	18	48	66
12	HEMENDRA DABARIYA	A60515814001	AU14UCV1213	20	53	73
13	NIKHIL TYAGI	A60215814022	AU14UCV1215	17	50	67
14	PRASHANT SHARMA	A60215814007	AU14UCV1216	18	44	62

15	RAHUL SINGH	A60215814025	AU14UCV1217	18	61	79
16	RAJAN SINGH DHAKAD	A60215814011	AU14UCV1218	12	37	49
17	RISHABH RATHORE	A60215814023	AU14UCV1219	18	44	62
18	RYENA HAROON	A60215814030	AU14UCV1221	12	44	56
19	SACHIN TRIPATHI	A60215814004	AU14UCV1222	20	52	72
20	SACHINDRA VISHWAKARMA	A60215814018	AU14UCV1223	14	46	60
21	SHASHANK SINGH CHAUHAN	A60215814002	AU14UCV1224	19	47	66
22	SHREYANSH SINGHAL	A60215814014	AU14UCV1225	19	51	70
23	SHUBHAM KUMAR	A60215814013	AU14UCV1226	19	44	63
24	SHUBHAM KUMAR	A60215814031	AU14UCV1227	20	40	60
25	SHUBHAM VERMA	A60215814009	AU14UCV1228	22	36	58
26	VAIBHAV TYAGI	A60215814006	AU14UCV1229	18	61	79
27	VIPUL SINGH YADAV	A60215814017	AU14UCV1230	18	42	60

No. of students attended the Exam	27
No. of students secure more than 60% marks	18
Percentage of students secure more than 60% marks	66.67
Attainment Level	Level 1

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : ENVIRONMENTAL ENGINEERING - II
Course Code : BTCE702, Crédits : 03, Session :2018-19 (Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Imran Ahmad Khan

U. ***Introduction:*** *The objective of this course is to* teach students the basic principles and concepts of unit operations and processes involvedin water and wastewater treatment. To develop a student's skill in the basic design of unit operations and processesinvolved in water and wastewater treatment. To develop a student's skill in evaluating the performance of water and wastewater treatmentplants. To teach students the various methods of sludge management

V. **Course Outcomes:** At the end of the course, students will be able to:

BTCE702.1. Able to design individual unit operation or process appropriate to the situation by applying physical, chemical, biological and engineering principles.

BTCE702.2. Able to identify the type of unit operations and processes involved in water and wastewater treatment plants based on the water quality

BTCE702.3. Investigate the performance of various unit operations and processes to meet the desired health and environment related goals.

BTCE702.4. Understand sludge management and disposal

W. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

X. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

Y. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be	A	5%

	qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

Z. Syllabus

Module I

Sanitary plumbing – sanitary fixtures – systems of piping – house drainage– connection of house drains and street sewers. Systems of sewerage– Dry weather flow and wet weather flow– sewers and sewer appurtenances – sewage pumping – maintenance of sewers.

Module II

Waste water- Characteristics– sampling – population equivalent –– preliminary treatment of waste water – screens – grit chamber – detritus tank – Sedimentation tank.
Biological treatment (process details and design considerations) - Aerobic- Activated Sludge Process- Trickling Filter- Oxidation Ponds

Module III

Anaerobic treatment- Anaerobic digesters- Septic Tanks- Soak pits
Waste water disposal – disposal into stream –fundamentals of stream sanitation- disposal by irrigation – sludge treatment and disposal

Module IV

Solid waste management: Generation- on site handling and storage- transfer and transportprocessing- resource recovery-treatment and disposal.
Air pollution and control – sources –pollutants and their health effects– particulate and gaseous pollution control devices (fundamentals)-Settling chambers- Electrostatic precipitators- Cyclones- Wet Collectors-Gas absorption by tray and packed towers

Module V: Industrial Visit

At least one visit to industry with in India in the field of Civil Engineering maximum three working days duration.

AA. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

BB. Suggested Text/Reference Books:

- Birdie G. S and Birdie J.S, Water Supply and Sanitary Engineering, Dhanpat Rai and Sons (1998), New Delhi
- Duggal K.N., Elements of Environmental Engineering, S. Chand and Co. Ltd. (2000), New Delhi
- Garg S.K, Environmental Engineering Vol. II¸ Khanna Publications (2001) New Delhi
- Ehlers VM & Steel EW, Municipal & Rural Sanitation, 6th Edn.(1965)McGraw Hill.
- Sawyer and McCarte, Chemistry for Environmental Engineering, Tata McGraw-Hill, (2003) New Delhi,.
- Fair, Geyer & Okun, Water and Waste water Engineering, John Wiley & sons, Inc (1966)
- Metcalf & Eddy, Waste Water Engineering Treatment, Disposal & Reuse, Tata McGraw Hill (1979)

CC. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Sanitary plumbing	Lecture	BTCE702.1	Mid Term-1, Quiz & End Sem Exam
2	sanitary fixtures	Lecture	BTCE702.1	Mid Term-1, Quiz & End Sem Exam
3	systems of piping	Lecture	BTCE702.1	Mid Term-1, Quiz & End Sem Exam
4	house drainage	Lecture	BTCE702.1	Mid Term-1, Quiz & End Sem Exam
5	connection of house drains and street sewers	Lecture	BTCE702.1	Mid Term-1, Quiz & End Sem Exam
6	Systems of sewerage	Lecture	BTCE702.1	Mid Term-1, Quiz & End Sem Exam
7	Dry weather flow and wet weather flow	Lecture	BTCE702.1	Mid Term-1, Quiz & End Sem Exam
8	sewers and sewer appurtenances	Lecture	BTCE702.1	Mid Term-1, Quiz & End Sem Exam
9	sewage pumping – maintenance of sewers	Lecture	BTCE702.1	Mid Term-1, Quiz & End Sem Exam
10	Waste water- Characteristics– sampling	Lecture	BTCE702.2	Mid Term-1, Quiz & End Sem Exam
11	population equivalent	Lecture	BTCE702.2	Mid Term-1, Quiz & End Sem Exam
12	preliminary treatment of waste water	Lecture	BTCE702.2	Mid Term-1, Quiz & End Sem Exam
13	screens – grit chamber	Lecture	BTCE702.2	Mid Term-1, Quiz & End Sem Exam
14	detritus tank – Sedimentation tank	Lecture	BTCE702.2	Mid Term-1, Quiz & End Sem Exam
15	Biological treatment (process details and design considerations)	Lecture	BTCE702.2	Mid Term-1, Quiz & End Sem Exam
16	Aerobic- Activated Sludge Process	Lecture	BTCE702.2	Mid Term-1, Quiz & End Sem Exam
17	Trickling Filter	Lecture	BTCE702.2	Mid Term-1, Quiz & End Sem Exam
18	Oxidation Ponds	Lecture	BTCE702.2	Mid Term-1, Quiz & End Sem Exam
19	Anaerobic treatment	Lecture	BTCE702.3	Mid Term-1, Quiz & End Sem Exam
20	Anaerobic digesters	Lecture	BTCE702.3	Mid Term-1, Quiz & End Sem Exam
21	Septic Tanks- Soak pits	Lecture	BTCE702.3	Assignment, Quiz & End Sem Exam
22	Waste water disposal	Lecture	BTCE702.3	Assignment, Quiz & End Sem Exam
23	disposal into stream	Lecture	BTCE702.3	Assignment, Quiz & End Sem Exam

24	fundamentals of stream l	Lecture	BTCE702.3	Assignment, Quiz & End Sem Exam
25	disposal by irrigation	Lecture	BTCE702.3	Assignment, Quiz & End Sem Exam
26	sludge treatment	Lecture	BTCE702.3	Assignment, Quiz & End Sem Exam
27	disposal	Lecture	BTCE702.3	Assignment, Quiz & End Sem Exam
28	Solid waste management:	Lecture	BTCE702.4	Assignment, Quiz & End Sem Exam
29	Generation- on site handling	Lecture	BTCE702.4	Assignment, Quiz & End Sem Exam
30	storage- transfer	Lecture	BTCE702.4	Assignment, Quiz & End Sem Exam
31	Transportprocessing	Lecture	BTCE702.4	Assignment, Quiz & End Sem Exam
32	resource recovery- treatment and disposal.	Lecture	BTCE702.4	Assignment, Quiz & End Sem Exam
33	Air pollution and control – sources –pollutants and their health effects	Lecture	BTCE702.4	Assignment, Quiz & End Sem Exam
34	particulate and gaseous pollution control devices (fundamentals)-	Lecture	BTCE702.4	Assignment, Quiz & End Sem Exam
35	Settling chambers- Electrostatic precipitators- Cyclones	Lecture	BTCE702.4	Assignment, Quiz & End Sem Exam
36	Wet Collectors-Gas absorption by tray and packed towers	Lecture	BTCE702.4	Mid Term-1, Quiz & End Sem Exam

DD. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE702.1 .	Able to design individual unit operation or process appropriate to the situation by applying physical, chemical, biological and engineering principles.	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**

BTCE702.2 .	Able to identify the type of unit operations and processes involved in water and wastewater treatment plants based on the water quality	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE702.3.	Investigate the performance of various unit operations and processes to meet the desired health and environment related goals.	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
BTCE702.4.	Understand sludge management and disposal	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**

				ENVIRONMENTAL ENGINEERING - II		
Course Code				BTCE 702		
Credit Units Associated				3		
Ser. No.	Name	Enrollment No.	Roll No.	30	70	100
1	A. POORNA ANAND	A60215814033	AU14UCV1201	12	45	57
2	ABHISHEK PRATAP SINGH SIKARWAR	A60215814024	AU14UCV1202	26	57	83
3	ABHISHEK SINGH PARMAR	A60215814028	AU14UCV1203	22	39	61
4	ABHISHANK TOMAR	A60215814032	AU14UCV1204	18	35	53
5	ABID KHAN	A60215814019	AU14UCV1205	19	42	61
6	ADITYA GUPTA	A60215814029	AU14UCV1206	24	44	68
7	AKSHAY KUMAR	A60215814008	AU14UCV1207	20	45	65
8	DEEPAK YADAV	A60215814016	AU14UCV1209	22	46	68
9	GAURAV YADAV	A60215814020	AU14UCV1210	15	37	52
10	EKTA BAJPAI	A60215814010	AU14UCV1211	20	47	67
11	GOURANG SHARMA	A60215814012	AU14UCV1212	23	47	70
12	HEMENDRA DABARIYA	A60515814001	AU14UCV1213	21	49	70
13	NIKHIL TYAGI	A60215814022	AU14UCV1215	16	36	52

14	PRASHANT SHARMA	A60215814007	AU14UCV1216	21	53	74
15	RAHUL SINGH	A60215814025	AU14UCV1217	22	39	61
16	RAJAN SINGH DHAKAD	A60215814011	AU14UCV1218	20	54	74
17	RISHABH RATHORE	A60215814023	AU14UCV1219	23	56	79
18	RYENA HAROON	A60215814030	AU14UCV1221	19	51	70
19	SACHIN TRIPATHI	A60215814004	AU14UCV1222	25	56	81
20	SACHINDRA VISHWAKARMA	A60215814018	AU14UCV1223	21	48	69
21	SHASHANK SINGH CHAUHAN	A60215814002	AU14UCV1224	20	53	73
22	SHREYANSH SINGHAL	A60215814014	AU14UCV1225	26	55	81
23	SHUBHAM KUMAR	A60215814013	AU14UCV1226	23	31	54
24	SHUBHAM KUMAR	A60215814031	AU14UCV1227	26	53	79
25	SHUBHAM VERMA	A60215814009	AU14UCV1228	23	30	53
26	VAIBHAV TYAGI	A60215814006	AU14UCV1229	25	57	82
27	VIPUL SINGH YADAV	A60215814017	AU14UCV1230	22	36	58

No. of students attended the Exam	27
No. of students secure more than 60% marks	20
Percentage of students secure more than 60% marks	74.07
Attainment Level	Level 2

AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : DESIGN OF HYDRAULIC STRUCTURES
Course Code : BTCE703, Crédits : 03, Session :2018-19 (Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia, Dr. Imran Ahmad Khan, Dr. Ripunjoy Gogoi, Dr. P. Mahakavi, Mr. Sachin Tiwari

K. **Introduction:** The objective of this course is to understand the various concepts of water resources engineering. The course introduces the concept of hydrology, ground water and then deals with irrigation engineering. It also deals with design of dam.

L. **Course Outcomes:** At the end of the course, students will be able to:

BTCE703.1. Identify different component in an head work and its use

BTCE703.2 Design the head work of an irrigation system

BTCE703.3 Design the drops, escapes and outlet for the canal system

BTCE703.4 Describe various storage zones in an reservoir

BTCE703.5 Calculate different types of forces acting on a dam and design it

M. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

N. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

O. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%

End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

P. Syllabus

Moduls I : Diversion head work

Diversion head works-Location – Essential components of Weir and Barrage – Weirs on permeable foundations- Blighs and khoslas seepage theories – Design procedure.

Moduls II : Earthen Dams and Rock fill Dams

Dams – Types of dams and their selection

Types, causes of failure and design criteria, soils suitable for earth dam construction, construction methods, foundation requirements, typical earth dam sections, estimation of seepage through and below the dam, seepage control, stability of slopes by slip circle method of analysis, pore pressure, sudden draw down, steady seepage and construction pore pressure condition. Rock fill dams: Types, merits and demerits, conditions favourable for their adoption.

Moduls III : Gravity dams

Gravity dam- Analysis and design.

Gravity dams: Design Criteria, forces acting on gravity dams, elementary profile, low and high gravity dams, stability analysis, evaluation of profile by method of zoning, practical profile, foundation treatment, construction joints, galleries in gravity dam

Moduls IV : Spillways

Different types and suitability

Ogee spill way and its design, details of syphon, shaft, chute and side channel spillways, emergency spillways.

Energy dissipatiors and gates: Principles of energy dissipation Energy dissiptors based on tail water rating curve and jump height curves Spillway crest gates- vertical lift and radial gates, their design principles and details. Design of canal regulating structures, Detailed design of Sarda Falls, design of cross drainage works,sphypon aquaduct.

Moduls V : Regulation and control of canal system

Purpose, Types of canal regulation works and their function aspects. Irrigation Outlets- Requirements, Types, non-moular, semi- module and rigid module, selection criterion. River Training – Objective and need, classification of rivers and rivers, and river training works, meandering, stages, methods of river training, bank protection,Methods for measurement of discharge.

Q. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

R. Suggested Text/Reference Books:

- Irrigation Engg and Hydraulic Structures by S.K.Garg, Khanna Publishers.
- Irrigation. Water Resources, and water power Engineering By Dr.P.N.Modi, Standard Book House 1990
- Engineering Hydrology by K. Subramanya, TMH.
- Irrigation Water Power and Water Resource Engg. By K.R. Arora.
- Water Resources Engg. By Larry W. Mays, John Wiley India
- Water Resources Engg. By Wurbs and James, John wiley India
- Water Resources Engg. By R.K.Linsely, McGraw Hill
- Irrigation and water Resources Engg.By G L Asawa, New age International Publishers
- Irrigation Theory and practices by A.M.Michel.

- Irrigation and water Power engineering by B.C.Punmia, Laxmi Publishers.

S. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Diversion head works	Lecture	BTCE703.1	Mid Term-1, Quiz & End Sem Exam
2	Location	Lecture	BTCE703.1	Mid Term-1, Quiz & End Sem Exam
3	Essential components of Weir and Barrage	Lecture	BTCE703.1	Mid Term-1, Quiz & End Sem Exam
4	Weirs on permeable foundations	Lecture	BTCE703.1	Mid Term-1, Quiz & End Sem Exam
5	Blighs and khoslas seepage theories	Lecture	BTCE703.1	Mid Term-1, Quiz & End Sem Exam
6	Design procedure	Lecture	BTCE703.1	Mid Term-1, Quiz & End Sem Exam
7	Design procedure	Lecture	BTCE703.1	Mid Term-1, Quiz & End Sem Exam
8	Dams – Types of dams and their selection	Lecture	BTCE703.2	Mid Term-1, Quiz & End Sem Exam
9	Types, causes of failure and design criteria, soils suitable for earth dam construction	Lecture	BTCE703.2	Mid Term-1, Quiz & End Sem Exam
10	construction methods, foundation requirements.	Lecture	BTCE703.2	Mid Term-1, Quiz & End Sem Exam
11	typical earth dam sections, estimation of seepage through and below the dam	Lecture	BTCE703.2	Mid Term-1, Quiz & End Sem Exam
12	seepage control, stability of slopes by slip circle method of analysis, pore pressure	Lecture	BTCE703.2	Mid Term-1, Quiz & End Sem Exam
13	sudden draw down, steady seepage and construction pore pressure condition	Lecture	BTCE703.2	Mid Term-1, Quiz & End Sem Exam
14	Rock fill dams: Types, merits and demerits, conditions favourable for their adoption.	Lecture	BTCE703.2	Mid Term-1, Quiz & End Sem Exam
15	Gravity dam- Analysis and design.	Lecture	BTCE703.3	Mid Term-1, Quiz & End Sem Exam
16	Gravity dams: Design Criteria	Lecture	BTCE703.3	Mid Term-1, Quiz & End Sem Exam
17	forces acting on gravity dams	Lecture	BTCE703.3	Mid Term-1, Quiz & End Sem Exam
18	elementary profile, low and high gravity dams	Lecture	BTCE703.3	Mid Term-1, Quiz & End Sem Exam
19	stability analysis, evaluation of profile by method of zoning,	Lecture	BTCE703.3	Mid Term-1, Quiz & End Sem Exam
20	practical profile, foundation treatment,	Lecture	BTCE703.3	Mid Term-1, Quiz & End Sem Exam
21	construction joints, galleries in	Lecture	BTCE703.3	Assignment, Quiz

	gravity dam			& End Sem Exam
22	Different types and suitability	Lecture	BTCE703.4	Assignment, Quiz & End Sem Exam
23	Ogee spill way and its design, details of syphon	Lecture	BTCE703.4	Assignment, Quiz & End Sem Exam
24	shaft, chute and side channel spillways,	Lecture	BTCE703.4	Assignment, Quiz & End Sem Exam
25	emergency spillways. Energy dissipatiors and gates: Principles of energy dissipation	Lecture	BTCE703.4	Assignment, Quiz & End Sem Exam
26	Energy dissiptors based on tail water rating curve and jump height curves Spillway crest gates- vertical lift and radial gates, their design principles and details.	Lecture	BTCE703.4	Assignment, Quiz & End Sem Exam
27	Design of canal regulating structures, Detailed design of Sarda Falls, design of cross drainage works,sphypon aquaduct.	Lecture	BTCE703.4	Assignment, Quiz & End Sem Exam
28	Purpose, Types of canal regulation works and their function aspects.	Lecture	BTCE703.4	Assignment, Quiz & End Sem Exam
29	Irrigation Outlets- Requirements,	Lecture	BTCE703.5	Assignment, Quiz & End Sem Exam
30	Types, non-moular, semi- module and rigid module,	Lecture	BTCE703.5	Assignment, Quiz & End Sem Exam
31	selection criterion. River Training – Objective and need	Lecture	BTCE703.5	Assignment, Quiz & End Sem Exam
32	classification of rivers and rivers	Lecture	BTCE703.5	Assignment, Quiz & End Sem Exam
33	river training works, meandering, stages	Lecture	BTCE703.5	Assignment, Quiz & End Sem Exam
34	methods of river training	Lecture	BTCE703.5	Assignment, Quiz & End Sem Exam
35	bank protection	Lecture	BTCE703.5	Assignment, Quiz & End Sem Exam
36	Methods for measurement of discharge.	Lecture	BTCE703.5	Assignment, Quiz & End Sem Exam

T. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

BTCE703.1	Identify different component in an head work and its use	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
BTCE703.2	Design the head work of an irrigation system	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE703.3	Design the drops, escapes and outlet for the canal system	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
BTCE703.4	Describe various storage zones in an reservoir	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**
BTCE703.5	Calculate different types of forces acting on a dam and design it	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**

				WATER RESORCE ENGINEERING		
Course Code				BTCE 703		
Credit Units	Associated			3		
Ser. No.	Name	Enrollment No.	Roll No.	30	70	100
1	A. POORNA ANAND	A60215814033	AU14UCV1201	22	28	50
2	ABHISHEK PRATAP SINGH SIKARWAR	A60215814024	AU14UCV1202	24	36	60
3	ABHISHEK SINGH PARMAR	A60215814028	AU14UCV1203	19	24	43
4	ABHISHANK TOMAR	A60215814032	AU14UCV1204	16	22	38
5	ABID KHAN	A60215814019	AU14UCV1205	20	24	44
6	ADITYA GUPTA	A60215814029	AU14UCV1206	21	35	56
7	AKSHAY KUMAR	A60215814008	AU14UCV1207	15	24	39
8	DEEPAK YADAV	A60215814016	AU14UCV1209	16	36	52
9	GAURAV YADAV	A60215814020	AU14UCV1210	15	24	39
10	EKTA BAJPAI	A60215814010	AU14UCV1211	18	48	66
11	GOURANG SHARMA	A60215814012	AU14UCV1212	21	26	47
12	HEMENDRA DABARIYA	A60515814001	AU14UCV1213	22	38	60
13	NIKHIL TYAGI	A60215814022	AU14UCV1215	21	24	45
14	PRASHANT SHARMA	A60215814007	AU14UCV1216	20	45	65

15	RAHUL SINGH	A60215814025	AU14UCV1217	19	25	44
16	RAJAN SINGH DHAKAD	A60215814011	AU14UCV1218	18	41	59
17	RISHABH RATHORE	A60215814023	AU14UCV1219	21	48	69
18	RYENA HAROON	A60215814030	AU14UCV1221	20	37	57
19	SACHIN TRIPATHI	A60215814004	AU14UCV1222	24	44	68
20	SACHINDRA VISHWAKARMA	A60215814018	AU14UCV1223	17	32	49
21	SHASHANK SINGH CHAUHAN	A60215814002	AU14UCV1224	22	30	52
22	SHREYANSH SINGHAL	A60215814014	AU14UCV1225	24	63	87
23	SHUBHAM KUMAR	A60215814013	AU14UCV1226	17	26	43
24	SHUBHAM KUMAR	A60215814031	AU14UCV1227	16	38	54
25	SHUBHAM VERMA	A60215814009	AU14UCV1228	21	29	50
26	VAIBHAV TYAGI	A60215814006	AU14UCV1229	16	34	50
27	VIPUL SINGH YADAV	A60215814017	AU14UCV1230	18	32	50

				WATER RESORCE ENGINEERING
				BTCE 703
				3
No. of students attended the Exam				27
No. of students secure more than 60% marks				5
Percentage of students secure more than 60% marks				18.52
Attainment Level				-

AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : HYDROLOGY AND FLOOD CONTROL
Course Code : BTCE707, Crédits : 04, Session :2018-19 (Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia, Dr. Imran Ahmad Khan, Dr. Ripunjoy Gogoi, Dr. P. Mahakavi, Mr. Sachin Tiwari

K. ***Introduction:*** The objective of this course is to understand the physical processes that determines the exchange of water at the Earth'ssurface.To become familiar with the physical properties that govern the movement of water throughthe unsaturated zone and how these can be observed in the field and modelled mathematically.To understand the physical factors that control evaporation and their representation usingenergy fluxes and diffusive transfer.To be familiar with the various physical and empirical models used to calculate evaporation& evapotranspiration and the data need to support their use.To be able to understand the processes which influence runoff from catchments and themethods for estimating the runoffTo use measured / estimated data like precipitation, runoff, infiltration, for hydrologic design

L. **Course Outcomes:** At the end of the course, students will be able to:

BTCE707.1*Understand the process and mathematical representation of hydrologic cycle*

BTCE707.2 *Understand the importance of catchment characteristics for runoff estimation*

BTCE707.3. Evaluate the hydrologic abstractions and also learn about the factors affecting various hydrologic abstractions

BTCE707.4 *Implementing the knowledge of precipitation and runoff measurement in hydrologic design*

M. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

N. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

O. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal	Mid Term 1	CT	15%

Evaluation	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

P. Syllabus

Module I

Introduction hydrologic cycle, water budget equations, world water balance, application in engineering. Precipitation: Forms of precipitation, measurement, depth-area-duration & intensity- duration- frequency relationships, probable maximum precipitation.

Module II

Abstraction from Precipitation: Evaporation – process, measurement and estimation; Evapotranspiration- measurement and estimation; Initial Losses- Interception & Depression storage; Infiltration- process, capacities, indices, measurement & estimation

Module III: Runoff and Hydrographs

Hydrograph, runoff characteristics of stream, Yield, Rainfall-runoff correlations, flow duration curve, mass curve, droughts and floods. Factors affecting flood hydrographs, unit hydrograph and its analysis, s-curve hydrograph, synthetic and instantaneous unit hydrographs.

Module IV: Flood

Rational method, empirical formulae, unit hydrograph method, flood frequency studies, statistical analysis, regional flood frequency analysis, design storm & design flood, risk/reliability and safety factor; Flood Routing: Basic equation, hydrologic storage routing & attenuation, hydrologic channel routing, flood forecasting & control, hydraulic method of flood routing.

Q. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

R. Suggested Text/Reference Books:

- ‘‘Hydrology for Engineers’ by Linsley R. K., Kohler M. A. and Paulhus J. L. H.
- ‘Engineering Hydrology’ by K. Subramanya
- ‘Hydrology: Principles. Analysis. Design’ by Raghunath H. M.
- ‘Handbook of Applied Hydrology’ by Chow V. T.
- ‘Irrigation: Theory & Practice’ by Michael A. M.

S. Lecture Plan

Lecture	**Topics**	**Mode of**	**Corresponding CO**	**Mode of Assessing CO**

		Delivery		
1	Introductionhydrologic cycle	Lecture	BTCE707.1	Mid Term-1, Quiz & End Sem Exam
2	water budget equations	Lecture	BTCE707.1	Mid Term-1, Quiz & End Sem Exam
3	world water balance	Lecture	BTCE707.1	Mid Term-1, Quiz & End Sem Exam
4	application in engineering.	Lecture	BTCE707.1	Mid Term-1, Quiz & End Sem Exam
5	Precipitation	Lecture	BTCE707.1	Mid Term-1, Quiz & End Sem Exam
6	Forms of precipitation	Lecture	BTCE707.1	Mid Term-1, Quiz & End Sem Exam
7	measurement	Lecture	BTCE707.1	Mid Term-1, Quiz & End Sem Exam
8	depth-area-duration	Lecture	BTCE707.1	Mid Term-1, Quiz & End Sem Exam
9	intensity- duration- frequency relationships	Lecture	BTCE707.1	Mid Term-1, Quiz & End Sem Exam
10	probable maximum precipitation	Lecture	BTCE707.1	Mid Term-1, Quiz & End Sem Exam
11	probable maximum precipitation	Lecture	BTCE707.1	Mid Term-1, Quiz & End Sem Exam
12	probable maximum precipitation	Lecture	BTCE707.1	Mid Term-1, Quiz & End Sem Exam
13	Abstraction from Precipitation	Lecture	BTCE707.2	Mid Term-1, Quiz & End Sem Exam
14	Evaporation	Lecture	BTCE707.2	Mid Term-1, Quiz & End Sem Exam
15	process	Lecture	BTCE707.2	Mid Term-1, Quiz & End Sem Exam
16	measurement	Lecture	BTCE707.2	Mid Term-1, Quiz & End Sem Exam
17	estimation	Lecture	BTCE707.2	Mid Term-1, Quiz & End Sem Exam
18	Evapotranspiration	Lecture	BTCE707.2	Mid Term-1, Quiz & End Sem Exam
19	measurement and estimation	Lecture	BTCE707.2	Mid Term-1, Quiz & End Sem Exam
20	Initial Losses	Lecture	BTCE707.2	Mid Term-1, Quiz & End Sem Exam
21	Interception	Lecture	BTCE707.2	Assignment, Quiz & End Sem Exam
22	Depression storage	Lecture	BTCE707.2	Assignment, Quiz & End Sem Exam
23	Infiltration- process, capacities,	Lecture	BTCE707.2	Assignment, Quiz & End Sem Exam
24	indices, measurement & estimation	Lecture	BTCE707.2	Assignment, Quiz & End Sem Exam

25	Hydrograph	Lecture	BTCE707.3	Assignment, Quiz & End Sem Exam
26	runoff characteristics of stream	Lecture	BTCE707.3	Assignment, Quiz & End Sem Exam
27	Yield	Lecture	BTCE707.3	Assignment, Quiz & End Sem Exam
28	Rainfall-runoff correlations	Lecture	BTCE707.3	Assignment, Quiz & End Sem Exam
29	flow duration curve, mass curve	Lecture	BTCE707.3	Assignment, Quiz & End Sem Exam
30	droughts and floods	Lecture	BTCE707.3	Assignment, Quiz & End Sem Exam
31	Factors affecting flood hydrographs	Lecture	BTCE707.3	Assignment, Quiz & End Sem Exam
32	unit hydrograph	Lecture	BTCE707.3	Assignment, Quiz & End Sem Exam
33	unit hydrograph and its analysis	Lecture	BTCE707.3	Assignment, Quiz & End Sem Exam
34	s-curve hydrograph	Lecture	BTCE707.3	Assignment, Quiz & End Sem Exam
35	Synthetic hydrographs	Lecture	BTCE707.3	Assignment, Quiz & End Sem Exam
36	instantaneous unit hydrographs	Lecture	BTCE707.3	Assignment, Quiz & End Sem Exam
37	Rational method	Lecture	BTCE707.4	Quiz & End Sem Exam
38	empirical formulae	Lecture	BTCE707.4	Quiz & End Sem Exam
39	unit hydrograph method	Lecture	BTCE707.4	Quiz & End Sem Exam
40	flood frequency studies	Lecture	BTCE707.4	Quiz & End Sem Exam
41	statistical analysis	Lecture	BTCE707.4	Quiz & End Sem Exam
42	regional flood frequency analysis,	Lecture	BTCE707.4	Quiz & End Sem Exam
43	design storm & design flood	Lecture	BTCE707.4	Quiz & End Sem Exam
44	risk/reliability and safety factor	Lecture	BTCE707.4	Quiz & End Sem Exam
45	Flood Routing: Basic equation	Lecture	BTCE707.4	Quiz & End Sem Exam
46	hydrologic storage routing &attenuation	Lecture	BTCE707.4	Quiz & End Sem Exam
47	hydrologic channel routing, flood forecasting & control	Lecture	BTCE707.4	Quiz & End Sem Exam
48	hydraulic method of flood routing	Lecture	BTCE707.4	Quiz & End Sem Exam

T. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE707.1	Understand the process and mathematical representation of hydrologic cycle	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
BTCE707.2	Understand the importance of catchment characteristics for runoff estimation	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE707.3	Evaluate the hydrologic abstractions and also learn about the factors affecting various hydrologic abstractions	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
BTCE707.4	Implementing the knowledge of precipitation and runoff measurement in hydrologic design	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**

				HYDROLOGY & FLOOD CONTROL		
Course Code				BTCE 707		
Units		Associated Credit		4		
Ser. No.	Name	Enrollment No.	Roll No.	30	70	100
1	A. POORNA ANAND	A60215814033	AU14UCV1201	12	49	61
2	ABHISHEK PRATAP SINGH SIKARWAR	A60215814024	AU14UCV1202	26	48	74
3	ABHISHEK SINGH PARMAR	A60215814028	AU14UCV1203	15	35	50
4	ABHISHANK TOMAR	A60215814032	AU14UCV1204	12	34	46
5	ABID KHAN	A60215814019	AU14UCV1205	9	35	44
6	ADITYA GUPTA	A60215814029	AU14UCV1206	21	42	63
7	AKSHAY KUMAR	A60215814008	AU14UCV1207	15	35	50
8	DEEPAK YADAV	A60215814016	AU14UCV1209	18	42	60
9	GAURAV YADAV	A60215814020	AU14UCV1210	14	31	45
10	EKTA BAJPAI	A60215814010	AU14UCV1211	11	35	46
11	GOURANG SHARMA	A60215814012	AU14UCV1212	20	37	57
12	HEMENDRA DABARIYA	A60515814001	AU14UCV1213	16	47	63
13	NIKHIL TYAGI	A60215814022	AU14UCV1215	17	37	54
14	PRASHANT SHARMA	A60215814007	AU14UCV1216	21	36	57
15	RAHUL SINGH	A60215814025	AU14UCV1217	20	50	70

16	RAJAN SINGH DHAKAD	A60215814011	AU14UCV1218	12	32	44
17	RISHABH RATHORE	A60215814023	AU14UCV1219	18	48	66
18	RYENA HAROON	A60215814030	AU14UCV1221	15	45	60
19	SACHIN TRIPATHI	A60215814004	AU14UCV1222	21	48	69
20	SACHINDRA VISHWAKARMA	A60215814018	AU14UCV1223	13	44	57
21	SHASHANK SINGH CHAUHAN	A60215814002	AU14UCV1224	18	42	60
22	SHREYANSH SINGHAL	A60215814014	AU14UCV1225	25	56	81
23	SHUBHAM KUMAR	A60215814013	AU14UCV1226	21	57	78
24	SHUBHAM KUMAR	A60215814031	AU14UCV1227	19	43	62
25	SHUBHAM VERMA	A60215814009	AU14UCV1228	20	49	69
26	VAIBHAV TYAGI	A60215814006	AU14UCV1229	16	46	62
27	VIPUL SINGH YADAV	A60215814017	AU14UCV1230	20	35	55

				HYDROLOGY & FLOOD CONTROL
				BTCE 707
				4
No. of students attended the Exam				27
No. of students secure more than 60% marks				12
Percentage of students secure more than 60% marks				44.44
Attainment Level				-

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : ENVIRONMENTAL ENGINEERING LAB
Course Code : BTCE720 Crédits : 01, Session :2018-19 (Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia, Dr. Imran Ahmad Khan, Dr. Ripunjoy Gogoi, Dr. P. Mahakavi, Mr. Sachin Tiwari

A. ***Introduction:*** *The objective of this course is to* teach students the basic principles and concepts of unit operations and processes involvedin water and wastewater treatment. To develop a student's skill in the basic design of unit operations and processesinvolved in water and wastewater treatment. To develop a student's skill in evaluating the performance of water and wastewater treatmentplants. To teach students the various methods of sludge management

B. **Course Outcomes:** At the end of the course, students will be able to:

BTCE720.1. Able to design individual unit operation or process appropriate to the situation by applying physical, chemical, biological and engineering principles.

BTCE720.2. Able to identify the type of unit operations and processes involved in water and wastewater treatment plants based on the water quality

BTCE720.3. Investigate the performance of various unit operations and processes to meet the desired health and environment related goals.

BTCE720.4. Understand sludge management and disposal

U. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

V. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

W. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

X. Syllabus

1. Determination of solids (total, dissolved, organic, inorganic and settleable) in water

2. Determination of turbidity and the optimum coagulant dose

3. Determination of alkalinity and pH of water

4. Determination of hardness and chlorides in water

5. Determination of iron and manganese in water

6. Determination of sulphates and sulphides in water

7. Determination of D.O and B.O.D of waste water

8. Determination of available chlorine in bleaching powder and the chlorine dose required to treat the given water sample

9. Determination of coliforms in water

10. Demonstration of Instrumental methods of pollutant analysis

Y. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Z. Suggested Text/Reference Books:

- Standard method for the examination of water and waste water, 2005, APHA, AWWA, WPCF Publication

AA. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Determination of solids (total, dissolved, organic, inorganic and settleable) in water	Practical	BTCE720.1	Mid Term-1, Quiz & End Sem Exam
2	Determination of turbidity and the optimum coagulant dose	Practical	BTCE720.1	Mid Term-1, Quiz & End Sem Exam
3	Determination of alkalinity and pH of water	Practical	BTCE720.1	Mid Term-1, Quiz & End Sem Exam
4	Determination of hardness and chlorides in water	Practical	BTCE720.2	Mid Term-1, Quiz & End Sem Exam
5	Determination of iron and manganese in water	Practical	BTCE720.2	Mid Term-1, Quiz & End Sem Exam
6	Determination of sulphates and sulphides in water	Practical	BTCE720.2	Mid Term-1, Quiz & End Sem Exam
7	Determination of D.O and B.O.D of waste water	Practical	BTCE720.3	Mid Term-1, Quiz & End Sem Exam

8	Determination of available chlorine in bleaching powder and the chlorine dose required to treat the given water sample	Practical	BTCE720.3	Mid Term-1, Quiz & End Sem Exam
9	Determination of coliforms in water	Practical	BTCE720.3	Mid Term-1, Quiz & End Sem Exam
10	Determination of coliforms in water	Practical	BTCE720.4	Mid Term-1, Quiz & End Sem Exam
11	Demonstration of Instrumental methods of pollutant analysis	Practical	BTCE720.4	Mid Term-1, Quiz & End Sem Exam
12	Demonstration of Instrumental methods of pollutant analysis	Practical	BTCE720.4	Mid Term-1, Quiz & End Sem Exam

BB. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE720.1	Able to design individual unit operation or process appropriate to the situation by applying physical, chemical, biological and engineering principles.	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
BTCE720.2	Able to identify the type of unit operations and processes involved in water and wastewater treatment plants based on the water quality	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE720.3	Investigate the performance of various unit operations and processes to meet the desired health and environment	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**

	related goals.															
BTCE720.4	Understand sludge management and disposal	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**

				ENVIRONMENTAL ENGINEERING LAB		
Course Code				**BTCE 720**		
Credit Units		**Associated**		**1**		
Ser. No.	**Name**	**Enrollment No.**	**Roll No.**	**30**	**70**	**100**
1	**A. POORNA ANAND**	**A60215814033**	**AU14UCV1201**	**25**	**57**	**82**
2	**ABHISHEK PRATAP SINGH SIKARWAR**	**A60215814024**	**AU14UCV1202**	**24**	**57**	**81**
3	**ABHISHEK SINGH PARMAR**	**A60215814028**	**AU14UCV1203**	**22**	**58**	**80**
4	**ABHISHANK TOMAR**	**A60215814032**	**AU14UCV1204**	**23**	**50**	**73**
5	**ABID KHAN**	**A60215814019**	**AU14UCV1205**	**23**	**56**	**79**
6	**ADITYA GUPTA**	**A60215814029**	**AU14UCV1206**	**23**	**60**	**83**
7	**AKSHAY KUMAR**	**A60215814008**	**AU14UCV1207**	**16**	**50**	**66**
8	**DEEPAK YADAV**	**A60215814016**	**AU14UCV1209**	**25**	**63**	**88**
9	**GAURAV YADAV**	**A60215814020**	**AU14UCV1210**	**19**	**50**	**69**
10	**EKTA BAJPAI**	**A60215814010**	**AU14UCV1211**	**18**	**55**	**73**
11	**GOURANG SHARMA**	**A60215814012**	**AU14UCV1212**	**23**	**56**	**79**
12	**HEMENDRA DABARIYA**	**A60515814001**	**AU14UCV1213**	**24**	**60**	**84**
13	**NIKHIL TYAGI**	**A60215814022**	**AU14UCV1215**	**23**	**60**	**83**
14	**PRASHANT SHARMA**	**A60215814007**	**AU14UCV1216**	**25**	**56**	**81**
15	**RAHUL SINGH**	**A60215814025**	**AU14UCV1217**	**23**	**58**	**81**

16	RAJAN SINGH DHAKAD	A60215814011	AU14UCV1218	22	51	73
17	RISHABH RATHORE	A60215814023	AU14UCV1219	22	55	77
18	RYENA HAROON	A60215814030	AU14UCV1221	20	55	75
19	SACHIN TRIPATHI	A60215814004	AU14UCV1222	25	57	82
20	SACHINDRA VISHWAKARMA	A60215814018	AU14UCV1223	23	52	75
21	SHASHANK SINGH CHAUHAN	A60215814002	AU14UCV1224	23	59	82
22	SHREYANSH SINGHAL	A60215814014	AU14UCV1225	25	60	85
23	SHUBHAM KUMAR	A60215814013	AU14UCV1226	23	55	78
24	SHUBHAM KUMAR	A60215814031	AU14UCV1227	21	54	75
25	SHUBHAM VERMA	A60215814009	AU14UCV1228	23	58	81
26	VAIBHAV TYAGI	A60215814006	AU14UCV1229	22	55	77
27	VIPUL SINGH YADAV	A60215814017	AU14UCV1230	23	52	75

	ENVIRONMENTAL ENGINEERING LAB
	BTCE 720
	1
No. of students attended the Exam	27
No. of students secure more than 60% marks	27
Percentage of students secure more than 60% marks	100.00
Attainment Level	Level 3

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : STRUCTURAL DETAILING LAB
Course Code : BTCE721 Crédits : 01, Session :2018-19 (Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia, Dr. Imran Ahmad Khan, Dr. Ripunjoy Gogoi, Dr. P. Mahakavi, Mr. Sachin Tiwari

C. ***Introduction:*** *The objective of this course is to* understand the design of columns. To understand the design of beams. To know the importance of the beams and its applications. To apply the numerical techniques for different structural elements. To study the different numerical procedures for calculating the response of structures. To learn the design of frames, slabs.

D. **Course Outcomes:** At the end of the course, students will be able to:
BTCE721.1. Understand the designand theories of slabs.
BTCE721.2. Understand the design and theories of columns.
BTCE721.3. Understand the design and theories of beams.
BTCE721.4. Understand the design and theories of foundations.

CC. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

DD. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

EE. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

FF. Syllabus

Preparation of working drawings for the following using any drafting software:

RC Beams- Simply supported, Continuous, Cantilever

T – beam / L-beam floor

Slabs – Simply supported, Continuous, One way and two way slabs.

Columns – Tied Columns and Spirally reinforced columns.

Isolated footings for RC Columns.

Combined rectangular and trapezoidal footings.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

GG. Suggested Text/Reference Books:

- SPurushothaman. P, Reinforced Concrete Structural Elements-, Tata McGraw Hill, 1986
- G.S. Ramaswamy, Design and Construction of Concrete Shell Roofs-CBS publishers, 1986
- Ashok K Jain, Reinforced Concrete –Nem Chand Bros. Roorkee, 1998
- Jain & Jaikrishna, Plain and Reinforced Concrete – Vol I & II, Nem Chand Bros., Roorkee, 2000.
- Taylor C Pere, Reinforced Concrete Chimneys, Concrete publications, 1960
- Design of deep girders, Concrete Association of India, 1960
- Mallick & Gupta, Reinforced Concrete, - Oxford & IBH, 1982
- BIS codes (IS 456, IS 2210, IS 4998, IS 3370, SP 16, SP 24, SP 34).
- IRC Codes (IRC 5, IRC 6, IRC 21)

HH. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Corresponding CO**	**Mode of Assessing CO**
1	RC Beams- Simply supported, Continuous, Cantileve	Practical	BTCE721.1	Mid Term-1, Quiz & End Sem Exam
2	RC Beams- Simply supported, Continuous, Cantileve	Practical	BTCE721.1	Mid Term-1, Quiz & End Sem Exam
3	T – beam / L-beam floor	Practical	BTCE721.1	Mid Term-1, Quiz & End Sem Exam
4	T – beam / L-beam floor	Practical	BTCE721.2	Mid Term-1, Quiz & End Sem Exam
5	Slabs – Simply supported, Continuous, One way and two way slabs.	Practical	BTCE721.2	Mid Term-1, Quiz & End Sem Exam
6	Slabs – Simply supported, Continuous, One way and two way slabs.	Practical	BTCE721.2	Mid Term-1, Quiz & End Sem Exam

7	Columns – Tied Columns and Spirally reinforced columns.	Practical	BTCE721.3	Mid Term-1, Quiz & End Sem Exam
8	Columns – Tied Columns and Spirally reinforced columns.	Practical	BTCE721.3	Mid Term-1, Quiz & End Sem Exam
9	Isolated footings for RC Column	Practical	BTCE721.3	Mid Term-1, Quiz & End Sem Exam
10	Isolated footings for RC Column	Practical	BTCE721.4	Mid Term-1, Quiz & End Sem Exam
11	Combined rectangular and trapezoidal footings	Practical	BTCE721.4	Mid Term-1, Quiz & End Sem Exam
12	Combined rectangular and trapezoidal footings	Practical	BTCE721.4	Mid Term-1, Quiz & End Sem Exam

II. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE721.1	Understand the design and theories of slabs.	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
BTCE721.2	Understand the design and theories of columns.	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE721.3	Understand the design and theories of beams.	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
BTCE721.4	Understand the design and theories of foundations.	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**

				STRUCTURAL DETAILING LAB		
Course Code				BTCE 721		
Units		Associated Credit		1		
Ser. No.	Name	Enrollment No.	Roll No.	30	70	100
1	A. POORNA ANAND	A60215814033	AU14UCV1201	26	48	74
2	ABHISHEK PRATAP SINGH SIKARWAR	A60215814024	AU14UCV1202	24	61	85
3	ABHISHEK SINGH PARMAR	A60215814028	AU14UCV1203	23	52	75
4	ABHISHANK TOMAR	A60215814032	AU14UCV1204	25	53	78
5	ABID KHAN	A60215814019	AU14UCV1205	23	57	80
6	ADITYA GUPTA	A60215814029	AU14UCV1206	21	53	74
7	AKSHAY KUMAR	A60215814008	AU14UCV1207	17	50	67
8	DEEPAK YADAV	A60215814016	AU14UCV1209	23	58	81
9	GAURAV YADAV	A60215814020	AU14UCV1210	19	47	66
10	EKTA BAJPAI	A60215814010	AU14UCV1211	16	42	58
11	GOURANG SHARMA	A60215814012	AU14UCV1212	23	54	77
12	HEMENDRA DABARIYA	A60515814001	AU14UCV1213	23	54	77
13	NIKHIL TYAGI	A60215814022	AU14UCV1215	23	50	73
14	PRASHANT SHARMA	A60215814007	AU14UCV1216	27	53	80
15	RAHUL SINGH	A60215814025	AU14UCV1217	23	57	80

16	RAJAN SINGH DHAKAD	A60215814011	AU14UCV1218	21	52	73
17	RISHABH RATHORE	A60215814023	AU14UCV1219	22	54	76
18	RYENA HAROON	A60215814030	AU14UCV1221	20	46	66
19	SACHIN TRIPATHI	A60215814004	AU14UCV1222	26	58	84
20	SACHINDRA VISHWAKARMA	A60215814018	AU14UCV1223	24	51	75
21	SHASHANK SINGH CHAUHAN	A60215814002	AU14UCV1224	23	58	81
22	SHREYANSH SINGHAL	A60215814014	AU14UCV1225	26	62	88
23	SHUBHAM KUMAR	A60215814013	AU14UCV1226	24	58	82
24	SHUBHAM KUMAR	A60215814031	AU14UCV1227	21	50	71
25	SHUBHAM VERMA	A60215814009	AU14UCV1228	24	56	80
26	VAIBHAV TYAGI	A60215814006	AU14UCV1229	22	49	71
27	VIPUL SINGH YADAV	A60215814017	AU14UCV1230	20	51	71

				STRUCTURAL DETAILING LAB
				BTCE 721
				1
No. of students attended the Exam				27
No. of students secure more than 60% marks				26
Percentage of students secure more than 60% marks				96.30
Attainment Level				Level 3

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **PROJECT**
Course Code : BTCE760, Crédits : 06, Session :2018-19 (Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia, Dr. Imran Ahmad Khan, Dr. Ripunjoy Gogoi, Dr. P. Mahakavi, Mr. Sachin Tiwari

A. **Introduction:** The objective of project is to enable the student to take up investigative study in the broad field of Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the Department on an individual basis or two/three students in a group, under the guidance of a Supervisor.

B. **Course Outcomes:**At the end of the course, students will be able to:
BTCE760.1. Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.
BTCE760.2. Design, implement and test the prototype/algorithm in order to solve the conceived problem.
BTCE760.3. Write comprehensive report on project work.

C. **Programme Outcomes:**
PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
End Semester Examination	End Semester Examination	EE	100%
Total			**100%**

F. Syllabus

Methodology:

Practical training is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

G. Examination Scheme:

Literature study/ Fabrication/ Experimentation	40
Written Report	20

Viva	15
Presentation	25
Total	**100**

H. Suggested Text/Reference Books: NA

I. Lecture Plan : NA

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE760.1	*Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.*	3	**2**	1	3	1	-	-	-	2		2	1	**1**	**2**	**1**
BTCE760.2	*Design, implement and test the prototype/algorithm in order to solve the conceived problem.*	3	1	2	2	2	-	-	-	2		1	1	**3**	**2**	**3**
BTCE760.3	*Write comprehensive report on project work*	2	2	2	2	2	-	-	-	3		3	1	**3**	**3**	**2**

				PROJECT
Course Code				BTCE 760
Units		Associated Credit		6
Ser. No.	Name	Enrollment No.	Roll No.	100
1	A. POORNA ANAND	A60215814033	AU14UCV1201	82
2	ABHISHEK PRATAP SINGH SIKARWAR	A60215814024	AU14UCV1202	82
3	ABHISHEK SINGH PARMAR	A60215814028	AU14UCV1203	75
4	ABHISHANK TOMAR	A60215814032	AU14UCV1204	70
5	ABID KHAN	A60215814019	AU14UCV1205	79
6	ADITYA GUPTA	A60215814029	AU14UCV1206	80
7	AKSHAY KUMAR	A60215814008	AU14UCV1207	68
8	DEEPAK YADAV	A60215814016	AU14UCV1209	81
9	GAURAV YADAV	A60215814020	AU14UCV1210	65
10	EKTA BAJPAI	A60215814010	AU14UCV1211	68
11	GOURANG SHARMA	A60215814012	AU14UCV1212	79
12	HEMENDRA DABARIYA	A60515814001	AU14UCV1213	81
13	NIKHIL TYAGI	A60215814022	AU14UCV1215	80
14	PRASHANT SHARMA	A60215814007	AU14UCV1216	77
15	RAHUL SINGH	A60215814025	AU14UCV1217	74

16	RAJAN SINGH DHAKAD	A60215814011	AU14UCV1218	73
17	RISHABH RATHORE	A60215814023	AU14UCV1219	76
18	RYENA HAROON	A60215814030	AU14UCV1221	72
19	SACHIN TRIPATHI	A60215814004	AU14UCV1222	77
20	SACHINDRA VISHWAKARMA	A60215814018	AU14UCV1223	72
21	SHASHANK SINGH CHAUHAN	A60215814002	AU14UCV1224	82
22	SHREYANSH SINGHAL	A60215814014	AU14UCV1225	82
23	SHUBHAM KUMAR	A60215814013	AU14UCV1226	75
24	SHUBHAM KUMAR	A60215814031	AU14UCV1227	65
25	SHUBHAM VERMA	A60215814009	AU14UCV1228	78
26	VAIBHAV TYAGI	A60215814006	AU14UCV1229	73
27	VIPUL SINGH YADAV	A60215814017	AU14UCV1230	72

				PROJECT
				BTCE 760
				6
No. of students attended the Exam				**27**
No. of students secure more than 60% marks				27
Percentage of students secure more than 60% marks				100
Attainment Level				Level 3

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **INDUSTRIAL TRAINING**
Course Code : BTCE750, Crédits : 06, Session :2018-19 (Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia, Dr. Imran Ahmad Khan, Dr. Ripunjoy Gogoi, Dr. P. Mahakavi, Mr. Sachin Tiwari

K. **Introduction:** The objective of this course is to enable the students to explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills. It will help them to manage the technical content and work. It will also help them to prepare and present technical report..

L. **Course Outcomes:**At the end of the course, students will be able to:

BTCE750.1. Explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills.

BTCE750.2. Manage the technical content and work.

BTCE750.3. Learn the various administrative process followed in industry and prepare and present technical report.

M. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

N. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

O. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
End Semester Examination	End Semester Examination	EE	100%
Total			**100%**

P. Syllabus

Methodology:

Industrial training is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

Q. Examination Scheme:

Feedback from industry/work place	20
Training Report	40
Viva	15
Presentation	25
Total	**100**

R. Suggested Text/Reference Books: NA

S. Lecture Plan : NA

T. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE750.1	Explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills.	3	**2**	1	3	1	-	-	-	2		2	1	**1**	**2**	**1**
BTCE750.2	Manage the technical content and work.	3	1	2	2	2	-	-	-	2		1	1	**3**	**2**	**3**
BTCE750.3	Learn the various administrative process followed in industry and prepare and present technical report.	2	2	2	2	2	-	-	-	3		3	1	**3**	**3**	**2**

PROGRAMME ARTICULATION MATRIX																
4th Year		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
VIII SEM	BTCE-801	3	2	2	-	2	-	-	3	2	-	-	2	3	-	2
	BTCE-802	3	2	2	-	-	-	1	-	-	-	-	2	3	-	2
	BTCE-804	3	2	2	-	2	-	1	-	-	-	-	2	3	-	2
	BTCE-86 0	3	2	2	-	2	-	1	-	-	-	-	2	3	-	2

dvs

				INDUSTRIAL TRAINING (EVALUATION)
Course Code				BTCE 750
Associated Credit Units				6
Ser. No.	Name	Enrollment No.	Roll No.	100
1	A. POORNA ANAND	A60215814033	AU14UCV1201	82
2	ABHISHEK PRATAP SINGH SIKARWAR	A60215814024	AU14UCV1202	80
3	ABHISHEK SINGH PARMAR	A60215814028	AU14UCV1203	78
4	ABHISHANK TOMAR	A60215814032	AU14UCV1204	71
5	ABID KHAN	A60215814019	AU14UCV1205	75
6	ADITYA GUPTA	A60215814029	AU14UCV1206	79
7	AKSHAY KUMAR	A60215814008	AU14UCV1207	65

8	DEEPAK YADAV	A60215814016	AU14UCV1209	80
9	GAURAV YADAV	A60215814020	AU14UCV1210	65
10	EKTA BAJPAI	A60215814010	AU14UCV1211	67
11	GOURANG SHARMA	A60215814012	AU14UCV1212	78
12	HEMENDRA DABARIYA	A60515814001	AU14UCV1213	80
13	NIKHIL TYAGI	A60215814022	AU14UCV1215	80
14	PRASHANT SHARMA	A60215814007	AU14UCV1216	78
15	RAHUL SINGH	A60215814025	AU14UCV1217	77
16	RAJAN SINGH DHAKAD	A60215814011	AU14UCV1218	75
17	RISHABH RATHORE	A60215814023	AU14UCV1219	75
18	RYENA HAROON	A60215814030	AU14UCV1221	73
19	SACHIN TRIPATHI	A60215814004	AU14UCV1222	78
20	SACHINDRA VISHWAKARMA	A60215814018	AU14UCV1223	70
21	SHASHANK SINGH CHAUHAN	A60215814002	AU14UCV1224	81
22	SHREYANSH SINGHAL	A60215814014	AU14UCV1225	80
23	SHUBHAM KUMAR	A60215814013	AU14UCV1226	72
24	SHUBHAM KUMAR	A60215814031	AU14UCV1227	65
25	SHUBHAM VERMA	A60215814009	AU14UCV1228	76
26	VAIBHAV TYAGI	A60215814006	AU14UCV1229	78
27	VIPUL SINGH YADAV	A60215814017	AU14UCV1230	72

				SIP
				BTCE 750
				6

No. of students attended the Exam	**27**
No. of students secure more than 60% marks	27
Percentage of students secure more than 60% marks	100
Attainment Level	Level 3

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **ADVANCED CONCRETE DESIGN**
Course Code : BTCE 801, Crédits : 04, Session : 2018-19 (Even Sem.), Class : B.Tech. 4th Year
Faculty Name : Mr. Sachin Tiwari

A. **Introduction**

Design is a plan or drawing produced to show the look and function or workings of a building before it is built. It is also the process of selecting the proper materials and proportioning the different elements of the structure according to state-of-the art engineering science and technology.

B. **Course Outcomes:** At the end of the course, students will be able to:

- **BTCE 801.1**.Estimate the crack width and deflection with regard to the serviceability. .
- **BTCE 801.2**. Analyse and design a grid floor system. Analyse and design a flat slab system. Discuss fire and seismic resistance of concrete structures

C. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentt	A	5%

	o be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			100%

F. **Course Content**

Module I Large span concrete roofs: Introduction– classification- behaviour of flat slabs - direct design and equivalent frame method- codal provisions - waffle slabs.

Module II: Deep beams Analysis of deep beams- design as per BIS - design using strut and tie method.

Chimneys Analysis of stresses in concrete chimneys - uncracked and cracked sections- codal provisions- design of chimney. A project involving the design of a deep beam and concrete chimney is envisaged at this stage.

Module III: Water tanks /Bunkers/Silos: Introduction- rectangular and circular with flat bottom- spherical and conical tank roofs- staging- design as per BIS. A project involving the design and detailing of a water tank is envisaged at this stage.

Module IV: Bridges : Design of slab culvert – R.C box culverts –T-beam bridges – Concept on design of continuous bridges, balanced cantilever bridges, arch bridges and rigid frame bridges. A project involving the design and detailing of a slab culvert/ T-beam bridge is envisaged at this stage.

G. **Examination Scheme:**

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. **Suggested Books**

- Purushothaman. P, Reinforced Concrete Structural Elements-, Tata McGraw Hill, 1986
- G.S. Ramaswamy, Design and Construction of Concrete Shell Roofs-CBS publishers, 1986
- Ashok K Jain, Reinforced Concrete –Nem Chand Bros. Roorkee, 1998
- Jain & Jaikrishna, Plain and Reinforced Concrete – Vol I & II, Nem Chand Bros., Roorkee, 2000.
- Taylor C Pere, Reinforced Concrete Chimneys, Concrete publications, 1960

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Introduction	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
2	classification- behaviour of flat slabs.	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
3	classification- behaviour of flat slabs.	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
4	Design and classification-behaviour of flat slabs.	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
5	direct design and equivalent frame method	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
6	direct design and equivalent frame method	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
7	direct design and equivalent frame method	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
8	direct design and equivalent frame method	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
9	codal provisions for design of flat slab	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
10	codal provisions for design of flat slab	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
11	Analysis of deep beams- design as per BIS - design using strut and tie method.	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
12	Analysis of deep beams design as per BIS - design using strut and tie method.	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
13	Analysis of deep beams design as per BIS - design using strut and tie method.	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
14	**Chimneys** Analysis of stresses in concrete chimneys	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
15	**Chimneys** Analysis of stresses in concrete chimneys	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam

16	**Chimneys** Analysis of stresses in concrete chimneys	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
17	uncracked and cracked sections	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
18	uncracked and cracked sections	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
19	codal provisions- design of chimney. A project involving the design of a deep beam and concrete chimney is envisaged at this stage.	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
20	codal provisions- design of chimney. A project involving the design of a deep beam and concrete chimney is envisaged at this stage.	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
21	codal provisions- design of chimney. A project involving the design of a deep beam and concrete chimney is envisaged at this stage.	Lecture	BTCE 801.1	Mid Term-2, Quiz & End Sem Exam
22	Introduction	Lecture	BTCE 801.1	Mid Term-2, Quiz & End Sem Exam
23	Rectangular and circular with flat bottom- spherical and conical tank roofs- staging- design as per BIS.	Lecture	BTCE 801.1	Mid Term-2, Quiz & End Sem Exam
24	Rectangular and circular with flat bottom- spherical and conical tank roofs- staging- design as per BIS.	Lecture	BTCE 801.1	Mid Term-2, Quiz & End Sem Exam
25	Rectangular and circular with flat bottom- spherical and conical tank roofs- staging- design as per BIS.	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
26	Rectangular and circular with flat bottom- spherical and conical tank roofs- staging- design as per BIS.	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
27	A project involving the design and detailing of a water tank is envisaged at this stage.	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
28	A project involving the design and detailing of a water tank is envisaged at this stage.	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
29	A project involving the design and detailing of a water tank is	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam

	envisaged at this stage.			
30	A project involving the design and detailing of a water tank is envisaged at this stage.	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
31	Design of slab culvert – R.C box culverts –T, balanced cantilever bridges, arch bridges and rigid frame bridges.	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
32	Beam bridges – Concept on design of continuous bridges	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
33	Beam bridges – Concept on design of continuous bridges	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
34	Beam bridges – Concept on design of continuous bridges	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
35	balanced cantilever bridges, arch bridges and rigid frame bridges.	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
36	balanced cantilever bridges, arch bridges and rigid frame bridges	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
37	A project involving the design and detailing of a slab culvert/ T-beam bridge is envisaged at this stage	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
38	A project involving the design and detailing of a slab culvert/ T-beam bridge is envisaged at this stage	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
39	A project involving the design and detailing of a slab culvert/ T-beam bridge is envisaged at this stage	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
40	A project involving the design and detailing of a slab culvert/ T-beam bridge is envisaged at this stage	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
41	Beam bridges – Concept on design of continuous bridges	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
42	Beam bridges – Concept on design of continuous bridges	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
43	balanced cantilever bridges, arch bridges and rigid frame bridges.	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
44	balanced cantilever bridges, arch bridges and rigid frame bridges	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
45	A project involving the design and detailing of a slab culvert/ T-beam bridge is envisaged at this stage	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam

46	A project involving the design and detailing of a slab culvert/ T-beam bridge is envisaged at this stage	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
47	A project involving the design and detailing of a slab culvert/ T-beam bridge is envisaged at this stage	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
48	A project involving the design and detailing of a slab culvert/ T-beam bridge is envisaged at this stage	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam

E. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE 801.1	Estimate the crack width and deflection with regard to the serviceability. .	3	3	1	3	1				2		2	1			
BTCE 801.2	Analyse and design a grid floor system. Analyse and design a flat slab system. Discuss fire and seismic resistance of concrete structures	3	2	2	2	2				2		1	1			

				ADVANCED CONCRETE DESIGN		
Course Code				BTCE 801		
Associated Credit Units				3		
S er. No.	Name	Enrollment No.	Roll No.	30	70	100
1	ABHISHEK MODI	A60215815012	AU15UCV8371	21	39	60
2	AJAY SINGH SIKARWAR	A60215815016	AU15UCV8372	21	39	60
3	ANCHAL SHRIVASTAVA	A60215815024	AU15UCV8373	23	44	67
4	ASHUTOSH DAIPURIA	A60215815017	AU15UCV8375	27	45	72
5	AYUSHI GUPTA	A60215815025	AU15UCV8376	20	40	60
6	BRAJMOHAN SINGH KUSHWAH	A60215815013	AU15UCV8377	24	44	68
7	DEEPAK SHRIVASTAVA	A60215815018	AU15UCV8378	29	50	79
8	HIMANSHU GUPTA	A60215815026	AU15UCV8380	22	45	67
9	JAGRATI DHINGRA	A60215815023	AU15UCV8381	19	27	46
10	NAVNEET PATHAK	A60215815003	AU15UCV8383	21	28	49
11	NIKHIL SINGH CHAUHAN	A60215815019	AU15UCV8384	24	41	65
12	PAWAN KUMAR SINGH	A60215815008	AU15UCV8385	23	46	69
13	SHALINI CHAKRABORTY	A60215815001	AU15UCV8386	22	35	57
14	SHISHIR SINGH	A60215815004	AU15UCV8387	29	41	70
15	SHIVAM GURJAR	A60215815009	AU15UCV8388	24	38	62
16	SUSHIL RAI	A60515815001	AU15UCV8389	26	39	65
17	VAIBHAV KANKAR	A60215815010	AU15UCV8390	24	52	76
18	VAIBHAV RAI	A60215815005	AU15UCV8391	20	40	60
19	VAISHNAV SAXENA	A60215815014	AU15UCV8392	29	50	79
20	VIPUL TRIPATHI	A60215815006	AU15UCV8394	21	36	57
21	YASH SONI	A60215815022	AU15UCV8396	20	39	59

				ADVANCED CONCRETE DESIGN
				BTCE 801
				3
No. of students attended the Exam				21
No. of students secure more than 60% marks				12
Percentage of students secure more than 60% marks				57.14
Attainment Level				-

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **ENGINEERING ECONOMICS AND MANAGEMENT**
Course Code : BTCE 802, Crédits : 03, Session : 2021-22 (Even Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Ripunjoy Gogoi

A. Introduction

This course aims to enables the Civil Engineering student to become an entrepreneur by understanding the law of economics. To ensure the students to apply different Methods of appraisal of projects and pricing techniques apart from knowing about various Macroeconomics Model.

Course Outcomes: At the end of the course, students will be able to:

- **BTCE 802.1**.Know the Scope and Method of Managerial economics along with Fundamental Economics and help them to develop a thorough understanding on engineering decision making.
- **BTCE 802.2**. Analyse the demand and supply adopting market strategy
- **BTCE 802.3.** Understand the production function and factors affecting it with various economy conditions of the firm.
- **BTCE 802.4.** Study the different types of market structure and strategies

- **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

B. Assessment Plan:

Component of Evaluation	Description	Code	Weightage
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentt o be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			100%

C. Course Content

Module I: Organisations and their Economic Environment: Definition of Economics and Managerial Economics – Nature and Scope – Definition and Concept of Good, Want, Value, Wealth, Utility – Utility and Demand – Law of Diminishing Marginal Utility – Assumptions and Importance. Demand and Supply – Law of Demand and Law of Supply. Market price and natural price. Standard market forms- Monopoly, Perfect competition. Organisational forms- Proprietorship, partnership, Joint Stock Company – Cooperative organisation.

Module II: Macroeconomics: Money- nature and functions – Inflation and Deflation – Kinds of Banking – commercial banks – Central banking – Credit instrument - Monetary Policy – International trade Balance of trade and Balance of Payments – taxation – Direct and Indirect taxes – Impact and Incidence of tax- Concept of National Income – Features with reference to developing countries.

Module III: Introduction to Management: Management Theory- Characteristics of management – Systems Approach to management –Concepts of goal, objective, strategies, programmes. Decision making under certainty, uncertainty and risk – Introduction to functional areas of management – Operations management, Human resources management, marketing management.

Module IV: Financial and Inventory Management: Need for Financial Management – Types of financing – Short term and long term Borrowing– Equity financing – Analysis of Financial Statement – balance sheet – Profit and Loss account – Fund flow statement – Ratio Analysis . Investment and Financial decision –Financial control and Job control. Functions and objectives of Inventory management – Decision models – Economic Order Quantity (EOQ) model – sensitivity analysis of EOQ model, Economic production lot size model – inventory model with planned shortages – Periodic order quantity – single period Inventory models – Simulation model for inventory analysis.

Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

D. Suggested Books

- Konni, Donnel C.O. and Weighnrich. H., Management, Eight Edition, McGraw Hill International Book Company, 1997.
- Philip Kotler, Marketing Management, Prentice-Hall of India, Edition 1998.
- G.W. Plossl, Production and inventory control by, Prentice Hall.
- Paul A Samuelson and William D Nardhaus, Economics, McGraw Hill International Edition.
- Barthwal R R, Industrial Economics – An Introductory Text Book, New Age International Pvt Ltd, 2000.
- Aninnya Sen, Microeconomics – Theory and Applications, OUP.
- Sharma J.L., Construction management and accounts, Sathya Prakashan, New Delhi, 1994.
- Srinath,L.S. An Introduction to Project Management, Tata McGraw Hill publications, 1995.

E. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	Definition of Economics and— Assumptions and. Market price and natural price. Standard market forms-	Lecture	BTCE 802.1	Mid Term-1, Quiz & End Sem Exam
2	Managerial Economics – Nature and Scope	Lecture	BTCE 802.1	Mid Term-1, Quiz & End Sem Exam
3	Managerial Economics – Nature	Lecture	BTCE 802.1	Mid Term-1, Quiz

	and Scope			& End Sem Exam
4	Definition and Concept of Good, Want, Value, Wealth, Utility – Utility and Demand	Lecture	BTCE 802.1	Mid Term-1, Quiz & End Sem Exam
5	Definition and Concept of Good, Want, Value, Wealth, Utility – Utility and Demand	Lecture	BTCE 802.1	Mid Term-1, Quiz & End Sem Exam
6	Law of Diminishing Marginal Utility	Lecture	BTCE 802.1	Mid Term-1, Quiz & End Sem Exam
7	Law of Diminishing Marginal Utility	Lecture	BTCE 802.1	Mid Term-1, Quiz & End Sem Exam
8	Importance. Demand and Supply – Law of Demand and Law of Supply	Lecture	BTCE 802.1	Mid Term-1, Quiz & End Sem Exam
9	Importance. Demand and Supply – Law of Demand and Law of Supply	Lecture	BTCE 802.1	Mid Term-1, Quiz & End Sem Exam
10	Monopoly, Perfect competition. Organisational forms- Proprietorship, partnership, Joint	Lecture	BTCE 802.2	Mid Term-1, Quiz & End Sem Exam
11	Stock Company – Cooperative organisation.	Lecture	BTCE 802.2	Mid Term-1, Quiz & End Sem Exam
12	Stock Company – Cooperative organisation.	Lecture	BTCE 802.2	Mid Term-1, Quiz & End Sem Exam
13	Money- nature and functions —— taxation	Lecture	BTCE 802.2	Mid Term-1, Quiz & End Sem Exam
14	Kinds of Banking – commercial banks – Central banking – Credit instrument.	Lecture	BTCE 802.2	Mid Term-1, Quiz & End Sem Exam
15	Kinds of Banking – commercial banks – Central banking – Credit instrument.	Lecture	BTCE 802.2	Mid Term-1, Quiz & End Sem Exam
16	Inflation and Deflation - Monetary Policy	Lecture	BTCE 802.2	Mid Term-1, Quiz & End Sem Exam
17	Inflation and Deflation - Monetary Policy	Lecture	BTCE 802.2	Mid Term-1, Quiz & End Sem Exam
18	International trade Balance of trade and Balance of Payments	Lecture	BTCE 802.2	Mid Term-1, Quiz & End Sem Exam
19	International trade Balance of trade and Balance of Payments	Lecture	BTCE 802.3	Mid Term-1, Quiz & End Sem Exam
20	Direct and Indirect taxes – Impact and Incidence of tax	Lecture	BTCE 802.3	Mid Term-1, Quiz & End Sem Exam
21	Direct and Indirect taxes – Impact and Incidence of tax	Lecture	BTCE 802.3	Mid Term-2, Quiz & End Sem Exam

22	Concept of National Income – Features with reference to developing countries.	Lecture	BTCE 802.3	Mid Term-2, Quiz & End Sem Exam
23	Concept of National Income – Features with reference to developing countries.	Lecture	BTCE 802.3	Mid Term-2, Quiz & End Sem Exam
24	Management Theory-–, programmes. Operations management.	Lecture	BTCE 802.3	Mid Term-2, Quiz & End Sem Exam
25	Characteristics of management – Systems Approach to management	Lecture	BTCE 802.3	Mid Term-2, Quiz & End Sem Exam
26	Characteristics of management – Systems Approach to management	Lecture	BTCE 802.3	Mid Term-2, Quiz & End Sem Exam
27	Concepts of goal, objective, strategies	Lecture	BTCE 802.3	Mid Term-2, Quiz & End Sem Exam
28	Concepts of goal, objective, strategies	Lecture	BTCE 802.4	Mid Term-2, Quiz & End Sem Exam
29	Decision making under certainty, uncertainty and risk – Introduction to functional areas of management	Lecture	BTCE 802.4	Mid Term-2, Quiz & End Sem Exam
30	Decision making under certainty, uncertainty and risk – Introduction to functional areas of management	Lecture	BTCE 802.4	Mid Term-2, Quiz & End Sem Exam
31	Human resources management, marketing management.	Lecture	BTCE 802.4	Mid Term-2, Quiz & End Sem Exam
32	Need for Financial Management – Types of financing – Short term and long term Borrowing– Equity financing .	Lecture	BTCE 802.4	Mid Term-2, Quiz & End Sem Exam
33	Analysis of Financial Statement – balance sheet – Profit and Loss account – Fund flow statement – Ratio Analysis	Lecture	BTCE 802.4	Mid Term-2, Quiz & End Sem Exam
34	Investment and Financial decision –– Economic Order Quantity (EOQ) model – sensitivity analysis of EOQ model, Economic production lot	Lecture	BTCE 802.4	Mid Term-2, Quiz & End Sem Exam
35	Financial control and Job control. Functions and objectives of Inventory management – Decision	Lecture	BTCE 802.4	Mid Term-2, Quiz & End Sem Exam

	models			
36	size model – inventory model with planned shortages – Periodic order quantity – single period Inventory models – Simulation model for inventory analysis.	Lecture	BTCE 802.4	Mid Term-2, Quiz & End Sem Exam

F. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE802.1	Know the Scope and Method of Managerial economics along with Fundamental Economics and help them to develop a thorough understanding on engineering decision making.	3	3	1	3	1				2		2	1			
BTCE802.2	Analyse the demand and supply adopting market strategy	3	2	2	2	2				2		1	1			
BTCE802.3	Understand the production function and factors affecting it with various economy conditions of the firm.	3	3	1	3	1				2		2	1			

BTCE802.4	Study the different types of market structure and strategies	3	2	2	2	2				2		1	1			

				ENGINEERING ECONOMICS AND MANAGEMENT		
Course Code				**BTCE 802**		
Associated Credit Units				**3**		
S er. No.	**Name**	**Enrollment No.**	**Roll No.**	**30**	**70**	**100**
1	ABHISHEK MODI	A60215815012	AU15UCV8371	18	43	61
2	AJAY SINGH SIKARWAR	A60215815016	AU15UCV8372	12	39	51
3	ANCHAL SHRIVASTAVA	A60215815024	AU15UCV8373	16	46	62
4	ASHUTOSH DAIPURIA	A60215815017	AU15UCV8375	19	47	66
5	AYUSHI GUPTA	A60215815025	AU15UCV8376	23	43	66
6	BRAJMOHAN SINGH KUSHWAH	A60215815013	AU15UCV8377	19	42	61
7	DEEPAK SHRIVASTAVA	A60215815018	AU15UCV8378	24	47	71
8	HIMANSHU GUPTA	A60215815026	AU15UCV8380	19	42	61
9	JAGRATI DHINGRA	A60215815023	AU15UCV8381	19	35	54
10	NAVNEET PATHAK	A60215815003	AU15UCV8383	20	39	59
11	NIKHIL SINGH CHAUHAN	A60215815019	AU15UCV8384	18	49	67
12	PAWAN KUMAR SINGH	A60215815008	AU15UCV8385	23	44	67
13	SHALINI CHAKRABORTY	A60215815001	AU15UCV8386	19	33	52
14	SHISHIR SINGH	A60215815004	AU15UCV8387	24	56	80
15	SHIVAM GURJAR	A60215815009	AU15UCV8388	21	55	76
16	SUSHIL RAI	A60515815001	AU15UCV8389	22	39	61
17	VAIBHAV KANKAR	A60215815010	AU15UCV8390	23	51	74

18	VAIBHAV RAI	A60215815005	AU15UCV8391	20	46	66
19	VAISHNAV SAXENA	A60215815014	AU15UCV8392	19	39	58
20	VIPUL TRIPATHI	A60215815006	AU15UCV8394	18	50	68
21	YASH SONI	A60215815022	AU15UCV8396	16	45	61

				ENGINEERING ECONOMICS AND MANAGEMENT
				BTCE 802
				3
No. of students attended the Exam				21
No. of students secure more than 60% marks				16
Percentage of students secure more than 60% marks				76.19
Attainment Level				Level 2

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : TRAFFIC ENGINEERING AND MANAGEMENT
Course Code : BTCE804, Crédits : 04, Session : 2018-19 (Even Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Ripunjoy Gogoi

A. Introduction

To provide understanding on basic traffic characteristics and various models describing the relationship among traffic stream parameters. To train students to collect and analyze traffic data. To prepare students to perform capacity and level of service analysis of a highway. To teach students to perform traffic signal design using IRC guidelines. To make students aware of traffic regulations and measures to manage traffic. To enable students to understand the importance of roadway safety and accident analysis

B. Course Outcomes: At the end of the course, students will be able to:

- **BTCE 804.1**.Describe traffic stream parameters and their relationship
- **BTCE 804.2**.Identify various traffic stream models and their application
- **BTCE 804.3.**Collect the traffic data and analyse it using statistical tools.
- **BTCE 804.4.**Evaluate capacity and level of service for a given highway
- **BTCE 804.5**.Design traffic signal using IRC guidelines

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage**
Continuous Internal	Mid Term 1	CT	15%

Evaluation			
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentt o be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			100%

E. Course Content

F. Module I: Introduction: Significance and scope, Characteristics of Vehicles and Road Users, Skid Resistance and Braking Efficiency (Problems), Components of Traffic Engineering- Road, Traffic and Land Use Characteristics

Module II: Traffic Surveys and Analysis: Surveys and Analysis - Volume, Capacity, Speed and Delays, Origin and Destination, Parking, Pedestrian Studies, Accident Studies and Safety Level of Services- Basic principles of Traffic Flow.

Module III: Traffic Control: Traffic signs, Road markings, Design of Traffic signals and Signal co-ordination (Problems),Traffic control aids and Street furniture, Street Lighting, Computer applications in Signal design

Module IV: Geometric Design of Intersections: Conflicts at Intersections, Classification of 'At Grade Intersections, - Channallised Intersections- Principles of Intersection Design, Elements of Intersection Design, Rotary design, GradeSeparation and interchanges - Design principles.

Module V: Traffic Management: Traffic Management- Transportation System Management (TSM) - Travel DemandManagement (TDM), Traffic Forecasting techniques, Restrictions on turning movements, OnewayStreets, Traffic Segregation, Traffic Calming, Tidal flow operations, Exclusive Bus Lanes,Introduction to Intelligent Transportation System (ITS).

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva. V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Kadiyali L R, Traffic Engineering and Transport Planning, Khanna Technical Publications,Delhi, 2000.
- Khanna K and Justo C E G, Highway Engineering, Khanna Publishers, Roorkee, 2001.
- Indian Roads Congress (IRC) specifications: Guidelines and special publications on TrafficPlanning and Management
- Guidelines of Ministry of Road Transport and Highways, Government of India.
- Subhash C.Saxena, A Course in Traffic Planning and Design, Dhanpat Rai Publications,New Delhi, 1989.
- Transportation Engineering – An Introduction, C.Jotin Khisty, B.Kent Lall, Prentice Hall ofIndia Pvt Ltd, 2006.
- **Lecture Plan**

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	**Introduction:**, Skid Resistance and	Lecture	BTCE 804.1	Mid Term-1, Quiz & End Sem Exam
2	Significance and scope, Characteristics of Vehicles and Road Users	Lecture	BTCE 804.1	Mid Term-1, Quiz & End Sem Exam
3	Significance and scope, Characteristics of Vehicles and Road Users	Lecture	BTCE 804.1	Mid Term-1, Quiz & End Sem Exam
4	Significance and scope, Characteristics of Vehicles and Road Users	Lecture	BTCE 804.1	Mid Term-1, Quiz & End Sem Exam
5	Braking Efficiency (Problems), Components of Traffic Engineering-Road, Traffic and Land Use Characteristics	Lecture	BTCE 804.1	Mid Term-1, Quiz & End Sem Exam
6	Braking Efficiency (Problems), Components of Traffic Engineering-Road, Traffic and Land Use Characteristics	Lecture	BTCE 804.1	Mid Term-1, Quiz & End Sem Exam
7	Braking Efficiency (Problems), Components of Traffic Engineering-Road, Traffic and Land Use Characteristics	Lecture	BTCE 804.1	Mid Term-1, Quiz & End Sem Exam
8	Braking Efficiency (Problems), Components of Traffic Engineering-Road, Traffic and Land Use Characteristics	Lecture	BTCE 804.1	Mid Term-1, Quiz & End Sem Exam
9	Braking Efficiency (Problems), Components of Traffic Engineering-Road, Traffic and Land Use Characteristics	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam
10	**Traffic Surveys and Analysis:**, Origin and Destination,	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam
11	Surveys and Analysis - Volume, Capacity, Speed and Delays	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam

12	Surveys and Analysis - Volume, Capacity, Speed and Delays	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam
13	Surveys and Analysis - Volume, Capacity, Speed and Delays	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam
14	Parking, Pedestrian Studies, Accident Studies	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam
15	Safety Level of Services- Basic principles of Traffic Flow	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam
16	Safety Level of Services- Basic principles of Traffic Flow	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam
17	Safety Level of Services- Basic principles of Traffic Flow	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam
18	Traffic signs, Road markings	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam
19	Design of Traffic signals and Signal co-ordination	Lecture	BTCE 804.3	Mid Term-1, Quiz & End Sem Exam
20	Design of Traffic signals and Signal co-ordination	Lecture	BTCE 804.3	Mid Term-1, Quiz & End Sem Exam
21	*Design of Traffic signals and Signal co-ordination*	Lecture	BTCE 804.3	Mid Term-2, Quiz & End Sem Exam
22	*Traffic control aids and Street furniture, Street Lighting*	Lecture	BTCE 804.3	Mid Term-2, Quiz & End Sem Exam
23	*Traffic control aids and Street furniture, Street Lighting*	Lecture	BTCE 804.3	Mid Term-2, Quiz & End Sem Exam
24	(Problems, Computer applications in Signal design	Lecture	BTCE 804.3	Mid Term-2, Quiz & End Sem Exam
25	*(Problems, Computer applications in Signal design*	Lecture	BTCE 804.3	Mid Term-2, Quiz & End Sem Exam
26	**Geometric Design of Intersections:** - Channallised Intersections-, Rotary design,.	Lecture	BTCE 804.3	Mid Term-2, Quiz & End Sem Exam
27	*Conflicts at Intersections, Classification of 'At Grade Intersections,*	Lecture	BTCE 804.3	Mid Term-2, Quiz & End Sem Exam
28	*Conflicts at Intersections, Classification of 'At Grade Intersections,*	Lecture	BTCE 804.3	Mid Term-2, Quiz & End Sem Exam
29	*Conflicts at Intersections, Classification of 'At Grade Intersections,*	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam
30	*Principles of Intersection Design, Elements of Intersection Design*	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam
31	Principles of Intersection Design,	Lecture	BTCE 804.4	Mid Term-2, Quiz

	Elements of Intersection Design			& End Sem Exam
32	Grade Separation and interchanges - Design principles	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam
33	Traffic Management- Transportation System Management (TSM)	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam
34	*Travel Demand Management (TDM), Traffic Forecasting techniques*	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam
35	*Restrictions on turning movements, One way Streets, Traffic Segregation*	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam
36	Traffic Calming, Tidal flow operations, Exclusive Bus Lanes, Introduction to Intelligent Transportation System (ITS).	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam
37	*(Problems, Computer applications in Signal design*	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam
38	**Geometric Design of Intersections:** - Channallised Intersections-, Rotary design,.	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam
39	*Conflicts at Intersections, Classification of 'At Grade Intersections,*	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam
40	*Conflicts at Intersections, Classification of 'At Grade Intersections,*	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam
41	*Conflicts at Intersections, Classification of 'At Grade Intersections,*	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam
42	*Principles of Intersection Design, Elements of Intersection Design*	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam
43	Principles of Intersection Design, Elements of Intersection Design	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam
44	Grade Separation and interchanges - Design principles	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam
45	Traffic Management- Transportation System Management (TSM)	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam
46	*Travel Demand Management (TDM), Traffic Forecasting techniques*	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam
47	*Restrictions on turning movements, One way Streets, Traffic Segregation*	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam
48	Traffic Calming, Tidal flow operations, Exclusive Bus Lanes, Introduction to Intelligent Transportation System (ITS).	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam

- **Course Articulation Matrix (Mapping of COs with POs)**

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE 804.1	Describe traffic stream parameters and their relationship	3	3	1	3	1				2		2	1			
BTCE 804.2	Identify various traffic stream models and their application	3	2	2	2	2				2		1	1			
BTCE 804.3	Collect the traffic data and analyse it using statistical tools.	3	3	1	3	1				2		2	1			
BTCE 804.4	Evaluate capacity and level of service for a given highway	3	2	2	2	2				2		1	1			
BTCE 804.5	Design traffic signal using IRC guidelines	3	3	1	3	1				2		2	1			

				TRAFFIC ENGINEERING AND MANAGEMENT		
Course Code				BTCE 804		
Associated Credit Units				4		
Ser. No.	Name	Enrollment No.	Roll No.	30	70	100
1	ABHISHEK MODI	A60215815012	AU15UCV8371	20	22	42
2	AJAY SINGH SIKARWAR	A60215815016	AU15UCV8372	16	24	40
3	ANCHAL SHRIVASTAVA	A60215815024	AU15UCV8373	25	50	75
4	ASHUTOSH DAIPURIA	A60215815017	AU15UCV8375	25	49	74
5	AYUSHI GUPTA	A60215815025	AU15UCV8376	24	46	70
6	BRAJMOHAN SINGH KUSHWAH	A60215815013	AU15UCV8377	18	40	58
7	DEEPAK SHRIVASTAVA	A60215815018	AU15UCV8378	26	48	74
8	HIMANSHU GUPTA	A60215815026	AU15UCV8380	23	39	62
9	JAGRATI DHINGRA	A60215815023	AU15UCV8381	18	41	59
10	NAVNEET PATHAK	A60215815003	AU15UCV8383	22	26	48
11	NIKHIL SINGH CHAUHAN	A60215815019	AU15UCV8384	21	46	67
12	PAWAN KUMAR SINGH	A60215815008	AU15UCV8385	26	47	73
13	SHALINI CHAKRABORTY	A60215815001	AU15UCV8386	25	47	72
14	SHISHIR SINGH	A60215815004	AU15UCV8387	27	50	77
15	SHIVAM GURJAR	A60215815009	AU15UCV8388	26	42	68
16	SUSHIL RAI	A60515815001	AU15UCV8389	26	35	61
17	VAIBHAV KANKAR	A60215815010	AU15UCV8390	21	47	68
18	VAIBHAV RAI	A60215815005	AU15UCV8391	24	41	65
19	VAISHNAV SAXENA	A60215815014	AU15UCV8392	25	42	67
20	VIPUL TRIPATHI	A60215815006	AU15UCV8394	20	49	69
21	YASH SONI	A60215815022	AU15UCV8396	21	26	47

				TRAFFIC ENGINEERING AND MANAGEMENT
				BTCE 804
				4
No. of students attended the Exam				21
No. of students secure more than 60% marks				15
Percentage of students secure more than 60% marks				71.43
Attainment Level				Level 2

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : Project
Course Code : BTCE860, Crédits : 09, Session : 2018-19 (Even Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Imran Ahmad Khan, Dr. Mohan Kantharia, Dr. P. Mahakavi

A. Introduction

The objective of project is to enable the student to take up investigative study in the broad field of Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the Department on an individual basis or two/three students in a group, under the guidance of a Supervisor.

Course Outcomes: At the end of the course, students will be able to:

BTCE860.1. Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.
BTCE860.2. Design, implement and test the prototype/algorithm in order to solve the conceived problem.
BTCE860.3. Write comprehensive report on project work

B. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects

C. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
End Semester Examination	End Semester Examination	EE	100%
Total			**100%**

A. Syllabus

Methodology:

Project is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the project the students are to present a report covering various aspects learnt by them and give a presentation on same.

D. Examination Scheme:

Literature study/ Fabrication/ Experimentation	**40**
Written Report	**20**
Viva	**15**
Presentation	**25**
Total	**100**

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva. V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

A. Suggested Text/Reference Books: NA

B. Lecture Plan : NA

C. Course Articulation Matrix (Mapping of COs with POs)

E. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE860.1	*Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.*	3	**2**	1	3	1	-	-	-	2		2	1	**1**	**2**	**1**
BTCE860.2	*Design, implement and test the prototype/algorithm in order to solve the conceived problem.*	3	1	2	2	2	-	-	-	2		1	1	**3**	**2**	**3**
BTCE860.3	*Write comprehensive report on project work*	2	2	2	2	2	-	-	-	3		3	1	**3**	**3**	**2**

				PROJECT (DISSERTAION)
Course Code				BTCE 860
Associated Credit Units				9
Ser. No.	Name	Enrollment No.	Roll No.	100
1	ABHISHEK MODI	A60215815012	AU15UCV8371	65
2	AJAY SINGH SIKARWAR	A60215815016	AU15UCV8372	65
3	ANCHAL SHRIVASTAVA	A60215815024	AU15UCV8373	70
4	ASHUTOSH DAIPURIA	A60215815017	AU15UCV8375	80
5	AYUSHI GUPTA	A60215815025	AU15UCV8376	75
6	BRAJMOHAN SINGH KUSHWAH	A60215815013	AU15UCV8377	75
7	DEEPAK SHRIVASTAVA	A60215815018	AU15UCV8378	75
8	HIMANSHU GUPTA	A60215815026	AU15UCV8380	70
9	JAGRATI DHINGRA	A60215815023	AU15UCV8381	65
10	NAVNEET PATHAK	A60215815003	AU15UCV8383	70
11	NIKHIL SINGH CHAUHAN	A60215815019	AU15UCV8384	75
12	PAWAN KUMAR SINGH	A60215815008	AU15UCV8385	75
13	SHALINI CHAKRABORTY	A60215815001	AU15UCV8386	75
14	SHISHIR SINGH	A60215815004	AU15UCV8387	85
15	SHIVAM GURJAR	A60215815009	AU15UCV8388	75
16	SUSHIL RAI	A60515815001	AU15UCV8389	75
17	VAIBHAV KANKAR	A60215815010	AU15UCV8390	75
18	VAIBHAV RAI	A60215815005	AU15UCV8391	70
19	VAISHNAV SAXENA	A60215815014	AU15UCV8392	80
20	VIPUL TRIPATHI	A60215815006	AU15UCV8394	85
21	YASH SONI	A60215815022	AU15UCV8396	65

				PROJECT (DISSERTAION)
				BTCE 860
				9
No. of students attended the Exam				21
No. of students secure more than 60% marks				21
Percentage of students secure more than 60% marks				100.00
Attainment Level				Level 3

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR
AMITY SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF CIVIL ENGINEERING

PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Bachelor of Technology (B. Tech.) CEAcademic Year – 2019-20

Graduates of the programme B Tech (Civil Engineering) will

PEO 1: Gain knowledge and skills in Civil engineering which will enable them to have a career and professional accomplishment in the public or private sector organizations

PEO 2: Become consultants on complex real life Civil Engineering problems related to Infrastructure development especially housing, construction, water supply, sewerage, transport, spatial planning.

PEO 3: Become entrepreneurs and develop processes and technologies to meet desired infrastructure needs of society and formulate solutions that are technically sound, Economically feasible, and socially acceptable.

PEO 4: Perform investigation for solving Civil Engineering problems by conducting research using modern equipment and software tools.

PEO 5: Function in multi-disciplinary teams and advocate policies, systems, processes and equipment to support civil engineering

Programme Outcomes:

[PO. 1]. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

[PO. 2]. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

[PO. 3]. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

[PO. 4]. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

[PO. 5]. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

[PO. 6]. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

[PO. 7]. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

[PO. 8]. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

[PO. 9]. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

[PO. 10]. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

[PO. 11]. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

[PO. 12]. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

Note: - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put "- "

PROGRAMMEARTICULATIONM ATRIX

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ISEM	MAT101	3	2	3	3	3	-	-	-	2	-	2	3	-	-	-
	CHE101	3	3	3	3	-	3	3	3	3	3	3	3	-	-	-
	CSE104	3	3	3	2	-	-	-	-	-	-	-	3	3	3	3
	BME101	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2
	CIV101	3	2	2	2	-		-	-	1	1	1	2	2	-	-
	CHE121	3	3	2	-	-	-	-	-	-	-	-	2	3	-	2
	CSE124	3	3	3	2	-	-	-	-	-	-	-	3	3	3	3
	BME121	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2
	BCU141	3	2	2	2	-		-	-	1	1	1	2	2	-	-
	EVS142	3	3	2	-	-	-	-	-	-	-	-	2	3	-	2
	BSU143	3	3	2	-	-	-	-	-	-	-	-	2	3	-	2
	FLU144	3	3	3	2	-	-	-	-	-	-	-	3	3	3	3
IISEM	MAT201	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2
	PHY101	3	2	2	2	-		-	-	1	1	1	2	2	-	-
	ECE101	3	3	2	-	-	-	-	-	-	-	-	2	3	-	2
	CSE204	3	3	3	2	-	-	-	-	-	-	-	3	3	3	3
	BME102	3	2	2	-	2	-	-	3	2	-	-	2	3	-	2
	PHY121	3	2	2	-	2	-	-	3	2	-	-	2	3	-	2
	ECE121	3	2	2	-	-	-	1	-	-	-	-	2	3	-	2
	CSE224	3	2	2	-	2	-	1	-	-	-	-	2	3	-	2
	BME122	3	2	2	-	2	-	-	3	2	-	-	2	3	-	2
	BCU241	3	2	2	-	2	-	1	3	2	-	1	2	3	-	2
	EVS242	3	2	2	1	2	-	-	3	2	-	2	2	3	-	2
	BSU243	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2
	FLU244	3	2	2	-	2	-	1	-	-	-	-	2	3	-	2

PROGRAMME ARTICULATION MATRIX																
2nd Year																
BME	MAT 301	3	2	1	-	-	-	-	-	-	-	-	2	1	1	1
III SEM	CIV 302	3	3	3	2	-	-	-	-	-	-	-	3	3	3	3
	CIV 303	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2
	CIV 304	3	2	2	2	-		-	-	1	1	1	2	2	-	-
	CIV 305	3	3	2	-	-	-	-	-	-	-	-	2	3	-	2
	CIV 306	1	2	2	1	1	-	-	-	-	-	-	-	2	-	-
	CIV 307	3	3	2	-	-	-	-	-	-	-	-	2	3	-	2
	BME 104	3	2	-	-	-	-	-	-	-	-	2	3	-	2	3
	CIV 322	1	2	2	1	1	-	-	-	-	-	-	-	2	-	-
	ECE 327	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2
	CIV 401	3	2	2	-	2	-	-	3	2	-	-	2	3	-	2
IV SEM	CIV 402	3	2	2	-	-	-	1	-	-	-	-	2	3	-	2
	CIV 403	3	2	2	-	2	-	1	-	-	-	-	2	3	-	2
	CIV 404	3	2	2	-	2	-	-	3	2	-	-	2	3	-	2
	CIV 405	3	2	2	-	2	-	1	3	2	-	1	2	3	-	2
	CIV 406	3	2	2	1	2	-	-	3	2	-	2	2	3	-	2
	ECE 407	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2
	CIV 421	3	2	2	1	2	-	-	3	2	-	2	2	3	-	2
	CIV 422	3	2	2	1	2	-	-	3	2	-	2	2	3	-	2
	CIV 423	3	2	2	1	2	-	-	3	2	-	2	2	3	-	2
	CIV 424	3	2	2	1	2	-	-	3	2	-	2	2	3	-	2
	ECE 427	3	2	2	1	2	-	-	3	2	-	2	2	3	-	2

PROGRAMME ARTICULATION MATRIX

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
VSEM	BTCE501	3	3	2	3	3	2	2	-	3	2	3	3	3	3	3
	BTCE502	2	2	2	-	3	-	3	2	-	3	-	3	1	2	1
	BTCE503	3	3	1	2	3	3	3	3	3	-	1	3	3	2	2
	BTCE504	2	-	2	-	3	-	3	2	-	3	-	3	3	2	2
	BTCE505	3	3	3	2	2	1	1	-	-	-	-	3	3	3	3
	BTCE506	2	2	2	-	3	-	3	2	-	3	-	3	1	2	1
	BTCE520	2	-	2	-	3	-	3	2	-	3	-	3	3	2	2
	BTCE521	3	3	1	2	3	3	3	3	3	-	1	3	3	2	2
	BTCE550	3	3	2	3	3	2	2	-	3	2	3	3	3	3	3
VISEM	BTCE601	3	3	2	3	3	2	2	-	3	2	3	3	1	2	1
	BTCE602	2	2	2	-	3	-	3	2	-	3	-	3	3	2	2
	BTCE603	3	3	1	2	3	3	3	3	3	-	1	3	3	2	2
	BTCE604	2	2	2	-	3	-	3	2	-	3	-	3	3	3	3
	BTCE605	3	3	1	2	3	3	3	3	3	-	1	3	1	2	1
	BTCE606	2	-	2	-	3	-	3	2	-	3	-	3	3	2	2
	BTCE620	3	3	1	2	3	3	3	3	3	-	1	3	3	3	3
	BTCE621	2	2	2	-	3	-	3	2	-	3	-	3	1	2	1

PROGRAMME ARTICULATION MATRIX

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
VII SEM	BTCE 701	3	3	2	3	3	2	2	-	3	2	3	3	3	3	3
	BTCE 702	2	2	2	-	3	-	3	2	-	3	-	3	1	2	1
	BTCE 703	2	2	2	-	3	-	3	2	-	3	-	3	1	2	1
	BTCE 707	3	3	2	3	3	2	2	-	3	2	3	3	3	3	3
	BTCE 720	3	2	1		1	2	1	-	2	-	1	3	3	3	3
	BTCE 721	3	2	1		1	2	1	-	2	-	1	3	3	3	3
	BTCE 760	3	2	1		1	2	1	-	2	-	1	3	3	3	3
	BTCE 750	3	2	1		1	2	1	-	2	-	1	3	3	3	3
VIII SEM	BTCE 801	3	3	2	3	3	2	2	-	3	2	3	3	1	2	1
	BTCE 802	2	2	2	-	3	-	3	2	-	3	-	3	3	2	2
	BTCE 804	3	3	1	2	3	3	3	3	3	-	1	3	3	2	2
	BTCE 860	2	-	2	-	3	-	3	2	-	3	-	3	3	2	2

AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : APPLIED MATHEMATICS – I (CALCULUS AND LINEAR ALGEBRA)
Course Code : MAT101, Crédits : 04, Session :2019-20(Odd Sem.), Class : B.Tech. 1st Year
Faculty Name : Dr. Santosh Kumar Sharma, Dr. Alok Jain, Dr. Girraj Kumar Verma, Dr. Deepti Shakti Tripathi,

A. **Introduction:**The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis, and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

B. **Course Outcomes:**At the end of the course, students will be able to:
MAT101.1. Solvetheproblemsofdifferentiationoffunctionsoftwovariablesandknow about the maximization and minimization of functions of severalvariables.
MAT101.2.
Cometoknowtheapplicationsofdoubleandtripleintegrationinfindingtheareaandvolume Apart from various applications, they will have a basic understanding of Beta and Gamma functions.
MAT101.3. KnowaboutqualitativeapplicationsofGauss's,Stoke'sandGreen'stheorem
MAT101.4. Able to solve qualitative problems based on vector analysis and matrixanalysissuchasrank, eigen values, diagonalizationetc.
MAT101.5. Use the tools of linear algebra includinglinearindependenceanddependenceofvectors, linear transformations, eigen values, matrix of a linear transformation.

C. **Programme Outcomes:**
[PO.1].Engineeringknowledge:Applytheknowledgeofmathematics,science,engineeringfundamentals,andanengineeringspecializationtothesolutionofcomplexengineeringproblems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineeringproblems reaching substantiated conclusions using first principles of mathematics, natural sciences,andengineeringsciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and designsystem components or processes that meet the specified needs with appropriate consideration for thepublichealthandsafety,andthecultural,societal,andenvironmentalconsiderations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of theinformationtoprovidevalidconclusions

[PO.5].**Moderntoolusage**:Create,select,andapplyappropriatetechniques,resources,an dmodernengineering and IT tools including prediction and modeling to complex engineering activities with anunderstandingofthelimitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to theprofessionalengineeringpractice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societalandenvironmentalcontexts,anddemonstratetheknowledgeof,andneedforsustai nabledevelopment

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities andnorms oftheengineeringpractices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverseteams,andinmultidisciplinarysettings

[PO.10].**Communication**:Communicateeffectivelyoncomplexengineeringactivitieswith theengineeringcommunity and with society at large, such as, being able to comprehend and write effective reports anddesigndocumentation,makeeffectivepresentations,andgiveandreceiveclearinstruct ions

[PO.11].**Projectmanagementandfinance**:Demonstrateknowledgeandunderstandingof theengineeringandmanagementprinciplesandapplythesetoone'sownwork,asamember andleaderinateam,tomanageprojectsandinmultidisciplinaryenvironments

[PO.12].**Life-longlearning**:Recognizetheneedfor,andhavethepreparationandabilityto engageinindependent andlife-longlearninginthebroadestcontextoftechnologicalchange

D. Programme Specific Outcomes:

PSO1: Will beabletodesign,developandimplementefficientsoftwareforagivenreallifeproblem.

PSO 2: Will be able to apply knowledge of AI, Machine Learning and Data Mining in analyzing big data forextractingusefulinformationfromitandforperformingpredictiveanalysis.

PSO 3: Will be able to design, manage and secure wired/ wireless computer networks for transfer and sharing ofinformation.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudent to be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Differential Calculus:

Successive differentiation, Leibnitz Theorem, Rolle's theorem, Mean value theorem, Taylor's and Maclaurin's theorems with remainders, Partial Differentiation, Total derivative; Maxima and minima for two variables.

Module II: Integral Calculus:

Evaluation of definite and improper integrals: Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface, areas and volumes of revolutions, Multiple Integration: Double integrals (Cartesian and polar), Triple integrals (Cartesian).

Module III: Vector Calculus:
Scalar and vector field, Gradient, Divergence and Curl, Directional Derivative, Evaluation of a Line Integral, Green's theorem in plane (without proof), Stoke's theorem (without proof) and Gauss Divergence theorem (without proof).

Module IV: Matrices:
Inverse and Rank of a matrix, Linear systems of equations, Consistency of Linear Simultaneous Equations, linear Independence, Gauss elimination and Gauss-Jordan elimination, Eigen values, eigenvectors, Caley-Hamilton theorem, Diagonalization.

Module V: Linear algebra & Vector spaces:
Linear algebra: Group, ring, field (Definition), Vector Space, linear dependence of vectors, basis, dimension; Linear transformations (maps), range and kernel of a linear map, Inverse of a linear transformation, rank- nullity theorem (without proof), composition of linear maps, Matrix associated with a linear map.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Suggested Text/Reference Books:

- Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
- G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
- V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–West press, Reprint 2005.

H. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Differentiation	Lecture	MAT101.1	Mid Term, Quiz & End Sem Exam
2	Successive Differentiation	Lecture	MAT101.1	Mid Term, Quiz & End Sem Exam
3	Leibnitz Theorem	Lecture	MAT101.1	Mid Term, Quiz & End Sem Exam
4	Rolle's theorem	Lecture	MAT101.1	Mid Term, Quiz & End Sem Exam
5	Mean value theorem	Lecture	MAT101.1	Mid Term, Quiz & End Sem Exam
6	Taylor's theorem	Lecture	MAT101.1	Mid Term, Quiz & End Sem Exam
7	Maclaurin's theorems	Lecture	MAT101.1	Mid Term, Quiz

	withremainders			& End Sem Exam
8	Partial Differentiation	Lecture	MAT101.1	Mid Term, Quiz & End Sem Exam
9	Total derivative	Lecture	MAT101.1	Mid Term, Quiz & End Sem Exam
10	Maxima and minima for two variables	Lecture	MAT101.1	Mid Term, Quiz & End Sem Exam
11	Evaluation of definite and improper integrals	Lecture	MAT101.2	Mid Term, Quiz & End Sem Exam
12	Beta and Gamma functions and their properties I	Lecture	MAT101.2	Mid Term, Quiz & End Sem Exam
13	Beta and Gamma functions and their properties-II	Lecture	MAT101.2	Mid Term, Quiz & End Sem Exam
14	Applications of definite integrals to evaluate surface of revolutions	Lecture	MAT101.2	Mid Term, Quiz & End Sem Exam
15	Applications of definite integrals to evaluate areas of revolutions	Lecture	MAT101.2	Mid Term, Quiz & End Sem Exam
16	Applications of definite integrals to evaluate volumes of revolutions	Lecture	MAT101.2	Mid Term, Quiz & End Sem Exam
17	Multiple Integration	Lecture	MAT101.2	Mid Term, Quiz & End Sem Exam
18	Double integrals (Cartesian)	Lecture	MAT101.2	Mid Term, Quiz & End Sem Exam
19	Double integrals (Polar)	Lecture	MAT101.2	Mid Term, Quiz & End Sem Exam
20	Triple integrals (Cartesian)	Lecture	MAT101.2	Mid Term, Quiz & End Sem Exam
21	Scalar and vector field	Lecture	MAT101.3	Home Assignment, Quiz & End Sem Exam
22	Gradient	Lecture	MAT101.3	Home Assignment, Quiz & End Sem Exam
23	Divergence and Curl	Lecture	MAT101.3	Home Assignment, Quiz & End Sem Exam
24	Directional Derivative	Lecture	MAT101.3	Home Assignment, Quiz & End Sem Exam
25	Evaluation of a Line Integral	Lecture	MAT101.3	Home Assignment, Quiz & End Sem Exam
26	Green’s theorem in plane (without proof)	Lecture	MAT101.3	Home Assignment, Quiz & End Sem Exam
27	Stoke’s theorem (without proof)	Lecture	MAT101.3	Home Assignment, Quiz & End Sem Exam

28	Gauss Divergence theorem (without proof)	Lecture	MAT101.3	Home Assignment, Quiz & End Sem Exam
29	Inverse and Rank of a matrix	Lecture	MAT101.4	Home Assignment, Quiz & End Sem Exam
30	Linear systems of equations	Lecture	MAT101.4	Home Assignment, Quiz & End Sem Exam
31	Consistency of Linear Simultaneous Equations	Lecture	MAT101.4	Home Assignment, Quiz & End Sem Exam
32	Linear Independence	Lecture	MAT101.4	Home Assignment, Quiz & End Sem Exam
33	Gauss elimination and Gauss-Jordan elimination	Lecture	MAT101.4	Home Assignment, Quiz & End Sem Exam
34	Eigen values, eigenvectors	Lecture	MAT101.4	Home Assignment, Quiz & End Sem Exam
35	Caley-Hamilton theorem	Lecture	MAT101.4	Home Assignment, Quiz & End Sem Exam
36	Diagonalization	Lecture	MAT101.4	Home Assignment, Quiz & End Sem Exam
37	Group	Lecture	MAT101.5	Home Assignment,Quiz & End Sem Exam
38	Ring, field (Definition)	Lecture	MAT101.5	Home Assignment, Quiz & End Sem Exam
39	Vector Space	Lecture	MAT101.5	Home Assignment, Quiz & End Sem Exam
40	Linear dependence of vectors	Lecture	MAT101.5	Home Assignment, Quiz & End Sem Exam
41	Basis	Lecture	MAT101.5	Home Assignment, Quiz & End Sem Exam
42	Dimension	Lecture	MAT101.5	Home Assignment, Quiz & End Sem Exam
43	Linear transformations (maps)	Lecture	MAT101.5	Home Assignment, Quiz & End Sem Exam
44	Range and kernel of a linear map	Lecture	MAT101.5	Home Assignment, Quiz & End Sem Exam

45	Inverse of a linear transformation	Lecture	MAT101.5	Home Assignment, Quiz & End Sem Exam
46	Rank- nullity theorem (without proof)	Lecture	MAT101.5	Home Assignment, Quiz & End Sem Exam
47	Composition of linear maps	Lecture	MAT101.5	Home Assignment, Quiz & End Sem Exam
48	Matrix associated with a linear map	Lecture	MAT101.5	Home Assignment, Quiz & End Sem Exam

I. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
MAT 101.1	Solvetheproblemsofdifferentiationoffunctionsoftwo variablesandknow about the maximization and minimization of functions of severalvariables	3	3	1	3	1				2		2	1			
MAT 101.2	Cometoknowtheapplicationsofdoubleandtripleintegrationinfindingthe areaandvolume. Apart from various applications, they will have a basic understanding of Beta and Gamma functions.	3	2	2	2	2				2		1	1			
MAT 101.3	KnowaboutqualitativeapplicationsofGauss's,Stoke'sandGreen'stheorem	3	2	2	2	2				3		3	1			
MAT 101.4	Able to solve qualitative problems based on vector analysis and matrixanalysissuchasrank, eigen values, diagonalizationetc.	3	3	2	3	2				1		2	1			

MAT 101. 5	Use the tools of linear algebra including linearindependenceanddependenceofvectors, linear transformations, eigen values, matrix of a linear transformation.	2	2	1	2	3				2		2	1			

S. No.	**Enrollment.No.**	**Student's Name**	**MAT101 APPLIED MATHEMATICS – I (CALCULUS AND LINEAR ALGEBRA)**							
			Max Marks	**CE Weight Age (%)**	**ET Weight Age (%)**	**GO**	**GP**	**ACU**	**ECU**	**U4G4**
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A	9	4	4	36
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A	9	4	4	36
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	B-	5	4	4	20
4	A60215819004	Ms RIYA NAMDEV	100	30	70	B	6	4	4	24
5	A60215819005	Mr YASH YOGI	100	30	70	B-	5	4	4	20
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	2	40	%	
			Attainment Level					-		

AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : APPLIEDPHYSICS – I
Course Code : PHY101, Crédits : 04, Session :2019-20(Even Sem.), Class : B.Tech. 1st Year
Faculty Name : Dr. Manisha Singh, Dr. PankajMishra, Dr. SnehalC.Jani

A. Introduction: The objective of this course is to familiarize the prospective engineers with fundamentals and applications ofElectromagnetics,Relativity,and Modern Physics. It aims to equip the students with standard concepts at an intermediate to advanced level that that will equip them with requisite skills to apply in solving real life problems.

B. Course Outcomes: At the end of the course, students will be able to:

PHY101.1. Solvetheproblems related to time varying electric and magnetic field, and apply its concept in day to day applications.

PHY101.2. Students will develop understanding of relativistic motion and its applications.

PHY101.3. Students will acquire understanding of mechanics involved at microscopic levels

PHY101.4. Students willdevelop understanding of fundamental components of any electronic devices and its applications.

C. Programme Outcomes:

[PO.1].**Engineeringknowledge**:Applytheknowledgeofmathematics,science,engineeringfundamentals,andanengineeringspecializationtothesolutionofcomplexengineeringproblems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyzecomplex engineeringproblems reaching substantiated conclusions using first principles of mathematics, natural sciences,andengineeringsciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and designsystem components or processes that meet the specified needs with appropriate consideration for thepublichealthandsafety,andthecultural,societal,andenvironmentalconsiderations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of theinformationtoprovidevalidconclusions

[PO.5].**Moderntoolusage**:Create,select,andapplyappropriatetechniques,resources,andmodernengineering and IT tools including prediction and modeling to complex engineering activities with anunderstandingofthelimitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to theprofessionalengineeringpractice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societalandenvironmentalcontexts,anddemonstratetheknowledgeof,andneedforsustainabledevelopment

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities andnorms oftheengineeringpractices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverseteams,andinmultidisciplinarysettings

[PO.10].**Communication**:Communicateeffectivelyoncomplexengineeringactivitieswith theengineeringcommunity and with society at large, such as, being able to comprehend and write effective reports anddesigndocumentation,makeeffectivepresentations,andgiveandreceiveclearinstructions

[PO.11].**Projectmanagementandfinance**:Demonstrateknowledgeandunderstandingof theengineeringandmanagementprinciplesandapplythesetoone'sownwork,asamember andleaderinateam,tomanageprojectsandinmultidisciplinaryenvironments

[PO.12].**Life-longlearning**:Recognizetheneedfor,andhavethepreparationandabilityto engageinindependent andlife-longlearninginthebroadestcontextoftechnologicalchange

D. Programme Specific Outcomes:
A graduate of Civil Engineering Program will demonstrate:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds**.**

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudent to be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. **Syllabus**

Module I: Electromagnetics:

Scalar and vector fields, gradient of a scalar field, physical significance of gradient, equipotential surface. Line, surface and volume integrals, Divergence and curl of vector field and mathematical analysis physical significance, Electric flux, Gauss' law, Proof and Applications, Gauss divergence and Stokes theorems.

Differential form of Gauss' Law, Amperes' Law, Displacement current, Faradays Law, Maxwell equations in free space & isotropic media (Integral form & differential form), EM wave propagation in free space, Poynting vector..

Module II: Special Theory of Relativity:

Michelson-Morley experiment, Importance of negative result, Inertial & non-inertial frames of reference, Einstein's postulates of Special theory of Relativity, Space-time coordinate system, Relativistic Space Time transformation (Lorentz transformation equation), Transformation of velocity, Addition of velocities, Length contraction and Time dilation, Mass-energy equivalence (Einstein's energy mass relation) & Derivation of Variation of mass with velocity .

Module III: Wave Mechanics:

Wave particle duality, De-Broglie matter waves, phase and group velocity, Heisenberg uncertainty principle, wave function and its physical interpretation, Operators, expectation values. Time dependent & time independent Schrödinger wave equation for free & bound states, square well potential (rigid wall), Step potential.

Module IV: Semiconductor and Electronic Materials:

Band Theory of Solids, Semi-conductors: Intrinsic and Extrinsic,carrIer concentration, Direct and indirect band- gaps, Types of Electronic materials, p-n Junction Diode,Diode Equation, Breakdown in p-n Junction Diode: Avalanche and Zener, Zener Diode and its applications photoconductivity and photovoltaics. Superconductivity, Meissner Effect, Type I and Type II Superconductors.

G. **Examination Scheme:**

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. **Suggested Text/Reference Books:**

- Physics of waves, W. C. Elmore & M. A. Heald
- Introduction to Electrodynamics, D. J. Griffith
- Engineering Physics, Satya Prakash
- Concept of Modern Physics, A. Beiser
- Solid State Physics, S. O. Pallai

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Scalar and vector fields	Lecture	PHY101.1	Mid Term-1, Quiz & End Sem Exam
2	Gradient of a scalar field,physical significance of gradient	Lecture	PHY101.1	Mid Term-1, Quiz & End Sem Exam
3	Equipotential surface.Line, surface and volume integrals,	Lecture	PHY101.1	Mid Term-1, Quiz & End Sem Exam
4	Divergence of vector field(mathematical analysis),physical significance	Lecture/ Tutorials	PHY101.1	Mid Term-1, Quiz & End Sem Exam
5	Curl of vector field(mathematical analysis),physical significance	Lecture/ Tutorials	PHY101.1	Mid Term-1, Quiz & End Sem Exam
6	Electric flux, Gauss' law, Proof and Applications	Lecture	PHY101.1	Mid Term-1, Quiz & End Sem Exam
7	Gauss divergence and Stokes theorems	Lecture	PHY101.1	Mid Term-1, Quiz & End Sem Exam
8	Differential form of Gauss' Law, Amperes' Law	Lecture	PHY101.1	Mid Term-1, Quiz & End Sem Exam
9	Displacement current, Faradays Law	Lecture	PHY101.1	Mid Term-1, Quiz & End Sem Exam
10	Displacement current, Faradays Law	Lecture	PHY101.1	Mid Term-1, Quiz & End Sem Exam
11	EM wave propagation in free space	Lecture	PHY101.1	Mid Term-1, Quiz & End Sem Exam
12	Poynting vector	Lecture	PHY101.1	Mid Term-1, Quiz & End Sem Exam
13	Electromagnetics	Tutorials	PHY101.1	Mid Term-1, Quiz & End Sem Exam
14	Michelson-Morley experiment	Lecture	PHY101.2	Mid Term-1, Quiz & End Sem Exam
15	Michelson-Morley experimentImportance of negative result	Lecture	PHY101.2	Mid Term-1, Quiz & End Sem Exam
16	Inertial & non-inertial frames of reference	Lecture	PHY101.2	Mid Term-1, Quiz & End Sem Exam
17	Einstein's postulates of Special theory of Relativity	Lecture/ Tutorials	PHY101.2	Mid Term-1, Quiz & End Sem Exam
18	Space-time coordinate system	Lecture	PHY101.2	Mid Term-1, Quiz & End Sem Exam
19	Relativistic Space Time	Lecture	PHY101.2	Mid Term-1, Quiz

	transformation (Lorentz transformation equation			& End Sem Exam
20	Transformation of velocity	Lecture	PHY101.2	Mid Term-1, Quiz & End Sem Exam
21	Addition of velocities,	Lecture/ Tutorials	PHY101.2	Mid Term-2, Quiz & End Sem Exam
22	Length contraction and Time dilation	Lecture/ Tutorials	PHY101.2	Mid Term-2, Quiz & End Sem Exam
23	Mass-energy equivalence (Einstein's energy mass relation)	Lecture	PHY101.2	Mid Term-2, Quiz & End Sem Exam
24	Mass-energy equivalence (Einstein's energy mass relation)	Lecture/ Tutorials	PHY101.2	Mid Term-2, Quiz & End Sem Exam
25	Derivation of Variation of mass with velocity,	Lecture	PHY101.2	Mid Term-2, Quiz & End Sem Exam
26	Special Theory of Relativity	Tutorials/Revision	PHY101.2	Mid Term-2, Quiz & End Sem Exam
27	Wave particle duality	Lecture	PHY101.3	Mid Term-2, Quiz & End Sem Exam
28	, De-Broglie matter waves	Lecture	PHY101.3	Mid Term-2, Quiz & End Sem Exam
29	phase and group velocity	Lecture	PHY101.3	Mid Term-2, Quiz & End Sem Exam
30	Heisenberg uncertainty principle	Lecture	PHY101.3	Mid Term-2, Quiz & End Sem Exam
31	wave function and its physical interpretation	Lecture	PHY101.3	Mid Term-2, Quiz & End Sem Exam
32	Operators, expectation values	Lecture/ Tutorials	PHY101.3	Mid Term-2, Quiz & End Sem Exam
33	Time dependent & time independent Schrödinger wave equation for free	Lecture	PHY101.3	Mid Term-2, Quiz & End Sem Exam
34	Time dependent & time independent Schrödinger wave equation for bound states	Lecture	PHY101.3	Mid Term-2, Quiz & End Sem Exam
35	Schrödinger wave equation for free & bound states, square well potential (rigid wall),	Lecture	PHY101.3	Mid Term-2, Quiz & End Sem Exam
36	Schrödinger wave equation for free & bound states, Step potential.	Lecture	PHY101.3	Mid Term-2, Quiz & End Sem Exam
37	Band Theory of Solids	Lecture	PHY101.4	Quiz & End Sem Exam
38	Semi-conductors: Intrinsic and Extrinsic	Lecture	PHY101.4	Quiz & End Sem Exam

39	Carrier concentration	Lecture/ Tutorials	PHY101.4	Quiz & End Sem Exam
40	Direct and indirect band-gaps	Lecture	PHY101.4	Quiz & End Sem Exam
41	Types of Electronic materials	Lecture	PHY101.4	Quiz & End Sem Exam
42	P-N Junction Diode,Diode Equation	Lecture	PHY101.4	Quiz & End Sem Exam
43	Breakdown in p-n Junction Diode: Avalanche and Zener	Lecture	PHY101.4	Quiz & End Sem Exam
44	Zener Diode and its applications	Lecture/ Tutorials	PHY101.4	Quiz & End Sem Exam
45	photoconductivity and photovoltaics	Lecture	PHY101.4	Quiz & End Sem Exam
46	Superconductivity, Meissner Effect	Lecture	PHY101.4	Quiz & End Sem Exam
47	Type I and Type II Superconductors	Lecture	PHY101.4	Quiz & End Sem Exam
48	Semiconductor and Electronic Materials	Revision	PHY101.4	Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
PHY101.1	Solvetheproblemsofdifferentiationoffunctions oftwovariables andknow about the maximization and minimization of functions of severalvariables	3	3	1	2	3	3	2	1	2	1	-	3	-	-	-

PHY101.2	Cometoknowtheapplicationsofdoubleandtripleintegrationinfindingthe areaandvolume. Apart from various applications, they will have a basic understanding of Beta and Gamma functions.	3	3	1	2	3	3	2	1	2	1	-	3	-	-	-
PHY101.3	Knowaboutqualitativeapplicationsof Gauss's,Stoke'sandGreen'stheorem	3	3	1	2	3	3	2	1	2	1	-	3	-	-	-
PHY101.4	Able to solve qualitative problems based on vector analysis and matrixanalysissuchasrank, eigen values, diagonalization etc.	3	3	1	2	3	3	2	1	2	1	-	3	-	-	-

S. No.	Enrollment.No.	Student's Name	PHY101 APPLIED PHYSICS - I							
			Max Marks	CE Weigh t Age (%)	ET Weigh t Age (%)	GO	GP	ACU	ECU	U5G5
1	A60215819001	Mr MAYANK CHAHAR	100	50	50	A+	10	4	4	40
2	A60215819002	Mr KULDEEP GUPTA	100	50	50	A+	10	4	4	40
3	A60215819003	Mr MOHD SAIF KHAN	100	50	50	C+	4	4	4	16
4	A60215819004	Ms RIYA NAMDEV	100	50	50	A+	10	4	4	40
5	A60215819005	Mr YASH YOGI	100	50	50	C+	4	4	4	16

Total No. of Students	=	5		
Total No. of Students	>60 % marks	3	60	%
Attainment Level			Level 1	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : APPLIEDPHYSICS LAB-1
Course Code : PHY121, Crédits : 01, Session :2019_2020(Even Sem.), Class : B.Tech. 1^{st}Year
Faculty Name : Dr.ManishaSingh,Dr.PankajMishra,Dr.SnehalC.Jani

Introduction: Principles of Physics relevant to the study of science and engineering have clarity of understanding through experiments. Learning process and learning outcomes get enhanced through experiments relevant to and commensurate with theoretical knowledge. The lab course is designed to teach the students the basics and advanced chemical principles through experiments.

Physics is the building blocks in engineering and technology and is essential to develop analytical capabilities of students, so that they can transform and apply the fundamental knowledge in their field. All engineering fields have unique applicationsof laws of Physics, insights of matter and space is a key factor in understanding of nature and laws governing it. For electronics and computer science engineering, knowledge of semiconductors and its devices is essentially needed. With this versatile need in view, course has been designed in such a way so that the student should get an insight of the subject starting from the very basic application of principles.

K. **Course Outcomes:**After successful completion of the course students will have the knowledge and skill to:

PHY 121.1.Apply the fundamentals of semiconductors to understand the conceptEnergy band gap.

PHY 121.2.Apply the fundamentals of physical sciences to understand the importance resonance,and its applications in day to day life.

PHY 121.3.Apply the understanding of varying fieldand determine parameters of significance.

PHY 121.4.Apply the fundaments of semiconductors to understand working of basic electronic devices

PHY 121.5 Apply the fundaments understandings of different types of semiconductors to understand working of basic electronic devices .

PHY 121.6.Apply the fundaments of semiconductors to understand working of basic electronic devices

PHY 121.7.Apply the working principles of electronic components to different types of cct arrangements involved in day to day life.

PHY 121.8.Apply the principles of semiconductor devices as a voltage regulator

PHY 121.9.Apply the principles of semiconductor devices in designing solar cells.

PHY 121.10.Apply the principles of varying electric and magnetic field in day to day life.

L. **Programme Outcomes:**

[PO.1].**Engineeringknowledge**:Applytheknowledgeofmathematics,science,engineeringfundamentals,andanengineeringspecializationtothesolutionofcomplexengineeringproblems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineeringproblems reaching substantiated conclusions using first principles of mathematics, natural sciences,andengineeringsciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and designsystem components or processes that meet the specified needs with appropriate consideration for thepublichealthandsafety,andthecultural,societal,andenvironmentalconsiderations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of theinformationtoprovidevalidconclusions

[PO.5].**Moderntoolusage**:Create,select,andapplyappropriatetechniques,resources,an dmodernengineering and IT tools including prediction and modeling to complex engineering activities with anunderstandingofthelimitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to theprofessionalengineeringpractice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societalandenvironmentalcontexts,anddemonstratetheknowledgeof,andneedforsustai nabledevelopment

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities andnorms oftheengineeringpractices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverseteams,andinmultidisciplinarysettings

[PO.10].**Communication**:Communicateeffectivelyoncomplexengineeringactivitieswith theengineeringcommunity and with society at large, such as, being able to comprehend and write effective reports anddesigndocumentation,makeeffectivepresentations,andgiveandreceiveclearinstruct ions

[PO.11].**Projectmanagementandfinance**:Demonstrateknowledgeandunderstandingof theengineeringandmanagementprinciplesandapplythesetoone'sownwork,asamember andleaderinateam,tomanageprojectsandinmultidisciplinaryenvironments

[PO.12].**Life-longlearning**:Recognizetheneedfor,andhavethepreparationandabilityto engageinindependent andlife-longlearninginthebroadestcontextoftechnologicalchange

M. Programme Specific Outcomes:
A graduate of Civil Engineering Program will demonstrate:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

N. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudent to be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

O. Syllabus

List of experiments: [Any 10]

1. To determine the forbidden band gap energy of a semiconductor.
2. To determine the frequency of AC mains using sonometer.
3. To determine the value of specific charge (ratio of e/m) of an electron by Thomson method.
4. To study the common base characteristics of a PNP junction transistor, by drawinginput characteristic curves andoutput characteristic curves.
5. To study the common emitter characteristics of a NPN junction transistor, by drawinginput characteristic curves andoutput characteristic curves.
6. To study a series /parallel resonant LCR circuit, its resonate frequency and quality factor
7. To study the voltage regulation characteristics of a zener diode.
8. To study the characteristics of a solar cell.
9. To draw V – I characteristics of a photocell and to verify the inverse square law of

radiation.

10. To plot graph showing the variation of magnetic field with distance along the axis of a circular coil carrying current, and hence estimate the radius of the coil.

P. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Q. Suggested Text/Reference Books:

- Physics Practical, Gupta and Kumar

R. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	To determine the forbidden band gap energy of a semiconductor	Practical	PHY121.1	Mid Term-1, Quiz & End Sem Exam
2	To determine the frequency of AC mains using sonometer	Practical	PHY121.2	Mid Term-1, Quiz & End Sem Exam
3	To determine the value of specific charge (ratio of e/m) of an electron by Thomson method.	Practical	PHY121.3	Mid Term-1, Quiz & End Sem Exam
4	To study the common base characteristics of a PNP junction transistor, by drawinginput characteristic curves andoutput characteristic curves	Practical	PHY121.4	Mid Term-1, Quiz & End Sem Exam
5	To study the common emitter characteristics of a NPN junction transistor, by drawinginput characteristic curves andoutput characteristic curves.	Practical	PHY21.5	Mid Term-1, Quiz & End Sem Exam
6	To study a series /parallel resonant LCR circuit, its resonate frequency and quality factor	Practical	PHY121.6	Mid Term-1, Quiz & End Sem Exam
7	To study the voltage regulation characteristics of a zener diode.	Practical	PHY121.7	Mid Term-1, Quiz & End Sem Exam
8	To study the characteristics of a solar cell	Practical	PHY121.8	Mid Term-1, Quiz & End Sem Exam
9	To draw V – I characteristics of a photocell and to verify the inverse square law of radiation	Practical	PHY121.9	Mid Term-1, Quiz & End Sem Exam
10	To plot graph showing the variation of magnetic field with distance along the axis of a circular coil carrying current, and hence estimate the radius of the coil.	Practical	PHY121.10	Mid Term-1, Quiz & End Sem Exam

S. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
PHY 121.1	Determination the forbidden band gap energy of a semiconductor	3	3	3	2	2	1	1	1	1	3	3	3	-	-	-
PHY 121.2	To determine the frequency of AC mains using sonometer	3	3	3	2	2	1	1	1	1	3	3	3	-	-	-
PHY 121.3	To determine the value of specific charge (ratio of e/m) of an electron by Thomson method.	3	3	3	2	2	1	1	1	1	3	3	3	-	-	-
PHY 121.4	To study the common base characteristics of a PNP junction transistor, by drawinginput characteristic curves andoutput characteristic curves	3	3	3	2	2	1	1	1	1	3	3	3	-	-	-
PHY 121.5	To study the common emitter characteristics of a NPN junction transistor, by drawinginput characteristic curves andoutput characteristic curves.	3	3	3	2	2	1	1	1	1	3	3	3	-	-	-
PHY 121.6	To study a series /parallel resonant LCR circuit, its resonate frequency and quality factor	3	3	3	2	2	1	1	1	1	3	3	3	-	-	-

PHY 121.7	To study the voltage regulation characteristics of a zener diode.	3	3	3	2	2	1	1	1	1	3	3	3	-	-	-
PHY 121.8	To study the characteristics of a solar cell	3	3	3	2	2	1	1	1	1	3	3	3	-	-	-
PHY 121.9	To draw V – I characteristics of a photocell and to verify the inverse square law of radiation	3	3	3	2	2	1	1	1	1	3	3	3	-	-	-
PHY 121.10	To plot graph showing the variation of magnetic field with distance along the axis of a circular coil carrying current, and hence estimate the radius of the coil.	3	3	3	2	2	1	1	1	1	3	3	3	-	-	-

SampleQuestionPaper

<table>
<tr><td colspan="7">Amity School of Engineering and Technology
DepartmentofCivilEngineering
IMID-SEMESTER(SEM–I)2019-20</td></tr>
<tr><td colspan="7">Class:B.Tech.(CSE) ISemester</td></tr>
<tr><td colspan="2">SubjectName:
CHE101APPLIED CHEMISTRY</td><td colspan="3">Time:2 Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of thequestions as perBloomsTaxo nomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>QuestionM apping</td><td></td><td>Q.1, 2</td><td>Q.1, 2</td><td>Q.1, 2</td><td>Q.1, 2</td><td>Q.1, 2</td></tr>
<tr><td colspan="7">Student willbeableto attain CO1 to 12</td></tr>
<tr><td>COMap</td><td>QuestionNo.</td><td colspan="4">Question</td><td>Marks</td></tr>
<tr><td>CO1-12</td><td>Q.1</td><td colspan="4">Calculate the type and extent of alkalinity when 50 mL of water sample was analyzed against N/50 HCl. The volume of acid used upto the Phenolphthalein end point was 18.2 mL, whereas, volume of acid used upto the methyl orange end point was 11.6 mL. Calculate the type and extent of alkalinity in the given water sample.</td><td>15</td></tr>
</table>

CO1-12	Q2	Plant pigment separation by thin layer chromatography.	35

S. No.	Enrollment.No.	Student's Name	PHY121 APPLIED PHYSICS LAB -I							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U9G9
1	A60215819001	Mr MAYANK CHAHAR	100	50	50	A+	10	1	1	10
2	A60215819002	Mr KULDEEP GUPTA	100	50	50	A+	10	1	1	10
3	A60215819003	Mr MOHD SAIF KHAN	100	50	50	C+	4	1	1	4
4	A60215819004	Ms RIYA NAMDEV	100	50	50	A+	10	1	1	10
5	A60215819005	Mr YASH YOGI	100	50	50	C+	4	1	1	4
			Total No. of Students			=	5			
			Total No. of Students			>60 % marks	3	60	%	
			Attainment Level					Level 1		

Attainments		Rubric
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : APPLIED MATHEMATICS – III (PROBABILITY, STATISTICS AND NUMERICAL METHODS)
Course Code : MAT301, Crédits : 03, Session :2019-20(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Santosh Kumar Sharma, Dr. Alok Jain, Dr. Girraj Kumar Verma, Dr. Deepti Shakti Tripathi

T. Introduction: The objective of this course is to familiarize the prospective engineers with techniques in basic statistics, probability, testing of significance, and numerical methods for differentiation, integration, equations and ordinary differential equations. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

U. Course Outcomes: At the end of the course, students will be able to:

MAT301.1. Solve the problems of real life applications using measures of central tendency and to find out the correlation between various factors.

MAT301.2. Come to know the applications of probability and probability distribution functions in various sampling methods.

MAT301.3. Solve problems of sampling for large and small sampling using test of significance based on normal and chi-square statistics.

MAT301.4. Find the interpolated values of dependent variable, derivative at certain point, solution of equations and solution of simultaneous equations.

MAT301.5. Use the tools of numerical methods to solve definite integration and ordinary differential equations.

V. Programme Outcomes:

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modernengineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage inindependent and life-long learning in the broadest context of technological change

W. Programme Specific Outcomes:

PSO 1: Will be able to design, develop and implement efficient software for a given real life problem.

PSO 2: Will be able to apply knowledge of AI, Machine Learning and Data Mining in analyzing big data forextracting useful information from it and for performing predictive analysis.

PSO 3: Will be able to design, manage and secure wired/ wireless computer networks for transfer and sharing ofinformation.

X. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**

Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a studentto be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

Y. **Syllabus**

Module I : Basic Statistics

Measures of Central tendency: Moments, skewness and Kurtosis, Correlation and regression – Rank correlation.

Applied Statistics : Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves.

Module II : Basic Probability and expectation

Discrete and Continuous random variables and their properties, Dependent and Independent random variables. Probability spaces, conditional probability, sums of independent random variables. Expectation of Discrete Random Variables.

Probability distributions and probability density function for discrete and continuous variable: Binomial, Poisson's and Normal distribution and evaluation of its statistical parameters.

Module III: Test of significance for Small and large samples

est of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.

Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

Module IV : Numerical Methods

Solution of simultaneous linear equations by numerical techniques; Jacobi's and Gauss-Seidel method. Solution of algebraic and transcendental equations – Bi-section method, Newton-Raphson method and Regula-Falsi method.

Interpolation : Finite differences, Relation between operators, Interpolation using Newton's forward and backward difference formula.

Interpolation for unequal intervals: Newton's divided difference and Lagrange's formulae.

Module V : Numerical Methods

Numerical differentiation and integration: Picard's method, Trapezoidal rule and Simpson's 1/3rd and 3/8 rules.

Solution of Ordinary differential equation : Taylor's series, Euler's and modified Euler's methods, Runge-Kutta method of fourth order, Milne's and Adam's predicator-corrector methods.

Z. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

AA.Suggested Text/Reference Books:

- Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- P.G. Hoel, S.C. Port and C.J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003(Reprint).
- S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
- W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968.
- N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
- T. Veerarajan, Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi, 2010.

BB. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Measures of Central tendency	Lecture	MAT301.1	Mid Term-1, Quiz & End Sem Exam
2	Moments, skewness and Kurtosis	Lecture	MAT301.1	Mid Term-1, Quiz & End Sem Exam
3	Correlation and regression	Lecture	MAT301.1	Mid Term-1, Quiz & End Sem Exam
4	Rank Correlation	Lecture	MAT301.1	Mid Term-1, Quiz & End Sem Exam
5	Curve fitting by the method of least squares	Lecture	MAT301.1	Mid Term-1, Quiz & End Sem Exam

6	Straight Line	Lecture	MAT301.1	Mid Term-1, Quiz & End Sem Exam
7	Parabola and More curves	Lecture	MAT301.1	Mid Term-1, Quiz & End Sem Exam
8	Discrete and Continuous random variables	Lecture	MAT301.2	Mid Term-1, Quiz & End Sem Exam
9	Dependent and Independent random variables	Lecture	MAT301.2	Mid Term-1, Quiz & End Sem Exam
10	Probability spaces, conditional probability	Lecture	MAT301.2	Mid Term-1, Quiz & End Sem Exam
11	Sums of independent random variables, Expectation of Discrete Random Variables	Lecture	MAT301.2	Mid Term-1, Quiz & End Sem Exam
12	Probability distributions and probability density function	Lecture	MAT301.2	Mid Term-1, Quiz & End Sem Exam
13	Binomial and Poisson's distribution	Lecture	MAT301.2	Mid Term-1, Quiz & End Sem Exam
14	Normal distribution	Lecture	MAT301.2	Mid Term-1, Quiz & End Sem Exam
15	Large sample test for single proportion	Lecture	MAT301.3	Quiz & End Sem Exam
16	difference of proportions, single mean	Lecture	MAT301.3	Quiz & End Sem Exam
17	difference of means and standard deviations	Lecture	MAT301.3	Quiz & End Sem Exam
18	Test for single mean, difference of means	Lecture	MAT301.3	Quiz & End Sem Exam
19	Test for ratio of variances	Lecture	MAT301.3	Quiz & End Sem Exam
20	Chi-square test for goodness of fit	Lecture	MAT301.3	Quiz & End Sem Exam
21	Independence of attributes	Lecture	MAT301.3	Quiz & End Sem Exam
22	Jacobi's and Gauss-Seidel method	Lecture	MAT301.4	Quiz & End Sem Exam
23	Bi-section method, Newton-Raphson method	Lecture	MAT301.4	Quiz & End Sem Exam
24	Regula-Falsi method	Lecture	MAT301.4	Quiz & End Sem Exam
25	Finite differences, Relation between operators	Lecture	MAT301.4	Quiz & End Sem Exam
26	Interpolation using Newton's forward and backward difference formula	Lecture	MAT301.4	Quiz & End Sem Exam
27	Newton's divided difference	Lecture	MAT301.4	Quiz & End Sem Exam
28	Lagrange's formulae	Lecture	MAT301.4	Quiz & End Sem Exam
29	Picard's method	Lecture	MAT301.5	Quiz & End Sem Exam
30	Trapezoidal rule	Lecture	MAT301.5	Quiz & End Sem

				Exam
31	Simpson's 1/3rd and 3/8 rules	Lecture	MAT301.5	Quiz & End Sem Exam
32	Taylor's series and Euler's method	Lecture	MAT301.5	Quiz & End Sem Exam
33	modified Euler's methods	Lecture	MAT301.5	Quiz & End Sem Exam
34	Runge-Kutta method of fourth order	Lecture	MAT301.5	Quiz & End Sem Exam
35	Milne's predicator-corrector methods	Lecture	MAT301.5	Quiz & End Sem Exam
36	Adam's predicator-corrector methods	Lecture	MAT301.5	Quiz & End Sem Exam

CC. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
MAT301.1	Solve the problems of real life applications using measures of central tendency and to find out the correlation between various factors.	3	3	2	3	2						2		**3**	**2**	**1**
MAT301.2	Come to know the applications of probability and probability distribution functions in various sampling methods.	3	2	2	3	3						2		**3**	**2**	**1**
MAT301.3	Solve problems of sampling for large and small sampling using test of significance based on normal and chi-	3	2	2	3	3						2		**3**	**2**	**1**

	square statistics.															
MAT301.4	Find the interpolated values of dependent variable, derivative at certain point, solution of equations and solution of simultaneous equations.	3	2	2	3	3						2		**3**	**2**	**1**
MAT301.5	Use the tools of numerical methods to solve definite integration and ordinary differential equations.	3	2	2	3	2						2		**3**	**2**	**1**

Amity University Madhya Pradesh

B.Tech (Civil Engineering)

2018-2022

Exam Result For (Semester) : III

Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment.No.	Student's Name	BTCE301 APPLIED MATHEMATICS – III (TRANSFORM, NUMERICAL AND DISCRETE MATHEMATICS)							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U3G3
1	A60215818001	Mr NAMAN GOYAL	100	30	70	C+	4	3	3	12
2	A60215818003	Mr SADAV KHAN	100	30	70	B	6	3	3	18
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	B	6	3	3	18
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	0	0	%	
			Attainment Level					-		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **COMPUTER-AIDED CIVIL ENGINEERING DRAWING**
Course Code : CIV 302, Crédits : 03, Session : 2019-20 (Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Mohan Khantharia

A. Introduction

The objective of the course is to develop the capability for carrying out independent design. Information in the form of sketch and images to be illustrated as a part of discussion.

B. Course Outcomes: At the end of the course, students will be able to:

- **CIV302.1**. Application of software's in design and drawings of Civil Engineering structures.
- **CIV302.2**. Able to proficiency, including the ability to use industry-standard computer software to generate 2D and 3D drawings.
- **CIV302.3**. Understanding of the theory of orthographic projection and the conventions associated with Civil engineering drawings.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

E. Course Content

F. Module I: Basics of Auto Cad (2-D) and Auto Cad (3-D): Two-dimensional drafting work to be handled in detail on Auto Cad. Complete Drafting, Editing and modification work to be done and presentations be made.Basic commands and usage of 3d Auto Cad drawing. Drafting basic geometrical forms and combinations of the same in three dimensions and their editing.

Module II: Elements of Building Drawing: Symbols and sing Conventions used for materials, plumbing, rebar drawing, electrical fittings. Masonry Bonds details, one brick wall and one and half brick wall, wall connections, . RCC beam, column, footings, foundation plan, load wearing wall.

Module III:Building Drawing: Detail drawing of single story building Plan, Elevation, Sectional Elevation. Standard fittings, drawings of different types of buildings. .

Module IV: Building Bye-laws: Building Planning – Provisions of National Building Code, open area,setbacks, FAR terminology, principles of planning, orientation. site selection, types of drawings. Types of buildings. Classification of structure, Load bearing structure, Framed structure, Composite structure.

Module V: Perspective Drawing: Elements of perspective drawing involving simple problems, one point and two point perspectives.

G. Examination Scheme:

Components	A	CT	S/V/Q/ HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- Building Drawing Shah M. G. Kale C. M, Tata McGraw-Hill Education
- Planning & Designing of Building Sane Y. S, Allies Book Stall
- Architectural Design Ernest Pickering, J. Wiley & Sons
- National Building Code-2005

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Two-dimensional drafting work to be handled in detail on Auto Cad.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
2	Complete Drafting.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
3	Basic commands and usage of 3d Auto Cad drawing	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
4	Drafting basic geometrical forms	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
5	combinations of the same in three dimensions and their editing.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
6	Editing and modification work to be done and presentations be made.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
7	Symbols and sing Conventions used for materials,., , .	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
8	plumbing, rebar drawing, electrical fittings.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
9	plumbing, rebar drawing,	Lecture	CIV 302.1	Mid Term-1, Quiz

	electrical fittings.			& End Sem Exam
10	Masonry Bonds details, one brick wall and one and half brick wall.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
11	Masonry Bonds details, one brick wall and one and half brick wall.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
12	wall connections.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
13	RCC beam.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
14	Rcc column, footings.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
15	Foundation plan, load Bearing wall.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
16	Detail drawing of single story building Plan,	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
17	Elevation, of buildings	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
18	Sectional Elevation.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
19	Standard fittings.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
20	Drawings of different types of buildings	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
21	Building Planning Types of buildings.	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
22	Provisions of National Building Code.	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
23	Provisions of National Building Code.	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
24	Open area,setbacks	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
25	FAR terminology	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
26	Principles of planning, orientation	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
27	Site selection, types of drawings.	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
28	*Classification of structure, Load bearing structure,*	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
29	Framed structure, Composite structure.	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
30	Elements of perspective drawing involving simple problems, one point and two point perspectives.	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
31	Elements of perspective	Lecture	CIV 302.1	Mid Term-2, Quiz

	drawing involving simple problems, one point and two point perspectives.			& End Sem Exam
32	Elements of perspective drawing involving simple problems, one point and two point perspectives. Elements of perspective drawing involving simple problems, one point and two point perspectives.	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
33	Elements of perspective drawing involving simple problems, one point and two point perspectives.	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
34	Elements of perspective drawing involving simple problems, one point and two point perspectives.	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
35	Elements of perspective drawing involving simple problems, one point and two point perspectives.	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
36	Elements of perspective drawing involving simple problems, one point and two point perspectives.	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam

J.

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV302.1	Application of software's in design and drawings of Civil Engineering structures.	3	3	1	3	1				2		2	1			

CIV302.2	Able to proficiency, including the ability to use industry-standard computer software to generate 2D and 3D drawings	3	2	2	2	2				2		1	1			
CIV302.3	Understanding of the theory of orthographic projection and the conventions associated with Civil engineering drawings.	3	2	2	2	2				3		3	1			

Sample Question Paper

<table>
<tr><td colspan="7">Amity School of Engineering and Technology
Department of CIVIL Engineering
MID-SEMESTER(SEM–III)2019-20</td></tr>
<tr><td colspan="7">Class: B.Tech (CE) 3rd Semester</td></tr>
<tr><td colspan="2">Subjec tName:
CIV 302 Computer Aided Civil Engg drawing</td><td colspan="3">Time:1.5Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of thequestions as perBloomsTaxo nomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3,6</td><td>Q.4</td><td>Q.2,5</td><td></td><td></td></tr>
<tr><td colspan="7">Student will be able to
CO1: Using the software for the design of buildings, making plans.
CO2: Applying the basic concept of drawing
CO3: Understanding the various projections.</td></tr>
</table>

CO Map	Question No.	Question	Marks
CO1	Q.1	Use Auto CADD to make 2-D plan of building	3
CO1	Q.2a	What are various software used for the design of building.	3
	Q.2b	Write down various commands in Auto-CADD	3
CO1	Q.3	What is use of line command ?	6
CO2	Q.4	Discuss various types of projections.	3
CO2	Q.5a	Draw orthographic projections.	3
	Q.5b	Discuss various types of elements of building drawing.	3
CO3	Q6	What do you mean by 2-d and 3-d projections.	6

Attainments		Rubric
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No .	Enrollment.No.	Student's Name	CIV302 COMPUTER-AIDED CIVIL ENGINEERING DRAWING							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U6G6
1	A60215818001	Mr NAMAN GOYAL	100	30	70	B	6	2	2	12
2	A60215818003	Mr SADAV KHAN	100	30	70	B-	5	2	2	10
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	B	6	2	2	12
			Total No. of Students			=	3			
			Total No. of Students			>60 % marks	0	0	%	
			Attainment Level					-		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **ENGINEERING MECHANICS**
Course Code : CIV 303, Credits : 04, Session : 2019-20(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Mohan Khantharia, Mr. Sachin Tiwari

A. Introduction

The course also covers the simple and compound stresses due to forces, stresses and deflection in beams due to bending, torsion in circular section, strain energy, different theories of failure, stress in thin cylinder thick cylinder and spheres due to external and internal pressure.

B. Course Outcomes: At the end of the course, students will be able to:

- **CIV303.1** Able to know the importance of seismic activity consideration in terrain.
- **CIV303.2** Able to understand various techniques to determine engineering properties of rocks and distinguish different types of rocks and minerals.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects.

D.

Component of Evaluation	Description	Code	Weightag e %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/H A	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

E. **Module I: Introduction to Engineering Mechanics Covering:** Introduction to Engineering Mechanics covering, Force Systems Basic concepts, Particle equilibrium in 2-D & 3-D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces, Components in Space – Resultant- Moment of Forces and its Application; Couples and Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems; Static Indeterminacy.

Module II:Centroid and Centre of Gravity Covering: Centroid and Centre of Gravity covering, Centroid of simple figures from first principle, centroid of composite sections; Centre of Gravity and its implications; Area moment of inertia- Definition, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections; Mass moment inertia of circular plate, Cylinder, Cone, Sphere, Hook.

Module III: Basic Structural Analysis: Basic Structural Analysis covering, Equilibrium in three dimensions; Method of Sections; Method of Joints; How to determine if a member is in tension or compression; Simple Trusses; Zero force members; Beams & types of beams; Frames & Machines, Friction covering, Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, wedge friction, screw jack & differential screw jack;

Module IV: Virtual Work and Energy Method: Virtual Work and Energy Method- Virtual displacements, principle of virtual work for particle and ideal system of rigid bodies, degrees of freedom. Active force diagram, systems with friction, mechanical efficiency. Conservative forces and potential energy (elastic and gravitational), energy equation for equilibrium. Applications of energy method.

Module V: Review of Particle Kinematics, Dynamics and **Mechanical Vibrations:**Introduction to Kinematics of Rigid Bodies covering, Basic terms, general principles in dynamics; Types of motion, Instantaneous centre of rotation in plane motion and simple problems; D'Alembert's principle and its applications in plane motion and connected bodies; Work energy principle and its application in plane motion of connected bodies; Kinetics of rigid body rotation; Review of particle dynamics- Rectilinear motion; Plane curvilinear motion (rectangular, path, and polar coordinates). 3-D curvilinear motion; Relative and constrained motion; Newton's 2nd law (rectangular, path, and polar coordinates). Work-kinetic energy, power, potential energy. Impulse-momentum (linear, angular); Impact (Direct and oblique), Mechanical Vibrations covering, Basic terminology, free and forced vibrations, resonance and its effects; Degree of freedom; Derivation for frequency and amplitude of free vibrations without damping and single degree of freedom system, simple problems, types of pendulum, use of simple, compound and torsion pendulums.

F. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/ HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

G. Text Books

- Jindal U.C., "Strength of Materials", Galgotia Publication, New Delhi, 1998.
- Ryder G.H., "Strength of Materials", Macmillan, Delhi, 2003.
- R.K. Bansal, "Strength of Materials", Laxmi Publication, New Delhi, 2001.
- Sadhu Singh, "Strength of Materials", Khanna Publishers, New Delhi, 2000.
- Timoshenko S.P., "Elements of Strength of Materials", East-West affiliated, New Delhi, 2000.
- Hibbler R.C., "Mechanics of Materials", Prentice Hall, New Delhi, 1994.

H.

Lecture	**Topics**	**Mode of Delivery**	**Corresponding CO**	**Mode of Assessing CO**
1	Introduction to Engineering Mechanics covering.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
2	Force Systems Basic concepts	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
3	Particle equilibrium in 2-D & 3-D.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
4	Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
5	Components in Space – Resultant- Moment of Forces and its Application.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
6	Couples and Resultant of Force System, Equilibrium of System of Forces	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
7	Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
8	Static Indeterminacy.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
9	Centroid and Centre of Gravity covering.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
10	Centroid of simple figures.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam

11	from first principle, centroid of composite sections.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
12	Centre of Gravity and its implications.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
13	Area moment of inertia-Definition.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
14	Moment of inertia of plane sections from first principles.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
15	Theorems of moment of inertia.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
16	Moment of inertia of standard sections and composite sections	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
17	Mass moment inertia of circular plate, Cylinder,	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
18	Mass moment inertia Cone, Sphere, Hook.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
19	Basic Structural Analysis covering.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
20	Equilibrium in three dimensions.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
21	Method of Sections.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
22	Method of Joints; How to determine if a member is in tension or compression	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
23	Simple Trusses; Zero force members.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
24	Beams & types of beams; Frames & Machines	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
25	Friction covering, Types of friction, Limiting friction.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
26	Friction, Static and Dynamic Friction	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
27	Laws of; Motion of Bodies, wedge friction.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
28	screw jack & differential screw jack	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
29	Method of Joints; How to determine if a member is in tension.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
30	Virtual Work and Energy Method-for. (	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
31	Virtual displacements, principle of virtual work.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
32	particle and ideal system of rigid bodies.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
33	degrees of freedom.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
34	Active force diagram, systems with friction.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
35	Mechanical efficiency. Conservative forces and potential energy.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
36	Elastic and gravitational),	Lecture	CIV303.1	Mid Term-2, Quiz

	energy equation for equilibrium. Applications of energy method.			& End Sem Exam
37	Introduction to Kinematics of Rigid Bodies covering, Basic terms, general principles in dynamics.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
38	Mechanical Vibrations covering, Basic terminology, free and forced vibrations.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
39	Resonance and its effects; Degree of freedom.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
40	Derivation for frequency and amplitude of free vibrations without damping and single degree of freedom system.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam

I.

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV303.1	Able to know the importance of seismic activity consideration in terrain.	3	3	1	3	1				2		2	1			
CIV303.2	Able to understand various techniques to determine engineering properties of rocks and distinguish different types of rocks and minerals	3	2	2	2	2				2		1	1			

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–III)2019-20						
Class: B.Tech (CE) 3rd Semester						
Subject t Name: CIV 303 Engineering Mechanics		Time:1.5Hrs		Max.Marks:30		
Levels of the questions as per Blooms	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

Taxonomy						
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		

Student will be able to
CO1: Understand the basic concept of stress and strain
CO2: Analyze the basic properties of different materials.

CO Map	Question No.	Question	Marks
CO1	Q.1	What is force and it system?	3
CO1	Q.2a	What is concurrent and coplanar forces?	3
	Q.2b	What do you mean by free body diagram?	3
CO1	Q.3	What is stress and strain?	6
CO2	Q.4	What is Kinetics of rigid body and also Review of particle dynamics.	3
CO2	Q.5a	What is centre of gravity.	3
	Q.5b	What is curvilinear motion, Relative and constrained motion.	3
CO2	Q6	What is Newton’s 2nd law (rectangular, path, and polar coordinates).	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	CIV303 ENGINEERING MECHANICS Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U7G7
1	A60215818001	Mr NAMAN GOYAL	100	30	70	B-	5	4	4	20
2	A60215818003	Mr SADAV KHAN	100	30	70	C+	4	4	4	16
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	A+	10	4	4	40
			Total No. of Students			=	3			
			Total No. of Students			>60 % marks	1	33.3333	%	
			Attainment Level					-		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **ENERGY SCIENCE AND ENGINEERING**
Course Code : CIV 304, Credits : 04, Session : 2019-20 (Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Mohan Khantharia, Mr. Sachin Tiwari

A. Introduction

Energy-efficient construction implies the development of energy-efficient technological and other measures that are aimed at streamlining the processes of using energy resources at all stages of construction. One of their effective directions is the construction of "green" buildings with zero energy consumption.

B. Course Outcomes: At the end of the course students will be able to learn

- **CIV 304.1** properties of fluids, pressure measurement devices, hydraulic forces on surfaces, bouncy and flotation in fluids, kinematics and static behavior of fluids.
- **CIV 304.2** dimension and model analysis, laminar and turbulent flow, flow through pipes and orifices, boundary layer theory.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects.

D. Programme Specific Outcomes:

PSO1: Students will be able to understand the different types of construction ancient and modern in recent trends.

PSO2: Students will able to apply all the concepts to develop green construction and to use energy efficiently.

PSO3: It will help student to understand the different types of construction.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/ HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25%includesalltypesofleaves Including medical leaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F.

Module I: Introduction: What is Civil Engineering/ Infrastructure? Basics of Engineering and Civil Engineering; Broad disciplines of Civil Engineering; Importance of Civil Engineering, Possible scopes for a career. Early constructions and developments over time; Ancient monuments & Modern marvels; Development of various materials of construction and methods of construction; Works of Eminent civil engineers. Introduction to Energy Science: Scientific principles and historical interpretation to place energy use in the context of pressing societal, environmental and climate issues.

Module II: Energy Sources: Overview of energy systems, sources, transformations, efficiency, and storage. Fossil fuels (coal, oil, oil-bearing shale and sands, coal gasification) - past, present & future, Remedies & alternatives for fossil fuels - biomass, wind, solar, nuclear, wave, tidal and hydrogen; Sustainability and environmental trade-offs of different energy systems; possibilities for energy storage or regeneration (Ex. Pumped storage hydro power projects, superconductor-based energy storages, high efficiency batteries)

Module III: Energy & Environment: Energy efficiency and conservation; introduction to clean energy technologies and its importance in sustainable development; Carbon footprint, energy consumption and sustainability; introduction to the economics of energy;; How future energy use can be influenced by economic, environmental, trade, and research policy.

Module IV: Civil Engineering Projects connected with the Energy Sources: Coal mining technologies, Oil exploration offshore platforms, Underground and under-sea oil pipelines, solar chimney project, wave energy caissons, coastal installations for tidal power, wind mill towers; hydro power stations above-ground and underground along with associated dams, tunnels, penstocks, etc.; Nuclear reactor; Spent Nuclear fuel storage and disposal systems.

Module V: Engineering for Energy Conservation: Concept of Green Building and Green Architecture; Green building concepts; LEED ratings. Energy Audit of Facilities and optimization of energy consumption**:** Aesthetics in Civil Engineering, Examples of great architecture, fundamentals of architectural design & town planning; Building Systems (HVAC, Acoustics, Lighting, etc.); LEED ratings; Development of Smart cities.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- Patil, B.S.(1974), Legal Aspects of Building and Engineering Contract
- The National Building Code, BIS, (2017)
- RERA Act, (2017)
- Meena Rao (2006), Fundamental concepts in Law of Contract, 3rd Edn. Professional Offset
- Chandiramani, Neelima (2000), The Law of Contract: An Outline, 2nd Edn. Avinash Publications Mumbai
- Boyle, Godfrey (2004), Renewable Energy (2nd edition). Oxford UniversityPress

I. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Corresponding CO**	**Mode of Assessing CO**
1	What is Civil Engineering/ and Civil Engineering;	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
2	Infrastructure? Basics of Engineering	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam

3	Broad disciplines of Civil Engineering.	Lecture	CIV304.1	Mid Term-1, Quiz & End Sem Exam
4	Importance of Civil Engineering,	Lecture	CIV304.1	Mid Term-1, Quiz & End Sem Exam
5	Early constructions and developments over time	Lecture	CIV304.1	Mid Term-1, Quiz & End Sem Exam
6	Ancient monuments & Modern marvels	Lecture	CIV304.1	Mid Term-1, Quiz & End Sem Exam
7	Development of various materials of construction and methods of construction	Lecture	CIV304.1	Mid Term-1, Quiz & End Sem Exam
8	Works of Eminent civil engineers. Introduction to Energy Science	Lecture	CIV304.1	Mid Term-1, Quiz & End Sem Exam
9	Scientific principles and historical interpretation to place energy use in the context of pressing societal	Lecture	CIV304.1	Mid Term-1, Quiz & End Sem Exam
10	Environmental and climate issues.	Lecture	CIV304.1	Mid Term-1, Quiz & End Sem Exam
11	Possible scopes for a career.	Lecture	CIV304.1	Mid Term-1, Quiz & End Sem Exam
12	Overview of energy systems, and storage., coal gasification)	Lecture	CIV304.1	Mid Term-1, Quiz & End Sem Exam
13	Overview of energy systems, sources, transformations, efficiency	Lecture	CIV307.1	Mid Term-1, Quiz & End Sem Exam
14	Fossil fuels (coal, oil, oil-bearing shale and sands.	Lecture	CIV304.1	Mid Term-1, Quiz & End Sem Exam
15	past, present & future, remedies & alternatives for fossil fuels	Lecture	CIV304.1	Mid Term-1, Quiz & End Sem Exam
16	Biomass, wind, solar, nuclear, wave, tidal and hydrogen.	Lecture	CIV304.1	Mid Term-1, Quiz & End Sem Exam
17	Sustainability and environmental trade-offs of different energy systems	Lecture	CIV304.1	Mid Term-1, Quiz & End Sem Exam
18	possibilities for energy storage or regeneration (Ex. Pumped storage hydro power project	Lecture	CIV304.1	Mid Term-1, Quiz & End Sem Exam
19	superconductor-based energy storages, high efficiency batteries)	Lecture	CIV304.1	Mid Term-1, Quiz & End Sem Exam
20	Energy efficiency and conservation;, environmental,	Lecture	CIV304.1	Mid Term-1, Quiz & End Sem Exam
21	introduction to clean energy technologies	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam
22	introduction to clean energy technologies and its importance in sustainable development	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam
23	Carbon footprint, energy consumption and sustainability	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam
24	introduction to the economics of energy	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam
25	How future energy use can be	Lecture	CIV304.1	Mid Term-2, Quiz

	influenced by economic			& End Sem Exam
26	Trade, and research policy.	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam
27	Coal mining technologies, Oil exploration offshore platforms, , solar,; tunnels, penstocks, etc.;	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam
28	Underground and under-sea oil pipelines	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam
29	chimney project, wave energy caissons	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam
30	coastal installations for tidal power, wind mill towers	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam
31	hydro power stations above-ground and underground along with associated dams,	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam
32	Nuclear reactor; Spent Nuclear fuel storage and disposal systems.	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam
33	Nuclear reactor; Spent Nuclear fuel storage and disposal systems.	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam
34	Concept of Green Building and Green Architecture.:,	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam
35	Green building concepts	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam
36	LEED ratings	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam
37	Energy Audit of Facilities and optimization of energy consumption	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam
38	Aesthetics in Civil Engineering, Examples of great architecture	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam
39	fundamentals of architectural design & town planning; Building Systems	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam
40	(HVAC, Acoustics, Lighting, etc.); LEED ratings; Development of Smart cities.	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV304.1	Understand the basic concept of sustainable construction with different materials.	3	3	1	3	1				2		2	1		1	1
CIV304.2	Students will able to visualize the difference between ancient and modern construction.	3	2	2	2	2				2		1	1		2	1
CIV304.3	Understanding the basic of different structural components and their usage.	3	2	2	2	2				2		1	1		1	2

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–III)2019-20						
Class: B.Tech (CE) 3rd Semester						
Subject Name: CIV 304 Energy Science and Engineering		Time:1.5Hrs		Max.Marks:30		
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		
Student will be able to CO1: Understand the basic difference between modern and ancient constructions CO2: Understand basic of different energy sources and their						

origin			
CO Map	Question No.	Question	Marks
CO1	Q.1	What do you understand by modern construction materials?	3
CO1	Q.2a	What do you understand by carbon foortprint?	3
	Q.2b	What are different types of construction materials?	3
CO1	Q.3	What do you mean by green house gases?	6
CO2	Q.4	What are different conventional energy sources?	3
CO2	Q.5a	Discuss use of fossil fuel and its impact on environment	3
	Q.5b	Discuss tidal energy, solar energy and wind energy.	3
CO2	Q6	Discuss conventional and non conventional energy sources.	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No .	**Enrollment.No.**	**Student's Name**	**CIV304 ENERGY SCIENCE & ENGINEERING**							
			Max Marks	**CE Weight Age (%)**	**ET Weight Age (%)**	**GO**	**GP**	**ACU**	**ECU**	**U4G4**
1	A60215818001	Mr NAMAN GOYAL	100	30	70	A	9	2	2	18
2	A60215818003	Mr SADAV KHAN	100	30	70	B-	5	2	2	10
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	B+	7	2	2	14
			Total No. of Students			=	3			
			Total No. of Students			>60 % marks	1	33.3333	%	
			Attainment Level					-		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **BASIC CIVIL Engineering**
Course Code : CIV 305, Credits : 04, Session : 2019-20 (Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Mohan Khantharia, Mr. Sachin Tiwari

A. Introduction: Energy-efficient construction implies the development of energy-efficient technological and other measures that are aimed at streamlining the processes of using energy resources at all stages of construction. One of their effective directions is the construction of "green" buildings with zero energy consumption.

B. Course Outcomes: At the end of the course students will be able to learn

- **CIV 305.** Introduction to what constitutes Civil Engineering
- Identifying the various areas available to pursue and specialize within the overall field of Civil Engineering
- **CIV 305.2** Highlighting the depth of engagement possible within each of these areas, Exploration of the various possibilities of a career in this field

C. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects.

F. Programme Specific Outcomes:

PSO1: Students will be able to understand the different types of construction ancient and modern in recent trends.

PSO2: Students will able to apply all the concepts to develop green construction and to use energy efficiently.

PSO3: It will help student to understand the different types of construction.

G.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/ HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25%includesalltypesofleaves Including medical leaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

Module 1: Basic Understanding: What is Civil Engineering/ Infrastructure? Basics of Engineering and Civil Engineering; Broad disciplines of Civil Engineering; Importance of Civil Engineering, Possible scopes for a career. Early constructions and developments over time; Ancient monuments & Modern marvels; Development of various materials of construction and methods of construction; Works of Eminent civil engineers.

Module 2: Fundamentals of Architecture & Town Planning: Aesthetics in Civil Engineering, Examples of great architecture, fundamentals of architectural design & town planning; Building Systems (HVAC, Acoustics, Lighting, etc.); LEED ratings; Development of Smart cities.

Module 3: Fundamentals of Building Materials: Stones, bricks, mortars, Plain, Reinforced & Prestressed Concrete, Construction Chemicals; Structural Steel, High Tensile Steel, Carbon Composites; Plastics in Construction; 3D printing; Recycling of Construction & Demolition wastes. Types of buildings; tall structures; various types of bridges; Water retaining structures; Other structural systems; Experimental Stress Analysis; Wind tunnel studies.

Module 4: Environmental Engineering & Sustainability: Water treatment systems; Effluent treatment systems; Solid waste management; Sustainability in Construction; **Geotechnical Engineering:**-(Basics of soil mechanics, rock mechanics and geology; various types of foundations) **Hydraulics, Hydrology &Water Resources Engineering: (**Fundamentals of fluid flow, basics of water supply systems; Underground Structures)

Module 5: Surveying & Geometrics: Traditional surveying techniques, Total Stations, Development of Digital Terrain Models; GPS, LIDAR**. Traffic &Transportation Engineering: (**Development in India for different modes of transport; Developments and challenges in integrated transport development in India: road, rail, port and harbour and airport sector; PPP in transport sector; Intelligent Transport Systems; Urban Public and Freight Transportation; Road Safety under heterogeneous traffic; Sustainable and resilient pavement materials)

Module 6: Repairs & Rehabilitation of Structures: Basics of corrosion phenomena and other structural distress mechanisms; some simple systems of rehabilitation of structures; Non- Destructive testing systems; Use of carbon fibre wrapping and carbon composites in repairs. Typical software used in Civil Engineering- Finite Element Method, Modelling; highlighting typical available software systems (SAP, STAAD, ABAQUS, MATLAB, ETAB, REVIT, AUTOCAD, PRIMAVERA)

Module 7: Industrial Visit.

At least one day visit to local industry in the field of Civil Engineering.

G.Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

I. Suggested Books

- Patil, B.S.(1974), Legal Aspects of Building and Engineering Contract
- The National Building Code, BIS, (2017)
- RERA Act, (2017)
- Meena Rao (2006), Fundamental concepts in Law of Contract, 3rd Edn. Professional Offset
- Chandiramani, Neelima (2000), The Law of Contract: An Outline, 2nd Edn. Avinash Publications Mumbai
- Boyle, Godfrey (2004), Renewable Energy (2nd edition). Oxford UniversityPress

J. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Corresponding CO**	**Mode of Assessing CO**

1	What is Civil Engineering/ Infrastructure? Ancient monuments & Modern marvels	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
2	Basics of Engineering and Civil Engineering	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
3	Broad disciplines of Civil Engineering; Importance of Civil Engineering	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
4	Broad disciplines of Civil Engineering; Importance of Civil Engineering	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
5	Possible scopes for a career. Early constructions and developments over time	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
6	Possible scopes for a career. Early constructions and developments over time	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
7	Development of various materials of construction and methods of construction	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
8	Development of various materials of construction and methods of construction	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
9	Works of Eminent civil engineers.	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
10	Aesthetics in Civil Engineering,; Building Systems	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
11	Examples of great architecture	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
12	fundamentals of architectural design & town planning	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
13	fundamentals of architectural design & town planning	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
14	HVAC, Acoustics, Lighting, etc.); LEED ratings	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
15	HVAC, Acoustics, Lighting, etc.); LEED ratings	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
16	Development of Smart cities.	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
17	Development of Smart cities.	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
18	Stones, bricks, mortars, Plain, Reinforced & Prestressed Concrete	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
19	Plain, Reinforced & Prestressed Concrete	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
20	Construction Chemicals; Structural Steel, High Tensile Steel	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
21	Construction Chemicals; Structural Steel, High Tensile Steel	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam
22	Carbon Composites; Plastics in Construction; 3D printing	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam
23	Recycling of Construction & Demolition wastes	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam
24	Types of buildings; tall structures;	Lecture	CIV305.1	Mid Term-2, Quiz

	various types of bridges			& End Sem Exam
25	Water retaining structures; Other structural systems	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam
26	Water retaining structures; Other structural systems	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam
27	Experimental Stress Analysis; Wind tunnel studies	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam
28	Water treatment systems; Effluent treatment systems	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam
29	Solid waste management; Sustainability in Construction	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam
30	**Geotechnical Engineering:**-(Basics of soil mechanics, rock mechanics and geology.	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam
31	**Hydraulics, Hydrology &Water Resources Engineering: (**Fundamentals of fluid flow, basics of water supply systems.	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam
32	various types of foundations); Underground Structures)	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam
33	Traditional surveying techniques, Total Stations, Development of Digital Terrain Models; GPS, LIDAR**.**	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam
34	Development in India for different modes of transport; Developments and challenges in integrated transport development in India	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam
35	road, rail, port and harbour and airport sector; PPP in transport sector; Intelligent Transport Systems	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam
36	Urban Public and Freight Transportation; Road Safety under heterogeneous traffic; Sustainable and resilient pavement materials)	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam
37	Basics of corrosion phenomena and other structural distress mechanisms; some simple systems of rehabilitation of structures	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam
38	Non- Destructive testing systems; Use of carbon fibre wrapping and carbon composites in repairs	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam
39	. Typical software used in Civil Engineering- Finite Element Method	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam
40	Modelling; highlighting typical available software systems (SAP, STAAD, ABAQUS, MATLAB, ETAB, REVIT, AUTOCAD, PRIMAVERA)	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam

K. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV305.1	Introduction to what constitutes Civil Engineering Identifying the various areas available to pursue and specialize within the overall field of Civil Engineering Exploration of the various possibilities of a career in this field.	3	3	1	3	1				2		2	1		1	1
CIV305.2	Students will able to visualize the difference between ancient and modern construction.	3	2	2	2	2				2		1	1		2	1
CIV305.3	Highlighting the depth of engagement possible within each of these areas.	3	2	2	2	2				2		1	1		1	2

Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–III)2019-20						
Class: B.Tech (CE) 3rd Semester						
Subjec tName: CIV 305 Basic Civil Engineering		Time:1.5Hrs		Max.Marks:30		
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		

Student will be able to CO1: Understand the basic difference between modern and ancient constructions CO2: Understand basic of different energy sources and their origin. CO3: Analyze the difference between modern and ancient construction techniques.			
CO Map	Question No.	Question	Marks
CO1	Q.1	What do you understand by modern construction materials?	3
CO1	Q.2a	What do you understand by sulphate resisting cement?	3
	Q.2b	What are different types of construction materials?	3
CO1	Q.3	What do you mean by lean concrete?	6
CO2	Q.4	What do you understand by HVACC?	3
CO2	Q.5a	What do you understand by smart city? Discuss in detail.	3
	Q.5b	Discuss cement manufacturing process. Dry process	3
CO3	Q6	Discuss Green building concept.	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	CIV305 BASIC CIVIL ENGINEERING							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U5G5
1	A60215818001	Mr NAMAN GOYAL	100	30	70	B+	7	2	2	14
2	A60215818003	Mr SADAV KHAN	100	30	70	B-	5	2	2	10
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	A	9	2	2	18

Total No. of Students	=	3	
Total No. of Students	>60 % marks	1	33.3333 %
Attainment Level		-	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **BIOLOGY FOR ENGINEERS**
Course Code : CIV306, Credits : 02, Session : 2019-20(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Nidhi Shukla, Dr. Kuldeep Dwivedi, Dr. Swapnil Rai

A. Introduction

Life science engineering concerns the application of engineering principles and practices to living organisms and is used in areas such as stem cell engineering, biochips and biosensors, and molecular bio-computing.

B. Course Outcomes: At the end of the course students will be able to learn

- **CIV306.1**. Develop an understanding of the ecosystems, community ecology, ecosystem structure etc.
- The significance of biological sciences. Develop an insight into the various environmental management covering principles environment
- **CIV306.2** Develop an understanding of the ecosystems, community ecology, ecosystem structure etc. Understand the concept of population characteristics, ecotypes; population genetics.
- **CIV306.3** Develop an insight into the various environmental management covering principles environment.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects.

D. Programme Specific Outcomes:

PSO1: Understanding the concepts of Cell biology and Genetics.

PSO2: To get insights about the discovery of nucleic acids.

PSO3: Learning about basic concepts of Bioinformatics

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25%includesalltypesofleaves	A	5%

	Including medical leaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module 1:Why we need to study biology? To convey that Biology is as important a scientific discipline as Mathematics, Physics and Chemistry Bring out the fundamental differences between science and engineering. Mention the most exciting aspect of biology as an independent scientific discipline. Why we need to study biology? Discuss how biological observations of 18th Century that lead to major discoveries.

Module 2: Plant Physiology: Transpiration; Mineral nutrition

Module 3:Ecology, Ecosystems & Population Ecology: Components, types, flow of matter and energy in an ecosystem; Community ecology- Characteristics, frequency, life forms, and biological spectrum; Ecosystem structure- Biotic and a-biotic factors, food chain, food web, ecological pyramids.

Population characteristics, ecotypes; Population genetics- Concept of gene pool and genetic diversity in populations, polymorphism and heterogeneity;

Module 4: Environmental Management: Perspectives concerns and management strategies; Policies and legal aspects- Environment Protection Acts and modification, International Treaties; Environmental Impact Assessment- Case studies (International Airport, thermal power plant)

Module 5: Introduction to Biostatistics: Terms used, types of data; Measures of Central Tendencies- Mean, Median, Mode, Normal and Skewed distributions; Analysis of Data- Hypothesis testing and ANNOVA (single factor)

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H. John Wiley and Sons
- Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freeman andCompany
- Molecular Genetics (Second edition), Stent, G. S.; and Calender, R. W.H. Freeman and company, Distributed by Satish Kumar Jain for CBSPublisher
- Microbiology, Prescott, L.M J.P. Harley and C.A. Klein 1995. 2nd edition Wm, C. Brown Publishers

I. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	convey that Biology is as important a scientific discipline as Mathematics, Physics and Chemistry	Lecture	CIV306.1	Mid Term-1, Quiz & End Sem Exam

2	Bring out the fundamental differences between science and engineering.	Lecture	CIV306.1	Mid Term-1, Quiz & End Sem Exam
3	Mention the most exciting aspect of biology as an independent scientific discipline.	Lecture	CIV306.1	Mid Term-1, Quiz & End Sem Exam
4	Mention the most exciting aspect of biology as an independent scientific discipline.	Lecture	CIV306.1	Mid Term-1, Quiz & End Sem Exam
5	Why we need to study biology? Discuss how biological observations of 18th Century that lead to major discoveries.	Lecture	CIV306.1	Mid Term-1, Quiz & End Sem Exam
6	Why we need to study biology? Discuss how biological observations of 18th Century that lead to major discoveries.	Lecture	CIV306.1	Mid Term-1, Quiz & End Sem Exam
7	Transpiration; Mineral nutrition	Lecture	CIV306.1	Mid Term-1, Quiz & End Sem Exam
8	Transpiration; Mineral nutrition	Lecture	CIV306.1	Mid Term-1, Quiz & End Sem Exam
9	Transpiration; Mineral nutrition	Lecture	CIV306.1	Mid Term-1, Quiz & End Sem Exam
10	Transpiration; Mineral nutrition	Lecture	CIV306.1	Mid Term-1, Quiz & End Sem Exam
11	Components, types, flow of matter and energy in an ecosystem.	Lecture	CIV306.1	Mid Term-1, Quiz & End Sem Exam
12	Community ecology- Characteristics, frequency	Lecture	CIV306.1	Mid Term-1, Quiz & End Sem Exam
13	life forms, and biological spectrum; Ecosystem structure	Lecture	CIV306.1	Mid Term-1, Quiz & End Sem Exam
14	Biotic and a-biotic factors, food chain, food web, ecological pyramids	Lecture	CIV306.1	Mid Term-1, Quiz & End Sem Exam
15	Biotic and a-biotic factors, food chain, food web, ecological pyramids	Lecture	CIV306.1	Mid Term-1, Quiz & End Sem Exam
16	Population characteristics, ecotypes	Lecture	CIV306.1	Mid Term-1, Quiz & End Sem Exam
17	Population genetics- Concept of gene pool and genetic diversity in populations	Lecture	CIV306.1	Mid Term-1, Quiz & End Sem Exam
18	polymorphism and heterogeneity	Lecture	CIV306.1	Mid Term-1, Quiz & End Sem Exam
19	Perspectives concerns and management strategies; Policies and legal aspects-	Lecture	CIV306.1	Mid Term-1, Quiz & End Sem Exam

20	Environment Protection Acts and modification, International Treaties; Environmental Impact	Lecture	CIV306.1	Mid Term-1, Quiz & End Sem Exam
21	Assessment- Case studies (International Airport, thermal power plant)	Lecture	CIV306.1	Mid Term-2, Quiz & End Sem Exam
22	Terms used, types of data; Measures of Central Tendencies	Lecture	CIV306.1	Mid Term-2, Quiz & End Sem Exam
23	Mean, Median, Mode, Normal and Skewed distributions; Analysis of Data	Lecture	CIV306.1	Mid Term-2, Quiz & End Sem Exam
24	Hypothesis testing and ANNOVA (single factor)	Lecture	CIV306.1	Mid Term-2, Quiz & End Sem Exam

Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV306.1	Develop an understanding of the ecosystems, community ecology, ecosystem structure etc.	3	3	1	3	1				2		2	1	1	2	1
CIV306.2	The significance of biological sciences. Develop an insight into the various environmental management covering principles environment	3	2	2	2	2				2		1	1	2	2	1
CIV306.3	Develop an understanding of the ecosystems, community ecology, ecosystem structure etc. Understand the concept of population characteristics, ecotypes; population genetics.	2	1	1	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–III)2019-20						
Class: B.Tech (CE) 3rd Semester						
Subjec tName: CIV 306 Biology for Engineers		Time:1.5Hrs			Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		
Student will be able to CO1: Understand need of biology, its importance. CO2: Understand basic of origin of species. CO3: understand ecosystem, ecology and population forecasting						

CO Map	Question No.	Question	Marks
CO1	Q.1	Why we need to study biology? Discuss how biological observations of 18th Century that lead to major discoveries.	3
CO1	Q.2a	Discuss in detail evapotranspiration.	3
	Q.2b	Discuss Concept of gene pool and genetic diversity in populations.	3
CO1	Q.3	What is biodiversity? Discuss its importance.	6
CO2	Q.4	Discuss environment protection acts in detail.	3
CO2	Q.5a	What is population forecasting? Discuss one method.	3
	Q.5b	What is biotic and discuss its importance.	3
CO3	Q6	Discuss in detail Environmental Impact Assessment-Case studies (International Airport, thermal power plant)	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	CIV306 BIOLOGY FOR ENGINEERS							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U8G8
1	A60215818001	Mr NAMAN GOYAL	100	30	70	B-	5	2	2	10
2	A60215818003	Mr SADAV KHAN	100	30	70	B-	5	2	2	10
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	A-	8	2	2	16

Total No. of Students	=	3		
Total No. of Students	>60 % marks	1	33.3333	%
Attainment Level			-	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **LIFE SCIENCE**
Course Code : CIV 307, Credits : 02, Session : 2019-20(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Nidhi Shukla, Dr. Kuldeep Dwivedi

A. Introduction

B. Course Outcomes: At the end of the course students will be able to learn

- **CIV 307.1** Understand the basic principles & techniques of biotechnology.Cellular structures of living forms.
- **CIV 307.2** Understand the basic concept of Enzimes and different species. About DNA and biological structure about the species exploring Molecular Genetics.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/ HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25%includesalltypesofleaves Including medical leaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F.Course Content

Module 1:Unicellular or Multicellular:(5 Hours)

Classification per se is not what biology is all about (Theunderlying criterion, such as morphological, biochemical or ecological be highlighted). Hierarchy of life forms at phenomenological level. Classification based on (a) cellularity- Unicellular or multicellular (b) ultrastructure- prokaryotes or eucaryotes. (c) energy and Carbon utilization -Autotrophs, heterotrophs, lithotropes (d) Ammonia excretion – aminotelic, uricoteliec, ureotelic (e) Habitats- acquatic or terrestrial.

Module 2:Concepts of Recessiveness and Dominance:(5 Hours)

Principles of Genetics in biology are like Newton's laws to Physical Sciences. Mendel's laws, Concept of segregation and independent assortment. Concept of allele. Gene mapping, Gene interaction, Epistasis. Meiosis and Mitosis (be taught as a part of genetics. Emphasis to be give not to the mechanics of cell division nor the phases but how genetic material passes from parent to offspring). Concepts of recessiveness and dominance. Concept of mapping of phenotypes to genes. Single gene disorders in humans. Concept of complementation using human genetics.

Module 3: Molecules of Life: All forms of life has the same building blocks (yet the manifestations are as diverse as one can imagine Molecules of life). Discuss monomeric units and polymeric structures. Discuss about sugars, starch and cellulose. Amino acids and proteins, Lipids. Nucleotides and DNA/RNA.

Module 4:Molecular Genetics: Structures of DNA and RNA; Concept of Gene, Gene regulation, e.g., Operon concept;

Module 5:Basic Concepts of Biotechnology: Totipotency and Cell manipulation; Plant & Animal tissue culture- Methods and uses in agriculture, medicine and health; Recombinant DNA Technology- Techniques and applications.

G.Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att Attendance

H.Suggested Books:

- Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd
- Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H. John Wiley and Sons
- Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freeman andCompany
- Molecular Genetics (Second edition), Stent, G. S.; and Calender, R. W.H. Freeman and company, Distributed by Satish Kumar Jain for CBSPublisher

I.lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Classification per se is not what biology is all about (The underlying criterion.	Lecture	CIV307.1	Mid Term-1, Quiz & End Sem Exam
2	such as morphological, biochemical or ecological be highlighted)	Lecture	CIV307.1	Mid Term-1, Quiz & End Sem Exam
3	Hierarchy of life forms at phenomenological level	Lecture	CIV307.1	Mid Term-1, Quiz & End Sem Exam
4	Classification based on (a) cellularity- Unicellular or multicellular (b) ultrastructure-prokaryotes or eucaryotes.	Lecture	CIV307.1	Mid Term-1, Quiz & End Sem Exam
5	Autotrophs, heterotrophs, lithotropes (d) Ammonia excretion	Lecture	CIV307.1	Mid Term-1, Quiz & End Sem Exam
6	energy and Carbon utilization	Lecture	CIV307.1	Mid Term-1, Quiz & End Sem Exam

7	aminotelic, uricoteliec, ureotelic (e) Habitats- acquatic or terrestrial.	Lecture	CIV307.1	Mid Term-1, Quiz & End Sem Exam
8	Principles of Genetics in biology are like Newton's laws to Physical Sciences. nor the phases but how genetic material passes from parent to offspring)..	Lecture	CIV307.1	Mid Term-1, Quiz & End Sem Exam
9	Mendel's laws, Concept of segregation and independent assortment.	Lecture	CIV307.1	Mid Term-1, Quiz & End Sem Exam
10	Concept of allele. Gene mapping, Gene interaction, Epistasis. Meiosis and Mitosis	Lecture	CIV307.1	Mid Term-1, Quiz & End Sem Exam
11	(be taught as a part of genetics. Emphasis to be give not to the mechanics of cell division	Lecture	CIV307.1	Mid Term-1, Quiz & End Sem Exam
12	Concepts of recessiveness and dominance. Concept of mapping of phenotypes to genes	Lecture	CIV307.1	Mid Term-1, Quiz & End Sem Exam
13	Single gene disorders in humans.	Lecture	CIV307.1	Mid Term-1, Quiz & End Sem Exam
14	Concept of complementation using human genetics.	Lecture	CIV307.1	Mid Term-1, Quiz & End Sem Exam
15	All forms of life has the same building blocks (yet the manifestations are as diverse as one can imagine Molecules of life).	Lecture	CIV307.1	Mid Term-1, Quiz & End Sem Exam
16	Discuss monomeric units and polymeric structures. Discuss about sugars, starch and cellulose.	Lecture	CIV307.1	Mid Term-1, Quiz & End Sem Exam
17	Amino acids and proteins, Lipids. Nucleotides and DNA/RNA.	Lecture	CIV307.1	Mid Term-1, Quiz & End Sem Exam
18	Structures of DNA and RNA; Concept of Gene, Gene regulation, e.g., Operon concept	Lecture	CIV307.1	Mid Term-1, Quiz & End Sem Exam
19	Totipotency and Cell manipulation; Plant & Animal tissue culture-Methods and uses in agriculture, medicine and health.	Lecture	CIV307.1	Mid Term-1, Quiz & End Sem Exam
20	Recombinant DNA Technology-Techniques and applications.	Lecture	CIV307.1	Mid Term-1, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES	CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV307.1	**CIV 307.1** Understand the basic principles & techniques of biotechnology.Cellular structures of living forms.	3	3	1	3	1				2		2	1	1	2	1
CIV307.2	Understand the basic concept of Enzimes and different species. About DNA and biological structure about the species exploring Molecular Genetics.	3	2	2	2	2				2		1	1	2	2	1

Sample Question Paper

<table>
<tr><td colspan="7" align="center">Amity School of Engineering and Technology
Department of CIVIL Engineering
MID-SEMESTER(SEM–III)2019-20</td></tr>
<tr><td colspan="7" align="center">Class: B.Tech (CE) 3rd Semester</td></tr>
<tr><td colspan="2">Subjec tName:
CIV 307 Life Science</td><td colspan="2">Time:1.5Hrs</td><td colspan="3">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3,6</td><td>Q.4</td><td>Q.2,5</td><td></td><td></td></tr>
<tr><td colspan="7">Student will be able to
CO1: Understand the basic principles & techniques of biotechnology. Cellular structures of living forms.

CO2: Understand the basic concept of Enzimes and different species. About DNA and biological structure about the species exploring Molecular Genetics.</td></tr>
</table>

CO Map	Question No.	Question	Marks
CO1	Q.1	What is unicellular, multicellular structure.	3
CO1	Q.2a	What is principles of genetics in biology?	3
	Q.2b	Discuss monomeric units and polymeric structures.	3
CO1	Q.3	Discuss about sugars, starch and cellulose. Amino acids and proteins.	6
CO2	Q.4	Discuss about. Amino acids and proteins, Lipids. Nucleotides and DNA/RNA.	3
CO2	Q.5a	Discuss Structures of DNA and RNA.	3
	Q.5b	Discuss Totipotency and Cell manipulation	3

CO2	Q6	Discuss Concept of Gene, Gene regulation, concept.	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	**Enrollment. No.**	**Student's Name**	**CIV307 LIFE SCIENCE**							
			Max Marks	**CE Weight Age (%)**	**ET Weight Age (%)**	**GO**	**GP**	**ACU**	**ECU**	**U16G16**
1	A60215818001	Mr NAMAN GOYAL	100	30	70	B-	5	2	2	10
2	A60215818003	Mr SADAV KHAN	100	30	70	C+	4	2	2	8
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	A-	8	2	2	16
			Total No. of Students			=	3			
			Total No. of Students			>60 % marks	1	33.3333	%	
			Attainment Level					-		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **MECHANICAL ENGINEERING**
Course Code : BME 104, Credits : 02, Session : 2019-20(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Nagendra Kumar Sharma

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A. Introduction

Mechanical engineering is **one of the broadest engineering disciplines**. Mechanical engineers design, develop, build, and test. They deal with anything that moves, from components to machines to the human body.

B. Course Outcomes: At the end of the course students will be able to learn

- **BME 104.1** Ability to design and conduct experiments, as well as to analyze and interpret data.
- **BME 104.2** Ability to apply modern engineering tools, techniques and resources to solve complex mechanical engineering activities with an understanding of the limitations.
- **BME 104.3** Ability to comprehend the thermodynamics and their corresponding processes that influence the behaviour and response of structural components.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects.

D. Programme Specific Outcomes:

PSO1: Apply basic knowledge of mathematics, science and engineering principles to solve technical problems.

PSO2: Design and analyze a system component, or process to meet desired needs in Mechanical Engineering. Design a system and conduct experiments to find suitable solution in the field of mechanical engineering.

PSO3: Identify, visualize, formulate and solve engineering problems in the field of mechanical Engineering

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End	A	5%

	Semester examination. The allowance of 25%includesalltypesofleaves Including medical leaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F.Course Content

Module I: Basic Concepts- Basic concepts: concept of continuum, macroscopic approach, Thermodynamic systems - closed, open and isolated. Property, state, path and process, quasistatic process, work, modes of work. Zeroth law of thermodynamics, concept of temperature and heat. Concept of ideal and real gases.

Module II: First Law of Thermodynamics: Concepts of Internal Energy, Specific Heat Capacities, Enthalpy. Energy Balance for Closed and Open Systems, Energy Balance for Steady-Flow Systems. Steady-Flow Engineering Devices. Energy Balance for Unsteady- Flow

Module III: Second Law of Thermodynamics: Thermal energy reservoirs, heat engines energy conversion, Kelvin's and Clausius statements of second law, the Carnot cycle, the Carnot Theorem, Carnot heat engine, efficiency, the Carnot refrigerator and heat pump, COP. Clausius inequality, concept of entropy, reversible and irreversible processes, Entropy change of pure substances, isentropic processes.

Module IV: Properties of Pure Substance: Properties of pure substances. Thermodynamic properties of pure substances in solid, liquid and vapour phases. Phase rule, P-V, P-T, T-V, T-S, H-S diagrams, PVT surfaces. Thermodynamic properties of steam. Calculations of work done and heat transfer in non- flow and flow processes

Module V: Power Cycles: Vapour and combined power cycles, including the Carnot vapor cycle, Rankine cycle, Gas power cycles, Otto cycle, diesel engine cycle, gas-turbine Brayton cycle.

G.Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att Attendance

H.Suggested Books:

- Nag.P.K., "Engineering Thermodynamics", Tata McGraw-Hill, NewDelhi.
- Cengel, Thermodynamics - AnEngineeringApproach*Tata McGraw Hill, New*Delhi.
- Sonntag, R. E., Borgnakke, C., &Wylen, G. J. V. Fundamentals of thermodynamics: Wiley.
- Moran, M. J., Shapiro, H. N., Boettner, D. D., & Bailey, M. Fundamentals of Engineering
- Thermodynamics: John Wiley & Sons.

I.lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	concept of continuum, macroscopic approach concept of	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam

	temperature and heat.			
2	Thermodynamic systems - closed, open and isolated. Property, state,	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
3	Path and process, quasistatic process, work, modes of work.	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
4	Zeroth law of thermodynamics.	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
5	Concept of ideal and real gases.	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
6	Concepts of Internal Energy, Specific Heat Capacities, Enthalpy,	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
7	Energy Balance for Closed and Open Systems	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
8	Energy Balance for Steady-Flow Systems	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
9	Steady-Flow Engineering Devices	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
10	Energy Balance for Unsteady-Flow.	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
11	Thermal energy reservoirs, the Carnot Theorem,. Clausius inequality, concept of entropy,.	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
12	Kelvin's and Clausius statements of second law.	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
13	heat engines energy conversion, , the Carnot cycle,	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
14	Carnot heat engine, efficiency, the Carnot refrigerator and heat pump, COP.	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
15	reversible and irreversible processes, Entropy change of pure substances, isentropic processes	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
16	Properties of pure substances. Thermodynamic properties of pure substances in solid, liquid and vapour phases.	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
17	Phase rule, P-V, P-T, T-V, T-S, H-S diagrams, PVT surfaces. Thermodynamic properties of steam	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
18	Calculations of work done and heat transfer in non- flow and flow processes.	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
19	Vapour and combined power cycles, including the Carnot vapor cycle,	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
20	Rankine cycle, Gas power cycles, Otto cycle, diesel engine cycle, gas-turbine Brayton cycle.	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam

D. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BME104.1	Explain the basic concepts and laws of thermodynamics. Distinguish the properties of ideal and real gases.	3	3	1	3	1				2		2	1	1	2	1
BME104.2	Apply the concept of enthalpy and entropy in thermal systems, Calculate the properties of pure substance and explain the working of steam cycles.	3	2	2	2	2				2		1	1	2	2	1
BME104.3	Problems in psychrometric processes and gas mixtures. Apply thermodynamic laws for real time applications	2	1	1	2	2				2		1	1	2	2	1

Sample Question Paper

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<tr><td colspan="2">Subject t Name:
BME 104 Mechanical Engineering</td><td colspan="3">Time:1.5Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3,6</td><td>Q.4</td><td>Q.2,5</td><td></td><td></td></tr>
</table>

Student will be able to
CO1: Understand the basic of mechanical engineering
CO2: Analyze the basic mechanical engineering problems
CO3: Analyze the basic of thermodynamics

CO Map	Question No.	Question	Marks
CO1	Q.1	What is concept of Continum?	3
CO1	Q.2a	Discuss Zeroth law of thermodynamics.	3
	Q.2b	Discuss quasi static process in detail.	3
CO1	Q.3	Discuss concept of real and ideal gases.	6
CO2	Q.4	Discuss Thermal energy reservoirs and its concept in detail.	3
CO2	Q.5a	Discuss statements of second law Carnot cycle.	3
	Q.5b	Discuss Carnot cycle and theorem.	3
CO3	Q6	Discuss various thermodynamics properties of various substances in liquid and vapour phase.	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment. No.	Student's Name	BME104 MECHANICAL ENGINEERING Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U14G14
1	A60215818001	Mr NAMAN GOYAL	100	30	70	C+	4	2	2	8
2	A60215818003	Mr SADAV KHAN	100	30	70	C+	4	2	2	8
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	B	6	2	2	12

Total No. of Students	=	3		
Total No. of Students	>60 % marks	0	0	%
Attainment Level		-		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **BASIC ELECTRONICS**
Course Code : ECE 307, Credits : 02, Session : 2019-20(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Narendra Kumar Garg, Mrs.Shally Goyal, Dr. Ajay Dadoria

A. Introduction

Electronics is about **manipulating electricity to accomplish a particular task** and is very much a hands-on endeavor. Since the result of building electronic circuits is usually a device that performs a task, this hands-on aspect should be self-evident.

B. Course Outcomes: At the end of the course students will be able to learn

- **ECE307.1** Know broadly the concepts and functionalities of the electronic devices, tools and instruments.
- **ECE307.2** Understand use, general specifications and deploy abilities of the electronic devices, and assemblies.
- **ECE307.3** Confidence in handling and usage of electronic devices, tools and instruments in engineering applications.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects.

D. Programme Specific Outcomes:
PSO1: Apply principles of Engineering Mathematics, Physics and core engineering including applications appropriate to the Electronics & Communication Engineering.
PSO2: Apply basic knowledge related to Electronic Devices & Circuits, Electromagnetics, Digital Signal Processing, Communication Engineering and Embedded Systems to solve engineering problems.
PSO3: Demonstrate proficiency in use of software and hardware required in reallife applications.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25%includesalltypesofleaves Including medical leaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module 1: Diodes and Applications: Semiconductor Diode - Ideal versus Practical, Diode Equivalent Circuits, Load Line Analysis; Diode as a Switch, Diode as a Rectifier, Half Wave and Full Wave Rectifiers; Breakdown Mechanisms, Zener Diode – Operation and Applications; Opto-Electronic Devices – LEDs, Clipper and clampers.

Module 2: Transistor Characteristics: Bipolar Junction Transistor (BJT) –Construction, Operation, Amplifying Action, Common Base, Common Emitter and Common Collector Configurations, Operating Point, Introduction to FET, Feedback Amplifiers – Principle, Advantages of Negative Feedback.

Module 3: Operational Amplifiers and Applications: Introduction to Op-Amp, Differential Amplifier Configurations, CMRR, PSRR, Slew Rate; Block Diagram, Pin Configuration of 741 Op-Amp, Characteristics of Ideal Op-Amp, Concept of Virtual Ground; inverting and non-inverting amplifier applications: summing and difference amplifier, unity gain buffer, comparator.

Module 4: Digital Electronics Fundamentals: Difference between analog and digital signals, Boolean algebra, Basic and Universal Gates, Symbols, Truth tables, logic expressions, Logic simplification using K- map, half and full adder/subtractor, multiplexers, de- multiplexer.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Books

- David. A. Bell (2003), Laboratory Manual for Electronic Devices and Circuits, Prentice Hall, India
- SantiramKal (2002), Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India
- Thomas L. Floyd and R. P. Jain (2009), Digital Fundamentals by Pearson Education,
- Paul B. Zbar, A.P. Malvino and M.A. Miller (2009), Basic Electronics – A Text-Lab. Manual, TMH
- R. T. Paynter (2009), Introductory Electronic Devices & Circuits, Conventional Flow Version, Pearson

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Semiconductor Diode - Ideal	Lecture	ECE 307.1	Mid Term-1, Quiz

	versus Practical,;; Breakdown Mechanisms.			& End Sem Exam
2	Diode Equivalent Circuits, Load Line Analysis.	Lecture	ECE 307.1	Mid Term-1, Quiz & End Sem Exam
3	Diode as a Switch, Diode as a Rectifier, Half Wave and Full Wave Rectifiers.	Lecture	ECE 307.1	Mid Term-1, Quiz & End Sem Exam
4	Zener Diode – Operation and Applications.	Lecture	ECE 307.1	Mid Term-1, Quiz & End Sem Exam
5	Opto-Electronic Devices – LEDs.	Lecture	ECE 307.1	Mid Term-1, Quiz & End Sem Exam
6	Clipper and clampers.	Lecture	ECE 307.1	Mid Term-1, Quiz & End Sem Exam
7	Bipolar Junction Transistor (BJT)	Lecture	ECE 307.1	Mid Term-1, Quiz & End Sem Exam
8	Construction, Operation, Amplifying Action.	Lecture	ECE 307.1	Mid Term-1, Quiz & End Sem Exam
9	Common Base, Common Emitter and Common Collector Configurations.	Lecture	ECE 307.1	Mid Term-1, Quiz & End Sem Exam
10	Operating Point, Introduction to FET.	Lecture	ECE 307.1	Mid Term-1, Quiz & End Sem Exam
11	Feedback Amplifiers – Principle.	Lecture	ECE 307.1	Mid Term-1, Quiz & End Sem Exam
12	Advantages of Negative Feedback.			Mid Term-2, Quiz & End Sem Exam
13	Introduction to Op-Amp, Differential Amplifier Configurations.	Lecture	ECE 307.1	Mid Term-2, Quiz & End Sem Exam
14	CMRR, PSRR, Slew Rate; Block Diagram, Pin Configuration of 741 Op-Amp	Lecture	ECE 307.1	Mid Term-2, Quiz & End Sem Exam
15	Characteristics of Ideal Op-Amp, Concept of Virtual Ground.	Lecture	ECE 307.1	Mid Term-2, Quiz & End Sem Exam
16	inverting and non-inverting amplifier applications	Lecture	ECE 307.1	Mid Term-2, Quiz & End Sem Exam
17	summing and difference amplifier, unity gain buffer, comparator.	Lecture	ECE 307.1	Mid Term-2, Quiz & End Sem Exam
18	Difference between analog and digital signals, Boolean algebra,	Lecture	ECE 307.1	Mid Term-2, Quiz & End Sem Exam
19	Logic simplification using K-map, half and full adder/subtractor, multiplexers, de- multiplexer	Lecture	ECE 307.1	Mid Term-2, Quiz & End Sem Exam
20	Basic and Universal Gates, Symbols, Truth tables, logic expressions	Lecture	ECE 307.1	Mid Term-2, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ECE307.1	Apply the knowledge of mathematics, science, engineering Know broadly the concepts and functionalities of the electronic devices, tools and instruments.	3	3	1	3	1				2		2	1	1	2	1
ECE307.2	Understand use, general specifications and deploy abilities of the electronic devices, and assemblies.	3	2	2	2	2				2		1	1	2	2	1
ECE307.3	Confidence in handling and usage of electronic devices, tools and instruments in engineering applications.	2	1	1	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–III)2019-20						
Class: B.Tech (CE) 3rd Semester						
Subjec tName: ECE 307 Basic Electronics		Time:1.5Hrs			Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		

Student will be able to
CO1: Understand and Know broadly the concepts and functionalities of the electronic devices, tools and instruments.

CO2: Understand use, general specifications and deploy abilities of the electronic devices, and assemblies.

CO3: Analyse usage of electronic devices, tools and instruments in engineering applications.

CO Map	Question No.	Question	Marks
CO1	Q.1	State operation of PNP transistor in detail using suitable diagrams.	3
CO1	Q.2a	Explain AND gate with their graphic symbol, algebraic function and truth table.	3
	Q.2b	Draw the schematic block diagram of OP-AMP stages.	3
CO1	Q.3	Give introduction to FET. State the advantages of FET over the conventional transistor	6
CO2	Q.4	Define Demulti plexer and draw a 1:4 DEMUX. How may select lines are required for 1:4 Demux?	3
CO2	Q.5a	What do you understand by intrinsic and extrinsic semiconductor? Draw the classification	3
	Q.5b	Discuss construction of Bipolar Junction Transistor along with its parts in detail.	3
CO3	Q6	Explain "OR" gate with their graphic symbol, algebraic function and truth table.	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	CIV307 LIFE SCIENCE Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U16G16
1	A60215818001	Mr NAMAN GOYAL	100	30	70	B-	5	2	2	10
2	A60215818003	Mr SADAV KHAN	100	30	70	C+	4	2	2	8
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	A-	8	2	2	16

Total No. of Students	=	3	
Total No. of Students	>60 % marks	1	33.3333 %
Attainment Level		-	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **COMPUTER-AIDED CIVIL ENGINEERING DRAWING LAB**
Course Code : CIV322, Credits : 01, Session : 2019-20(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Shashank Gupta, Mr. Sachin Tiwari, Mr. Mohan Kantharia

A. Introduction

Engineering drawing, most commonly referred to as engineering graphics, is the art of manipulation of designs of a variety of components, especially those related to engineering.

B. Course Outcomes: At the end of the course, students will be able to:

- **CIV322.1**. Application of software's in design and drawings of Civil Engineering structures.
- **CIV322.2**. Able to proficiency, including the ability to use industry-standard computer software to generate 2D and 3D drawings
- **CIV322.3**. Understanding of the theory of orthographic projection and the conventions associated with Civil engineering drawings.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Function as design consultants in construction industry for the design of civil engineering structures.

PSO2: Provide sustainable solutions to the Civil Engineering Problems

PSO3: It. will help students to analyze and Provide concrete solution to environmental problem

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester	End Semester Examination	EE	70%

Examination			
Total			**100%**

F. Course Content

- Basic of 2-D Auto CAD **(2 Hours)**
- Drawing of Elements of Buildings, column, beam, footings by 2-D Auto CAD**. (2 Hours)**
- Drawing of RCC Details by Auto CAD **(2 Hours)**
- Drawing of Residential Building, and school Building by Auto CAD. **(2 Hours**)
- Types of stair, RCC stair case, septic tank, Soak pit. **(2 Hours)**
- Paneled, doors, windows and ventilators in wood, Glazed paneled, wooden doors: **(2 Hours)**
- Residential building- with load wearing walls, including details of doors and windows: **(2 Hours)**
- Preparation of site plans and service plans as per Building Rules: **(2 Hours**)
- Roof trusses. Industrial buildings:**(2 Hours)**
- Perspective view of single story buildings.**(2 Hours)**

G. Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Books

- National Building Code of India
- Local Building Bye-laws
- Callender, John Hancock, Time Saver Standards for Architectural design Data, Tata McGraw Hill.
- Chiara, Callender, John Hancock, Time Saver Standards for Building Type, McGraw Hill

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Basic of 2-D Auto CAD	Practical	CIV322.1	Mid Term-1, Quiz & End Sem Exam
2	Drawing of Elements of Buildings, column, beam, footings by 2-D Auto CAD.	Practical	CIV322.1	Mid Term-1, Quiz & End Sem Exam
3	Drawing of RCC Details by Auto CAD.	Practical	CIV322.1	Mid Term-1, Quiz & End Sem Exam
4	Drawing of Residential Building, and school Building by Auto CAD.	Practical	CIV322.1	Mid Term-1, Quiz & End Sem Exam
5	Types of stair, RCC stair case, septic tank, Soak pit.	Practical	CIV322.1	Mid Term-1, Quiz & End Sem Exam
6	Paneled, doors, windows and ventilators in wood, Glazed paneled, wooden doors:	Practical	CIV322.1	Mid Term-1, Quiz & End Sem Exam
7	Residential building- with load wearing walls, including details of doors and windows.	Practical	CIV322.1	Mid Term-1, Quiz & End Sem Exam
8	Preparation of site plans and service plans as per Building Rules	Practical	CIV322.1	Mid Term-1, Quiz & End Sem Exam

9	Roof trusses. Industrial buildings	Practical	CIV322.1	Mid Term-1, Quiz & End Sem Exam
10	Perspective view of single story buildings.			

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV322.1	Function as design consultants in construction industry for the design of civil engineering structures.	3	3	1	3	1				2		2	1	1	2	1
CIV322.2	Provide sustainable solutions to the Civil Engineering Problems	3	2	2	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of Electronics and Communication Engineering MID-SEMESTER(SEM–IV)2019-20						
Class: B.Tech.(CE) IV Semester						
Subject Name: CIV 322 Civil Engineering Drawing Lab		Time:2 Hrs			Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1, 2	Q.1, 2	Q. 1,2	Q.1,2	Q.1,2	Q.1,2
Student will be able to attain CO1 to 4						

COMap	QuestionNo.	Question	Marks
CO1-4	Q.1	Basic of 2-D Auto CAD, Drawing of Elements of Buildings, column, beam, footings by 2-D Auto CAD.	15
CO1-4	Q2	Drawing of RCC Details by Auto CAD. Drawing of Residential Building, and school Building by Auto CAD	15

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	**Enrollment. No.**	**Student's Name**	**CIV322 COMPUTER-AIDED CIVIL ENGINEERING DRAWING LAB**							
			Max Marks	**CE Weight Age (%)**	**ET Weight Age (%)**	**GO**	**GP**	**ACU**	**ECU**	**U17G17**
1	A60215818001	Mr NAMAN GOYAL	100	30	70	A+	10	1	1	10
2	A60215818003	Mr SADAV KHAN	100	30	70	B+	7	1	1	7
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	A-	8	1	1	8

Total No. of Students	=	3		
Total No. of Students	>60 % marks	2	66.6667	%
Attainment Level			Level 1	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : BASIC ELECTRONICS LAB
Course Code : ECE 327, Credits : 01, Session : 2019-20(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Narendra Kumar Garg, Dr. Ajay Dadoria

A. Introduction

The objective of the job is to train students of making drawings using computer. The drawings are to be prepared as per specifications.

B. Course Outcomes: At the end of the course, students will be able to:

- **ECE327.1** Know broadly the concepts and functionalities of the electronic devices, tools and instruments.
- **ECE327.2** Understand use, general specifications and deploy abilities of the electronic devices, and assemblies.
- **ECE327.3** Confidence in handling and usage of electronic devices, tools and instruments in engineering applications

C. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Function as design consultants in construction industry for the design of civil engineering structures.

PSO2: Provide sustainable solutions to the Civil Engineering Problems

PSO3: It. will help students to analyze and Provide concrete solution to environmental problem.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

- To study and verify the VI characteristic of a diode. **(2 Hours)**
- To study the Zener diode in breakdown region. **(2 Hours)**
- To study diode as a half wave rectifier. **(2 Hours)**
- To study diode as a full wave rectifier. **(2 Hours)**

- To study the characteristics of a CE Transistor. **(2 Hours)**
- To study the VI characteristic of CB &CC Transistor **(2 Hours)**
- To study transistor as an a amplifiers **(2 Hours)**
- To study the JFET operation. **(2 Hours)**
- To study OP Amp. As inverting and non-inverting Amp. **(2 Hours)**
- To study OP Amp in open loop and close loop. **(2 Hours)**

G. Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

H. Suggested Books

- David. A. Bell (2003), Laboratory Manual for Electronic Devices and Circuits, Prentice Hall, India
- SantiramKal (2002), Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India
- Thomas L. Floyd and R. P. Jain (2009), Digital Fundamentals by Pearson Education,

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	To study and verify the VI characteristic of a diode.	Practical	ECE327.1	Mid Term-1, Quiz & End Sem Exam
2	To study the Zener diode in breakdown region.	Practical	ECE327.1	Mid Term-1, Quiz & End Sem Exam
3	To study diode as a half wave rectifier.	Practical	ECE327.1	Mid Term-1, Quiz & End Sem Exam
4	To study diode as a full wave rectifier.	Practical	ECE327.1	Mid Term-1, Quiz & End Sem Exam
5	To study the characteristics of a CE Transistor.	Practical	ECE327.1	Mid Term-1, Quiz & End Sem Exam
6	To study the VI characteristic of CB &CC Transistor	Practical	ECE327.1	Mid Term-1, Quiz & End Sem Exam
7	To study transistor as an a amplifiers	Practical	ECE327.1	Mid Term-1, Quiz & End Sem Exam
8	To study the JFET operation	Practical	ECE327.1	Mid Term-1, Quiz & End Sem Exam
9	To study OP Amp. As inverting and non-inverting Amp	Practical	ECE327.1	Mid Term-1, Quiz & End Sem Exam
10	To study OP Amp in open loop and close loop	Practical	ECE327.1	Mid Term-1, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ECE327.1	An ability to design, implement and evaluate Electronics and Communication systems for public health and safety, cultural, societal and environmental considerations.	3	3	1	3	1				2		2	1	1	2	1
ECE327.2	An ability to design electronic circuits and conduct investigations, as well as to analyze and interpret data.	3	2	2	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of Electronics and Communication Engineering MID-SEMESTER(SEM–IV)2019-20						
Class: B.Tech.(CE) IV Semester						
Subject Name: ECE 327 Basic Electronics Lab		Time:2 Hrs		Max.Marks:30		
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1, 2	Q.1, 2	Q. 1,2	Q.1,2	Q.1,2	Q.1,2
Student will be able to attain CO1 to 4						

COMap	QuestionNo.	Question	Marks

CO1-4	Q.1	Discuss construction of Bipolar Junction Transistor along with its parts in detail.	15
CO1-4	Q2	Explain “OR” gate with their graphic symbol, algebraic function and truth table.	15

Attainments		Rubric
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment. No.	Student's Name	ECE327 BASIC ELECTRONICS LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U12G12
1	A60215818001	Mr NAMAN GOYAL	100	30	70	A	9	1	1	9
2	A60215818003	Mr SADAV KHAN	100	30	70	A-	8	1	1	8
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	A+	10	1	1	10

Total No. of Students	=	3		
Total No. of Students	>60 % marks	3	100	%
Attainment Level			Level 3	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **MATERIALS, TESTING & EVALUATION**
Course Code : CIV 401, Credits : 02, Session : 2019-20(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Shashank Gupta, Mr. Mohan Kantharia

A. Introduction

Materials testing helps us to understand and quantify whether a specific material or treatment is suitable for a particular application. With the wide variety of materials and treatments available in the marketplace, testing can help narrow down the choices to the most appropriate selection for the intended use.

B. At the end of the course students will able to learn:

- **CIV 401.1** Calibrate electronic sensors, Operate a data acquisition system.
- **CIV 401.2** Operate various types of testing machines, Configure a testing machine to measure tension or compression behaviour.
- **CIV 401.3** Compute engineering values (e.g. stress or strain) from laboratory measures, Analyze a stress versus strain curve for modulus, yield strength and other related attributes

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Identify the properties of engineering materials like cement, sand, concrete, ceramics, bitumen, structural steel etc.

PSO2: Explain the classification of engineering materials and uses of materials

PSO3: Understand the manufacturing process of cement, concrete, bitumen, glass, plastics, metals, paints and other engineering materials.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module I: **Introduction to Engineering Materials Covering:** Cements, M-Sand, Concrete (plain, reinforced and steel fibre/ glass fibre-reinforced, light-weight concrete, High Performance Concrete, Polymer Concrete) Ceramics, and Refractories, Bitumen and asphaltic materials, Timbers, Glass and Plastics, Structural Steel and other Metals, Paints and Varnishes, Acoustical material and geo-textiles, rubber and asbestos, laminates and adhesives, Graphene, Carbon composites and other engineering materials including properties and uses of these.

Module II: **Introduction to Material Testing Covering**: What is the " Material Engineering" ?; Mechanical behavior and mechanical characteristics; Elasticity – principle and characteristics; Plastic deformation of metals; Tensile test – standards for different material (brittle, quasi-brittle, elastic and so on) True stress – strain interpretation of tensile test; hardness tests; Bending and torsion test; strength of ceramic.

Module III: **Introduction to Material Testing Covering**: Internal friction, creep – fundaments and characteristics; Brittle fracture of steel – temperature transition approach; Background of fracture mechanics; Discussion of fracture toughness testing – different materials; concept of fatigue of materials; Structural integrity assessment procedure and fracture mechanics

Module IV: **Standard Testing & Evaluation Procedures Covering:** Laboratory for mechanical testing; Discussion about mechanical testing; Naming systems for various irons, steels and nonferrous metals; Discussion about elastic deformation; Plastic deformation; Impact test and transition temperatures; Fracture mechanics – background; Fracture toughness – different materials; Fatigue of material; Creep.

Module V: Testing*:* from the above modules covering, Understanding i) Tests & testing of bricks, ii) Tests & testing of sand, iii) Tests & testing of concrete, iv) Tests & testing of soils, v) Tests & testing of bitumen & bituminous mixes, vi) Tests & testing of polymers and polymer based materials, vii) Tests & testing of metals & viii) Tests & testing of other special materials, composites and cementitious materials. Explanation of mechanical behavior of these materials.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- Chudley, R., Greeno (2006), 'Building Construction Handbook' (6th ed.),R. Butterworth- Heinemann
- Khanna, S.K., Justo, C.E.G and Veeraragavan, A, ' Highway Materials and Pavement Testing', Nem Chand& Bros, FifthEdition
- Various related updated & recent standards of BIS, IRC, ASTM, RILEM, AASHTO, etc. corresponding to materialsused for Civil Engineeringapplications
- Kyriakos Komvopoulos (2011), Mechanical Testing of Engineering Materials,Cognella
- E.N. Dowling (1993), Mechanical Behaviour of Materials,Prentice Hall International Edition
- AmericanSocietyforTestingandMaterials(ASTM),*AnnualBookofASTMStandards* (post 2000)
- Related papers published in international journals

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Cements, M-Sand, Concrete (plain, reinforced and steel fibre/ glass fibre-reinforced, Paints and Varnishes, Graphene.	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
2	light-weight concrete, High Performance Concrete, Polymer Concrete) Ceramics, and Refractories	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
3	Bitumen and asphaltic materials, Timbers.	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
4	Glass and Plastics, Structural Steel and other Metals	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
5	Acoustical material and geo-	Lecture	CIV401.1	Mid Term-1, Quiz

	textiles, rubber and asbestos, laminates and adhesives			& End Sem Exam
6	Carbon composites and other engineering materials including properties and uses of these.	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
7	What is the " Material Engineering" ?;; Elasticity –;and so on);	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
8	Mechanical behavior and mechanical characteristics	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
9	principle and characteristics.	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
10	Plastic deformation of metals; Tensile test – standards for different material (brittle, quasi-brittle, elastic.	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
11	True stress – strain interpretation of tensile test	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
12	hardness tests; Bending and torsion test; strength of ceramic.	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
13	Internal friction, creep – fundaments and characteristics;;;; concept of fatigue of materials;	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
14	Brittle fracture of steel – temperature transition approach.	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
15	Background of fracture mechanics.	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
16	Discussion of fracture toughness testing – different materials.	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
17	Structural integrity assessment procedure and fracture mechanics	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
18	For mechanical testing; Discussion about mechanical testing; Naming systems for various irons.	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
19	steels and nonferrous metals; Discussion about elastic deformation; Plastic deformation.	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
20	Impact test and transition temperatures; Fracture mechanics – background; Fracture toughness – different materials; Fatigue of material; Creep.	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
21	Tests & testing of bitumen & bituminous mixes, vi) Tests & testing of polymers and polymer based materials, vii)	Lecture	CIV401.1	Mid Term-2, Quiz & End Sem Exam
22	Tests & testing of metals & viii) Tests & testing of other special materials, composites and cementitious materials.	Lecture	CIV401.1	Mid Term-2, Quiz & End Sem Exam
23	Explanation of mechanical	Lecture	CIV401.1	Mid Term-2, Quiz

	behavior of these materials.			& End Sem Exam
24	Tests & testing of bricks, ii) Tests & testing of sand, iii) Tests & testing of concrete, iv) Tests & testing of soils, v)	Lecture	CIV401.1	Mid Term-2, Quiz & End Sem Exam

J.Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV401.1	Explain standards for different materials, stress-strain interpretation. Describe the fundamentals of internal friction, creep, brittle fracture of steel. Describe the testing procedures of fresh and hardened concrete	3	3	1	3	1				2		2	1	1	2	1
CIV401.2	Understand the concept of fatigue of materials, structural integrity assessment procedure. Perform the mechanical testing of various metals like iron, steel and non-ferrous metals.	3	2	2	2	2				2		1	1	2	2	1
CIV401.3	Explain elastic deformation and plastic deformation of metals. Understand the impact testing, fatigue and creep of materials. Explain fracture toughness of different materials like steel and non-ferrous metals. Explain the testing procedures of bricks and sand.	2	1	1	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–IV)2019-20						
Class: B.Tech (CE) 4th Semester						
Subject t Name: CIV 401 MATERIALS, TESTING & EVALUATION		Time:1.5Hrs		Max.Marks:30		
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		
Student will be able to CO1: Understand the basic concept of stress and strain CO2: Analysis of various types of materials properties and machines. CO3: Calculation of various parameters Young's Modulus, Yield strength						

CO Map	Question No.	Question	Marks
CO1	Q.1	What is stress and different types of stress?	3
CO1	Q.2a	Discuss relation between stress and strain.	3
	Q.2b	What do you understand by fracture modes of steel?	3
CO1	Q.3	What do you understand by fracture toughness?	6
CO2	Q.4	Calculate the stress and strain value for different grades of steel.	3
CO2	Q.5a	Calculate fracture toughness value for given steel specimen.	3
	Q.5b	Discuss various tests used to find the strength of steel.	3
CO3	Q6	Calculate the Yield and Young's modulus value for different grades of steel.	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S.	Enrollment.No.	Student's Name	CIV401

No.			MATERIALS, TESTING & EVALUATION							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U3G3
1	A60215818001	Mr NAMAN GOYAL	100	50	50	A	9	2	2	18
2	A60215818003	Mr SADAV KHAN	100	50	50	A-	8	2	2	16
3	A60215818004	Mr SHASHWAT MOHANTY	100	50	50	A+	10	2	2	20
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	3	100	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **ENGINEERING GEOLOGY**
Course Code : CIV 402, Credits : 02, Session : 2019-20(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Shashank Gupta, Mr. Mohan Kantharia, Mr. Sachin Tiwari

A. Introduction

Engineering Geology is the application of the geologic sciences to engineering practice to **assure the safe location, design, construction, operation and maintenance of engineering works**, which may not be adversely affected by potential geological problems.

B. At the end of the course students will able to learn:

- **CIV 402.1** Site characterization and how to collect, analyze, and report geologic data using standards in engineering practice,The fundamentals of the engineering properties of earth materials and fluids.
  The mechanics of soils and fluids and their influence on settlement, liquefaction, and soil slope stability.
- **CIV 402.2** Rock mass characterization and the mechanics of planar rock slide sand topples.
- **CIV 402.3** Soil characterization and the Unified Soil Classification System.

C. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Function as design consultants in construction industry for the design of civil engineering structures.

PSO2: Provide sustainable solutions to the Civil Engineering Problems

PSO3: It. will help students to analyze and Provide concrete solution to environmental problem.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up	A	5%

	the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module I: Branches and scope of geology, Physical Geology: Structure of the earth, Geological agents and their action, physical and chemical weathering, geological work done by wind, river, river meandering, glacial formation, coastal formation, underground water.

Module II: Mineralogy and Elements of Crystallography: Study of properties of minerals, formation, various groups of minerals, silicate, Felspar, pyroxene, mica. Various important minerals hornblende, Muscovite, Quartz, Corundum, calcite, Anthophyllite etc. Elements of a crystal, Cristallographique Axis, Crystal classes and system, Isométric, Tétragonal, Hexagonal, Orthorhombic, Monoclinic, Triclinic, System.

Module III: Petrology: Study of Igneous, Sedimentary, and metamorphic Rocks. Their texture, classification structure, forms, and engineering Use, Important rocks Granite, Gabbro, Dolerite, Pegmatite, Breccia, Sandstone, Shale, Limestone, Coals, Gypsum, Slate, Gneiss, Quartzite,

Module IV: Structural Geology and Ground Water: Types of folds, faults and joints, their classification and causes. Earthquake, volcanism and plate tectonics,Slope failures and landslides, elements of rock Mechanics.HydrogeologyGroundwater and occurrence, investigations, quality, artificial recharge

Module V: Geology in Civil Engineering, Stratigraphy and Geology of India: Tunnels, dams, reservoirs, Tunnels, Roads. Types of structures and classification and their effect on civil Engineering projects. Types, age and occurrence of rock formations and economic importance, study of Cuddapah, Vindhyan Dharwar, Deccan, and Gondwana group. Indian mineral deposits Coal, Petroleum, metallic and nonmetallic ores.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- R. Vaidyanathan, P. Perumal, Comprehensive Structural Analysis Vol. I & II, Laxmi Publications, New Delhi
- Reddy C.S., Basic Structural Analysis, 2^{nd} ed., Tata McGraw Hill, New Delhi (2004).

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Structure of the earth, geological work done by wind, river,	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
2	Geological agents and their	Lecture	CIV402.1	Mid Term-1, Quiz

	action			& End Sem Exam
3	physical and chemical weathering	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
4	River meandering, glacial formation.	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
5	coastal formation, underground water	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
6	Study of properties of minerals, mica.	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
7	various groups of minerals.	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
8	formation, silicate, Felspar, pyroxene	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
9	Various important minerals hornblende, Muscovite, Quartz	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
10	Elements of a crystal, Cristallographique Axis, Crystal classes and system.	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
11	Anthophyllite etc. , Isométric, Tétragonal, Hexagonal, Orthorhombic	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
12	Corundum, calcite, Monoclinic, Triclinic, System.	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
13	Study of Igneous, Sedimentary, and metamorphic Rocks.	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
14	Important rocks Granite, Gabbro, Dolerite, Pegmatite, Breccia, Sandstone.	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
15	classification structure, forms, and engineering Use, Shale, Limestone	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
16	Coals, Gypsum, Slate, Gneiss, Quartzite	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
17	Rocks and Their texture.	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
18	Structural Geology and Ground Water:	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
19	Earthquake, volcanism and plate tectonics,Slope failures and landslides, elements of rock Mechanics.	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
20	Hydrogeology Groundwater and occurrence, investigations, quality, artificial recharge	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
21	Types of folds, faults and joints, their classification and causes.	Lecture	CIV402.1	Mid Term-2, Quiz & End Sem Exam
22	Tunnels, dams, reservoirs, Tunnels, Roads. Types of structures and classification and their effect on civil Engineering projects..	Lecture	CIV402.1	Mid Term-2, Quiz & End Sem Exam
23	Types, age and occurrence of rock formations and economic	Lecture	CIV402.1	Mid Term-2, Quiz

	importance, study of Cuddapah, Vindhyan Dharwar, Deccan, and Gondwana group			& End Sem Exam
24	Indian mineral deposits Coal, Petroleum, metallic and nonmetallic ores.	Lecture	CIV402.1	Mid Term-2, Quiz & End Sem Exam

J.Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV402.1	Students will able to understand the presence of different types of rocks and their classification.	3	3	1	3	1				2		2	1	1	2	1
CIV402.2	To get a understanding of different types of geological formation and have knowledge of different types of minerals.	3	2	2	2	2				2		1	1	2	2	1
CIV402.3	To have a clears idea about the different geomorphic process.	2	1	1	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–IV)2019-20		
Class: B.Tech (CE) 4th Semester		
Subject t Name: CIV 402 Engineering Geology	Time:1.5Hrs	Max.Marks:30

Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		

Student will be able to
CO1: Understand the basic concept and different properties of rocks
CO2: Analyze different types of materials and rocks.
CO3: Understand the soil formation and characterization.

CO Map	Question No.	Question	Marks
CO1	Q.1	What do you understand by geology?	3
CO1	Q.2a	What is rock? Discuss different types of rocks.	3
	Q.2b	Discuss different classification of rocks and its properties.	3
CO1	Q.3	Discuss Types of folds, faults and joints, their classification and causes.	6
CO2	Q.4	Discuss various types of geological formation in detail.	3
CO2	Q.5a	Discuss Earthquake, volcanism and plate tectonic in details.	3
	Q.5b	Discuss Slope failures and landslides with neat sketch.	3
CO3	Q6	Discuss Hydrogeology Groundwater and artificial recharge.	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	CIV402 ENGINEERING GEOLOGY							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U4G4
1	A60215818001	Mr NAMAN GOYAL	100	50	50	A	9	2	2	18
2	A60215818003	Mr SADAV KHAN	100	50	50	B+	7	2	2	14
3	A60215818004	Mr SHASHWAT MOHANTY	100	50	50	A+	10	2	2	20

Total No. of Students	=	3		
Total No. of Students	>60% marks	2	66.6667	%
Attainment Level			Level 1	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **SURVEYING**
Course Code : CIV 403, Credits : 03, Session : 2019-20(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Mohan Kantharia, Mr. Sachin Tiwari, Dr. Ripunjoy Gogoi

A. Introduction

Surveying is **the process of determining the relative position of natural and man- made features on or under the earth's surface**, the presentation of this information either graphically in the form of plans or numerically in the form of tables, and the setting out of measurements on the earth's surface.

B. At the end of the course students will able to learn:

CIV403.1 Apply the knowledge, techniques, skills, and applicable tools of the discipline to engineering and surveying activities.

CIV403.2 Relate the knowledge on Surveying to the new frontiers of science like Hydrographic surveying, Electronic Distance Measurement, Global Positioning System, Photo grammetry and Remote Sensing.

C. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: apply the knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve well-defined surveying problems appropriate to the discipline.

PSO2: design solutions for well-defined technical problems and assist with engineering design of systems, components, or processes appropriate to the discipline

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home	S/V/Q/HA	10%

	Assignment		
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module I: Introduction to Surveying: Principles, Linear, angular and graphical methods, Survey stations, Survey lines- ranging, bearing of survey lines, Levelling: Plane table surveying, Principles of levelling- booking and reducing levels; differential, reciprocal leveling, profile levelling and cross sectioning. Digital and Auto Level, Errors in levelling; contouring: Characteristics, methods, uses; areas and volumes. Theodolite survey: Instruments, Measurement of horizontal and vertical angle; Horizontal and vertical control - methods - triangulation - network- Signals. Baseline - choices - instruments and accessories - extension of base lines - corrections - Satellite station - reduction to centre - Intervisibility of height and distances - Trigonometric leveling - Axis single corrections.

Module II: **Curves:** Elements of simple and compound curves – Method of setting out– Elements of Reverse curve - Transition curve – length of curve – Elements of transition curve - Vertical curve.

Module III: **Modern Field Survey Systems:** Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments, Distomat, Total Station – Parts of a Total Station – Accessories –Advantages and Applications, Field Procedure for total station survey, Errors in Total Station Survey; Global Positioning Systems- Segments, GPS measurements, errors and biases, Surveying with GPS, Co-ordinate transformation, accuracy considerations.

Module IV: Photogrammetry Surveying: Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; Stereoscopy, ground control extension for photographic mapping- aerial triangulation, radial triangulation, methods; photographic mapping- mapping using paper prints, mapping using stereoplotting instruments, mosaics, map substitutes.

Module V: **Remote Sensing:** Introduction –Electromagnetic Spectrum, interaction of electromagnetic radiation with the atmosphere and earth surface, remote sensing data acquisition: platforms and sensors; visual image interpretation; digital image processing.

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/ HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- Madhu, N, Sathikumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson India,2006.
- Manoj, K. Arora and Badjatia, Geomatics Engineering, Nem Chand & Bros,2011
- Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International,2010

- Chandra, A.M., Higher Surveying, Third Edition, New Age International (P) Limited, 2002.
- Anji Reddy, M., Remotesensing and Geographical information system, B.S. Publications,2001.
- Arora, K.R., Surveying, Vol-I, II and III, Standard Book House,2015.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Principles, Linear, angular and graphical methods, Survey stations, Survey lines- ranging,; differential.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
2	bearing of survey lines, Levelling: Plane table surveying, Principles of levelling- booking and reducing levels	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
3	contouring: Characteristics, methods, uses; areas and volumes. Theodolite survey.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
4	Reciprocal leveling, profile levelling and cross sectioning. Digital and Auto Level, Errors in levelling	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
5	Instruments, Measurement of horizontal and vertical angle; Horizontal and vertical control - methods -triangulation - network-Signals.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
6	Baseline - choices - instruments and accessories - extension of base lines - corrections	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
7	Satellite station - reduction to centre - Intervisibility of height and distances - Trigonometric leveling - Axis single corrections.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
8	Elements of simple and compound curves. Elements of transition curve - Vertical curve.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
9	Method of setting out	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
10	Elements of Reverse curve	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
11	Transition curve – length of curve.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
12	Principle of Electronic Distance Measurement.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
13	Types of EDM instruments.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam

14	Modulation, Distomat, Total Station – Parts of a Total Station.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
15	Accessories –Advantages and Applications, Field Procedure for total station survey.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
16	Co-ordinate transformation, accuracy considerations	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
17	Global Positioning Systems-Segments, GPS measurements	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
18	Errors in Total Station Survey.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
19	Errors and biases, Surveying with GPS.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
20	Introduction, Basic concepts, perspective geometry of aerial photograph.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
21	Basic concepts, perspective geometry of aerial photograph	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
22	relief and tilt displacements	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
23	terrestrial photogrammetry, flight planning.	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
24	Stereoscopy, ground control extension for photographic mapping.	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
25	Aerial triangulation, radial triangulation, methods.	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
26	photographic mapping- mapping using paper prints	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
27	Mapping using stereoplotting instruments, mosaics, map substitutes	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
28	mapping using stereoplotting instruments, mosaics, map substitutes	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
29	Introduction, –Electromagnetic Spectrum.	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
30	Electromagnetic Spectrum	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
31	Interaction of electromagnetic radiation with the atmosphere and earth surface.	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
32	Interaction of electromagnetic radiation with the atmosphere and earth surface.	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
33	Remote sensing data acquisition.	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
34	Platforms and sensors; visual image.	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam

35	Interpretation; digital image processing.	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
36	Interpretation; digital image processing.	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam

J.Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV403.1	Student will able to learn about different process of angle measurement in vertical and horizontal plane with manually and by using various devices.	3	3	1	3	1				2		2	1	1	2	1
CIV403.2	Setting out the correct orientation of any structural components and different distances measurement techniques.	3	2	2	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–IV)2019-20						
Class: B.Tech (CE) 4th Semester						
Subject t Name: CIV 403 SURVEYING		Time:1.5Hrs		Max.Marks:30		
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		

Student will be able to
CO1: Understand basic principles of surveying and tools.
CO2: Analyze different forms of science with new technique and instruments.

CO Map	Question No.	Question	Marks
CO1	Q.1	What is principle of surveying?	3
CO1	Q.2a	What do you understand by theodlite survey?	3
	Q.2b	Elements of simple and compound curves – Method of setting out curves.	3
CO1	Q.3	Discuss Elements of Reverse curve.	6
CO2	Q.4	Discuss Transition curve – length of curve Elements of transition curve.	3
CO2	Q.5a	Discuss Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments.	3
	Q.5b	Discuss principle of aerial survey and its importance.	3
CO2	Q6	Discuss remote sensing data acquisition, platforms and sensors.	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	CIV403 SURVEYING Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U5G5
1	A60215818001	Mr NAMAN GOYAL	100	50	50	A	9	2	2	18
2	A60215818003	Mr SADAV KHAN	100	50	50	B+	7	2	2	14
3	A60215818004	Mr SHASHWAT MOHANTY	100	50	50	A+	10	2	2	20
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	2	66.6667	%	
			Attainment Level					Level 1		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **FLUID MECHANICS**
Course Code : CIV 404, Credits : 03, Session : 2019-20(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Sachin Tiwari, Dr. Ripunjoy Gogoi

A. Introduction

Fluid mechanics is **the study of fluids either in motion (fluid dynamics) or at rest (fluid statics)**. Both liquids and gases are classified as fluids. There is a theory available for fluid flow problems, but in all cases it should be backed up by experiment. It is a highly visual subject with good instrumentation.

B. Students will be able to learn after completion of this course

- **CIV404.1** properties of fluids, pressure measurement devices, hydraulic forces on surfaces, bouncy and flotation in fluids.
- **CIV404.2** kinematics and static behavior of fluids, dimension and model analysis, laminar and turbulent flow.
- **CIV404.3** flow through pipes and orifices, boundary layer theory.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Calculate Hydrostatic Force and its Location for a given geometry and orientation of plane surface. Examine the possibility of a flow using continuity equation.

PSO2: Employ Archimedes principle to solve numerical examples on Buoyancy, Identify and interpret different flows with relevant equations

PSO3: Distinguish velocity potential function and stream function and solve for velocity and acceleration of a fluid at a given location in a fluid flow, Examine stability of a floating body by determining its metacentric height.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module I: Basic Concepts and Definitions: Distinction between a fluid and a solid; Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; variation of viscosity with temperature, Newton law of viscosity; vapour pressure, boiling point, cavitation; surface tension, capillarity, Bulk modulus of elasticity, compressibility.

Module II: Fluid Statics: Fluid Pressure: Pressure at a point, Pascals law, pressure variation with temperature, density and altitude. Piezometer, U-Tube Manometer, Single Column Manometer, U-Tube Differential Manometer, Micromanometers. pressure gauges, Hydrostatic pressure and force: horizontal, vertical and inclined surfaces. Buoyancy and stability of floating bodies.

Module III: Fluid Kinematics: Classification of fluid flow: steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one, two and three dimensional flows; Stream line, path line, streak line and stream tube; stream function, velocity potential function. One-, two- and three -dimensional continuity equations in Cartesian coordinate.

Module III: Fluid Dynamics: Surface and body forces; Equations of motion - Euler's equation; Bernoulli's equation – derivation; Energy Principle; Practical applications of Bernoulli's equation: venturimeter, orifice meter and pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend; Vortex Flow – Free and Forced; Dimensional Analysis and Dynamic Similitude - Definitions of Reynolds Number, Froude Number, Mach Number, Weber *Number and Euler Number; Buckingham's* π-Theorem. Notches and Weirs.

Module IV: Fluid Dynamics: Boundary layer theory, drag and lift force, drag on a sphere, rough and smoothboundaries, concept of mixinglength, boundary layer distribution for various shapes and for variousReynold'snumber.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- R.K. Bansal, "Fluid Mechanics & Hydraulic Machines", Laxmi Publications (P) Ltd., 2002.
- Gupta, S. C., Fluid Mechanics and Hydraulic Machines, Pearson Education, 2007
- D.S. Kumar, "Fluid Mechanics and Fluid Power Engineering", S.K. Kataria& Sons, 2000.
- F. M. White, Introduction to Fluid Mechanics, McGraw Hill

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Distinction between a fluid and a solid.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
2	Density, Specific weight, Specific gravity	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
3	Kinematic and dynamic viscosity.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
4	variation of viscosity with temperature.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
5	Newton law of viscosity; vapour pressure.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
6	boiling point, cavitation; surface tension.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam

7	capillarity, Bulk modulus of elasticity, compressibility.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
8	Fluid Pressure . pressure gauges..	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
9	Pressure at a point	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
10	Pascals law, pressure variation with temperature.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
11	Piezometer, U-Tube Manometer.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
12	Single Column Manometer.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
13	U-Tube Differential Manometer.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
14	Density and altitude. Micromanometers.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
15	Hydrostatic pressure and force	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
16	Hydrostatic pressure and force horizontal, vertical and inclined surfaces	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
17	Buoyancy and stability of floating bodies.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
18	Buoyancy and stability of floating bodies.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
19	Classification of fluid flow: steady and unsteady flow.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
20	Uniform and non-uniform flow.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
21	laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow.	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
22	Ideal and real fluid flow; one, two and three dimensional flows.	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
23	Stream line, path line, streak line and stream tube; stream function, velocity potential function.	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
24	One-, two- and three -dimensional continuity equations in Cartesian coordinate	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
25	Surface and body forces;; Momentum principle; Forces exerted by fluid flow on pipe bend; Vortex Flow -.	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
26	Equations of motion - Euler's equation; Bernoulli's equation – derivation	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
27	Energy Principle; Practical applications of Bernoulli's	Lecture	CIV 404.1	Mid Term-2, Quiz

	equation: venture-meter, orifice meter and pitot tube.			& End Sem Exam
28	Free and Forced; Dimensional Analysis and Dynamic Similitude	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
29	Definitions of Reynolds Number, Froude Number, Mach Number, Weber Number and Euler Number; Buckingham's π-Theorem. Notches and Weirs.	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
30	**Fluid Dynamics:**	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
31	Boundary layer theory, drag and lift force.	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
32	drag on a sphere, rough and smooth boundaries.	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
33	concept of mixing length,	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
34	boundary layer distribution for various shapes and for various Reynold's number.	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
35	boundary layer distribution for various shapes and for various Reynold's number.	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
36	boundary layer distribution for various for various Reynold's number.	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam

J.Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV404.1	Examine Bernoulli's equation for ideal and real fluids and evaluate the direction of flow. Distinguish between major loss and minor loss. Employ Darcy-Weichbach and Chezy's equation to calculate friction losses.	3	3	1	3	1				2		2	1	1	2	1

CIV404.2	Interpret different pipe fittings and evaluate the fluid velocity considering major and minor losses. Sketch HGL and TEL for a given pipe setting	3	2	2	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–IV)2019-20		
Class: B.Tech (CE) IV Semester		
SubjectName: CIV 404 Fluid Mechanics	Time:1.5Hrs	Max.Marks:30

Levels of thequestions as perBloomsTaxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
QuestionMapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student willbeableto
CO1:Understand the different types of fluid and their nature
CO2: Use of different types of pressure measuring devices

COMap	QuestionNo.	Question	Marks
CO1	Q.1	Discuss different types of fluid	3
CO1	Q.2a	What are different types of flow	3
	Q.2b	Discuss Newton’s law of viscosity	3
CO1	Q.3	What is Rehology?	6
CO2	Q.4	What do you mean by Barometer?	3
CO2	Q.5a	What is kinematic and dynamic viscosity	3
	Q.5b	Write different flow conditions.	3
CO2	Q6	Different types of manometers	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	CIV404 FLUID MECHANICS Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U6G6
1	A60215818001	Mr NAMAN GOYAL	100	50	50	A	9	2	2	18
2	A60215818003	Mr SADAV KHAN	100	50	50	B+	7	2	2	14
3	A60215818004	Mr SHASHWAT MOHANTY	100	50	50	A+	10	2	2	20
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	2	66.6667	%	
			Attainment Level					Level 1		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **SOLID MECHANICS**
Course Code : CIV 405, Credits : 02, Session : 2019-20(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Shashank Gupta, Mr. Mohan Kantharia, Dr. Ripunjoy Gogoi, Dr. Imran Ahmad Khan

A. Introduction

The course also covers the simple and compound stresses due to forces, stresses and deflection in beams due to bending, torsion in circular section, strain energy, different theories of failure, stress in thin cylinder thick cylinder and spheres due to external and internal pressure.

B. Course Outcomes: At the end of the course, students will be able to:

- **CIV405.1** Able to know the importance of seismic activity consideration in terrain.
- **CIV405.2** Able to understand various techniques to determine engineering properties of rocks and distinguish different types of rocks and minerals.

C. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects.

D.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal	Mid Term 1	CT	15%

Evaluation	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

E.

Module I: Simple stresses and strains Concept of stress and strain; Hooke's law, Young's modulus, Poisson ratio, stress at a point, stress and strains in bars subjected to axial loading. Modulus of elasticity, stress produced in compound bars subject to axial loading. Temperature stress and strain calculations due to applications of axial loads and variation of temperature in single and compound walls. Impact loading.

Module II: Compound stress and strains The two dimensional system; stress at a point on a plane, principal stresses and principal planes; Mohr's circle of stress. Graphical and Analytical methods for stresses on oblique section of body. Shear force and bending moment diagrams for cantilever, simply supported and overhanging beams.

Module III Theory of bending stresses in beams due to bending, assumptions in the simple bending theory, derivation of formula: its application to beams of rectangular, circular and channel sections, composite / flitched beams, bending and shear stresses in composite beams.

Module IV: Torsion Derivation of torsion equation and its assumptions. Applications of the equation of the hollow and solid circular shafts torsional rigidity, combined torsion and bending of circular shafts principal stress and maximum shear stresses under combined loading of bending and torsion, analysis of close-coiled-helical springs.

Module V: Thin cylinders and spheres Derivation of formulae and calculation of hoop stress, longitudinal stress in a cylinder and sphere subjected to internal pressure.

Module VI: Columns and struts Columns and failure of columns, Euler's formulas; Rankine-Gordon's formula, Johnson's empirical formula for axially loaded columns and their applications.

Module VII: Slope and deflection Relationship between moment, slope and deflection, Mohr's theorem; Moment area method; method of integration; Macaulay's method: Use of all these methods to calculate slope and deflection for the following:

- Cantilevers
- Simply supported beams with or without overhang
- Under concentrated loads, uniformly distributed loads or combination of concentrated and uniformly distributed loads.

F. Examination Scheme:

Components	A	CT	S/V/Q/ HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

G.

- Jindal U.C., "Strength of Materials", Galgotia Publication, New Delhi, 1998.
- Ryder G.H., "Strength of Materials", Macmillan, Delhi, 2003.
- R.K. Bansal, "Strength of Materials", Laxmi Publication, New Delhi, 2001.
- Sadhu Singh, "Strength of Materials", Khanna Publishers, New Delhi, 2000.
- Timoshenko S.P., "Elements of Strength of Materials", East-West affiliated, New Delhi, 2000.
- Hibbler R.C., "Mechanics of Materials", Prentice Hall, New Delhi, 1994.

H.

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Concept of stress and strain	Lecture	CIV405.1	Mid Term-1, Quiz & End Sem Exam
2	Hooke's law, Young's modulus, Poisson ratio, stress at a point	Lecture	CIV405.1	Mid Term-1, Quiz & End Sem Exam
3	stress and strains in bars subjected to axial loading	Lecture	CIV405.1	Mid Term-1, Quiz & End Sem Exam
4	Modulus of elasticity, stress produced in compound bars subject to axial loading.	Lecture	CIV405.1	Mid Term-1, Quiz & End Sem Exam
5	Temperature stress and strain calculations due to applications of axial loads	Lecture	CIV405.1	Mid Term-1, Quiz & End Sem Exam
6	variation of temperature in single and compound walls	Lecture	CIV405.1	Mid Term-1, Quiz & End Sem Exam
7	Impact loading.	Lecture	CIV405.1	Mid Term-1, Quiz & End Sem Exam
8	The two dimensional system., simply supported and overhanging beams	Lecture	CIV405.1	Mid Term-1, Quiz & End Sem Exam
9	stress at a point on a plane	Lecture	CIV405.1	Mid Term-1, Quiz & End Sem Exam
10	Principal stresses and principal planes	Lecture	CIV405.1	Mid Term-1, Quiz & End Sem Exam
11	Mohr's circle of stress.	Lecture	CIV405.1	Mid Term-1, Quiz & End Sem Exam
12	Graphical and Analytical methods for stresses on oblique section of body	Lecture	CIV405.1	Mid Term-1, Quiz & End Sem Exam
13	Shear force and bending moment diagrams for cantilever	Lecture	CIV405.1	Mid Term-1, Quiz & End Sem Exam

14	Shear force and bending moment diagrams overhanging beams	Lecture	CIV405.1	Mid Term-1, Quiz & End Sem Exam
15	Theory of bending stresses in beams due to bending,	Lecture	CIV405.1	Mid Term-1, Quiz & End Sem Exam
16	Theory of bending stresses in beams assumption	Lecture	CIV405.1	Mid Term-1, Quiz & End Sem Exam
17	In the simple bending theory	Lecture	CIV405.1	Mid Term-1, Quiz & End Sem Exam
18	Derivation of formula: its application to beams of rectangular	Lecture	CIV405.1	Mid Term-1, Quiz & End Sem Exam
19	circular and channel sections, composite / flitched	Lecture	CIV405.1	Mid Term-1, Quiz & End Sem Exam
20	Beams, bending and shear stresses in composite beams.	Lecture	CIV405.1	Mid Term-1, Quiz & End Sem Exam
21	Derivation of torsion equation . torsional and torsion.	Lecture	CIV405.1	Mid Term-2, Quiz & End Sem Exam
22	Derivation of torsion assumptions	Lecture	CIV405.1	Mid Term-2, Quiz & End Sem Exam
23	Applications of the equation of the hollow and solid circular shafts	Lecture	CIV405.1	Mid Term-2, Quiz & End Sem Exam
24	Rigidity, combined torsion and bending of circular shafts	Lecture	CIV405.1	Mid Term-2, Quiz & End Sem Exam
25	Principal stress	Lecture	CIV405.1	Mid Term-2, Quiz & End Sem Exam
26	Maximum shear stresses under combined loading of bending	Lecture	CIV405.1	Mid Term-2, Quiz & End Sem Exam
27	Analysis of close-coiled-helical springs	Lecture	CIV405.1	Mid Term-2, Quiz & End Sem Exam
28	Derivation of formulae and calculation of hoop stress.	Lecture	CIV405.1	Mid Term-2, Quiz & End Sem Exam
29	Longitudinal stress in a cylinder	Lecture	CIV405.1	Mid Term-2, Quiz & End Sem Exam
30	Sphere subjected to internal pressure.	Lecture	CIV405.1	Mid Term-2, Quiz & End Sem Exam
31	Columns and failure of columns.	Lecture	CIV405.1	Mid Term-2, Quiz & End Sem Exam
32	Euler’s formulas	Lecture	CIV405.1	Mid Term-2, Quiz & End Sem Exam
33	Rankine-Gordon’s formula.	Lecture	CIV405.1	Mid Term-2, Quiz & End Sem Exam
34	Johnson’s empirical formula	Lecture	CIV405.1	Mid Term-2, Quiz & End Sem Exam

35	For axially loaded columns and their applications	Lecture	CIV405.1	Mid Term-2, Quiz & End Sem Exam
36	For axially loaded columns and their applications	Lecture	CIV405.1	Mid Term-2, Quiz & End Sem Exam

I.

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV405.1	Able to know the importance of seismic activity consideration in terrain.	3	3	1	3	1				2		2	1			
CIV405.2	Able to understand various techniques to determine engineering properties of rocks and distinguish different types of rocks and minerals	3	2	2	2	2				2		1	1			

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–IV)2019-20						
Class: B.Tech (CE) 4th Semester						
Subject t Name: CIV 405 Solid Mechanics		Time:1.5Hrs		Max.Marks:30		
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		

Student will be able to
CO1: Understand the basic of stress and strain for different materials.
CO2: Apply basic concept to find engineering properties of materials.
CO3: Calculate different stress and strength parameters.

CO Map	Question No.	Question	Marks
CO1	Q.1	Calculate Poission's ratio for steel and concrete.	3
CO1	Q.2a	What is volumetric stress and strain? Discuss.	3
	Q.2b	What do you mean by free body diagram?	3
CO1	Q.3	What is stress and strain?	6
CO2	Q.4	What is shear force and bending moment?	3
CO2	Q.5a	What is thin and thick shell calculate hoop stress value?	3
	Q.5b	Discuss bending moment diagram for simply supported beam with Point load.	3
CO3	Q6	Calculate torsional strength for circular shaft.	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	CIV405 SOLID MECHANICS Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U7G7
1	A60215818001	Mr NAMAN GOYAL	100	50	50	A	9	2	2	18
2	A60215818003	Mr SADAV KHAN	100	50	50	B+	7	2	2	14
3	A60215818004	Mr SHASHWAT MOHANTY	100	50	50	A+	10	2	2	20

Total No. of Students	=	3	
Total No. of Students	>60 % marks	2	66.6667 %
Attainment Level			Level 1

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **DISASTER PREPAREDNESS & PLANNING MANAGEMENT**
Course Code : CIV406, Credits : 02, Session : 2019-20(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Mohan Kantharia, Dr. Ripunjoy Gogoi

A. Introduction

The overall aim of this course is to provide broad understanding about the basic concepts of Disaster Management with preparedness as a Civil Engineer. Further, the course introduces the various natural hazards that can pose risk to property, lives, and livestock, etc. and understanding of the social responsibility as an engineer towards preparedness as well as mitigating the damages.

After completion of this course students will able to learn

- **CIV406.1** Understanding the concept of Disaster planning and its management.
- **CIV406.2** Analyzing Relationship between Development and Disasters
- **CIV406.3** Ability to understand Categories of Disasters and realization of the responsibilities to society.

B. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

C. Programme Specific Outcomes:

PSO1 Associate various measures for enhancing the build environment, thereby improving quality of life of the occupants.

PSO2: Evaluate the potential of Civil Engineering for employment creation and its contribution to the GDP.

D.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

E. Course Content

Module I:Introduction to Course and Overview: Understanding the past to look into the future: Pre-industrial revolution days, Agricultural revolution, first and second industrial revolutions, IT revolution; Recent major Civil Engineering breakthroughs and innovations; Present day world and future projections, Evaluating future requirements for various resources; GIS and applications for monitoring systems; Human Development Index and Ecological Footprint of India Vs other countries and analysis.

Module II:Understanding the importance of Civil Engineering in Shaping and Impacting the World: The ancient and modern Marvels and Wonders in the field of Civil Engineering; Future Vision for CivilEngineering

Module III: Infrastructure - Habitats, Megacities, Smart Cities, Futuristic Visions: Transportation (Roads, Railways & Metros, Airports, Seaports, River ways, Sea canals, Tunnels (below ground, under water); Futuristic systems (ex, Hyper Loop)); Energy generation (Hydro, Solar (Photovoltaic, Solar Chimney), Wind, Wave, Tidal, Geothermal, Thermal energy); Water provisioning; Telecommunication needs (towers, above-ground and underground cabling).

Module IV: Environment: Traditional & futuristic methods; Solid waste management, Water purification, Wastewater treatment & Recycling, Hazardous waste treatment; Flood control (Dams, Canals, River interlinking), Multi-purpose water projects, Atmospheric pollution;

Module V: Built Environment: Recycling, Temperature/ Sound control in built environment, Conservation, Repairs & Rehabilitation of Structures & Heritage structures; Innovations and methodologies for ensuring Sustainability

Module VI: Civil Engineering Projects: Environmental Impact Analysis procedures; Waste (materials, manpower, equipment) avoidance/ Efficiency increase; Advanced construction techniques for better sustainability; Techniques for reduction of Green House Gas emissions in various aspects of Civil Engineering Projects; contribution of Civil Engineering to GDP.

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- Pradeep Sahni, 2004, Disaster Risk Reduction in South Asia, PrenticeHall.
- Singh B.K., 2008, Handbook of Disaster Management: Techniques & Guidelines, Rajat Publication.
- Ghosh G.K., 2006, Disaster Management, APH PublishingCorporation
- Disaster Medical Systems Guidelines. Emergency Medical Services Authority, State of California, EMSA no.214, June2003
- Inter Agency Standing Committee (IASC) (Feb. 2007). IASC Guidelines on Mental Health and Psychosocial Support in Emergency Settings. Geneva:IASC

I.Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	Understanding the past to look into the future.	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
2	Pre-industrial revolution days, Agricultural revolution, first and second industrial revolutions	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
3	IT revolution; Recent major Civil Engineering breakthroughs and innovations	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
4	Present day world and future projections, Evaluating future requirements for various resources	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
5	GIS and applications for monitoring systems	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam

6	Human Development Index and Ecological Footprint of India Vs other countries and analysis.	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
7	The ancient and modern Marvels and Wonders in the field of Civil Engineering.	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
8	Future Vision for Civil Engineering	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
9	Future Vision for Civil Engineering	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
10	Transportation (Roads, Railways & Metros, ,;);, Geothermal, Thermal energy);	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
11	Airports, Seaports, River ways, Sea canals.	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
12	Tunnels (below ground, under water)	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
13	Futuristic systems (ex, Hyper Loop)	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
14	Energy generation (Hydro, Solar (Photovoltaic, Solar Chimney), Wind, Wave, Tidal	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
15	Water provisioning; Telecommunication needs (towers, above-ground and underground cabling).	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
16	Water provisioning; Telecommunication needs (towers, above-ground and underground cabling).	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
17	Traditional & futuristic methods; Solid waste management, Water purification, Wastewater treatment & Recycling.	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
18	Hazardous waste treatment; Flood control (Dams, Canals, River interlinking), Multi-purpose water projects.	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
19	Innovations and methodologies for ensuring Sustainability	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
20	Atmospheric pollution; & Rehabilitation of Structures & Heritage structures	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
21	Recycling, Temperature/ Sound control in built environment, Conservation, Repairs	Lecture	CIV 406.1	Mid Term-2, Quiz & End Sem Exam
22	Environmental Impact Analysis procedures; Waste (materials, manpower, equipment) avoidance/ Efficiency increase;	Lecture	CIV 406.1	Mid Term-2, Quiz & End Sem Exam
23	Advanced construction techniques for better sustainability; Techniques for reduction of Green House Gas	Lecture	CIV 406.1	Mid Term-2, Quiz & End Sem Exam
24	emissions in various aspects of Civil Engineering Projects; contribution of Civil Engineering to GDP.	Lecture	CIV 406.1	Mid Term-2, Quiz & End Sem Exam

J.Course Articulation Matrix (Mapping of COs with POs

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV406.1	Ability to understand Categories of Disasters and realization of the responsibilities to society	3	3	1	3	1				2		2	1	1	2	1
CIV406.2	Ability to understand Categories of Disasters and realization of the responsibilities to society	3	2	2	2	2				2		1	1	2	2	1
CIV406.3	Ability to understand Categories of Disasters and realization of the responsibilities to society		2	1	3	2				2		1	1	2	1	

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–IV)2019-20						
Class: B.Tech (CE) 4th Semester						
Subject t Name: CIV 406 **DISASTER PREPAREDNESS & PLANNING MANAGEMENT**		Time:1.5Hrs			Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		
Student will be able to CO 1: Understanding the concept of Disaster planning and its management. CO 2: Analyzing Relationship between Development and Disasters						

CO 3: Ability to understand Categories of Disasters and realization of the responsibilities to society.

CO Map	Question No.	Question	Marks
CO1	Q.1	Define the term 'Disaster	3
CO1	Q.2a	What do you mean by 'Disaster Preparedness? How does frequency of a disaster affect its outcome on nature.	3
	Q.2b	Name any two manmade disasters.	3
CO1	Q.3	What do you mean by 'Sustainable Development	6
CO2	Q.4	Name any two disasters that had hit the India in recent past	3
CO2	Q.5a	Differentiate between 'Vulnerability ' and 'Risk	3
	Q.5b	Explain the terms RSS and GIS.	3
CO3	Q6	Write two important responsibilities of government	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	CIV406 DISASTER PREPAREDNESS & PLANNING Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U8G8
1	A60215818001	Mr NAMAN GOYAL	100	50	50	A	9	2	2	18
2	A60215818003	Mr SADAV KHAN	100	50	50	B+	7	2	2	14
3	A60215818004	Mr SHASHWAT MOHANTY	100	50	50	A+	10	2	2	20
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	2	66.6667	%	
			Attainment Level					Level 1		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **CIVIL ENGINEERING – SOCIETAL & GLOBAL IMPACT**
Course Code : CIV407, Credits : 02, Session : 2019-20(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Mohan Kantharia, Dr. Ripunjoy Gogoi

A. Introduction

The course is designed to provide a better understanding of the impact which Civil Engineering has on the Society at large and on the global arena. Civil Engineering projects have an impact on the Infrastructure, Energy consumption and generation, Sustainability of the Environment, Aesthetics of the environment, Employment creation, Contribution to the GDP, and on a more perceptible level, the Quality of Life.

B. After completion of this course students will able to learn

- **CIV407.1** The impact which Civil Engineering projects have on the Society at large and on the global arena and using resources efficiently and effectively.
- **CIV407.2** The extent of Infrastructure, its requirements for energy and how they are met: past, present and future, the Sustainability of the Environment, including its Aesthetics.
- **CIV407.3** The potentials of Civil Engineering for Employment creation and its Contribution to the GDP,the Built Environment and factors impacting the Quality of Life.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1 Associate various measures for enhancing the build environment, thereby improving quality of life of the occupants.

PSO2: Evaluate the potential of Civil Engineering for employment creation and its contribution to the GDP.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module I:Introduction to Course and Overview: Understanding the past to look into the future: Pre-industrial revolution days, Agricultural revolution, first and second industrial revolutions, IT revolution; Recent major Civil Engineering breakthroughs and innovations; Present day world and future projections, Evaluating future requirements for various resources; GIS and applications for monitoring systems; Human Development Index and Ecological Footprint of India Vs other countries and analysis.

Module II:Understanding the importance of Civil Engineering in Shaping and Impacting the World: The ancient and modern Marvels and Wonders in the field of Civil Engineering; Future Vision for CivilEngineering

Module III: Infrastructure - Habitats, Megacities, Smart Cities, Futuristic Visions: Transportation (Roads, Railways & Metros, Airports, Seaports, River ways, Sea canals, Tunnels (below ground, under water); Futuristic systems (ex, Hyper Loop)); Energy generation (Hydro, Solar (Photovoltaic, Solar Chimney), Wind, Wave, Tidal, Geothermal, Thermal energy); Water provisioning; Telecommunication needs (towers, above-ground and underground cabling).

Module IV: Environment: Traditional & futuristic methods; Solid waste management, Water purification, Wastewater treatment & Recycling, Hazardous waste treatment; Flood control (Dams, Canals, River interlinking), Multi-purpose water projects, Atmospheric pollution;

Module V: Built Environment: Recycling, Temperature/ Sound control in built environment, Conservation, Repairs & Rehabilitation of Structures & Heritage structures; Innovations and methodologies for ensuring Sustainability

Module VI: Civil Engineering Projects: Environmental Impact Analysis procedures; Waste (materials, manpower, equipment) avoidance/ Efficiency increase; Advanced construction techniques for better sustainability; Techniques for reduction of Green House Gas emissions in various aspects of Civil Engineering Projects; contribution of Civil Engineering to GDP.

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

I. Suggested Books

Brito, Ciampi, Vasconcelos, Amarol, Barros (2013) Engineering impacting Social, Economic and Working Environment, 120th ASEE Annual Conference and Exposition.

NAE Grand Challenges for Engineering (2006), Engineering for the Developing World, The Bridge, Vol 34, No.2, Summer2004.

Allen M. (2008) Cleansing the city. Ohio University Press. Athens Ohio.

I.Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	Understanding the past to look into the future: Pre-industrial revolution days, Agricultural revolution, first and second industrial revolutions;	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
2	IT revolution; Recent major Civil Engineering breakthroughs and innovations	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
3	Present day world and future projections	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
4	GIS and applications for monitoring systems; Human Development Index and Ecological Footprint of India Vs other countries and analysis.	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
5	Evaluating future requirements for various resources.	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam

6	The ancient and modern Marvels and Wonders in the field of Civil Engineering.	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
7	Future Vision for Civil Engineering	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
8	*Human Development Index and Ecological Footprint of India*	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
9	Transportation (Roads, Railways & Metros.);, Tidal, Geothermal, Thermal energy);	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
10	Airports, Seaports, River ways, Sea canals.	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
11	Tunnels (below ground, under water.	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
12	Futuristic systems (ex, Hyper Loop)	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
13	Energy generation (Hydro, Solar (Photovoltaic, Solar Chimney), Wind, Wave	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
14	Water provisioning; Telecommunication needs (towers, above-ground and underground cabling).	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
15	Traditional & futuristic methods; Solid waste management, Water purification.	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
16	Wastewater treatment & Recycling, Hazardous waste treatment	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
17	Recycling, Temperature/ Sound control in built environment, Conservation,;	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
18	Innovations and methodologies for ensuring Sustainability	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
19	Innovatins and methodologies for ensuring Sustainability Flood control (Dams, Canals, River interlinking), Multi-purpose water projects, Atmospheric pollution	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
20	Repairs & Rhabilitation of Structures & Heritage structures	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
21	Repairs & Rehabilitation of Structures & Heritage structures	Lecture	CIV 407.1	Mid Term-2, Quiz & End Sem Exam
22	Environmental Impact Analysis procedures; Waste (materials, manpower, equipment) avoidance/	Lecture	CIV 407.1	Mid Term-2, Quiz & End Sem Exam
23	emissions in various aspects of Civil Engineering Projects; contribution of Civil Engineering to GDP	Lecture	CIV 407.1	Mid Term-2, Quiz & End Sem Exam
24	Efficiency increase; Advanced	Lecture	CIV 407.1	Mid Term-2, Quiz

	construction techniques for better sustainability; Techniques for reduction of Green House Gas			& End Sem Exam

J.Course Articulation Matrix (Mapping of COs with POs

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV407.1	Students will be able to develop new idea about civil engineering and its impact on social life.	3	3	1	3	1				2		2	1	1	2	1
CIV407.2	Different types of energy sources linked to the development of society	3	2	2	2	2				2		1	1	2	2	1
CIV407.3	A new methods to reduce the effects of green house gases on the environment and its impact on human life.		2	1	3	2				2		1	1	2	1	

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–IV)2020-21						
Class: B.Tech (CE) 4th Semester						
Subject t Name: CIV 407 Civil Engg societal and global Impact		Time:1.5Hrs		Max.Marks:30		
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		
Student will be able to CO1: Understand the impact of society on global arena. CO2: Analyze the needs of resource and energy for the society. CO3: Understand the potentials of civil engineering projects and						

its impact on social life.

CO Map	Question No.	Question	Marks
CO1	Q.1	What do you understand by innovations in civil engineering?	3
CO1	Q.2a	Discuss ancient and modern civil engineering construction.	3
	Q.2b	Discuss application of GIS and GPS on global society.	3
CO1	Q.3	Discuss waste water treatment process in detail.	6
CO2	Q.4	Discuss water handling and purification scheme.	3
CO2	Q.5a	Discuss techniques of reduction for green house gases.	3
	Q.5b	What do you understand by solid waste management?	3
CO3	Q6	What do you mean by sustainable sonstruction?	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	CIV407 CIVIL ENGINEERING - SOCIETAL & GLOBAL IMPACT							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U15G15
1	A60215818001	Mr NAMAN GOYAL	100	50	50	A-	8	2	2	16
2	A60215818003	Mr SADAV KHAN	100	50	50	B+	7	2	2	14
3	A60215818004	Mr SHASHWAT MOHANTY	100	50	50	A+	10	2	2	20
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	2	66.6667	%	
			Attainment Level					Level 1		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **INSTRUMENTATION & SENSOR TECHNOLOGIES FOR CIVIL ENGINEERING APPLICATIONS**
Course Code : ECE 407, Credits : 02, Session : 2019-20(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Ajay Dadoria, Dr. Narendra Kumar Garg

A. Introduction

Sensors and Instrumentation research area encompasses the development and optimisation of new or existing devices that detect and measure changes in temperature, pressure, vibration and light. It also includes the integration and optimisation of these devices into a new system or instrument.

B. After completion of this course students will able to learn

- **ECE 407.1** Know broadly the concepts and functionalities of the electronic devices, tools and instruments.
- **ECE 407.2** Understand use, general specifications and deploy abilities of the electronic devices, and assemblies.
- **ECE 407.3** Confidence in handling and usage of electronic devices, tools and instruments in engineering applications.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Students will able to learn about the different types of sensors present to detect different natural phenomenon.

PSO2: Students will able to utilize the knowledge to detect natural and artificial calamities and to reduce the risk of their impact.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

E. Course Content

Module 1: Diodes and Applications: (5 Hours)

Semiconductor Diode - Ideal versus Practical, Diode Equivalent Circuits, Load Line Analysis; Diode as a Switch, Diode as a Rectifier, Half Wave and Full Wave Rectifiers; Breakdown Mechanisms, Zener Diode – Operation and Applications; Opto-Electronic Devices – LEDs, Clipper and clampers.

Module 2: Transistor Characteristics: (5 Hours)
Bipolar Junction Transistor (BJT) –Construction, Operation, Amplifying Action, Common Base, Common Emitter and Common Collector Configurations, Operating Point,
Introduction to FET, Feedback Amplifiers – Principle, Advantages of Negative Feedback,

Module 3: Operational Amplifiers and Applications: (5 Hours)
Introduction to Op-Amp, Differential Amplifier Configurations, CMRR, PSRR, Slew Rate; Block Diagram, Pin Configuration of 741 Op-Amp, Characteristics of Ideal Op-Amp, Concept of Virtual Ground; inverting and non-inverting amplifier applications: summing and difference amplifier, unity gain buffer, comparator,

Module 4: Digital Electronics Fundamentals: (5 Hours)
Difference between analog and digital signals, Boolean algebra, Basic and Universal Gates, Symbols, Truth tables, logic expressions, Logic simplification using K- map, half and full adder/subtractor, multiplexers, de- multiplexers

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- David. A. Bell (2003), Laboratory Manual for Electronic Devices and Circuits, Prentice Hall, India
- SantiramKal (2002), Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India
- Thomas L. Floyd and R. P. Jain (2009), Digital Fundamentals by Pearson Education,
- Paul B. Zbar, A.P. Malvino and M.A. Miller (2009), Basic Electronics – A Text-Lab. Manual, TMH.

I. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	Semiconductor Diode - Ideal versus Practical,Breakdown Mechanisms	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
2	Diode Equivalent Circuits, Load Line	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam

	Analysis			
3	Diode as a Switch, Diode as a Rectifier, Half Wave and Full Wave Rectifiers.	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
4	*Zener Diode – Operation and Applications*	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
5	Opto-Electronic Devices – LEDs,	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
6	Clipper and clampers.	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
7	Bipolar Junction Transistor (BJT)	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
8	Bipolar Junction Transistor (BJT) - Operation, Amplifying Action.	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
9	Common Base, Common Emitter and Common Collector	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
10	Construction, , Configurations, Operating Point	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
11	Introduction to FET, Feedback Amplifiers	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
12	Principle, Advantages of Negative Feedback.	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
13	Introduction to Op-Amp, Block inverting and non-inverting gain buffer, comparator	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
14	Configurations, CMRR, PSRR	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
15	Differential Amplifier, Slew Rate.	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
16	Diagram, Pin Configuration of 741 Op-Amp.	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
17	Characteristics of Ideal Op-Amp, Concept of Virtual Ground.	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
18	amplifier applications: summing and difference amplifier, unity	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
19	amplifier applications: summing and difference amplifier, unity	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
20	Difference between analog and digital signals,	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
21	Boolean algebra, Basic and Universal Gates.	Lecture	ECE 407.1	Mid Term-2, Quiz & End Sem Exam
22	Symbols, Truth tables, logic expressions.	Lecture	ECE 407.1	Mid Term-2, Quiz & End Sem Exam
23	Logic simplification using K-map, half and full adder/subtractor.	Lecture	ECE 407.1	Mid Term-2, Quiz & End Sem Exam
24	multiplexers, de- multiplexers	Lecture	ECE 407.1	Mid Term-2, Quiz

				& End Sem Exam

J.Course Articulation Matrix (Mapping of COs with POs

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ECE 407.1	To enable students to acquire in-depth knowledge in the field of Instrumentation Engineering with an ability to integrate existing and new knowledge with the advancement of the technology.	3	3	1	3	1				2		2	1	1	2	1
ECE 407.2	To train students to conduct research and experiments by applying appropriate techniques and tools with an understanding of the limitations for sustainable development of society.	3	2	2	2	2				2		1	1	2	2	1
ECE 407.3	To prepare students to act as a member and leader of the team to contribute positively to manage projects efficiently in the field of Instrumentation Engineering		2	1	3	2				2		1	1	2	1	

Sample Question Paper

Amity School of Engineering and Technology
Department of Electronics & Communication Engineering
IMID-SEMESTER(SEM–IV)2019-20

Class: B.Tech.(CE) IV Semester						
ECE 407 :INSTRUMENTATION & SENSOR TECHNOLOGIES FOR CIVIL ENGINEERING APPLICATIONS		Time:1.30 Hrs			Max.Marks:30	
Levels of thequestions as perBloomsTaxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
QuestionMapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student willbeableto
CO1:To analyze the errors during measurements
CO2:To specify the requirements in the calibration of sensors and instruments
CO5:To describe the requirements during the transmission of measured signals
CO7:To suggest proper sensor technologies for specific applications
CO8:To design and set up measurement systems and do the studies

COMap	QuestionNo.	Question	Marks
CO1	Q.1	What is difference between accuracy and precision of a measuring instruments.	3
CO2,CO8	Q.2a	What is IR Sensors? Explain active and passive IR sensors.	3
	Q.2b	What are the factors to be taken into account while performing measurement?	3
CO7	Q.3	Explain the basic working principles of temperature sensors. List types of temperature sensors. Explain any one in detail.	6
CO5	Q.4	What is the approach used for sensor installation explain it	3
CO2,CO8	Q.5a	Describe the order and methodology used for sensors installation.	3
	Q.5b	What are the factors to be taken into account while performing measurement?	3
CO7	Q6	Draw the classification of error in measurements and discuss in detail.	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	ECE407 INSTRUMENTATION & SENSOR TECHNOLOGIES FOR CIVIL ENGINEERING APPLICATIONS							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U16G16
1	A60215818001	Mr NAMAN GOYAL	100	50	50	A	9	2	2	18
2	A60215818003	Mr SADAV KHAN	100	50	50	B+	7	2	2	14
3	A60215818004	Mr SHASHWAT MOHANTY	100	50	50	A+	10	2	2	20
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	2	66.6667	%	
			Attainment Level					Level 1		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **MATERIAL TESTING AND EVALUATION LAB**
Course Code : CIV 421, Credits : 01, Session : 2019-20(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Mohan Kantharia, Dr. Imran Ahmad Khan

A. Introduction

Materials testing **helps us to understand and quantify whether a specific material or treatment is suitable for a particular application**. With the wide variety of materials and treatments available in the marketplace, testing can help narrow down the choices to the most appropriate selection for the intended use.

B. Course Outcomes: At the end of the course, students will be able to:

- **CIV421.1**. Gradation of coarse and fine aggregates ,Different corresponding tests and need/application of these tests in design and quality control.
- **CIV421.2**. Tensile Strength of materials &concrete composites.
- **CIV421.3**. Compressive strength test on aggregates.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate

consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Function as design consultants in construction industry for the design of civil engineering structures.

PSO2: Provide sustainable solutions to the Civil Engineering Problems

PSO3: It. will help students to analyze and Provide concrete solution to environmental problem

E.

Component of Evaluation	Description	Code	Weightage %

Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

- Gradation of course and fineaggregates. Different corresponding tests and need/ application of these tests in design and quality control**. (2 Hours)**
- Concrete permeability test, and tiles abrasion test **(1 Hour)**
- Tensile Strength of materials & concretecomposites. Compressive strength test onaggregates**(1 Hour)**
- Tension I-Elastic Behaviour of metals & materials. Tension II-Failure of CommonMaterials: **(2 Hours)**
- Direct Shear-Frictional Behaviour. Concrete I-Early Age Properties: **(2 Hours)**
- Concrete II-Compression and Indirect Tension. Compression-Directionality: **(2 Hours)**
- Soil Classification. Consolidation and Strength Tests: **(2 Hours)**
- Tension III-Heat Treatment. Torsion test: **(2 Hours)**
- Hardness tests (Brinnel's and Rockwell). Tests on closely coiled and open coiled springs: **(2 Hours)**
- Theories of Failure and Corroboration with Experiments. Tests on unmodified bitumen and modified binders with polymers: **(2 Hours)**
- Bituminous Mix Design and Tests on bituminous mixes – Marshall method. Concrete Mix Design as per BIS: **(2 Hours)**

G. Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Books

- National Building Code of India
- Local Building Bye-laws
- Callender, John Hancock, Time Saver Standards for Architectural design Data, Tata McGraw Hill.

- Chiara, Callender, John Hancock, Time Saver Standards for Building Type, McGraw Hill

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Gradation of course and fineaggregates. Different corresponding tests and need/ application of these tests in design and quality control.	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam
2	Concrete permeability test, and tiles abrasion	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam
3	Tensile Strength of materials & concrete composites. Compressive strength test on aggregates	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam
4	Tension I-Elastic Behaviour of metals & materials. Tension II-Failure of Common Materials	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam
5	Direct Shear-Frictional Behaviour. Concrete I-Early Age Properties	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam
6	Concrete II-Compression and Indirect Tension. Compression-Directionality.	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam
7	Soil Classification. Consolidation and Strength Tests: Tension III-Heat Treatment. Torsion test	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam
8	Hardness tests (Brinnel's and Rockwell). Tests on closely coiled and open coiled springs	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam
9	Theories of Failure and Corroboration with Experiments. Tests on unmodified bitumen and modified binders with polymers	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam
10	Bituminous Mix Design and Tests on bituminous mixes – Marshall method. Concrete Mix Design as per BIS	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO1	PO1	PSO	PSO	PSO

											0	1	2	1	2	3
CIV421.1	Function as design consultants in construction industry for the design of civil engineering structures.	3	3	1	3	1				2		2	1	1	2	1
CIV421.2	Provide sustainable solutions to the Civil Engineering Problems related with materials and their strength.	3	2	2	2	2				2		1	1	2	2	1

Sample Question Paper

<table>
<tr><td colspan="8">Amity School of Engineering and Technology
Department of Electronics and Communication Engineering
MID-SEMESTER(SEM–IV)2019-20</td></tr>
<tr><td colspan="8">Class: B.Tech.(CE) IV Semester</td></tr>
<tr><td colspan="3">Subject Name:
CIV 421 Material Testing and Evaluation Lab</td><td colspan="3">Time:2 Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td colspan="2">Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td colspan="2">Question Mapping</td><td>Q.1, 2,3</td><td>Q.1, 2,3</td><td>Q. 1,2,3</td><td>Q.1,2,3</td><td>Q.1,2,3</td><td>Q.1,2,3</td></tr>
<tr><td colspan="8">Student will be able to attain CO1 to 3</td></tr>
</table>

CO Map	Question No.	Question	Marks
CO1-3	Q.1	Tensile Strength of materials & concrete composites. Compressive strength test on aggregates	10
CO1-3	Q2	Tension I-Elastic Behaviour of metals & materials. Tension II-Failure of Common Materials.	10
CO1-3	Q3	Theories of Failure and Corroboration with Experiments. Tests on unmodified bitumen and modified binders with polymers.	10

Attainments	**Rubric**

Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	CIV421 MATERIALS TESTING AND EVALUATION LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U9G9
1	A60215818001	Mr NAMAN GOYAL	100	50	50	A	9	1	1	9
2	A60215818003	Mr SADAV KHAN	100	50	50	B+	7	1	1	7
3	A60215818004	Mr SHASHWAT MOHANTY	100	50	50	A+	10	1	1	10
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	2	66.6667	%	
			Attainment Level					Level 1		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **ENGINEERING GEOLOGY LAB**
Course Code : CIV 422, Credits : 01, Session : 2019-20(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Mohan Kantharia, Dr. Ripunjoy Gogoi

A. Introduction

The study of various types of rock formation and its physical properties. Topics such as rocks and minerals, soils, and earthquake activities are discussed with special reference to local geological problems. This lab course also focuses on physical properties of minerals.

B. Course Outcomes: At the end of the course, students will be able to:

- **CIV422.1**. To understand the various types of rocks (Igneous Petrology), Identification of rocks (Sedimentary Petrology)
- **CIV422.2**. Analyze the difference of rocks (Metamorphic Petrolody), Minerals and crystallography

C. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Students will able to understand the basic of rocks and various geological formations.

PSO2: Differentiate between different types of rocks and their origin and properties.

E.

Component of Evaluation	**Description**	**Code**	**Weightag e %**

Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

- Study of physical properties ofminerals: **(2 Hours)**
- Study of spgravity of minerals and rocks **(2 Hours)**
- Study of different group ofminerals:**(2 Hours)**
- Study of Crystal and Crystalsystem:**(2 Hours)**
- Identification of minerals: Silica group: Quartz, Amethyst, Opal; Feldspar group: Orthoclase, Plagioclase; Cryptocrystalline group: Jasper; Carbonate group: Calcite; Element group: Graphite; Pyroxene group: Talc; Mica group: Muscovite; Amphibole group: Asbestos, Olivine, Hornblende, Magnetite, Hematite, Corundum, Kyanite, Garnet, Galena,Gypsum:**(2 Hours)**
- Identification of rocks (Igneous Petrology): Acidic Igneous rock: Granite and its varieties, Syenite, Rhyolite, Pumice, Obsidian, Scoria, Pegmatite, Volcanic Tuff. Basic rock: Gabbro, Dolerite, Basalt and its varieties,Trachyte.**(2 Hours)**
- Identification of rocks (Sedimentary Petrology): Conglomerate, Breccia, Sandstone and its varieties, Laterite, Limestone and its varieties, Shales and itsvarieties: **(2 Hours)**
- Identification of rocks (Metamorphic Petrolody): Marble, slate, Gneiss and its varieties, Schist and its varieties. Quartzite,Phyllite: **(2 Hours)**
- Study of topographical features from Geological maps. Identification of symbols inmaps: **(2 Hours)**
- Field study of foulds and faults:**(2 Hours)**

G. Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**

5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Books

- Parbin Singh, Engineering & General Geology, S.K. Kataria& Sons, New Delhi (2008)
- Bangar, K.M., Principles of Engineering Geology, Standard Publishers Distributors, Delhi (2009)
- Billings, Marland P., Structural Geology, 3rd ed., Prentice-Hall India, New Delhi.
- Todd, D.K., Ground Water Hydrology, 2nd ed., Wiley India, New Delhi (2008)

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Study of physical properties of minerals, Study of sp gravity of minerals and rocks	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam
2	Study of different group of minerals.	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam
3	Study of Crystal and Crystal system	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam
4	Identification of minerals: Silica group: Quartz, Amethyst, Opal; Feldspar group: Orthoclase, Plagioclase; Cryptocrystalline group: Jasper; Carbonate group: Calcite; Element group: Graphite; Pyroxene group: Talc; Mica group: Muscovite.	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam
5	Identification of rocks (Igneous Petrology): Acidic Igneous rock: Granite and its varieties, Syenite, Rhyolite, Pumice, Obsidian, Scoria, Pegmatite, Volcanic Tuff. Basic rock: Gabbro, Dolerite, Basalt and its varieties.	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam
6	Identification of rocks (Sedimentary Petrology): Conglomerate, Breccia, Sandstone and its varieties, Laterite, Limestone and its varieties, Shales and itsvarieties	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam
7	Study of topographical features from Geological maps.	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam
8	Identification of rocks (Metamorphic Petrolody): Marble, slate, Gneiss and its varieties, Schist and its varieties. Quartzite.	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam
9	Identification of symbols in maps	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam
10	Field study of foulds and faults	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV422.1	To understand the difference of rocks (Igneous Petrology), Identification of rocks (Sedimentary Petrology)	3	3	1	3	1				2		2	1	1	2	1
CIV422.2	Analyze the various types of rocks (Metamorphic Petrolody), Minerals and crystallography.	3	2	2	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of Electronics and Communication Engineering MID-SEMESTER(SEM–IV)2019-20						
Class: B.Tech.(CE) IV Semester						
Subject Name: CIV 422 Engineering Geology Lab		Time:2 Hrs		Max.Marks:30		
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1, 2	Q.1, 2	Q. 1,2	Q.1,2	Q.1,2	Q.1,2
Student will be able to attain CO1 to 3						

CO Map	Question No.	Question	Marks
CO1-2	Q.1	Identification of rocks (Sedimentary Petrology): Conglomerate, Breccia, Sandstone and its varieties, Laterite, Limestone and its varieties, Shales and itsvarieties:	15

CO1-2	Q2	Study of topographical features from Geological maps. Identification of symbols inmaps: Field study of foulds and faults	15

Attainments		Rubric
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	CIV422 ENGINEERING GEOLOGY LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U10G10
1	A60215818001	Mr NAMAN GOYAL	100	50	50	A-	8	1	1	8
2	A60215818003	Mr SADAV KHAN	100	50	50	B+	7	1	1	7
3	A60215818004	Mr SHASHWAT MOHANTY	100	50	50	A+	10	1	1	10
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	2	66.6667	%	
			Attainment Level					Level 1		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **SURVEYING LAB**
Course Code : CIV 423, Credits : 01, Session : 2019-20(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Mohan Kantharia, Dr. Ripunjoy Gogoi

A. Introduction

Surveying Lab offers additional experience in fundamental land surveying measurement methods for surveying courses, including precision steel taping methods to perform horizontal measurements, digital theodolites to perform angular measurements and traditional and automatic levels for elevation measurements.

B. At the end of the course students will able to learn following idea's

Course Outcomes: At the end of the course, students will be able to:

- **CIV422.1** Understand the Chain survey - Traversing and plotting of details. Chain survey – Measurement of Area by offsetting.

- **CIV422.2**. Analyze the Compass survey - Traversing with compass and calculation of Interior angles. The use of advance survey instrument, Total station, theodolite etc.

C. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Students will able to understand the basic of different types of methods for measuring the distances and elevations of different points.

PSO2: Student will apply practical knowledge for determining the various control points.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

- Chain survey-Traversing and plotting of details: **(2 Hours)**
- Chain survey-Measurement of Area by offsetting: **(2 Hours)**
- Compass survey - Traversing with compass and calculation of Interior angles: **(2 Hours)**
- Plane table survey-Method of Radiation: **(2 Hours)**
- Plane table survey-Method of Intersection: **(2 Hours)**
- Leveling Fly Leveling-Plane of collimation method: **(2 Hours)**
- Leveling Fly leveling-Rise and Fall method: **(2 Hours)**
- Total station uses in angles and sop distance measurement.: **(2 Hours)**
- Total station leveling and Contour surveying, Topographical maps.: **(2 Hours)**
- Theodolite surveying-Measurement of horizontal angle by method of repetition and reiteration:**(2 Hours)**

G. Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**

5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Books

- Madhu, N, Sathikumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson India,2006.
- Manoj, K. Arora and Badjatia, Geomatics Engineering, Nem Chand & Bros,2011
- Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International,2010
- Chandra, A.M., Higher Surveying, Third Edition, New Age International (P) Limited, 2002.
- Anji Reddy, M., Remotesensing and Geographical information system, B.S. Publications,2001.
- Arora, K.R., Surveying, Vol-I, II and III, Standard Book House,2015.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Chain survey-Traversing and plotting of details.	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam
2	Chain survey-Measurement of Area by offsetting.	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam
3	Compass survey - Traversing with compass and calculation of Interior angles.	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam
4	Plane table survey-Method of Radiation.	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam
5	Plane table survey-Method of Intersection.	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam
6	Leveling Fly Leveling-Plane of collimation method	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam
7	Leveling Fly leveling-Rise and Fall method.	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam
8	*Total station uses in angles and sop distance measurement.*	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam
9	Total station leveling and Contour surveying, Topographical maps	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam
10	Theodolite surveying-Measurement of horizontal angle by method of repetition and reiteration.	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PS	PS	PS

		1	2	3	4	5	6	7	8	9	10	11	12	O1	O2	O3
CIV423.1	Understand the Chain survey - Traversing and plotting of details. Chain survey – Measurement of Area by offsetting.	3	3	1	3	1				2		2	1	1	2	1
CIV423.2	Analyze the Compass survey - Traversing with compass and calculation of Interior angles. The use of advance survey instrument, Total station, theodolite etc.	3	2	2	2	2				2		1	1	2	2	1

Sample Question Paper

<table>
<tr><td colspan="7">Amity School of Engineering and Technology
Department of Electronics and Communication Engineering
MID-SEMESTER(SEM–IV)2019-20</td></tr>
<tr><td colspan="7">Class: B.Tech.(CE) IV Semester</td></tr>
<tr><td colspan="2">Subject Name:
CIV 423 Surveying Lab</td><td colspan="3">Time:2 Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1, 2</td><td>Q.1, 2</td><td>Q. 1,2</td><td>Q.1,2</td><td>Q.1,2</td><td>Q.1,2</td></tr>
<tr><td colspan="7">Student will be able to attain CO1 to 3</td></tr>
</table>

CO Map	Question No.	Question	Marks
CO1-2	Q.1	• Chain survey-Traversing and plotting of details • Chain survey-Measurement of Area by offsetting	15
CO1-2	Q2	• Compass survey - Traversing with compass and calculation of Interior angles • Plane table survey-Method of Radiation • Plane table survey-Method of Intersection	15

Attainments	**Rubric**

Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.			**CIV423 SURVEYING LAB**							
	Enrollment.No.	**Student's Name**	**Max Marks**	**CE Weight Age (%)**	**ET Weight Age (%)**	**GO**	**GP**	**ACU**	**ECU**	**U11G11**
1	A60215818001	Mr NAMAN GOYAL	100	50	50	A-	8	1	1	8
2	A60215818003	Mr SADAV KHAN	100	50	50	B	6	1	1	6
3	A60215818004	Mr SHASHWAT MOHANTY	100	50	50	A	9	1	1	9
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	2	66.6667	%	
			Attainment Level					Level 1		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **FLUID MECHANICS LAB**
Course Code : CIV 424, Credits : 01, Session : 2019-20(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Ripunjoy Gogoi, Mr. Sachin Tiwari

A. Introduction

The Fluid Mechanics laboratory is designed to examine the properties of fluids and to conduct experiments involving both incompressible and compressible flow.

B. At the end of the course students will able to learn following idea's

Course Outcomes: At the end of the course, students will be able to:

- **CIV422.1** Understand the different types of fluid exists in nature their behaviour and characteristics.
- **CIV422.2**. Analyze the various types of losses and different types of flow conditions, calculate different types of forces observed by moving bodies in different flow conditions.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Students will able to understand the basic of different types of methods for measuring the pressure with the help of different devices.
PSO2: Student will apply practical knowledge for determining the discharge from various sections and pipes.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

- Measurement of viscosity: **(2 Hours)**
- Study of Pressure MeasuringDevices: **(2 Hours)**
- Stability of FloatingBody: (2 **Hours**)

- Hydrostatics Force on Flat Surfaces/ CurvedSurfaces: (2 **Hours**)
- Verification of Bernoulli'sTheorem: (2 **Hours)**
- Venturimeter: (2 **Hours**)
- Orificemeter: (2 **Hours**)
- Impacts ofjets: (2 **Hours**)
- Flow Visualisation–IdealFlow: (2 **Hours**)
- Length of establishment offlow, velocity distribution inpipes, LaminarFlow: (2 **Hours**)

G. Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Books

- R.K. Bansal, "Fluid Mechanics & Hydraulic Machines", Laxmi Publications (P) Ltd., 2002.
- Gupta, S. C., Fluid Mechanics and Hydraulic Machines, Pearson Education, 2007
- D.S. Kumar, "Fluid Mechanics and Fluid Power Engineering", S.K. Kataria& Sons, 2000.
- F. M. White, Introduction to Fluid Mechanics, McGraw Hill

I. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Corresponding CO**	**Mode of Assessing CO**
1	Measurement of viscosity	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam
2	Study of Pressure Measuring Devices	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam
3	Stability of Floating Body:	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam
4	Hydrostatics Force on Flat Surfaces/ Curved Surfaces	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam
5	Verification of Bernoulli'sTheorem:	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam
6	Venturimeter	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam
7	Orificemeter	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam
8	Impacts of jets:	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam
9	Flow Visualisation–Ideal Flow:	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam
10	Length of establishment off low, velocity distribution in pipes, Laminar Flow	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV424.1	Understand the different types of fluid exists in nature their behaviour and characteristics.	3	3	1	3	1				2		2	1	1	2	1
CIV424.2	Analyze the various types of losses and different types of flow conditions, calculate different types of forces observed by moving bodies in different flow conditions.	3	2	2	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of Electronics and Communication Engineering MID-SEMESTER(SEM–IV)2019-20		
Class: B.Tech.(CE) IV Semester		
Subject Name: CIV 424 Fluid Mechanics Lab	Time:2 Hrs	Max.Marks:30

Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1, 2	Q.1, 2	Q. 1,2	Q.1,2	Q.1,2	Q.1,2

Student will be able to attain CO1 to 3

CO Map	Question No.	Question	Marks
CO1-2	Q.1	• Measurement of viscosity • Study of Pressure Measuring Devices • Stability of Floating Body	15
CO1-2	Q2	• Hydrostatics Force on Flat Surfaces/ Curved Surfaces	15

		• Verification of Bernoulli's Theorem	

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	CIV424 FLUID MECHANICS LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U17G17
1	A60215818001	Mr NAMAN GOYAL	100	50	50	A	9	1	1	9
2	A60215818003	Mr SADAV KHAN	100	50	50	B+	7	1	1	7
3	A60215818004	Mr SHASHWAT MOHANTY	100	50	50	A+	10	1	1	10
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	2	66.6667	%	
			Attainment Level					Level 1		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **INSTRUMENTATION & SENSOR TECHNOLOGIES FOR CIVIL ENGINEERING APPLICATIONS LABORATORY**
Course Code : ECE 427, Credits : 01, Session : 2019-20(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Ajay Dadoria, Mr. Narendra Kumar Garg

A. Introduction

Sensors and Instrumentation research area encompasses the development and optimisation of new or existing devices that detect and measure changes in temperature, pressure, vibration and light. It also includes the integration and optimisation of these devices into a new system or instrument.

B. At the end of the course students will able to learn following idea's

Course Outcomes: At the end of the course, students will be able to:

- **CIV422.1** Understand the different types of sensors exist and their use in advanced technology. To analyze the errors during measurements
- **CIV422.2**. Analyze the various types of losses and Measure the resolution and sensitivity of thermocouple, thermistor and LVDT To specify the requirements in the calibration of sensors and instruments. To describe the measurement of electrical variables.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Students will able to understand the basic of different types of sensors and methods for measuring the losses from sensors

PSO2: Student will apply practical knowledge to find out the various new advancement in the field of sensors.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

- Measurement of resolution and sensitivity of thermocouple: **(2 Hours)**
- Measurement of resolution, sensitivity and non-linearity of thermistor: **(2 Hours)**
- Measurement of thickness of LVDT: **(2 Hours)**
- Measurement of resolution of LVDT (and displacement measurement): **(2 Hours)**
- Vibration measurement by stroboscope: **(2 Hours)**
- Angular frequency (speed of rotating objects) measurement by stroboscope: **(2 Hours)**
- Pressure transducer study and calibration: **(2 Hours)**
- Proving ring (force measurement): **(2 Hours)**
- Study of Torque cell: **(2 Hours)**
- Closed loop study of an electric circuit: **(2 Hours)**

G. Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Books

- David. A. Bell (2003), Laboratory Manual for Electronic Devices and Circuits, Prentice Hall, India
- SantiramKal (2002), Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India
- Thomas L. Floyd and R. P. Jain (2009), Digital Fundamentals by Pearson Education,
- Paul B. Zbar, A.P. Malvino and M.A. Miller (2009), Basic Electronics – A Text-Lab. Manual, TMH
- R. T. Paynter (2009), Introductory Electronic Devices & Circuits, Conventional Flow Version, Pearson

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Measurement of resolution and sensitivity of thermocouple:	Practical	ECE 427.1	Mid Term-1, Quiz & End Sem Exam
2	Measurement of resolution, sensitivity and non-linearity of thermistor:	Practical	ECE 427.1	Mid Term-1, Quiz & End Sem Exam
3	Measurement of thickness of LVDT:	Practical	ECE 427.1	Mid Term-1, Quiz & End Sem Exam
4	Measurement of resolution of LVDT (and displacement measurement):	Practical	ECE 427.1	Mid Term-1, Quiz & End Sem Exam
5	Vibration measurement by stroboscope:	Practical	ECE 427.1	Mid Term-1, Quiz & End Sem Exam
6	Angular frequency (speed of rotating objects) measurement by stroboscope:	Practical	ECE 427.1	Mid Term-1, Quiz & End Sem Exam
7	Pressure transducer study and calibration:	Practical	ECE 427.1	Mid Term-1, Quiz & End Sem Exam
8	Proving ring (force measurement):	Practical	ECE 427.1	Mid Term-1, Quiz & End Sem Exam
9	Study of Torque cell:	Practical	ECE 427.1	Mid Term-1, Quiz & End Sem Exam
10	Closed loop study of an electric circuit:	Practical	ECE 427.1	Mid Term-1, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ECE427.1	At the end of the course, students will be able to: Understand the different types of sensors exist and	3	3	1	3	1				2		2	1	1	2	1

	their use in advanced technology. To analyze the errors during measurements															
ECE427.2	Analyze the various types of losses and Measure the resolution and sensitivity of thermocouple, thermistor and LVDT To specify the requirements in the calibration of sensors and instruments. To describe the measurement of electrical variables.	3	2	2	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of Electronics and Communication Engineering MID-SEMESTER(SEM–IV)2019-20						
Class: B.Tech.(CE) IV Semester						
Subject Name: ECE 427 Instrumentation & Sensor Technologies for Civil Engineering Applications Lab		Time:2 Hrs		Max.Marks:30		
Levels of thequestions as perBloomsTaxo nomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
QuestionM apping	Q.1, 2	Q.1, 2	Q. 1,2	Q.1,2	Q.1,2	Q.1,2
Student willbeableto attain CO1 to 4						

COMap	QuestionNo.	Question	Marks
CO1-4	Q.1	Measurement of resolution and sensitivity of thermocouple:	15
CO1-4	Q2	Measurement of resolution of LVDT (and displacement measurement)	15

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2

Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	ECE427 INSTRUMENTATION & SENSOR TECHNOLOGIES FOR CIVIL ENGINEERING APPLICATIONS LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U18G18
1	A60215818001	Mr NAMAN GOYAL	100	50	50	A	9	1	1	9
2	A60215818003	Mr SADAV KHAN	100	50	50	B+	7	1	1	7
3	A60215818004	Mr SHASHWAT MOHANTY	100	50	50	A+	10	1	1	10

Total No. of Students	=	3		
Total No. of Students	>60 % marks	2	66.6667	%
Attainment Level			Level 1	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : STRUCTURAL ANALYSIS - II
Course Code : BTCE501, Crédits : 03, Session :2019-20 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name :Dr. Mohan Kantharia, Dr. P. Mahakavi, Mr. Sachin Tiwari

A. **Introduction:**The objective of this course is to *provide the basic concepts and principles of strength of materials.* It aims to equip the students *to give an ability to calculate stresses and deformations of objects under external loadings and also to give an ability to apply the knowledge of strength of materials on engineering applications and design problems.*

B. Course Outcomes: At the end of the course, students will be able to:
BTCE501.1. Understand the fundamental force method of analysis of indeterminate structures
BTCE501.2. Evaluate the problems relating to Displacement method of analysis of indeterminate structures
BTCE501.3. Examine the deflection of beams under Moving Loads & Influence Lines.
BTCE501.4. Understand the concept of Cables, suspension bridges and arches

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves Includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Force method of analysis of indeterminate structures Analysis of rigid frames of different geometry by consistent deformation method – settlement effects - analysis of pin-jointed trusses by consistent deformation method - externally and internally redundant trusses - effects of settlement and prestrains.

Module II: Displacement method of analysis of indeterminate structures Slope deflection method - analysis of continuous beams - beams with overhang - analysis of rigid frames - frames with sloping legs - gabled frames - frames without sway and with sway - settlement effects - moment distribution method as successive approximation of slope deflection equations - analysis of beams and frames - non-sway and sway analyses - Kani's method as iterative method of analysis of frames (outline only)

Module III: Moving Loads & Influence Lines

Introduction to moving loads - concept of influence lines - influence lines for reaction, shear force and bending moment in simply supported beams - influence lines for forces in trusses – analysis for different types of moving loads - single concentrated load - several concentrated loads - uniformly distributed load shorter and longer than the span.

Module IV: Cables, suspension bridges and arches
Analysis of forces in cables - suspension bridges with three-hinged and two-hinged stiffening girders - theory of arches - Eddy's theorem - analysis of three-hinged and two-hinged arches - settlement and temperature effects.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Wang C.K., Statically Indeterminate Structures, McGraw Hill, New York, 1983.
- Wilbur J.B. & Norris C.H., Elementary Structural Analysis, McGraw Hill, 1960.
- Wang C.K., Intermediate Structural Analysis, McGraw Hill, 1983.
- Timoshenko S.P. & Young D.H., Theory of Structures, McGraw Hill, 1965.
- Kinney S.J., Indeterminate Structural Analysis, Oxford & IBH, 1985.
- Matheson J.A.L., Hyperstatic Structures, John Wiley and Sons, 1996.
- Reddy C.S., Basic Structural Analysis, Tata McGraw Hill
- Negi L.S. & Jangid R.S, Structural Analysis, Tata McGraw Hill
- Rajasekaran S. & Sankarasubramanian G., Computational Structural Mechanics, PHI

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Analysis of rigid frames of different geometry by consistent deformation method	Lecture	BTCE501.1	Mid Term-1, Quiz & End Sem Exam
2	settlement effects	Lecture	BTCE501.1	Mid Term-1, Quiz & End Sem Exam
3	analysis of pin-jointed trusses by consistent deformation method;	Lecture	BTCE501.1	Mid Term-1, Quiz & End Sem Exam
4	externally and internally redundant trusses	Lecture	BTCE501.1	Mid Term-1, Quiz & End Sem Exam
5	effects of settlement and prestrains	Lecture	BTCE501.1	Mid Term-1, Quiz & End Sem Exam
6	Slope deflection method	Lecture	BTCE501.1	Mid Term-1, Quiz & End Sem Exam
7	analysis of continuous beams	Lecture	BTCE501.1	Mid Term-1, Quiz & End Sem Exam

8	beams with overhang	Lecture	BTCE501.1	Mid Term-1, Quiz & End Sem Exam
9	analysis of rigid frames	Lecture	BTCE501.2	Mid Term-1, Quiz & End Sem Exam
10	frames with sloping legs	Lecture	BTCE501.2	Mid Term-1, Quiz & End Sem Exam
11	gabled frames - frames without sway and with sway	Lecture	BTCE501.2	Mid Term-1, Quiz & End Sem Exam
12	settlement effects	Lecture	BTCE501.2	Mid Term-1, Quiz & End Sem Exam
13	moment distribution method	Lecture	BTCE501.2	Mid Term-1, Quiz & End Sem Exam
14	approximation of slope deflection equations	Lecture	BTCE501.2	Mid Term-1, Quiz & End Sem Exam
15	analysis of beams and frames	Lecture	BTCE501.2	Mid Term-1, Quiz & End Sem Exam
16	non-sway and sway analyses	Lecture	BTCE501.2	Mid Term-1, Quiz & End Sem Exam
17	Kani's method as iterative method of analysis of frames	Lecture	BTCE501.3	Mid Term-1, Quiz & End Sem Exam
18	Introduction to moving loads	Lecture	BTCE501.3	Mid Term-1, Quiz & End Sem Exam
19	concept of influence lines	Lecture	BTCE501.3	Mid Term-1, Quiz & End Sem Exam
20	influence lines for reaction	Lecture	BTCE501.3	Mid Term-1, Quiz & End Sem Exam
21	shear force and bending moment in simply supported beams	Lecture	BTCE501.3	Assignment, Quiz & End Sem Exam
22	influence lines for forces in trusses	Lecture	BTCE501.3	Assignment, Quiz & End Sem Exam
23	analysis for different types of moving loads	Lecture	BTCE501.3	Assignment, Quiz & End Sem Exam
25	Static Indeterminacy	Lecture	BTCE501.3	Assignment, Quiz & End Sem Exam
26	Uniaxial Loading and Material Properties	Lecture	BTCE501.3	Assignment, Quiz & End Sem Exam
27	single concentrated load	Lecture	BTCE501.3	Assignment, Quiz & End Sem Exam
28	several concentrated loads	Lecture	BTCE501.3	Assignment, Quiz & End Sem Exam
29	uniformly distributed load shorter and longer than the span.	Lecture	BTCE501.4	Assignment, Quiz & End Sem Exam
30	**Cables, suspension bridges and arches**	Lecture	BTCE501.4	Assignment, Quiz & End Sem Exam
31	Analysis of forces in cables	Lecture	BTCE501.4	Assignment, Quiz & End Sem Exam
32	suspension bridges with three-hinged and two-hinged stiffening girders	Lecture	BTCE501.4	Assignment, Quiz & End Sem Exam

33	theory of arches - Eddy's theorem	Lecture	BTCE501.4	Assignment, Quiz & End Sem Exam
34	Principal Stress	Lecture	BTCE501.4	Assignment, Quiz & End Sem Exam
35	analysis of three-hinged and two-hinged arches -	Lecture	BTCE501.4	Assignment, Quiz & End Sem Exam
36	settlement and temperature effects.	Lecture	BTCE501.4	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE501.1 .	*Understand the fundamental force method of analysis of indeterminate structures*	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
BTCE501.2	*Evaluate the problems relating to Displacement method of analysis of indeterminate structures*	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
BTCE501.3.	*Examine the deflection of beams under Moving Loads & Influence Lines.*	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**
BTCE501.4.	*Understand the concept of Cables, suspension bridges and arches*	3	3	2	3	3	2	2	-	3	2	3	3	**1**	**2**	**3**

Sample Question Paper

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–V) 2019-20
Class: B.Tech.(CE) V Semester

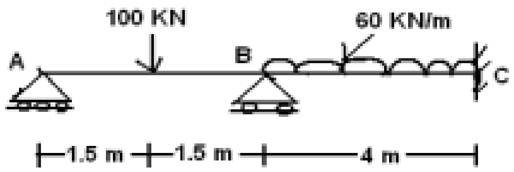
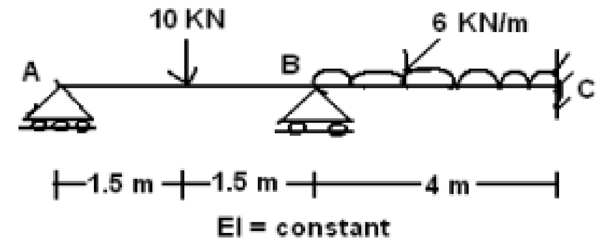
Subject Name: BTCE501 Structural Analysis II	Time: 2 Hrs	Max.Marks:30

Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: Understand the fundamental force method of analysis of indeterminate structures

CO2: Evaluate the problems relating to Displacement method of analysis of indeterminate structures

CO Map	Question No.	Question	Marks
CO1	Q.1	Differentiate pin-jointed plane frame and rigid jointed plane frame.	3
CO1	Q.2a	What is meant by force method in structural analysis?	3
	Q.2b	Briefly mention the two types of matrix methods of analysis of indeterminate structures	3
CO1	Q.3	Analyse the continuous beam shown in figure using force method 	6
CO2	Q.4	What is degree of kinematic indeterminacy and give an example.	3
CO2	Q.5a	List out the properties of rotation matrix.	3
	Q.5b	Compare flexibility method and stiffness method.	3
CO2	Q6	Analyse the continuous beam ABC shown in figure by stiffness method and also sketch the bending moment diagram. 	6

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	**Enrollment.No.**	**Student's Name**	**BTCE501 STRUCTURAL ANALYSIS - II**							
			Max Marks	**CE Weight Age (%)**	**ET Weight Age (%)**	**GO**	**GP**	**ACU**	**ECU**	**U5G5**
1	A60215817001	Mr UDDESHYA UPADHYAY	100	30	70	C+	4	3	3	12
2	A60215817003	Ms NEHA KARAIYA	100	30	70	B+	7	3	3	21
3	A60215817005	Mr RAHUL PINGLE	100	30	70	B-	5	3	3	15
4	A60515817001	Mr KARAN SINGH SIKARWAR	100	30	70	A-	8	3	3	24
5	A60515817003	Mr DHANANJAY CHAUHAN	100	30	70	B+	7	3	3	21

Total No. of Students	=	5		
Total No. of Students	>60% marks	1	20	%
Attainment Level			-	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : Principles of Structural Design
Course Code : BTCE502, Crédits : 04, Session :2019-20 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. P. Mahakavi, Mr. Sachin Tiwari

A. **Introduction:** The objective of this course is to understand the basic concepts of Limit state design and to obtain the knowledge of using Indian standard codes and special publication. It aims to equip the students to know the design concepts of all the structural members and learn economical design for materials saving and to know the design methodologies by limit state design for the beams, slabs, column and footings. The objective of this course is to learn the design of structural members such as prestress concrete members.

B. **Course Outcomes:** At the end of the course, students will be able to:

   BTCE502.1. Apply the usage of IS codes in design of reinforced concrete structures and Identify the types and design of beams and slabs

   BTCE502.2 Design the uniaxial and biaxial bending of column. and Design the simple footings and combined footings

   BTCE502.3 Develop skills in design of different types of steel connections and design of compression and tension member

   BTCE502.4 Design the timber member

C. **Programme Outcomes:**

   PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

   PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

   PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

   PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

   PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves	A	5%

	includingmedicalleaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Design Philosophy

Introduction –Structures and structural systems–Internal forces in different types of structural systems such as Trusses, Cables, Arches, Beams and Slabs, Frames. – stability criteria – design considerations – loading standards – working stress method(WSM) – ultimate load method – probabilistic analysis and design – uncertainties in design – classical reliability models – reliability analysis and design – levels of reliability methods – limit state method(LSM) – limit states – multiple safety factor formats – load and resistance factor design format – partial safety factor format.

Module II: Reinforced Concrete

Introduction – materials – mix design by IS method – basic properties of concrete and reinforcement – basic design concepts of working stress method (WSM) – analysis of sections by WSM – flexure, shear, torsion and bond – singly reinforced, doubly reinforced and flanged sections – deflection criteria.

Module III: Steel

Steel - introduction to connections - analysis and design of riveted, bolted and welded joints for direct force and moment - struts and ties made of single and double angles.

A design project involving the design and detailing of a typical connection is envisaged at this stage.

Module IV: Timber

Classification and allowable stresses - design of beams for flexure, shear & bearing – deflection criteria - design of solid and built-up columns-flitched beam – formwork design.

A design project involving the design and specification of the formwork for a typical concrete structure is envisaged at this stage.

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Pillai S.U. & Menon D, Reinforced Concrete Design Tata McGraw Hill, 2003.
- Varghese P.C., Limit State Design of Reinforced Concrete, Prentice Hall of India, 2003.
- Mallick S.K. & Gupta A.K., Reinforced Concrete, Oxford & IBH, 1982.
- Jain A.K., Reinforced Concrete - Limit State Design, Standard Book House, 1998.
- Shetty M.S., Concrete Technology, S. Chand, 1988.
- Punmia B.C., Reinforced Concrete Structures Vol. I, Standard Book House, 2005
- Jain & Jaikrishna, Plain & Reinforced Concrete Vol. I, Nemchand, 2000.
- Sinha S.N., Reinforced Concrete Design, Tata McGraw Hill, 2005.
- Ram Chandra, Design of Steel Structures Vol. I, Standard Book House, 2005.
- Negi L.S., Design of Steel Structures Vol. I, Tata McGraw Hill, 2005.
- BIS Codes (IS 875, IS 10262, SP 23, IS 456, IS 800, SP 6, IS 883, IS 2750).

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction- concepts of energy principles, safety	Lecture	BTCE502.1	Mid Term-1, Quiz & End Sem Exam
2	sustainable development in performance	Lecture	BTCE502.1	Mid Term-1, Quiz & End Sem Exam
3	what makes a structure; principles of stability	Lecture	BTCE502.1	Mid Term-1, Quiz & End Sem Exam
4	architect, user, builder;	Lecture	BTCE502.1	Mid Term-1, Quiz & End Sem Exam
5	*what are the functions'*	Lecture	BTCE502.1	Mid Term-1, Quiz & End Sem Exam
6	equilibrium; what is a structural engineer, role of engineer	Lecture	BTCE502.1	Mid Term-1, Quiz & End Sem Exam
7	what do the engineers design, first principles of process of design	Lecture	BTCE502.1	Mid Term-1, Quiz & End Sem Exam
8	Planning and Design Process	Lecture	BTCE502.2	Mid Term-1, Quiz & End Sem Exam
9	Materials, Loads, and Design Safety	Lecture	BTCE502.2	Mid Term-1, Quiz & End Sem Exam
10	Behaviour and Properties of Concrete	Lecture	BTCE502.2	Mid Term-1, Quiz & End Sem Exam
11	Behaviour and Properties of Concrete	Lecture	BTCE502.2	Mid Term-1, Quiz & End Sem Exam
12	Behaviour and Properties of Steel	Lecture	BTCE502.2	Mid Term-1, Quiz & End Sem Exam
13	Wind and Earthquake Loads.	Lecture	BTCE502.2	Mid Term-1, Quiz & End Sem Exam
14	Wind and Earthquake Loads.	Lecture	BTCE502.2	Mid Term-1, Quiz & End Sem Exam
15	Materials and Structural Design Criteria	Lecture	BTCE502.3	Mid Term-1, Quiz & End Sem Exam
16	Introduction to the analysis and design of structural systems	Lecture	BTCE502.3	Mid Term-1, Quiz & End Sem Exam
17	Analyses of determinate and indeterminate trusse	Lecture	BTCE502.3	Mid Term-1, Quiz & End Sem Exam
18	beams, and frames, and design philosophies for structural engineering	Lecture	BTCE502.3	Mid Term-1, Quiz & End Sem Exam
19	philosophies for structural engineering	Lecture	BTCE502.3	Mid Term-1, Quiz & End Sem Exam
20	analysis of determinate structures	Lecture	BTCE502.3	Mid Term-1, Quiz & End Sem Exam
21	Laboratory experiments	Lecture	BTCE502.3	Assignment, Quiz

	dealing with the analysis of indeterminate structures			& End Sem Exam
22	Design of Structural Elements; Concrete Elements, Steel Elements, Structural Joints;	Lecture	BTCE502.3	Assignment, Quiz & End Sem Exam
23	Theories and concepts of both concrete and steel design and analysis both at the element and system levels	Lecture	BTCE502.3	Assignment, Quiz & End Sem Exam
24	Approximate Analysis Methods as a Basis for Design	Lecture	BTCE502.3	Assignment, Quiz & End Sem Exam
25	Reinforced Concrete Beams for Flexure; Design of Reinforced Concrete Beams for Shear; Bond, Anchorage, and Serviceability	Lecture	BTCE502.3	Assignment, Quiz & End Sem Exam
26	Reinforced Concrete Columns; Reinforced Concrete Slabs; Introduction to Steel Design	Lecture	BTCE502.3	Assignment, Quiz & End Sem Exam
27	Tension Members and Connections; Bending Members;	Lecture	BTCE502.4	Assignment, Quiz & End Sem Exam
28	Classification and allowable stresses	Lecture	BTCE502.4	Assignment, Quiz & End Sem Exam
29	design of beams for flexure, shear & bearing	Lecture	BTCE502.4	Assignment, Quiz & End Sem Exam
30	deflection criteria - design of solid and built-up columns-flitched beam	Lecture	BTCE502.4	Assignment, Quiz & End Sem Exam
31	formwork design.	Lecture	BTCE502.4	Assignment, Quiz & End Sem Exam
32	A design project involving the design and detailing of a typical connection is envisaged at this stage	Lecture	BTCE502.4	Assignment, Quiz & End Sem Exam
33	design of beams for flexure, shear & bearing	Lecture	BTCE502.4	Assignment, Quiz & End Sem Exam
34	deflection criteria - design of solid and built-up columns-flitched beam	Lecture	BTCE502.4	Assignment, Quiz & End Sem Exam
35	formwork design.	Lecture	BTCE502.4	Assignment, Quiz & End Sem Exam
36	A design project involving the design and specification of the formwork typical concrete structure is envisaged at this stage.	Lecture	BTCE502.4	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE502.1	Apply the usage of IS codes in design of reinforced concrete structures and Identify the types and design of beams and slabs	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
BTCE502.2	Design the uniaxial and biaxial bending of column. and Design the simple footings and combined footings	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
BTCE502.3	Develop skills in design of different types of steel connections and design of compression and tension member	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**
BTCE502.4	Design the timber member	3	3	2	3	3	2	2	-	3	2	3	3	**1**	**2**	**3**

<u>Sample Question Paper</u>

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–V) 2019-20
Class: B.Tech.(CE) V Semester

Subject Name: BTCE502 Principles of Structural Design			Time: 2 Hrs		Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: Apply the usage of IS codes in design of reinforced concrete structures and Identify the types and design of beams and slabs

CO2: Design the uniaxial and biaxial bending of column. and Design the simple footings and combined footings

CO Map	Question No.	Question	Marks
CO1	Q.1	What are the various limit states explain each in detail.	3
CO1	Q.2a	Explain the use of shear force and bending moment diagram	3
	Q.2b	What are the various differences between working stress method and limit state method.	3
CO1	Q.3	Describe the following with neat sketch (a) Balanced Section (b) Under reinforced section (c) Over reinforced section	6
CO2	Q.4	What do the terms stiffening, setting and hardening mean, with reference to cement paste?	3
CO2	Q.5a	Enumerate the steps involved in the Indian Standard method of mix design.	3
	Q.5b	What is meant by segregation of concrete? Under what circumstances does it take place?	3
CO2	Q6	Design a reinforced concrete beam subjected to a bending moment of 20 KN-m. Use M20 concrete, Fe 415 reinforcement. Keep the width of the beam equal to half the effective depth.	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2

Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	BTCE502 PRINCIPLES OF STRUCTURAL DESIGN Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U6G6
1	A60215817001	Mr UDDESHYA UPADHYAY	100	30	70	C+	4	4	4	16
2	A60215817003	Ms NEHA KARAIYA	100	30	70	B	6	4	4	24
3	A60215817005	Mr RAHUL PINGLE	100	30	70	C+	4	4	4	16
4	A60515817001	Mr KARAN SINGH SIKARWAR	100	30	70	C+	4	4	4	16
5	A60515817003	Mr DHANANJAY CHAUHAN	100	30	70	B	6	4	4	24

Total No. of Students	=	5		
Total No. of Students	>60% marks	0	0	%
Attainment Level			-	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : GEOTECHNICAL ENGINEERING I
Course Code : BTCE503, Crédits : 02, Session :2019-20 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name :Dr. Imran Ahmad Khan

A. Introduction: The objective of this course is to impart the fundamental concepts of soil mechanics and understand the bearing capacity and to understand the concept of compaction and consolidation of soils. It aims to understand the design aspects of foundation and to evaluate the stress developed in the soil medium.

B. Course Outcomes: At the end of the course, students will be able to:

BTCE503.1*Compare the various engineering and index properties of soil.*

BTCE503.2 *Explain the hydraulic conductivity of the soil and seepage actions*

BTCE503.3. E*xamine the stress distribution at any point below the ground level.*

BTCE503.4 *Evaluate the shear strength of the soil using Mohr Soil.*

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Nature of soil and functional relationships

Soil type -Concepts of single grained, honey combed and flocculent structure and their effects on the basic soil properties - 3 phase system - void ratio - specific gravity - dry density - porosity - water content - saturated unit weight - submerged unit weight - degree of saturation. Laboratory and field identification of soils:Determination of water content by oven drying -Specific gravity using pycnometer and specific gravity bottle - Grain size analysis by sieve analysis, hydrometer analysis and pipette analysis - Atterberg limits and indices – Visual identification by simple field tests - Field density by core cutter, sand replacement and wax coating methods. Classification of soils:Necessity - Principles of classification - I.S. classification – Plasticity charts - Group index.

Module II: Soil Water, Permeability and Stress Distribution
Soil water: Types - Effective stress - Total stress - Pore pressure - Pressure diagrams. Permeability: Definition - Darcy's law - Factors affecting permeability – Laboratory determination - Stratified soils: average permeability. Stress distribution:Boussinesq's equations for vertical pressure due to point loads- Assumptions and limitations - pressure bulb – Influence diagram - Vertical pressure due to uniformly distributed loads, line loads and strip loads - Newmark charts and their use - Westergaard's solution.

Module III: Consolidation and Compa tion
Consolidation: Definition - Concepts of coefficient of compressibility - Coefficient of volume change and compression index - e-log p curves - Terzaghi's theory of one dimensional consolidation – Determination of coefficient of consolidation- pre-consolidation pressure difference between consolidation and compaction. Compaction:Definition and objectives of compaction - Proctor test and modified proctor test - Concept of OMC and maximum dry density - Zero air voids line -Factors influencing compaction.- Effect of compaction on soil properties - Field compaction methods - Proctor needle for field control.

Module IV: Shear Strength and Stability of Slopes
Shear Strength:Definition - Mohr's strength and stress circles - origin of planes - Mohr's envelope - Mohr-Coulomb strength theory -Direct, triaxial and UCC tests - Drainage conditions - Measurement of pore pressure - Vane shear tests - Total and effective stress -strength parameters – Stress path, Liquefaction of sand - Choice of test conditions for field problems. Stability of slopes:Slope failure, base failure and toe failure - Swedish circle method - $\phi=0$ analysis and $c=0$ analysis - Friction circle method - Taylor's stability number -Stability charts - Sliding block analysis.

Module V: Industrial Visit
At least one visit to industry in the field of Civil Engineering max two working days duration.

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Soil Mechanics by Craig R.F., Chapman & Hall
- Fundamentals of Soil Engineering by Taylor, John Wiley & Sons
- An Introduction to Geotechnical Engineering, by Holtz R.D. and Kovacs, W.D., Prentice Hall, NJ 4. Principles of Geotechnical Engineering, by Braja M. Das, Cengage Learning
- Principles of Foundation Engineering, by Braja M. Das, Cengage Learning

I. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	Introduction–Types of soils, their formation and	Lecture	BTCE503.1	Mid Term-1, Quiz & End Sem Exam

	deposition			
2	Definitions: soil mechanics, soil engineering, rock mechanics, geotechnical engineering.	Lecture	BTCE503.1	Mid Term-1, Quiz & End Sem Exam
3	Scope of soil engineering. Comparison and difference between soil and rock	Lecture	BTCE503.1	Mid Term-1, Quiz & End Sem Exam
4	*Basic Definitions and Relationships-Soil as three-phase system in terms of weight, volume, voids ratio*	Lecture	BTCE503.1	Mid Term-1, Quiz & End Sem Exam
5	Definitions: moisture content, unit weights, degree of saturation, voids ratio, porosity, specific gravity, mass specific gravity.	Lecture	BTCE503.1	Mid Term-1, Quiz & End Sem Exam
6	Plasticity Characteristics of Soil - Introduction to definitions of: plasticity of soil,	Lecture	BTCE503.2	Mid Term-1, Quiz & End Sem Exam
7	consistency limits-liquid limit, plastic limit, shrinkage limit, plasticity, liquidity and consistency indices, flow & toughness indices	Lecture	BTCE503.2	Mid Term-1, Quiz & End Sem Exam
8	definitions of activity and sensitivity. Determination of: liquid limit, plastic limit and shrinkage limit. Use of consistency units	Lecture	BTCE503.2	Mid Term-1, Quiz & End Sem Exam
9	Classification of Soils-Introduction of soil classification: particle size classification, textural classification, unified soil classification system, Indian standard soil classification system.	Lecture	BTCE503.2	Mid Term-1, Quiz & End Sem Exam
10	Permeability of Soil - Darcy's law, validity of Darcy's law	Lecture	BTCE503.3	Mid Term-1, Quiz & End Sem Exam
11	Determination of coefficient of permeability: Laboratory method: constant-head method, falling-head method	Lecture	BTCE503.3	Mid Term-1, Quiz & End Sem Exam
12	Field method: pumping- in	Lecture	BTCE503.3	Mid Term-1, Quiz

	test, pumping- out test. Permeability aspects: permeability of stratified soils, factors affecting permeability of soil			& End Sem Exam
13	Seepage Analysis- Introduction, stream and potential functions, characteristics of flow nets.	Lecture	BTCE503.3	Mid Term-1, Quiz & End Sem Exam
14	Effective Stress Principle -	Lecture	BTCE503.3	Mid Term-1, Quiz & End Sem Exam
15	Introduction, effective stress principle, nature of effective stress	Lecture	BTCE503.3	Mid Term-1, Quiz & End Sem Exam
16	effect of water table. Fluctuations of effective stress	Lecture	BTCE503.3	Mid Term-1, Quiz & End Sem Exam
17	effective stress in soils saturated by capillary action	Lecture	BTCE503.3	Mid Term-1, Quiz & End Sem Exam
18	seepage pressure, quick sand condition.	Lecture	BTCE503.3	Mid Term-1, Quiz & End Sem Exam
19	Compaction of Soil- Introduction, theory of compaction	Lecture	BTCE503.3	Mid Term-1, Quiz & End Sem Exam
20	laboratory determination of optimum moisture content ; maximum dry density. Compaction in field,	Lecture	BTCE503.4	Mid Term-1, Quiz & End Sem Exam
21	compaction specifications and field control	Lecture	BTCE503.4	Assignment, Quiz & End Sem Exam
22	Consolidation of Soil - Introduction, comparison between compaction and consolidation, initial, primary & secondary consolidation, spring analogy for primary consolidation, interpretation of consolidation test results,	Lecture	BTCE503.4	Assignment, Quiz & End Sem Exam
23	Terzaghi’s theory of consolidation, final settlement of soil deposits, computation of consolidation settlement and secondary consolidation. Introduction, stresses due to point load, line load, strip load,	Lecture	BTCE503.4	Assignment, Quiz & End Sem Exam

	uniformly loaded circular area, rectangular loaded area			
24	Influence factors, Isobars, Boussinesq's equation, Newmark's Influence Chart.	Lecture	BTCE503.4	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE503.1	Compare the various engineering and index properties of soil.	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
BTCE503.2	Explain the hydraulic conductivity of the soil and seepage actions	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE503.3 .	Examine the stress distribution at any point below the ground level.	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
BTCE503.4	Evaluate the shear strength of the soil using Mohr Soil.	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**

<u>Sample Question Paper</u>

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–V) 2019-20
Class: B.Tech.(CE) V Semester

Subject Name: BTCE503 Geotechnical Engineering I		Time: 2 Hrs		Max.Marks:30		
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: Compare the various engineering and index properties of soil.

CO2: *Explain the hydraulic conductivity of the soil and seepage actions*

CO Map	Question No.	Question	Marks
CO1	Q.1	Explain with a neat sketch the three phase diagram for soil. Define air content and percentage air voids with the help of phase diagram..	3
CO1	Q.2a	Define uniformity coefficient and coefficient of curvature and its importance	3
	Q.2b	Calculate the void ratio and dry density of the soil sample with 25% prorosity if the specific gravity is 2.75.	3
CO1	Q.3	A partially saturated sample from a borrow pit has a natural water content of 14% and bulk unit weight of 19kN/m3 . The specific gravity of solids is 2.70. Determine the void ratio and degree of saturation. What will be the unit weight of the sample on saturation?	6
CO2	Q.4	Define Stoke's law and its limitations.	3
CO2	Q.5a	Classify the soil with justifications; Cu=7, Cc=2, % Gravel =20%, % Sand =75%	3
	Q.5b	Explain: Effects of Compaction on Properties of Soil.	3
CO2	Q6	The plastic limit and plasticity index of the soil are 13% and 10 respectively. If the natural water content of the soil is 18%. Determine the following. a) Liquid Limit b)Liquidity Index c) Consistency Index	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	BTCE503 GEOTECHNICAL ENGINEERING - I							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U7G7
1	A60215817001	Mr UDDESHYA UPADHYAY	100	30	70	C+	4	3	3	12
2	A60215817003	Ms NEHA KARAIYA	100	30	70	A+	10	3	3	30
3	A60215817005	Mr RAHUL PINGLE	100	30	70	B+	7	3	3	21
4	A60515817001	Mr KARAN SINGH SIKARWAR	100	30	70	A+	10	3	3	30
5	A60515817003	Mr DHANANJAY CHAUHAN	100	30	70	A+	10	3	3	30
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	3	60	%	
			Attainment Level					Level 1		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : TRANSPORTATION ENGINEERING II
Course Code : BTCE504, Crédits : 03, Session :2019-20 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Ripunjoy Gogoi, Dr. P. Mahakavi

A. Introduction: The objective of this course is to expose the students with various transportation modes and their advantages and disadvantages and to facilitate students to decide highway alignment and design highway geometry. It aims to enable students to select suitable materials for highway pavements and design the pavement and to explain students with various components of a railway track.

B. Course Outcomes: At the end of the course, students will be able to:

BTCE504.1. Classify basic design of highway geometry according to the design specifications.

BTCE504.2. Design a flexible pavement using IRC method and Describe various components of railways and their functions.

BTCE504.3. Design a railway geometry according to the design specifications.

BTCE504.4. Classify various components of an airport and identify the alignment and the required length of a runway.

C. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Highway Classification, Alignment and Geometrical Design

Introduction – Highway development in India - Classification of roads - Typical cross sections of roads in urban and rural area - Requirements and factors controlling alignment of roads - Engineering surveys for highway location - Pavement surface characteristics - Camber and width requirements – Sight distances - stopping and overtaking sight distances, overtaking zone requirements - Design of horizontal alignment - speed, radius, super elevation, methods of providing super elevation, extra widening of pavements, transition curves - Design of vertical alignment - gradient, grade compensation, summit curves and valley curves - worked out problems on all the above topics.

Module II: Traffic engineering

Introduction - Road user, vehicle and traffic characteristics - Speed and volume studies - Simple worked out problems - Principles of design of at-grade intersections -Simple layouts - Objectives, classification and uses of traffic signs and markings - Design of isolated signals by Webster's method.

Module III: Pavement Materials and Design

Desirable properties and testing of highway materials: road aggregates, bituminous materials and subgrade soil - Factors influencing the design of pavements - CBR method and IRC guidelines of flexible pavements design - Design of rigid pavements using IRC charts - worked out problems.

Module IV: Airport planning and Design

Introduction. Aircraft characteristics and their influence on planning of airports. Airport obstructions and zoning. Component parts of airport and site selection. Runway design. Orientation, basic runway length, corrections and geometric.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Khanna, S.K., Justo, C.E.G and Veeraragavan, A, 'Highway Engineering', Revised 10th Edition, Nem Chand & Bros, 2017
- Kadiyalai, L.R., ' Traffic Engineering and Transport Planning', Khanna Publishers.
- Partha Chakraborty, ' Principles Of Transportation Engineering, PHI Learning,
- Papacostas, C.S., Transportation Engineering and Planning, 3rd ed., Pearson Education, New Delhi (2008)
- O' Flaherty Coleman. A., Transport Planning and Traffic Engineering, Elsevier, New Delhi (2008).
- Slinn, Mike, Traffic Engineering Design (Principles and Practice), Elsevier, New Delhi (2008), O'Flaherty, Coleman A., Highways (The Location, Design, Construction and Maintenance of Pavement) 4th ed, Elsevier, New Delhi (2008).

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Highway development and planning	Lecture	BTCE504.1	Mid Term-1, Quiz & End Sem Exam
2	Classification of roads, road development in India,	Lecture	BTCE504.1	Mid Term-1, Quiz & End Sem Exam
3	Current road projects in India	Lecture	BTCE504.1	Mid Term-1, Quiz & End Sem Exam
4	*highway alignment and project preparation*	Lecture	BTCE504.1	Mid Term-1, Quiz & End Sem Exam
5	Geometric design of highways	Lecture	BTCE504.1	Mid Term-1, Quiz & End Sem Exam
6	Introduction; highway cross section elements	Lecture	BTCE504.1	Mid Term-1, Quiz & End Sem Exam
7	sight distance, design of horizontal alignment	Lecture	BTCE504.1	Mid Term-1, Quiz & End Sem Exam
8	design of vertical alignment	Lecture	BTCE504.1	Mid Term-1, Quiz & End Sem Exam
9	; design of intersections, problems	Lecture	BTCE504.2	Mid Term-1, Quiz & End Sem Exam
10	Traffic engineering & control	Lecture	BTCE504.2	Mid Term-1, Quiz & End Sem Exam
11	Traffic Characteristics, traffic engineering studies	Lecture	BTCE504.2	Mid Term-1, Quiz & End Sem Exam
12	traffic flow and capacity	Lecture	BTCE504.2	Mid Term-1, Quiz & End Sem Exam

13	traffic regulation and control	Lecture	BTCE504.2	Mid Term-1, Quiz & End Sem Exam
14	design of road intersections	Lecture	BTCE504.2	Mid Term-1, Quiz & End Sem Exam
15	design of parking facilities; highway lighting; problems	Lecture	BTCE504.2	Mid Term-1, Quiz & End Sem Exam
16	Pavement materials	Lecture	BTCE504.3	Mid Term-1, Quiz & End Sem Exam
17	Materials used in Highway Construction	Lecture	BTCE504.3	Mid Term-1, Quiz & End Sem Exam
18	Soils, Stone aggregates	Lecture	BTCE504.3	Mid Term-1, Quiz & End Sem Exam
19	bituminous binders,	Lecture	BTCE504.3	Mid Term-1, Quiz & End Sem Exam
20	Portland cement and cement concrete: desirable properties,	Lecture	BTCE504.3	Mid Term-1, Quiz & End Sem Exam
21	tests, requirements for different types of pavements. Problems	Lecture	BTCE504.3	Assignment, Quiz & End Sem Exam
22	Design of pavements- Introduction; flexible pavements,	Lecture	BTCE504.3	Assignment, Quiz & End Sem Exam
23	design of flexible pavements as per IRC; rigid pavements- components and functions;	Lecture	BTCE504.4	Assignment, Quiz & End Sem Exam
24	stresses in rigid pavements;	Lecture	BTCE504.4	Assignment, Quiz & End Sem Exam
25	factors affecting design and performance of CC pavements	Lecture	BTCE504.4	Assignment, Quiz & End Sem Exam
26	design of concrete pavements as per IRC; problems.	Lecture	BTCE504.4	Assignment, Quiz & End Sem Exam
27	factors affecting design and performance;	Lecture	BTCE504.4	Assignment, Quiz & End Sem Exam
28	stresses in flexible pavements	Lecture	BTCE504.4	Assignment, Quiz & End Sem Exam
29	bituminous paving mixes;	Lecture	BTCE504.4	Assignment, Quiz & End Sem Exam
30	Introduction. Aircraft characteristics	Lecture	BTCE504.4	Assignment, Quiz & End Sem Exam
31	and their influence on planning of airports	Lecture	BTCE504.4	Assignment, Quiz & End Sem Exam
32	Airport obstructions and zoning.	Lecture	BTCE504.4	Assignment, Quiz & End Sem Exam
33	Component parts of airport and site selection	Lecture	BTCE504.4	Assignment, Quiz & End Sem Exam
34	Runway design	Lecture	BTCE504.4	Assignment, Quiz

				& End Sem Exam
35	Orientation, basic runway length,	Lecture	BTCE504.4	Assignment, Quiz & End Sem Exam
36	corrections and geometric.	Lecture	BTCE504.4	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE504.1.	Classify basic design of highway geometry according to the design specifications.	3	3	2	2	3	-	1	2	-	2	3	3	**2**	**2**	**1**
BTCE504.2.	Design a flexible pavement using IRC method and Describe various components of railways and their functions.	3	3	2	1	1	2	1	-	1	2	3	3	**3**	**2**	**1**
BTCE504.3.	Design a railway geometry according to the design specifications.	3	3	2	3	3	2	2	-	2	2	3	3	**3**	**2**	**3**
BTCE504.4.	Classify various components of an airport and identify the alignment and the required length of a runway.	3	2	3	1	2	-	1	-	3	2	3	3	**3**	**2**	**1**
BTCE504.5.	Identify various components of a harbor and their functions.	3	3	2	2	3	2	2	-	3	2	3	3	**3**	**1**	**2**

Sample Question Paper

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–V) 2019-20						
Class: B.Tech.(CE) V Semester						
Subject Name: BTCE504 TRANSPORTATION ENGINEERING II		Time: 2 Hrs			Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: Classify basic design of highway geometry according to the design specifications.

CO2: Design a flexible pavement using IRC method and Describe various components of railways and their functions.

CO Map	Question No.	Question	Marks
CO1	Q.1	Write down the definition of a gauge of a railway track.	3
CO1	Q.2a	Explain the reasons for train derailments	3
	Q.2b	Explain how airport pavements are damaged due to frost action.	3
CO1	Q.3	Draw a neat sketch of the line diagram of the fixed heel type switch	6
CO2	Q.4	Explain briefly about the requirements of an ideal permanent way	3
CO2	Q.5a	Evaluate different types of gradients used in railway tracks.	3
	Q.5b	Describe the sleeper density and spacing of sleepers	3
CO2	Q6	Enumerate the factors affecting site selection for an airport	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2

Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	BTCE504 TRANSPORTATION ENGINEERING - II							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U8G8
1	A60215817001	Mr UDDESHYA UPADHYAY	100	30	70	B-	5	3	3	15
2	A60215817003	Ms NEHA KARAIYA	100	30	70	A+	10	3	3	30
3	A60215817005	Mr RAHUL PINGLE	100	30	70	A	9	3	3	27
4	A60515817001	Mr KARAN SINGH SIKARWAR	100	30	70	A+	10	3	3	30
5	A60515817003	Mr DHANANJAY CHAUHAN	100	30	70	A+	10	3	3	30

Total No. of Students	=	5		
Total No. of Students	>60% marks	4	80	%
Attainment Level			Level 3	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : HYDRAULIC MACHINES
Course Code : BTCE505, Crédits : 03, Session :2019-20 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Mr. Sachin Tiwari

A. Introduction: The objective of this course is to provide and train students of hydraulic engineering. The course will introduce students to various fluid properties, and their behavior under different condition.

B. Course Outcomes: At the end of the course, students will be able to:

BTCE505.1. Analyse various hydraulic systems, turbo machines and jet propulsion

BTCE505.2. Develop the knowledge on pelton, francis, propeller and Kaplan turbines

BTCE505.3. Evaluate Centrifugal pumps, velocity triangles, efficiency, turbine pumps

BTCE505.4. Perform dimensional analysis on specific speed, unit quantities; characteristic curves; use of models

BTCE505.5.determine the Transmission of hydraulic power through pipe lines; water hammer and hydraulic power and pumps

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I:Introduction

Euler's equations for turbo machines; impulse and reaction forces due to fluid systems on stationery and moving system of vanes; jet propulsion.

Module II: WaterTurbines
Classification: Pelton, Francis, Propeller and Kaplan turbines; velocity triangles; efficiency; draft tubes, governing.

Module III: Pumps
Centrifugal pumps, velocity triangles, efficiency, turbine pumps, axial and mixed flow pumps.

Module IV: Performance of Fluid Machines
Similarity laws applied to rotodynamic machines; specific speed, unit quantities; characteristic curves; use of models; cavitations and attendant problems in turbo machines; selection of turbines hydroelectric plants.

Module V: HydraulicPower Transmission
Transmission of hydraulic power through pipe lines; water hammer; precautions against water hammer in turbine and pump installations: hydraulic ram.(added to FM-1)

Module VI: PowerHydraulics
Positive pumps: gear, vane, screw, pump, variable delivery valves: flow control, pressure control, direction control, solenoid operated valve, hydraulic circuits, fluid coupling and torque converter.
Pneumatic Power: Basic principles, comparison of pneumatic and hydraulic Systems.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Gupta, S. C., Fluid Mechanics and Hydraulic Machines, Pearson Education, 2007
- R.K. Bansal, "Fluid Mechanics & Hydraulic Machines", Laxmi Publications (P) Ltd., 2002.
- Dr. D.S. Kumar, "Fluid Mechanics & Fluid Power Engineering", S.K. Kataria & Sons,2001
- D.R. Malhotra & N.K. Malhotra, "The Fluid Mech. & Hydraulics", Satya Prakashan, 2001
- V.P. Gupta, Alam Singh, Manish Gupta, "Fluid Mechanics, Fluid Mechanics & Hydraulics", CBS Publishers; 1999

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Euler's equations for turbo machines	Lecture	BTCE505.1	Mid Term-1, Quiz & End Sem Exam
2	impulse and reaction forces due to fluid systems on stationery and moving system of vanes	Lecture	BTCE505.1	Mid Term-1, Quiz & End Sem Exam
3	jet propulsion.	Lecture	BTCE505.1	Mid Term-1, Quiz & End Sem Exam
4	*Turbulent Flow- Reynolds experiment, Transition from laminar to turbulent flow*	Lecture	BTCE505.2	Mid Term-1, Quiz & End Sem Exam

5	Definition of turbulence, scale and intensity, Causes of turbulence, instability, mechanism of turbulence and effect of turbulent flow in pipes	Lecture	BTCE505.2	Mid Term-1, Quiz & End Sem Exam
6	Classification: Pelton, Francis	Lecture	BTCE505.2	Mid Term-1, Quiz & End Sem Exam
7	Propeller and Kaplan turbines	Lecture	BTCE505.2	Mid Term-1, Quiz & End Sem Exam
8	velocity triangles; efficiency	Lecture	BTCE505.2	Mid Term-1, Quiz & End Sem Exam
9	draft tubes, governing.	Lecture	BTCE505.3	Mid Term-1, Quiz & End Sem Exam
10	Boundary-layer thickness, displacement, momentum & energy thickness	Lecture	BTCE505.3	Mid Term-1, Quiz & End Sem Exam
11	laminar and Turbulent boundary layers on a flat plate	Lecture	BTCE505.3	Mid Term-1, Quiz & End Sem Exam
12	Laminar sub-layer, smooth and rough boundaries	Lecture	BTCE505.3	Mid Term-1, Quiz & End Sem Exam
13	Centrifugal pumps,	Lecture	BTCE505.3	Mid Term-1, Quiz & End Sem Exam
14	velocity triangles	Lecture	BTCE505.4	Mid Term-1, Quiz & End Sem Exam
15	efficiency,	Lecture	BTCE505.4	Mid Term-1, Quiz & End Sem Exam
16	turbine pumps	Lecture	BTCE505.4	Mid Term-1, Quiz & End Sem Exam
17	axial and mixed flow pumps.	Lecture	BTCE505.4	Mid Term-1, Quiz & End Sem Exam
18	Similarity laws applied to rotodynamic machines;	Lecture	BTCE505.4	Mid Term-1, Quiz & End Sem Exam
19	specific speed, unit quantities; characteristic curves;	Lecture	BTCE505.4	Mid Term-1, Quiz & End Sem Exam
20	use of models; cavitations and attendant problems in turbo machines;	Lecture	BTCE505.4	Mid Term-1, Quiz & End Sem Exam
21	selection of turbines hydroelectric plants.	Lecture	BTCE505.4	Assignment, Quiz & End Sem Exam
22	Transmission of hydraulic power through pipe lines;	Lecture	BTCE505.5	Assignment, Quiz & End Sem Exam
23	water hammer; precautions against water hammer in turbine	Lecture	BTCE505.5	Assignment, Quiz & End Sem Exam
24	pump installations:	Lecture	BTCE505.5	Assignment, Quiz & End Sem Exam
25	hydraulic ram.	Lecture		Assignment, Quiz

				& End Sem Exam
26	**PowerHydraulics**	Lecture	BTCE505.5	Assignment, Quiz & End Sem Exam
27	Positive pumps	Lecture	BTCE505.5	Assignment, Quiz & End Sem Exam
28	gear, vane	Lecture	BTCE505.5	Assignment, Quiz & End Sem Exam
29	screw, pump	Lecture	BTCE505.5	Assignment, Quiz & End Sem Exam
30	variable delivery valves	Lecture	BTCE505.5	Assignment, Quiz & End Sem Exam
31	flow control	Lecture	BTCE505.5	Assignment, Quiz & End Sem Exam
32	pressure control, direction control	Lecture	BTCE505.5	Assignment, Quiz & End Sem Exam
33	, solenoid operated valve, hydraulic circuits	Lecture	BTCE505.5	Assignment, Quiz & End Sem Exam
34	fluid coupling and torque converter	Lecture	BTCE505.5	Assignment, Quiz & End Sem Exam
35	Pneumatic Power: Basic principles	Lecture	BTCE505.5	Assignment, Quiz & End Sem Exam
36	comparison of pneumatic and hydraulic Systems	Lecture	BTCE505.5	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE505.1.	Analyse various hydraulic systems, turbo machines and jet propulsion	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
BTCE505.2.	Develop the knowledge on pelton, francis, propeller and Kaplan turbines	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**

BTCE505.3 .	Evaluate Centrifugal pumps, velocity triangles, efficiency, turbine pumps	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
BTCE505.4 .	Perform dimensional analysis on specific speed, unit quantities; characteristic curves; use of models	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**
BTCE505.5 .	determine the Transmission of hydraulic power through pipe lines; water hammer and hydraulic power and pumps .	3	3	2	3	3	2	2	-	3	2	3	3	**1**	**2**	**3**

Sample Question Paper

<table>
<tr><td colspan="7">Amity School of Engineering and Technology
Department of Civil Engineering
I MID-SEMESTER (SEM–V) 2019-20</td></tr>
<tr><td colspan="7">Class: B.Tech.(CE) V Semester</td></tr>
<tr><td colspan="2">Subject Name:
BTCE505 HYDRAULIC MACHINES</td><td colspan="3">Time: 2 Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3</td><td>Q.4</td><td>Q.2,5,6</td><td></td><td></td></tr>
<tr><td colspan="7">Student will be able to
CO1: Analyse various hydraulic systems, turbo machines and jet propulsion
CO2: Develop the knowledge on pelton, francis, propeller and Kaplan turbines</td></tr>
</table>

CO Map	Question No.	Question	Marks
CO1	Q.1	What do you understand by specific speed of a turbine? What is its use?	3
CO1	Q.2a	State and explain Bazin’s formula for determining the constant C.	3

	Q.2b	Discuss critically, how you plan a power house.	3
CO1	Q.3	Derive the expression for the force exerted by a jet of water on an inclined fixed plate in the direction of the jet	6
CO2	Q.4	Write short note on integration method of solving GVF equation	3
CO2	Q.5a	Define cavitation. What are the effects of cavitation? Give the necessary precautions against cavitation	3
	Q.5b	What is the principle behind a centrifugal pump and derive an expression for the minimum starting speed of a centrifugal pump.	3
CO2	Q6	Explain in detail about Rayleigh's method of dimensional analysis. What are the practical uses?	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	**Enrollment.No.**	**Student's Name**	**BTCE505 HYDRAULIC MACHINES** Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U9G9
1	A60215817001	Mr UDDESHYA UPADHYAY	100	30	70	C+	4	3	3	12
2	A60215817003	Ms NEHA KARAIYA	100	30	70	A-	8	3	3	24
3	A60215817005	Mr RAHUL PINGLE	100	30	70	B-	5	3	3	15
4	A60515817001	Mr KARAN SINGH SIKARWAR	100	30	70	A	9	3	3	27
5	A60515817003	Mr DHANANJAY CHAUHAN	100	30	70	A-	8	3	3	24
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	3	60	%	
			Attainment Level					Level 1		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : HYDRO SYSTEMS
Course Code : BTCE 506 Crédits : 03, Session :2019-20 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Mr. Sachin Tiwari

A. Introduction: The objective of this course is *to motivate the students to identify, formulate, solve the complex problem to manage the water resource related issues and to prepare the students to synthesize data and technical concepts to apply in water resources engineering. It aims to develop the ability of the students to conduct appropriate experiments, analyse and interpret data and use engineering judgement to draw conclusions in water resources problems.*

B. Course Outcomes: At the end of the course, students will be able to:

BTCE 506.1. Analyse various hydraulic systems by applying the fundamental laws of fluid statics.

BTCE 506.2. Solve the fluid flow governing equations by taking suitable constraints and assumptions

BTCE 506.3. Evaluate major and minor losses in pipes

BTCE 506.4. Analyse the practical significance of open channel flows and Perform dimensional analysis on any real life problems

BTCE 506.5. Interpret the boundary layer aspects of laminar and turbulent flows and experimentally determine the fluid properties and flow parameters using various experimental setups.

C. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves	A	5%

	includingmedicalleaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I

Open channel flow in rigid boundary channels- Comparison with pipe flow, Classification of flow, uniform flow – Equations for uniform flow such as Chezy's and Manning's formula, Most efficient channel section – Circular. Rectangular, and Trapezoidal channel sections, Velocity distribution in open channels, Conveyance, Normal depth, Hydraulic exponent for uniform flow, Determination of normal depth and velocity, Specific energy and Specific force diagrams, Critical flow, Hydraulic exponent for critical flow, Channel transitions, Venturi, Standing wave and Parshall flumes.

Module II

Non-uniform flow, Basic assumptions, Gradually Varied Flow, Dynamic equation for gradually varied flow, Different forms of the dynamic equation, Flow profiles in prismatic channels, Computation of the length of the backwater curve - Graphical Integration and Direct Step Methods. Rapidly Varied Flow- Hydraulic Jump, Hydraulic jump equations for a rectangular channel, Practical applications, Energy loss and efficiency of a jump, Stilling Basins, Selection of Stilling Basins, Rapidly varied unsteady flow – Surges.

Module III

Distribution works - Classification of canals, Canal alignment, Considerations for fixing longitudinal slope, Typical canal cross sections in embankment and filling, Cross sections of irrigation canals as per BIS codes, Maintenance of canals, Canals in alluvial soils – Regime Theory - Kennedy's and Lacey's Theories, Silting in canals, Scour and protection against scour. Canal lining - losses in irrigation canals, Advantages and disadvantages of lining, Types of lining. Water logging- Causes & preventive measures. Drainage – Open and Closed Drains.

Module IV

Components of a distribution system (no detailed design) - Head and Cross Regulator, Canal Falls, Canal Outlets, Cross Drainage Works, Canal Escapes- Surplussing arrangements in minor irrigation tanks.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- K. Subramanya, Flow in Open Channels, 3rd ed., Tata McGraw Hill, New Delhi (2008).
- P. N. Modi, Irrigation, Water Resources &Water Power Engineering, 2nd ed., Standard Book House, New Delhi (2009)
- Srivastava, Flow through Open Channels, Oxford University Press, New Delhi (2008).
- Todd, D.K., Ground Water Hydrology, 2nd ed., Wiley India, New Delhi (2008)

I. Lecture Plan

Lecture	Topics	Mode of	Correspon ding CO	Mode of Assessing CO

		Delivery		
1	Open channel flow in rigid boundary channels	Lecture	BTCE506.1	Mid Term-1, Quiz & End Sem Exam
2	Comparison with pipe flow,	Lecture	BTCE506.1	Mid Term-1, Quiz & End Sem Exam
3	Classification of flow, uniform flow	Lecture	BTCE506.1	Mid Term-1, Quiz & End Sem Exam
4	Equations for uniform flow such as	Lecture	BTCE506.1	Mid Term-1, Quiz & End Sem Exam
5	Chezy's and Manning's formula,	Lecture	BTCE506.1	Mid Term-1, Quiz & End Sem Exam
6	Most efficient channel section – Circular. Rectangular, and Trapezoidal channel sections,	Lecture	BTCE506.1	Mid Term-1, Quiz & End Sem Exam
7	Velocity distribution in open channels,	Lecture	BTCE506.1	Mid Term-1, Quiz & End Sem Exam
8	Conveyance, Normal depth, Hydraulic exponent for uniform flow	Lecture	BTCE506.2	Mid Term-1, Quiz & End Sem Exam
9	Determination of normal depth and velocity	Lecture	BTCE506.2	Mid Term-1, Quiz & End Sem Exam
10	Specific energy and Specific force diagrams	Lecture	BTCE506.2	Mid Term-1, Quiz & End Sem Exam
11	Critical flow, Hydraulic exponent for critical flow	Lecture	BTCE506.2	Mid Term-1, Quiz & End Sem Exam
12	Channel transitions, Venturi	Lecture	BTCE506.2	Mid Term-1, Quiz & End Sem Exam
13	Standing wave and Parshall flumes	Lecture	BTCE506.2	Mid Term-1, Quiz & End Sem Exam
14	Non-uniform flow, Basic assumptions	Lecture	BTCE506.2	Mid Term-1, Quiz & End Sem Exam
15	Gradually Varied Flow, Dynamic equation for gradually varied flow	Lecture	BTCE506.2	Mid Term-1, Quiz & End Sem Exam
16	Different forms of the dynamic equation, Flow profiles in prismatic channels	Lecture	BTCE506.2	Mid Term-1, Quiz & End Sem Exam
17	Computation of the length of the backwater curve	Lecture	BTCE506.2	Mid Term-1, Quiz & End Sem Exam
18	Graphical Integration and Direct Step Methods	Lecture	BTCE506.2	Mid Term-1, Quiz & End Sem Exam
19	actual evapotranspiration, interception	Lecture	BTCE506.2	Mid Term-1, Quiz & End Sem Exam
20	Rapidly Varied Flow-Hydraulic Jump	Lecture	BTCE506.2	Mid Term-1, Quiz & End Sem Exam
21	Hydraulic jump equations for a rectangular channel	Lecture	BTCE506.2	Assignment, Quiz & End Sem Exam
22	Practical applications, Energy loss and efficiency of a jump	Lecture	BTCE506.2	Assignment, Quiz & End Sem Exam
23	Stilling Basins, Selection of Stilling Basins	Lecture	BTCE506.2	Assignment, Quiz & End Sem Exam

24	Rapidly varied unsteady flow - Surges	Lecture	BTCE506.3	Assignment, Quiz & End Sem Exam
25	Distribution works - Classification of canals, Canal alignment	Lecture	BTCE506.3	Assignment, Quiz & End Sem Exam
26	Considerations for fixing longitudinal slope, Typical canal cross sections in embankment and filling	Lecture	BTCE506.4	Assignment, Quiz & End Sem Exam
27	Cross sections of irrigation canals as per BIS codes, Maintenance of canals	Lecture	BTCE506.4	Assignment, Quiz & End Sem Exam
28	Canals in alluvial soils - Regime Theory	Lecture	BTCE506.4	Assignment, Quiz & End Sem Exam
29	Kennedy's and Lacey's Theories, Silting in canals	Lecture	BTCE506.4	Assignment, Quiz & End Sem Exam
30	Scour and protection against scour. Canal lining	Lecture	BTCE506.4	Assignment, Quiz & End Sem Exam
31	losses in irrigation canals, Advantages and disadvantages of lining	Lecture	BTCE506.5	Assignment, Quiz & End Sem Exam
32	Types of lining. Water logging- Causes & preventive measures	Lecture	BTCE506.5	Assignment, Quiz & End Sem Exam
33	Drainage – Open and Closed Drains.	Lecture	BTCE506.5	Assignment, Quiz & End Sem Exam
34	Components of a distribution system (no detailed design	Lecture	BTCE506.5	Assignment, Quiz & End Sem Exam
35	Head and Cross Regulator, Canal Falls, Canal Outlets, Cross Drainage Works	Lecture	BTCE506.5	Assignment, Quiz & End Sem Exam
36	Canal Escapes- Surplussing arrangements in minor irrigation tanks	Lecture	BTCE506.5	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE506.1.	Analyse various hydraulic systems by applying the fundamental laws of fluid statics.	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**

BTCE506.2.	Solve the fluid flow governing equations by taking suitable constraints and assumptions	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE506.3.	Evaluate major and minor losses in pipes	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
BTCE506.4	Analyse the practical significance of open channel flows and Perform dimensional analysis on any real life problems	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**
BTCE506.5 .	Interpret the boundary layer aspects of laminar and turbulent flows and experimentally determine the fluid properties and flow parameters using various experimental setups.	3	3	2	3	3	2	2	-	3	2	3	3	**1**	**2**	**3**

<u>Sample Question Paper</u>

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–V) 2019-20						
Class: B.Tech.(CE) V Semester						
Subject Name: BTCE506 HYDRO SYSTEMS		Time: 2 Hrs		Max.Marks:30		
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: Analyse various hydraulic systems by applying the fundamental laws of fluid statics.

CO2 : Solve the fluid flow governing equations by taking suitable constraints and assumptions

CO Map	Question No.	Question	Marks
CO1	Q.1	Define open channel flow with examples.	3
CO1	Q.2a	Explain laminar and turbulent flow.	3
	Q.2b	What are the various types of flow in open channels?	3
CO1	Q.3	Distinguish between steady and unsteady flow.	6
CO2	Q.4	Explain the terms: (i) Gradually varied flow and (ii) Rapidly varied flow.	3
CO2	Q.5a	Write down the formula for Froude number	3
	Q.5b	Define hydraulic mean depth. .Define specific energy	3
CO2	Q6	Distinguish between critical, sub critical and subcritical flows.	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	**Enrollment.No.**	**Student's Name**	**BTCE506 HYDRO SYSTEMS**							
			Max Marks	**CE Weight Age (%)**	**ET Weight Age (%)**	**GO**	**GP**	**ACU**	**ECU**	**U15G15**
1	A60215817001	Mr UDDESHYA UPADHYAY	100	30	70	B+	7	3	3	21
2	A60215817003	Ms NEHA KARAIYA	100	30	70	A	9	3	3	27
3	A60215817005	Mr RAHUL PINGLE	100	30	70	C+	4	3	3	12
4	A60515817001	Mr KARAN SINGH SIKARWAR	100	30	70	A	9	3	3	27
5	A60515817003	Mr DHANANJAY CHAUHAN	100	30	70	A-	8	3	3	24

Total No. of Students	=	5		
Total No. of Students	>60% marks	3	60	%
Attainment Level			Level 1	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : HIGHWAY ENGINEERING LAB
Course Code : BTCE 520, Crédits : 01, Session :2019-20 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Mr. Sachin Tiwari

A. Introduction**:** T*he objective of this course is to introduce the students to various hydraulic engineering machines like centrifugal pump, pelton turbine and francis turbine etc.. At the completion of the course, the student sho*

B. *ld be able to relate the theory and practice of problems in hydraulic machines.*

C. Course Outcomes: At the end of the course, students will be able to:
BTCE520.1. Conduct test on aggregate and bitumen
BTCE520.2. Plot the characteristics of penetration test value of bitumen and CBR value
BTCE520.3. Evaluate viscosity, ductility, flash point and fire point of bitumen

D. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

E. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

F. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

G. Syllabus

Practical Work:

1.Determination of Aggregates crushing value test

2. Determination of Aggregates impact value

3. Determination of Los Angles Abrasion value

4. Determination of Calefornia Bearing Ratio value

5.Determination of Shape test on aggregates.

6. Determination of Penetration test value of Bitumen

7. Determination of Softneing point of Bitumen

8. Determination of Viscosity of Bitumen

9. Determination of Ductility of the Bitumen

10. Determination of flash point and fire point of bitumen.

11. Determination of Bitumen content by Centrifuge extractor

12. Determination of Stripping value of Bituminous Mix

13. Determination of Marshal stability of bituminous Mix.

H. Examination Scheme:

Components	IA				EE	
	A	PR	LR	V	PR	V
Weightage (%)	5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

I. Suggested Text/Reference Books:

- Hydraulics and Fluid Mechanics, P.M. Modi and S.M. Seth, Standard Book House
- Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill.
- Open channel Flow, K. Subramanya, Tata McGraw Hill.

J. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Determination of Aggregates crushing value test	Lecture	BTCE520.1	Internal Assessment, Viva &External Exam
2	Determination of Aggregates impact value	Lecture	BTCE520.1	Internal Assessment, Viva &External Exam

3	Determination of Los Angles Abrasion value	Lecture	BTCE520.1	Internal Assessment, Viva &External Exam
4	Determination of Calefornia Bearing Ratio value	Lecture	BTCE520.1	Internal Assessment, Viva &External Exam
5	Determination of Shape test on aggregates.	Lecture	BTCE520.2	Internal Assessment, Viva &External Exam
6	*Determination of Penetration test value of Bitumen*	Lecture	BTCE520.2	Internal Assessment, Viva &External Exam
7	*Determination of Softneing point of Bitumen*	Lecture	BTCE520.2	Internal Assessment, Viva &External Exam
8	Determination of Viscosity of Bitumen	Lecture	BTCE520.2	Internal Assessment, Viva &External Exam
9	Determination of Ductility of the Bitumen	Lecture	BTCE520.3	Internal Assessment, Viva &External Exam
10	Determination of flash point and fire point of bitumen.	Lecture	BTCE520.3	Internal Assessment, Viva &External Exam
11	*Determination of Bitumen content by Centrifuge extractor*	Lecture	BTCE520.3	Internal Assessment, Viva &External Exam
12	*Determination of Stripping value of Bituminous Mix* Determination of Marshal stability of bituminous Mix.	Lecture	BTCE520.3	Internal Assessment, Viva &External Exam

K. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE520 .1	Conduct test on aggregate and bitumen	3	3	2	2	3	2	2	-	3	2	3	3	**3**	**1**	**2**

BTCE520 .2	Plot the characteristics of penetration test value of bitumen and CBR value	3	3	2	3	3	2	2	-	2	2	3	3	**3**	**2**	**3**
BTCE520 .3	Evaluate viscosity, ductility, flash point and fire point of bitumen	3	2	3	1	2	-	1	-	3	2	3	3	**3**	**2**	**1**

Sample Question Paper

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–V) 2017-18		
Class: B.Tech.(CE) V Semester		
Subject Name: BTCE520 Highway Engineering Lab	Time: 2 Hrs	Max.Marks:30

Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: Conduct test on aggregate and bitumen

CO2: Plot the characteristics of penetration test value of bitumen and CBR value

CO Map	Question No.	Question	Marks
CO1	Q.1	What are factors to be considered for selection of Railway Alignment?	3
CO1	Q.2a	How various Gauges are different from each other?	3
	Q.2b	What are various surveys that are conducted for railway alignment?	3
CO1	Q.3	Draw a general layout of Airport Layout	6
CO2	Q.4	Write about Vertical Curves of Railway Network.	3
CO2	Q.5a	What are the functions of Rails and Sleepers?	3
	Q.5b	Ministry of Civil Aviation is planning an International Airport at one City. How various factors affect site selection of Airport?	3

CO2	Q6	Discuss about design methods of flexible pavements of Runway.	6

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	**Enrollment.No.**	**Student's Name**	**BTCE520 HIGHWAY ENGINEERING LAB**							
			Max Marks	**CE Weight Age (%)**	**ET Weight Age (%)**	**GO**	**GP**	**ACU**	**ECU**	**U10G10**
1	A60215817001	Mr UDDESHYA UPADHYAY	100	30	70	B+	7	1	1	7
2	A60215817003	Ms NEHA KARAIYA	100	30	70	A+	10	1	1	10
3	A60215817005	Mr RAHUL PINGLE	100	30	70	A	9	1	1	9
4	A60515817001	Mr KARAN SINGH SIKARWAR	100	30	70	A+	10	1	1	10
5	A60515817003	Mr DHANANJAY CHAUHAN	100	30	70	A+	10	1	1	10
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	4	80	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : HYDRAULIC MACHINES LAB
Course Code : BTCE 521, Crédits : 01, Session :2019-20 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Mr. Sachin Tiwari

L. Introduction**:** T*he objective of this course is to introduce the students to various hydraulic engineering machines like centrifugal pump, pelton turbine and francis turbine etc.. At the completion of the course, the student should be able to relate the theory and practice of problems in hydraulic machines.*

M. Course Outcomes: At the end of the course, students will be able to:
BTCE521.1. Conduct test on centrifugal pump and pelton turbine
BTCE521.2. Plot the characteristics of pelton and franics turbine
BTCE521.3. Evaluate effect of a draft tube on reaction turbines, model law and flow through pipes

N. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

O. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

P. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

Q. Syllabus

Practical Work:

- To conduct a test on Centrifugal Pump and plot its characteristics.
- To Plot the characteristics of Pelton turbine.
- To conducts an experiment on Francis turbine.
- To study the effect of a draft tube on reaction turbines.
- To find the friction factor for flow through pipes.
- To study the hydraulic controls rig.
- To conduct an experiment for verifying model laws.
- To study the cavitations phenomenon in turbines.
- Study of hydraulic couplings and torque converters.

R. Examination Scheme:

Components	IA				EE	
	A	PR	LR	V	PR	V
Weightage (%)	5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

S. Suggested Text/Reference Books:

- Hydraulics and Fluid Mechanics, P.M. Modi and S.M. Seth, Standard Book House
- Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill.
- Open channel Flow, K. Subramanya, Tata McGraw Hill.

T. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	To conduct a test on Centrifugal Pump and plot its characteristics.	Lecture	BTCE521.1	Internal Assessment, Viva &External Exam
2	To Plot the characteristics of Pelton turbine	Lecture	BTCE521.1	Internal Assessment, Viva &External Exam
3	To conducts an experiment on Francis turbine	Lecture	BTCE521.1	Internal Assessment, Viva &External Exam
4	To study the effect of a draft tube on reaction turbines.	Lecture	BTCE521.1	Internal Assessment, Viva &External Exam
5	To find the friction factor for flow through pipes.	Lecture	BTCE521.2	Internal Assessment, Viva &External Exam
6	To study the hydraulic controls rig.	Lecture	BTCE521.2	Internal Assessment, Viva

				&External Exam
7	To conduct an experiment for verifying model laws.	Lecture	BTCE521.2	Internal Assessment, Viva &External Exam
8	To study the cavitations phenomenon in turbines.	Lecture	BTCE521.2	Internal Assessment, Viva &External Exam
9	Study of hydraulic couplings and torque converters.	Lecture	BTCE521.3	Internal Assessment, Viva &External Exam
10	To find the friction factor for flow through pipes.	Lecture	BTCE521.3	Internal Assessment, Viva &External Exam
11	To study the hydraulic controls rig.	Lecture	BTCE521.3	Internal Assessment, Viva &External Exam
12	To conduct an experiment for verifying model laws.	Lecture	BTCE521.3	Internal Assessment, Viva &External Exam

U. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE521 .1	Conduct test on centrifugal pump and pelton turbine	3	3	2	2	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE521 .2	Plot thecharacteristics of pelton and franics turbine	3	3	2	3	3	2	2	-	2	2	3	3	**3**	**2**	**3**
BTCE521 .3	Evaluate effect of a draft tube on reaction turbines, model law and flow through pipes	3	2	3	1	2	-	1	-	3	2	3	3	**3**	**2**	**1**

Sample Question Paper

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–V) 2017-18						
Class: B.Tech.(CE) V Semester						
Subject Name: BTCE521 Hydraulic Machines Lab		Time: 2 Hrs			Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: Conduct test on centrifugal pump and pelton turbine

CO2: Plot the characteristics of pelton and franics turbine

CO Map	Question No.	Question	Marks
CO1	Q.1	What is the difference between dynamic viscosity and kinematic viscosity? State their units of measurements and explain types of fluids	3
CO1	Q.2a	Define the following fluid properties: Density, weight density, specific volume and specific gravity of a fluid	3
	Q.2b	State the Newton's law of viscosity and give examples of its application.	3
CO1	Q.3	Derive expression of pressure intensity inside water droplets, soup bubbles and water jet. Consider surface tension σ and diameter d. 2 A U – tube differential manomet	6
CO2	Q.4	Name the different forces present in a fluid flow	3
CO2	Q.5a	What is Euler's equation of motion?	3
	Q.5b	What are the applications of Bernoulli's equation?	3
CO2	Q6	Derive the Euler's equation of motion and deduce the expression to Bernoulli's equation	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	BTCE521 HYDRAULIC MACHINES LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U11G11
1	A60215817001	Mr UDDESHYA UPADHYAY	100	30	70	A-	8	1	1	8
2	A60215817003	Ms NEHA KARAIYA	100	30	70	A	9	1	1	9
3	A60215817005	Mr RAHUL PINGLE	100	30	70	A-	8	1	1	8
4	A60515817001	Mr KARAN SINGH SIKARWAR	100	30	70	A	9	1	1	9
5	A60515817003	Mr DHANANJAY CHAUHAN	100	30	70	A+	10	1	1	10
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	5	100	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **INDUSTRIAL PRACTICAL TRAINING – I**
Course Code : BTCE550, Crédits : 03, Session :2019-20 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia, Dr. Imran Ahmad Khan, Dr. Ripunjoy Gogoi, Dr. P. Mahakavi, Mr. Sachin Tiwari

A. Introduction: The objective of this course is to enable the students to explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills. It will help them to manage the technical content and work. It will also help them to prepare and present technical report..

B. Course Outcomes: At the end of the course, students will be able to:

BTCE550.1. Explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills.

BTCE550.2. Manage the technical content and work.

BTCE550.3. Learn the various administrative process followed in industry and prepare and present technical report.

C. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
End Semester Examination	End Semester Examination	EE	100%
Total			**100%**

F. Syllabus
Methodology:

Practical training is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

G. Examination Scheme:

Feedback from industry/work place	20
Training Report	40
Viva	15
Presentation	25
Total	**100**

H. Suggested Text/Reference Books: NA

I. Lecture Plan : NA

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE550.1	Explore the preferred field of specialization and develop analytical / hardware /	3	**2**	1	3	1	**-**	**-**	**-**	2		2	1	**1**	**2**	**1**

	software / experimental / observation skills.															
BTCE550. 2	Manage the technical content and work.	3	1	2	2	2	**-**	**-**	**-**	2		1	1	**3**	**2**	**3**
BTCE550. 3	Learn the various administrative process followed in industry.	2	2	2	2	2	**-**	**-**	**-**	3		3	1	**3**	**3**	**2**
BTCE550. 4	Prepare and present technical report.	1	2	1	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**3**

S. No.	Enrollment.No.	Student's Name	BTCE550 INDUSTRIAL PRACTICAL TRAINING (EVALUATION)							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U16G16
1	A60215817001	Mr UDDESHYA UPADHYAY	100	0	100	B	6	4	4	24
2	A60215817003	Ms NEHA KARAIYA	100	0	100	A	9	4	4	36
3	A60215817005	Mr RAHUL PINGLE	100	0	100	B+	7	4	4	28
4	A60515817001	Mr KARAN SINGH SIKARWAR	100	0	100	A-	8	4	4	32
5	A60515817003	Mr DHANANJAY CHAUHAN	100	0	100	A	9	4	4	36
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	3	60	%	
			Attainment Level					Level 1		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : Environmental Engineering – I
Course Code : BTCE601, Crédits : 03, Session : 2019-20 (Even Sem.), Class : B.Tech. 3rd Year
Faculty Name : DDr. Mohan Kantharia, Dr. Imran Ahmad Khan,

A. Introduction: The objective of this course is to teach students the basic principles and concepts of unit operations and processes involved in water and wastewater treatment and to develop a student's skill in the basic design of unit operations and processes involved in water and wastewater treatment. It aims to develop a student's skill in evaluating the performance of water and wastewater treatment plants and to teach students the various methods of sludge management.

B. Course Outcomes: At the end of the course, students will be able to:

BTCE601.1. Examine the Quantity of water, calculate the demand of water and design period

BTCE601.2. Estimate the various ground water sources and water quality parameters.

BTCE601.3. Able to identify the type of unit operations and processes involved in water and wastewater treatment plants based on the water quality

BTCE601.4. Prepare the layout of water and water treatment plants and evaluate the distribution system and its maintenance

C. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Scope of Environmental Engineering

Water Supply Engineering. Quantity of water. Types of water demand. Fluctuation in demand. Factors affecting consumption. Forecasting population. Design period.

Module II: Sources of water

Surface water sources. Intakes. Ground water Sources. Estimation of yield from various ground water sources. Quality of water. Drinking water standards – Water quality parameters- effects on human health- Methods of Physical, Chemical and Bacteriological analysis of water.

Module III: Treatment of water

Process details and design considerations. Aeration. Coagulation. Flocculation. Sedimentation. Filtration. Disinfection. Miscellaneous and advanced treatments. Iron and manganese removal. Fluoridation and defluoridation. Water Softening. Arsenic removal. Desalination. Membrane filtration.

Module IV: Water supply schemes

Gravitational, pumping and combined schemes. Pumps. Pumping stations. Transmission of water. Materials of water supply pipes. Design of gravity and pumping main. Distribution systems. Different layout of pipe networks.House connection from mains. Different valves, meters and hydrants. Storage reservoirs. Balancing reservoir. Detection and prevention of leaks in the distribution systems. Maintenance of distribution systems.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Garg S. K, Environmental Engineering, Vol. I, Khanna Publications, 2001, New Delhi.
- Birdie G.S & Birdie J.S, Water Supply and Sanitary Engineering, Dhanpat Rai & Sons, 1998, New Delhi.
- Duggal, K.N., Elements of Environmental Engineering, S Chand & Co. Ltd., 2000, New Delhi.
- Mark J. Hammer & Mark J. Hammer Jr., Water and Waste Water Technology, Prentice Hall of India Pvt. Ltd., 1998, New Delhi.
- Fair, Geyer & Okun, Water & Waste Water Engineering, John Wiley, 1966, New York.
- Ernest W. Steel & Terence J. Mc Ghee, Water Supply & Sewage, McGraw Hill, 1990, New York.
- Relevant BIS Codes.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Water Supply Engineering	Lecture	BTCE601.1	Mid Term-1, Quiz & End Sem Exam
2	Quantity of water	Lecture	BTCE601.1	Mid Term-1, Quiz & End Sem Exam
3	Types of water demand	Lecture	BTCE601.1	Mid Term-1, Quiz & End Sem Exam

4	*Fluctuation in demand*	Lecture	BTCE601.1	Mid Term-1, Quiz & End Sem Exam
5	Factors affecting consumption. Forecasting population	Lecture	BTCE601.1	Mid Term-1, Quiz & End Sem Exam
6	Design period.	Lecture	BTCE601.1	Mid Term-1, Quiz & End Sem Exam
7	Surface water sources	Lecture	BTCE601.2	Mid Term-1, Quiz & End Sem Exam
8	Intakes. Ground water Sources	Lecture	BTCE601.2	Mid Term-1, Quiz & End Sem Exam
9	Estimation of yield from various ground water sources.	Lecture	BTCE601.2	Mid Term-1, Quiz & End Sem Exam
10	Quality of water	Lecture	BTCE601.2	Mid Term-1, Quiz & End Sem Exam
11	Drinking water standards	Lecture	BTCE601.2	Mid Term-1, Quiz & End Sem Exam
12	Water quality parameters	Lecture	BTCE601.2	Mid Term-1, Quiz & End Sem Exam
13	effects on human health	Lecture	BTCE601.3	Mid Term-1, Quiz & End Sem Exam
14	Methods of Physical, Chemical and Bacteriological analysis of water	Lecture	BTCE601.3	Mid Term-1, Quiz & End Sem Exam
15	**Treatment of water**	Lecture	BTCE601.3	Mid Term-1, Quiz & End Sem Exam
16	Process details and design considerations	Lecture	BTCE601.3	Mid Term-1, Quiz & End Sem Exam
17	Aeration. Coagulation	Lecture	BTCE601.3	Mid Term-1, Quiz & End Sem Exam
18	Flocculation. Sedimentation	Lecture	BTCE601.3	Mid Term-1, Quiz & End Sem Exam
19	Filtration. Disinfection	Lecture	BTCE601.3	Mid Term-1, Quiz & End Sem Exam
20	Miscellaneous and advanced treatments	Lecture	BTCE601.3	Mid Term-1, Quiz & End Sem Exam
21	Iron and manganese removal.	Lecture	BTCE601.3	Assignment, Quiz & End Sem Exam
22	Fluoridation and defluoridation.	Lecture	BTCE601.3	Assignment, Quiz & End Sem Exam
23	Water Softening. Arsenic removal	Lecture	BTCE601.3	Assignment, Quiz & End Sem Exam
24	Desalination. Membrane filtration	Lecture	BTCE601.3	Assignment, Quiz & End Sem Exam
25	Gravitational, pumping and combined schemes	Lecture	BTCE601.4	Assignment, Quiz & End Sem Exam
26	Pumps. Pumping stations	Lecture	BTCE601.4	Assignment, Quiz & End Sem Exam
27	Transmission of water. Materials of water supply pipes	Lecture	BTCE601.4	Assignment, Quiz & End Sem Exam

28	Design of gravity and pumping main. Distribution systems	Lecture	BTCE601.4	Assignment, Quiz & End Sem Exam
29	Different layout of pipe networks	Lecture	BTCE601.4	Assignment, Quiz & End Sem Exam
30	House connection from mains	Lecture	BTCE601.4	Assignment, Quiz & End Sem Exam
31	Different valves, meters and hydrants	Lecture	BTCE601.4	Assignment, Quiz & End Sem Exam
32	Storage reservoirs	Lecture	BTCE601.4	Assignment, Quiz & End Sem Exam
33	Balancing reservoir	Lecture	BTCE601.4	Assignment, Quiz & End Sem Exam
34	Detection and prevention of leaks in the distribution systems	Lecture	BTCE601.4	Assignment, Quiz & End Sem Exam
35	Maintenance of distribution systems	Lecture	BTCE601.4	Assignment, Quiz & End Sem Exam
36	Gravitational, pumping and combined schemes	Lecture	BTCE601.4	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE601.1.	Examine the Quantity of water, calculate the demand of water and design period	3	2	3	1	2	-	1	-	3	2	3	3	**3**	**2**	**1**
BTCE601.2.	Estimate the various ground water sources and water quality parameters.	3	3	2	2	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE601.3.	Able to identify the type of unit operations and processes involved in water and	3	3	2	2	3	-	1	2	-	2	3	3	**2**	**2**	**1**

	wastewater treatment plants based on the water quality															
BTCE601.4 .	*Prepare the layout of water and* water treatment plants and evaluate the *distribution system and its maintenance*	3	3	2	1	1	2	1	-	1	2	3	3	**3**	**2**	**1**

Sample Question Paper

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–VI) 2019-20		
Class: B.Tech.(CE) VI Semester		
Subject Name: BTCE601 Environmental Engineering - I	Time: 2 Hrs	Max.Marks:30

Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: Examine the Quantity of water, calculate the demand of water and design period

CO2: Estimate the various ground water sources and water quality parameters.

CO Map	Question No.	Question	Marks
CO1	Q.1	Define the term “ Design Period “ in water supply project?	3
CO1	Q.2a	List out the standards for water quality parameters?	3
	Q.2b	How is per capita demand for water calculated?	3
CO1	Q.3	List the components of a water supply system and their design period?	6

CO2	Q.4	Why turbidity in water is considered objectionable?	3
CO2	Q.5a	List the objectives of water supply systems?	3
	Q.5b	What is the significance of hardness and iron in water?	3
CO2	Q6	What are the components of a water supply(scheme) system?	6

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	BTCE601 ENVIRONMENTAL ENGINEERING - I Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U5G5
1	A60215817001	Mr UDDESHYA UPADHYAY	100	50	50	B+	7	3	3	21
2	A60215817003	Ms NEHA KARAIYA	100	50	50	A	9	3	3	27
3	A60215817005	Mr RAHUL PINGLE	100	50	50	A-	8	3	3	24
4	A60515817001	Mr KARAN SINGH SIKARWAR	100	50	50	A+	10	3	3	30
5	A60515817003	Mr DHANANJAY CHAUHAN	100	50	50	A+	10	3	3	30
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	4	80	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : Structural Concrete Design
Course Code : BTCE602, Crédits : 03, Session : 2019-20 (Even Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Mr. P Mahakavi, Mr. Sachin Tiwari

A. Introduction: The objective of this course is to teach students the basic principles and concepts of design concept of RCC and Steel structure. and to develop a have knowledge of principal of structural design. It aims to develop a student's skill in evaluating the performance of design of elements.

B. Course Outcomes: At the end of the course, students will be able to:

BTCE602.1.design, analysis, and proportioning of reinforced concrete members and structures.

BTCE602.2.design different type of foundations..

BTCE602.3.effective use of latest industry standard formula, table, design aids used for design of Reinforced concrete Structure.

BTCE602.4. Prepare the layout of building evaluate the RCC elements

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Introduction to limit state method of design

Review of partial safety factors. Limit state of collapse. Limit state of serviceability.

Limit State of Collapse: Flexure. Limit state of collapse for flexure as per IS. Assumptions. Moment capacity of rectangular and flanged sections. Singly and doubly reinforced sections. Design tables and charts. Critical sections for bending in important structural elements such as slabs, beams, retaining
wall, footings, staircase etc. Design project for the design and detailing of a floor slab system and staircase of aresidence (load bearing masonry walls).

Module II: Shear and Torsion

Limit State of Collapse: Shear. Nominal shear stress. Design shear strength of concrete. Design of shear reinforcement. Use of SP16 for shear design. Critical sections for shear in important structural elements such as slabs, beams, retaining walls, footings etc. Design project for the design and detailing the beams of a framed system.

Limit State of Collapse: Torsion. General. Critical section.Shear and torsion. Equivalent . Reinforcement for torsion. Equivalent longitudinal moment. Design project for the design and detailing of a water tank with curved beams.

Module III: Compression

Limit State of Collapse: Compression. Analysis and design of columns of rectangular and circular cross sections. Axially loaded columns Columns with uniaxial and biaxial eccentricity using SP 16 design charts. Short and slender columns. Design project for the design and detailing the columns of a framed system and isolated and combined footings.

Module IV: Limit State of Serviceability

Deflection. Short term deflection. Long term deflection. Cracking. Control of cracking. Estimation of width of cracks

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Pillai S.U. & Menon D., Reinforced Concrete Design Tata McGraw Hill, 2003
- Varghese P.C., Limit State Design of Reinforced Concrete, Prentice Hall of India, 2003
- Mallick S.K. & Gupta A.K., Reinforced Concrete, Oxford & IBH, 1982
- Jain A.K., Reinforced Concrete - Limit State Design, Standard Book House, 1998
- Punmia B.C., Reinforced Concrete Structures Vol. I, Standard Book House,2005
- Jain & Jaikrishna, Plain & Reinforced Concrete Vol. I, Nemchand, 2000
- Sinha S.N., Reinforced Concrete Design, Tata McGraw Hill, 2005
- BIS codes (IS 456, SP 16, SP 24, SP 34)

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Review of partial safety factors	Lecture	BTCE602.1	Mid Term-1, Quiz & End Sem Exam

2	Limit state of collapse	Lecture	BTCE602.1	Mid Term-1, Quiz & End Sem Exam
3	Limit state of serviceability.	Lecture	BTCE602.1	Mid Term-1, Quiz & End Sem Exam
4	***Limit State of Collapse: Flexure***	Lecture	BTCE602.1	Mid Term-1, Quiz & End Sem Exam
5	Limit state of collapse for flexure as per IS	Lecture	BTCE602.1	Mid Term-1, Quiz & End Sem Exam
6	Assumptions. Moment capacity of rectangular and flanged sections	Lecture	BTCE602.1	Mid Term-1, Quiz & End Sem Exam
7	Singly and doubly reinforced sections	Lecture	BTCE602.2	Mid Term-1, Quiz & End Sem Exam
8	Design tables and charts	Lecture	BTCE602.2	Mid Term-1, Quiz & End Sem Exam
9	Critical sections for bending in important structural elements such as slabs, beams, retaining	Lecture	BTCE602.2	Mid Term-1, Quiz & End Sem Exam
10	wall, footings, staircase	Lecture	BTCE602.2	Mid Term-1, Quiz & End Sem Exam
11	Design project for the design and detailing of a floor slab system	Lecture	BTCE602.2	Mid Term-1, Quiz & End Sem Exam
12	Nominal shear stress	Lecture	BTCE602.2	Mid Term-1, Quiz & End Sem Exam
13	Design shear strength of concrete	Lecture	BTCE602.3	Mid Term-1, Quiz & End Sem Exam
14	Design of shear reinforcement.	Lecture	BTCE602.3	Mid Term-1, Quiz & End Sem Exam
15	Use of SP16 for shear design.	Lecture	BTCE602.3	Mid Term-1, Quiz & End Sem Exam
16	Critical sections for shear in important structural elements such as slabs, beams, retaining walls, footings etc	Lecture	BTCE602.3	Mid Term-1, Quiz & End Sem Exam
17	**Limit State of Collapse: Torsion.**	Lecture	BTCE602.3	Mid Term-1, Quiz & End Sem Exam
18	General. Critical section.Shear and torsion. Equivalent	Lecture	BTCE602.3	Mid Term-1, Quiz & End Sem Exam
19	Reinforcement for torsion. Equivalent longitudinal moment	Lecture	BTCE602.3	Mid Term-1, Quiz & End Sem Exam
20	Miscellaneous and advanced treatments	Lecture	BTCE602.3	Mid Term-1, Quiz & End Sem Exam
21	Design project for the design and detailing of a water tank with curved beams.	Lecture	BTCE602.3	Assignment, Quiz & End Sem Exam
22	Analysis and design of columns of rectangular and circular cross sections.	Lecture	BTCE602.3	Assignment, Quiz & End Sem Exam
23	Axially loaded columns Columns with uniaxial and biaxial eccentricity using SP 16 design charts	Lecture	BTCE602.3	Assignment, Quiz & End Sem Exam

24	Short and slender columns	Lecture	BTCE602.3	Assignment, Quiz & End Sem Exam
25	Design project for the design and detailing the columns of a framed system and isolated and combined footing	Lecture	BTCE602.4	Assignment, Quiz & End Sem Exam
26	**Limit State of Serviceability**	Lecture	BTCE602.4	Assignment, Quiz & End Sem Exam
27	Deflection. Short term deflection	Lecture	BTCE602.4	Assignment, Quiz & End Sem Exam
28	Long term deflection.	Lecture	BTCE602.4	Assignment, Quiz & End Sem Exam
29	Cracking. Control of cracking.	Lecture	BTCE602.4	Assignment, Quiz & End Sem Exam
30	Estimation of width of cracks.	Lecture	BTCE602.4	Assignment, Quiz & End Sem Exam
31	Reinforcement for torsion. Equivalent longitudinal moment	Lecture	BTCE602.4	Assignment, Quiz & End Sem Exam
32	Miscellaneous and advanced treatments	Lecture	BTCE602.4	Assignment, Quiz & End Sem Exam
33	Design project for the design and detailing of a water tank with curved beams.	Lecture	BTCE602.4	Assignment, Quiz & End Sem Exam
34	Analysis and design of columns of circular cross sections.	Lecture	BTCE602.4	Assignment, Quiz & End Sem Exam
35	Estimation of width of cracks.	Lecture	BTCE602.4	Assignment, Quiz & End Sem Exam
36	Reinforcement for torsion. Equivalent longitudinal moment	Lecture	BTCE602.4	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE602.1.	*Able to design, analysis, and proportioning of reinforced concrete members and structures*	3	2	3	1	2	-	1	-	3	2	3	3	**3**	**2**	**1**

BTCE602.2 .	Able to design different type of foundations.	3	3	2	2	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE602.3 .	effective use of latest industry standard formula, table, design aids used for design of Reinforced concrete Structure	3	3	2	2	3	-	1	2	-	2	3	3	**2**	**2**	**1**
BTCE602.4 .	Prepare the layout of *building* evaluate the *RCC elements*	3	3	2	1	1	2	1	-	1	2	3	3	**3**	**2**	**1**

<u>Sample Question Paper</u>

<table>
<tr><td colspan="7">Amity School of Engineering and Technology
Department of Civil Engineering
I MID-SEMESTER (SEM–VI) 2019-20</td></tr>
<tr><td colspan="7">Class: B.Tech.(CE) VI Semester</td></tr>
<tr><td colspan="2">Subject Name:
BTCE602 Structural Concrete Design</td><td colspan="3">Time: 2 Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3</td><td>Q.4</td><td>Q.2,5,6</td><td></td><td></td></tr>
<tr><td colspan="7">Student will be able to
CO1: design, analysis, and proportioning of reinforced concrete members and structures.
CO2: design different type of foundations..</td></tr>
</table>

CO Map	Question No.	Question	Marks
CO1	Q.1	What are the rules to be followed in the design of slabs as per IS 456-2000?	3
CO1	Q.2a	State the basic assumption used in theory of bending as applied to limit state design of RC structures.	3

	Q.2b	Under what circumstances are doubly reinforced beams used in practice?	3
CO1	Q.3	Calculate the development length of 10mm diameter bars in M25 concrete if the steel is Mild steel with σst=230N/mm^2	6
CO2	Q.4	List the factors that influence the moments developed in two way rectangular slabs.	3
CO2	Q.5a	Distinguish between under reinforced and over reinforced sections	3
	Q.5b	List the factors that influence the moments developed in two way rectangular slabs.	3
CO2	Q6	Sketch the edge and middle strip of one way slab & two way slab.	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	BTCE602 STRUCTURAL CONCRETE DESIGN							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U6G6
1	A60215817001	Mr UDDESHYA UPADHYAY	100	50	50	A-	8	3	3	24
2	A60215817003	Ms NEHA KARAIYA	100	50	50	A	9	3	3	27
3	A60215817005	Mr RAHUL PINGLE	100	50	50	A	9	3	3	27
4	A60515817001	Mr KARAN SINGH SIKARWAR	100	50	50	A+	10	3	3	30
5	A60515817003	Mr DHANANJAY CHAUHAN	100	50	50	A+	10	3	3	30
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	5	100	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : Geotechnical Engineering II
Course Code : BTCE603, Crédits : 03, Session : 2019-20 (Even Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Mr. P Mahakavi, Mr. Sachin Tiwari

A. **Introduction:** The objective of this course is to teach students the basic principles and concepts of design concept of RCC and Steel structure. and to develop a have knowledge of principal of structural design. It aims to develop a student's skill in evaluating the performance of design of elements.

B. **Course Outcomes:**At the end of the course, students will be able to:

BTCE603.1.apply the knowledge of concepts of Soil Mechanics and to describe the objectives and methods of soil investigation.

BTCE603.2apply the various earth pressure theories

BTCE603.3design various kinds of foundations and to perform various required tests for foundation.

BTCE603.4apply the utility of caissons and wells in the different conditions.

C. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Earth pressure

Earth pressure at rest. Active and passive earth pressure for cohesionless and cohesive soils. Coulomb's and Rankine's theories. Point of application of earth pressure for cases of with and without surcharge in cohesionless and cohesive soils. Culmann's and Rebhan's graphical construction for active earth pressure. Friction circle method for active earth pressure. **Site investigation and soil exploration:** Objectives. Planning. Reconnaissance. Depth of exploration. Methods of subsurface exploration. Test pits. Auger borings. Wash boring. Rotary drilling. Percussion drilling. Core drilling. Sampling. Types of soil samples. Splitspoon sampler. Thin walled sampler. Piston sampler. Denison sampler. Hand cut samples. Location of water table. S.P.T. Field vane shear test. Introduction to geophysical methods. Boring log. Soil profile.

Module II: Bearing capacity

Ultimate and allowable bearing capacity. Terzaghi's equation for bearing capacity for continuous circular and square footings. Types of shear failures. Bearing capacity factors and charts. Effect of water table on bearing capacity. Meyerhoff's bearing capacity heory. Skempton's formulae. Bearing capacity from field tests. Bearing capacity from building codes. Net bearing pressure. Methods of improvement of soil bearing capacity: vibro flotation and sand drains.

Settlement analysis: Distribution of contact pressure. Immediate and consolidation settlement. Estimation of initial and final settlement under building loads. Limitations in settlement computation. Causes of . Permissible, total and differential settlements. Cracks and effects of settlement.

Module III: Foundations

General considerations: Functions of foundations. Requisites of satisfactory foundations. Different types of foundations. Definition of shallow and deep foundation. Selection of type of foundation. Advantages and limitations of various types of foundations. Design considerations . Footings subjected to eccentric loading. Conventional procedure for proportioning footings for equal settlements.

Open excavation: Open foundation excavations with unsupported slopes. Supports for shallow and deep excavations. Stress distribution in sheeting and bracing of shallow and deep excavations. Stability of bottom of excavations. **Raft foundations**: Bearing capacity equations. Design considerations. Conventional design procedure for rigid mat. Uplift pressures. Methods of resisting uplift. Floating foundations.

Module IV: Pile foundations

Uses of piles. Classification of piles based on purpose and material. Determination of type and length of piles. Determination of bearing capacity of axially loaded. Single vertical pile. Static and dynamic formulae. Determination of bearing capacity by penetration tests and pile load tests (IS methods). Negative skin friction. Group action and pile spacing. Analysis of pile groups. Load distribution by Culmann's method. **Caissons and piers:** Open (well) caissons. Box (floating) caissons. Pneumatic caissons. Construction details and design considerations of well foundations. Drilled piers and theirconstruction details.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Joseph E. & Bowles, *Foundation Analysis & Design*, McGraw Hill
- Leonards G.A., *Foundation Engineering*, McGraw Hill

- Teng W.C., Foundation Design, PHI, 1984
- Tomlinson M.J., Foundation Design & Construction, Pitman, 1963.
- Terzaghi & Peck, Soil Mechanics in Engineering Practice, Asia Publishing
- Arora K.R., *Soil Mechanics & Foundation Engg.,* Standard Publications, 1987.
- Murthy V.N.S., Soil Mechanics & Foundations.
- Punmia B.C., Soil Mechanics & Foundations, Laxmi, 1988.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Earth pressure at rest. Active and passive earth pressure for cohesionless and cohesive soils	Lecture	BTCE603.1	Mid Term-1, Quiz & End Sem Exam
2	Coulomb's and Rankine's theories	Lecture	BTCE603.1	Mid Term-1, Quiz & End Sem Exam
3	Point of application of earth pressure for cases of with and without surcharge in cohesionless	Lecture	BTCE603.1	Mid Term-1, Quiz & End Sem Exam
4	*Culmann's and Rebhan's graphical construction for active earth pressure*	Lecture	BTCE603.1	Mid Term-1, Quiz & End Sem Exam
5	Friction circle method for active earth pressure	Lecture	BTCE603.1	Mid Term-1, Quiz & End Sem Exam
6	**Site investigation and soil exploration**	Lecture	BTCE603.1	Mid Term-1, Quiz & End Sem Exam
7	Objectives. Planning. Reconnaissance. Depth of exploration	Lecture	BTCE603.2	Mid Term-1, Quiz & End Sem Exam
8	Methods of subsurface exploration. Test pits	Lecture	BTCE603.2	Mid Term-1, Quiz & End Sem Exam
9	Auger borings. Wash boring. Rotary drilling. Percussion drilling	Lecture	BTCE603.2	Mid Term-1, Quiz & End Sem Exam
10	Core drilling. Sampling. Types of soil samples. Splitspoon sampler	Lecture	BTCE603.2	Mid Term-1, Quiz & End Sem Exam
11	Thin walled sampler. Piston sampler. Denison sampler	Lecture	BTCE603.2	Mid Term-1, Quiz & End Sem Exam
12	Hand cut samples. Location of water table	Lecture	BTCE603.2	Mid Term-1, Quiz & End Sem Exam
13	S.P.T. Field vane shear test. Introduction to geophysical methods. Boring log. Soil profile.	Lecture	BTCE603.3	Mid Term-1, Quiz & End Sem Exam
14	Ultimate and allowable bearing capacity	Lecture	BTCE603.3	Mid Term-1, Quiz & End Sem Exam
15	Terzaghi's equation for bearing capacity for continuous circular and square footings. Types of shear failures. Bearing capacity factors and charts	Lecture	BTCE603.3	Mid Term-1, Quiz & End Sem Exam
16	Bearing capacity factors and charts.	Lecture	BTCE603.3	Mid Term-1, Quiz

				& End Sem Exam
17	Skempton's formulae. Bearing capacity from field tests. Bearing	Lecture	BTCE603.3	Mid Term-1, Quiz & End Sem Exam
18	Net bearing pressure. Methods of improvement of soil bearing capacity: vibro flotation and sand drains.	Lecture	BTCE603.3	Mid Term-1, Quiz & End Sem Exam
19	**Settlement analysis:** Distribution of contact pressure.	Lecture	BTCE603.3	Mid Term-1, Quiz & End Sem Exam
20	Immediate and consolidation settlement. Estimation of initial and final settlement under building loads	Lecture	BTCE603.3	Mid Term-1, Quiz & End Sem Exam
21	Limitations in settlement computation. Causes of . Permissible, total and differential settlements. Cracks and effects of settlement	Lecture	BTCE603.3	Assignment, Quiz & End Sem Exam
22	General considerations: Functions of foundations. Requisites of satisfactory foundations	Lecture	BTCE603.3	Assignment, Quiz & End Sem Exam
23	Different types of foundations. Definition of shallow and deep foundation	Lecture	BTCE603.3	Assignment, Quiz & End Sem Exam
24	Selection of type of foundation. Advantages and limitations of various types of foundations. Design considerations	Lecture	BTCE603.3	Assignment, Quiz & End Sem Exam
25	Footings subjected to eccentric loading. Conventional procedure for proportioning footings for equal settlements	Lecture	BTCE603.4	Assignment, Quiz & End Sem Exam
26	**Open excavation:** Open foundation excavations with unsupported slopes	Lecture	BTCE603.4	Assignment, Quiz & End Sem Exam
27	Supports for shallow and deep excavations. Stress distribution in sheeting and bracing of shallow and deep excavations	Lecture	BTCE603.4	Assignment, Quiz & End Sem Exam
28	Stability of bottom of excavations. **Raft foundations**: Bearing capacity equations	Lecture	BTCE603.4	Assignment, Quiz & End Sem Exam
29	Design considerations. Conventional design procedure for rigid mat. Uplift pressures. Methods of resisting uplift. Floating foundations	Lecture	BTCE603.4	Assignment, Quiz & End Sem Exam
30	Uses of piles. Classification of piles based on purpose and material	Lecture	BTCE603.4	Assignment, Quiz & End Sem Exam
31	Determination of type and length of piles. Determination of bearing capacity of axially loaded. Single vertical pile	Lecture	BTCE603.4	Assignment, Quiz & End Sem Exam
32	Static and dynamic formulae. Determination of bearing	Lecture	BTCE603.4	Assignment, Quiz

	capacity by penetration tests and pile load tests (IS methods).			& End Sem Exam
33	Negative skin friction. Group action and pile spacing. Analysis of pile groups. Load distribution by Culmann's method	Lecture	BTCE603.4	Assignment, Quiz & End Sem Exam
34	**Caissons and piers:** Open (well) caissons. Box (floating) caissons	Lecture	BTCE603.4	Assignment, Quiz & End Sem Exam
35	Pneumatic caissons. Construction details and design considerations of well foundations	Lecture	BTCE603.4	Assignment, Quiz & End Sem Exam
36	Drilled piers and theirconstruction details.	Lecture	BTCE603.4	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE603.1.	apply the knowledge of concepts of Soil Mechanics and to describe the objectives and methods of soil investigation.	3	2	3	1	2	-	1	-	3	2	3	3	**3**	**2**	**1**
BTCE603.2.	apply the various earth pressure theories	3	3	2	2	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE603.3.	design various kinds of foundations and to perform various required tests for foundation.	3	3	2	2	3	-	1	2	-	2	3	3	**2**	**2**	**1**

BTCE603.4 .	*apply the utility of caissons and wells in the different conditions*	3	3	2	1	1	2	1	-	1	2	3	3	**3**	**2**	**1**

Sample Question Paper

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–VI) 2019-20		
Class: B.Tech.(CE) VI Semester		
Subject Name: BTCE603 Geotechnical Engineering II	Time: 2 Hrs	Max.Marks:30

Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: apply the knowledge of concepts of Soil Mechanics and to describe the objectives and methods of soil investigation.

CO2: apply the various earth pressure theories

CO Map	Question No.	Question	Marks
CO1	Q.1	List the primary factors considered for the selection of foundation.	3
CO1	Q.2a	Compute the area ratio of sampler with inside diameter 70mm and thickness 2 mm. Comments on the type of sample obtained.	3
	Q.2b	What is the function of bentonite slurry in rotary drilling method of boring?	3
CO1	Q.3	Write the uses of bore log report.	6
CO2	Q.4	Define detailed exploration.	3
CO2	Q.5a	What are the factors affecting quality of a sample?	3
	Q.5b	How is the depth of exploration decided?	3
CO2	Q6	What is significant depth?	6

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	BTCE603 GEOTECHNICAL ENGINEERING - II							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U7G7
1	A60215817001	Mr UDDESHYA UPADHYAY	100	50	50	B+	7	4	4	28
2	A60215817003	Ms NEHA KARAIYA	100	50	50	A+	10	4	4	40
3	A60215817005	Mr RAHUL PINGLE	100	50	50	A-	8	4	4	32
4	A60515817001	Mr KARAN SINGH SIKARWAR	100	50	50	A+	10	4	4	40
5	A60515817003	Mr DHANANJAY CHAUHAN	100	50	50	A+	10	4	4	40
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	4	80	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **COMPUTER APPLICATION IN CIVIL ENGINEERING**
Course Code : BTCE604, Crédits : 03, Session : 2019-20 (Even Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Mr. P Mahakavi, Mr. Sachin Tiwari

A. Introduction: The objective of this course is to teach students the basic principles and concepts of design concept of RCC and Steel structure. and to develop a have knowledge of principal of structural design. It aims to develop a student’s skill in evaluating the performance of design of elements.

B. Course Outcomes: At the end of the course, students will be able to:

BTCE604.1.operate softwares related design and drawings of Civil Engineering structures.

BTCE604.2 Design of different component of various structures and representation in different drawings for carrying out construction activity

BTCE604.3produce design calculations and drawings in appropriate professional formats identify and compute the design loads on a typical steel building.

BTCE604.4select the most suitable section shape and size for tension and compression members and beams according to specific design criteria.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Introduction of Computer applications in Civil Engineering

Introduction and application of computer in structural engineering, geotechnical engineering, water resources engineering, project management, surveying, highway, estimating and costing, Introduction to MATLAB.

Module II: Introduction to CAD

Computer Aided drafting, 2-D drawings, Introduction to CAD software, Planning and drawing of buildings, 2-D modeling, Problems in civil engineering.

Module III: Auto CAD

Introduction to computer graphics, 3-D drawings, 3-D modeling software and analysis software Learning of civil engineering drawing.

Module IV: Stadd Pro

Introduction to structural Analysis:- Loading system, Dead Load, Live Load, Imposed Load. Design of structural members:- Beam Design, Column Design, Slab Design, Foundation Design
Residential Building, Design of Multistoried Building.\

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Groover M.P. and Zimmers E.W. Jr., "CAD/CAM, Computer Aided Design and
- Manufacturing", Prentice Hall of India Ltd, New Delhi, 1993.
- Krishnamoorthy C.S. Rajeev S., "Computer Aided Design", Narosa Publishing House, New
- Delhi, 1993, Harrison H.B., "Structural Analysis and Design", Part I and II Pergamon Press,
- Oxford, 1990. Comptter Application in Civil Engineering:Paul D. Spindel, publisher: Van Nostrand
- Reinhold Co.
- AutoCAD Civil 3D 2015 Essentials: Autodesk Official, Eric Chappel
- T.S Sarma, "Stadd Pro V8i for Beginners", Notion Press 2014

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	**Introduction of Computer applications in Civil Engineering**	Lecture	BTCE604.1	Mid Term-1, Quiz & End Sem Exam
2	Introduction and application of computer in structural engineering,	Lecture	BTCE604.1	Mid Term-1, Quiz & End Sem Exam
3	Introduction and application of computer in geotechnical engineering	Lecture	BTCE604.1	Mid Term-1, Quiz & End Sem Exam
4	Introduction and application of computer in water resources engineering	Lecture	BTCE604.1	Mid Term-1, Quiz & End Sem Exam
5	Introduction and application of computer in project management	Lecture	BTCE604.1	Mid Term-1, Quiz & End Sem Exam
6	Introduction and application of computer in surveying	Lecture	BTCE604.1	Mid Term-1, Quiz & End Sem Exam
7	Introduction and application of computer in highway	Lecture	BTCE604.2	Mid Term-1, Quiz & End Sem Exam
8	Introduction and application of computer in estimating and costing	Lecture	BTCE604.2	Mid Term-1, Quiz & End Sem Exam
9	Introduction and application of computer in project management	Lecture	BTCE604.2	Mid Term-1, Quiz & End Sem Exam
10	Introduction to MATLAB	Lecture	BTCE604.2	Mid Term-1, Quiz & End Sem Exam
11	Computer Aided drafting	Lecture	BTCE604.2	Mid Term-1, Quiz

				& End Sem Exam
12	2-D drawings, Introduction to CAD software	Lecture	BTCE604.2	Mid Term-1, Quiz & End Sem Exam
13	Planning and drawing of buildings	Lecture	BTCE604.3	Mid Term-1, Quiz & End Sem Exam
14	2-D modeling, Problems in civil engineering.	Lecture	BTCE604.3	Mid Term-1, Quiz & End Sem Exam
15	**Auto CAD**	Lecture	BTCE604.3	Mid Term-1, Quiz & End Sem Exam
16	Introduction to computer graphics	Lecture	BTCE604.3	Mid Term-1, Quiz & End Sem Exam
17	3-D drawings	Lecture	BTCE604.3	Mid Term-1, Quiz & End Sem Exam
18	3-D modeling software and analysis software	Lecture	BTCE604.3	Mid Term-1, Quiz & End Sem Exam
19	Learning of civil engineering drawing	Lecture	BTCE604.3	Mid Term-1, Quiz & End Sem Exam
20	**Stadd Pro**	Lecture	BTCE604.3	Mid Term-1, Quiz & End Sem Exam
21	Introduction to structural Analysis	Lecture	BTCE604.3	Assignment, Quiz & End Sem Exam
22	Loading system	Lecture	BTCE604.3	Assignment, Quiz & End Sem Exam
23	Loading system, Dead Load, Live Load, Imposed Load	Lecture	BTCE604.3	Assignment, Quiz & End Sem Exam
24	Design of structural members	Lecture	BTCE604.3	Assignment, Quiz & End Sem Exam
25	Beam Design	Lecture	BTCE604.4	Assignment, Quiz & End Sem Exam
26	Column Design	Lecture	BTCE604.4	Assignment, Quiz & End Sem Exam
27	Slab Design	Lecture	BTCE604.4	Assignment, Quiz & End Sem Exam
28	Foundation Design Residential Building	Lecture	BTCE604.4	Assignment, Quiz & End Sem Exam
29	Design of Multistoried Building	Lecture	BTCE604.4	Assignment, Quiz & End Sem Exam
30	Loading system, Dead Load, Live Load, Imposed Load	Lecture	BTCE604.4	Assignment, Quiz & End Sem Exam
31	Design of structural members	Lecture	BTCE604.4	Assignment, Quiz & End Sem Exam
32	Beam Design	Lecture	BTCE604.4	Assignment, Quiz & End Sem Exam
33	Column Design	Lecture	BTCE604.4	Assignment, Quiz & End Sem Exam
34	Slab Design	Lecture	BTCE604.4	Assignment, Quiz & End Sem Exam
35	Foundation Design Residential Building	Lecture	BTCE604.4	Assignment, Quiz & End Sem Exam

36	Design of Multistoried Building	Lecture	BTCE604.4	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE604.1.	operate softwares related design and drawings of Civil Engineering structures.	3	2	3	1	2	-	1	-	3	2	3	3	**3**	**2**	**1**
BTCE604.2.	Design of different component of various structures and representation in different drawings for carrying out construction activity	3	3	2	2	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE604.3.	produce design calculations and drawings in appropriate professional formats identify and compute the design loads on a typical steel building.	3	3	2	2	3	-	1	2	-	2	3	3	**2**	**2**	**1**
BTCE604.4.	select the most suitable section shape and size for tension and compression members and beams according to specific design criteria.	3	3	2	1	1	2	1	-	1	2	3	3	**3**	**2**	**1**

<u>Sample Question Paper</u>

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–VI) 2019-20						
Class: B.Tech.(CE) VI Semester						
Subject Name: BTCE604 COMPUTER APPLICATION IN CIVIL ENGINEERING		Time: 2 Hrs		Max.Marks:30		
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: operate softwares related design and drawings of Civil Engineering structures.

CO2: Design of different component of various structures and representation in different drawings for carrying out construction activity

CO Map	Question No.	Question	Marks
CO1	Q.1	What is the purpose of auto cad software?	3
CO1	Q.2a	What are the uses of auto cad?	3
	Q.2b	What is the main purpose of auto cad?	3
CO1	Q.3	What is the use of variants in auto cad?	6
CO2	Q.4	What are the differences present in the software's features?	3
CO2	Q.5a	What is the procedure to create user interface?	3
	Q.5b	What is the procedure to remove the empty layers?	3
CO2	Q6	Give features involved in AutoCAD ws?	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	BTCE604 COMPUTER APPLICATION IN CIVIL ENGINEERING							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U8G8
1	A60215817001	Mr UDDESHYA UPADHYAY	100	50	50	B+	7	3	3	21
2	A60215817003	Ms NEHA KARAIYA	100	50	50	A+	10	3	3	30
3	A60215817005	Mr RAHUL PINGLE	100	50	50	A	9	3	3	27
4	A60515817001	Mr KARAN SINGH SIKARWAR	100	50	50	A	9	3	3	27
5	A60515817003	Mr DHANANJAY CHAUHAN	100	50	50	A+	10	3	3	30
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	4	80	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : ENGINEERING GEOLOGY
Course Code : BTCE605, Crédits : 03, Session :2019-20 (Even Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Mohan Kantharia, Dr. Imran Ahmad Khan

K. **Introduction:** The objective of this course is to provide and train students of hydraulic engineering. The course will introduce students to various fluid properties, and their behavior under different condition.

L. **Course Outcomes:** At the end of the course, students will be able to:
BTCE605.1.know the importance of seismic activity considerations in a terrain.
BTCE605.2. learn geology and its types, various structural features like folds, faults, joints, weathering etc., minerals, rocks, and rock formations in relation to civil engineering project
BTCE605.3.understand various techniques to determine engineering properties of rocks etc. and distinguish the different types of rocks and minerals
BTCE605.4.understand various techniques to analyze and to make possible solutions for various Geological Engineering problems

M. **Programme Outcomes:**
PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

N. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

O. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

P. Syllabus

Module I: Branches and scope of geology

Physical geology

Geological agents and their action, weathering, volcanism, earthquake and plate tectonics

Module II: Elements of crystallography and mineralogy

Petrology

Types of rocks, genesis and physical and chemical characters, Building stones

Module III: Structural geology

Types of structures and classification and their effect on civil engineering projects and Geological mapping

Hydrogeology

Groundwater and occurrence, investigations, quality, artificial recharge

Module IV: Geology in Civil Engineering

Tunnels, dams, reservoirs, bridges, Runways, Roads and Buildings.

Slope failures and landslides. Investigations, Remote sensing and GIS applications

Geology of India

Types, age and occurrence of rock formations and economic importance

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Q. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

R. Suggested Text/Reference Books:

- Parbin Singh, Engineering & General Geology, S.K. Kataria & Sons, New Delhi (2008)
- Bangar, K.M., Principles of Engineering Geology, Standard Publishers Distributors, Delhi (2009)
- Billings, Marland P., Structural Geology, 3rd ed., Prentice-Hall India, New Delhi.
- Todd, D.K., Ground Water Hydrology, 2nd ed., Wiley India, New Delhi (2008)

S. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	**Branches and scope of geology**	Lecture	BTCE605.1	Mid Term-1, Quiz & End Sem Exam
2	**Physical geology**	Lecture	BTCE605.1	Mid Term-1, Quiz & End Sem Exam
3	weathering, volcanism	Lecture	BTCE605.1	Mid Term-1, Quiz & End Sem Exam
4	*earthquake and plate tectonics*	Lecture	BTCE605.1	Mid Term-1, Quiz & End Sem Exam
5	**Elements of crystallography and mineralogy** **Petrology**	Lecture	BTCE605.1	Mid Term-1, Quiz & End Sem Exam
6	Types of rocks	Lecture	BTCE605.1	Mid Term-1, Quiz & End Sem Exam
7	genesis and physical and chemical characters	Lecture	BTCE605.1	Mid Term-1, Quiz & End Sem Exam
8	weathering, volcanism	Lecture	BTCE605.1	Mid Term-1, Quiz & End Sem Exam
9	*earthquake and plate tectonics*	Lecture	BTCE605.2	Mid Term-1, Quiz & End Sem Exam
10	**Elements of crystallography and mineralogy** **Petrology**	Lecture	BTCE605.2	Mid Term-1, Quiz & End Sem Exam
11	Types of rocks	Lecture	BTCE605.2	Mid Term-1, Quiz & End Sem Exam
12	genesis and physical and chemical characters	Lecture	BTCE605.2	Mid Term-1, Quiz & End Sem Exam
13	weathering, volcanism	Lecture	BTCE605.2	Mid Term-1, Quiz & End Sem Exam
14	**Module III: Structural geology**	Lecture	BTCE605.2	Mid Term-1, Quiz & End Sem Exam
15	Types of structures and classification	Lecture	BTCE605.2	Mid Term-1, Quiz & End Sem Exam
16	effect on civil engineering projects and Geological mapping	Lecture	BTCE605.3	Mid Term-1, Quiz & End Sem Exam
17	**Hydrogeology**	Lecture	BTCE605.3	Mid Term-1, Quiz & End Sem Exam
18	Groundwater and occurrence	Lecture	BTCE605.3	Mid Term-1, Quiz & End Sem Exam

19	investigations, quality, artificial recharge	Lecture	BTCE605.3	Mid Term-1, Quiz & End Sem Exam
20	**Module IV: Geology in Civil Engineering**	Lecture	BTCE605.3	Mid Term-1, Quiz & End Sem Exam
21	selection of turbines hydroelectric plants.	Lecture	BTCE605.3	Assignment, Quiz & End Sem Exam
22	Tunnels, dams, reservoirs, bridges	Lecture	BTCE605.3	Assignment, Quiz & End Sem Exam
23	Runways, Roads and Buildings.	Lecture	BTCE605.3	Assignment, Quiz & End Sem Exam
24	Slope failures and landslides. Investigations	Lecture	BTCE605.3	Assignment, Quiz & End Sem Exam
25	Remote sensing and GIS applications	Lecture	BTCE605.3	Assignment, Quiz & End Sem Exam
26	**Geology of India**	Lecture	BTCE605.4	Assignment, Quiz & End Sem Exam
27	Types, age and occurrence of rock formations and economic importance	Lecture	BTCE605.4	Assignment, Quiz & End Sem Exam
28	Groundwater and occurrence	Lecture	BTCE605.4	Assignment, Quiz & End Sem Exam
29	investigations, quality, artificial recharge	Lecture	BTCE605.4	Assignment, Quiz & End Sem Exam
30	**Module IV: Geology in Civil Engineering**	Lecture	BTCE605.4	Assignment, Quiz & End Sem Exam
31	selection of turbines hydroelectric plants.	Lecture	BTCE605.4	Assignment, Quiz & End Sem Exam
32	Tunnels, dams, reservoirs, bridges	Lecture	BTCE605.4	Assignment, Quiz & End Sem Exam
33	Runways, Roads and Buildings.	Lecture	BTCE605.4	Assignment, Quiz & End Sem Exam
34	Slope failures and landslides. Investigations	Lecture	BTCE605.4	Assignment, Quiz & End Sem Exam
35	Remote sensing and GIS applications	Lecture	BTCE605.4	Assignment, Quiz & End Sem Exam
36	**Geology of India**	Lecture	BTCE605.4	Assignment, Quiz & End Sem Exam

T. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PS	PS	PS

		1	2	3	4	5	6	7	8	9	10	11	12	O1	O2	O3
BTCE605.1.	know the importance of seismic activity considerations in a terrain.	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE605.2.	learn geology and its types, various structural features like folds, faults, joints, weathering etc., minerals, rocks, and rock formations in relation to civil engineering project	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
BTCE605.3.	understand various techniques to determine engineering properties of rocks etc. and distinguish the different types of rocks and minerals	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**
BTCE605.4.	understand various techniques to analyze and to make possible solutions for various Geological Engineering problems	3	3	2	3	3	2	2	-	3	2	3	3	**1**	**2**	**3**

Sample Question Paper

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–VI) 2019-20
Class: B.Tech.(CE) VI Semester

Subject Name: BTCE605 ENGINEERING GEOLOGY		Time: 2 Hrs			Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: know the importance of seismic activity considerations in a terrain.

CO2: learn geology and its types, various structural features like folds, faults, joints, weathering etc., minerals, rocks, and rock formations in relation to civil engineering project

CO Map	Question No.	Question	Marks
CO1	Q.1	Explain the causes, classification of earthquake?	3
CO1	Q.2a	What are various physical properties useful to identify a mineral in hand specimen?	3
	Q.2b	What is texture? Describe in brief the texture and structure of igneous rocks.	3
CO1	Q.3	Describe core and mantle of the earth with neat diagram.	6
CO2	Q.4	Define map. What are map layers in GIS?	3
CO2	Q.5a	Describe active and passive remote sensing	3
	Q.5b	What do you understand by electromagnetic spectrum?	3
CO2	Q6	Give an account of geological work of wind explaining briefly some major geological features?	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	BTCE605 ENGINEERING GEOLOGY							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U9G9
1	A60215817001	Mr UDDESHYA UPADHYAY	100	50	50	B+	7	3	3	21
2	A60215817003	Ms NEHA KARAIYA	100	50	50	A	9	3	3	27
3	A60215817005	Mr RAHUL PINGLE	100	50	50	A-	8	3	3	24
4	A60515817001	Mr KARAN SINGH SIKARWAR	100	50	50	A	9	3	3	27
5	A60515817003	Mr DHANANJAY CHAUHAN	100	50	50	A	9	3	3	27

Total No. of Students	=	5		
Total No. of Students	>60% marks	4	80	%
Attainment Level			Level 3	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : HYDROLOGY & WATER RESOURCES ENGINEERING
Course Code : BTCE606 Crédits : 03, Session :2019-20 (Even Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Mr. Sachin Tiwari

K. Introduction: The objective of this course is *to deal with various concepts of water resources engineering. The course introduces the concept of hydrology, ground water and then deals with irrigation engineering. It also deals with design of dam.*

L. Course Outcomes: At the end of the course, students will be able to:

BTCE606.1. Identify the various components of hydrological cycle and the spatial and temporal variation of rainfall.

BTCE606.2. Determine the different methods and hydrological models to estimate the stream flow.

BTCE606.3. Examine the different techniques to calculate the probable maximum flood based on different returned period.

BTCE606.4. Evaluate the basic aquifer parameters and groundwater resources for different hydro geological boundary conditions.

BTCE606.5. Understand the different methods of irrigation and find the optimum methods of irrigation for judicious use of water resources.

M. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

N. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

O. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

P. Syllabus

Moduls I : Precipitation Measurement

Hydrologic cycle- Precipitation, rainfall variations, measurement, presentation of RF data, Mean precipitation, Abstractions from precipitation

Moduls II : Flow Measurement

Runoff-Long term runoff, empirical formulae, short term runoff- hydrograph analysis. Flood-Rational and Empirical methods for prediction – Design floods. Ground water – Aquifer types – flow of ground water – Well hydraulics- Types of wells –Other sources of ground water.

Moduls III : Irrigation

Necessity of irrigation and type of irrigation systems. – Total planning concept- Water requirements of crops- Command area- duty-delta. Consumptive use of water – Irrigation efficiency – Irrigation requirement of crops- Reservoir planning – Site investigation- Zone of storage- Reservoir yield- Reservoir losses and Control- Life of reservoir.

Moduls IV : Reservoir

Reservoir planning – Site investigation – Zone of storage-Reservoir yield- Reservoir losses and Control- Life of reservoir.

Q. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

R. Suggested Text/Reference Books:

- K Subramanya, Engineering Hydrology, Mc-Graw Hill.
- K N Muthreja, Applied Hydrology, Tata Mc-Graw Hill.
- K Subramanya, Water Resources Engineering through Objective Questions, Tata McGraw Hill.
- G L Asawa, Irrigation Engineering, Wiley Eastern

S. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction - hydrologic cycle,	Lecture	BTCE606.1	Mid Term-1, Quiz & End Sem Exam
2	water-budget equation,	Lecture	BTCE606.1	Mid Term-1, Quiz & End Sem Exam
3	history of hydrology,	Lecture	BTCE606.1	Mid Term-1, Quiz & End Sem Exam
4	*world water balance,*	Lecture	BTCE606.1	Mid Term-1, Quiz & End Sem Exam
5	applications in engineering, sources of data**.**	Lecture	BTCE606.1	Mid Term-1, Quiz & End Sem Exam
6	Precipitation - forms of precipitation,	Lecture	BTCE606.1	Mid Term-1, Quiz & End Sem Exam

	characteristics of precipitation in India			
7	measurement of precipitation	Lecture	BTCE606.1	Mid Term-1, Quiz & End Sem Exam
8	rain gauge network, mean precipitation over an area	Lecture	BTCE606.2	Mid Term-1, Quiz & End Sem Exam
9	deptharea-duration relationships	Lecture	BTCE606.2	Mid Term-1, Quiz & End Sem Exam
10	maximum intensity/depth	Lecture	BTCE606.2	Mid Term-1, Quiz & End Sem Exam
11	duration-frequency relationship	Lecture	BTCE606.2	Mid Term-1, Quiz & End Sem Exam
12	Probable Maximum Precipitation (PMP),	Lecture	BTCE606.2	Mid Term-1, Quiz & End Sem Exam
13	rainfall data in India.	Lecture	BTCE606.2	Mid Term-1, Quiz & End Sem Exam
14	Abstractions from precipitation - evaporation process	Lecture	BTCE606.2	Mid Term-1, Quiz & End Sem Exam
15	evaporimeters, analytical methods of evaporation estimation,	Lecture	BTCE606.3	Mid Term-1, Quiz & End Sem Exam
16	Reservoir evaporation and methods for its reduction	Lecture	BTCE606.3	Mid Term-1, Quiz & End Sem Exam
17	evapotranspiration, measurement of evapotranspiration, evapotranspiration	Lecture	BTCE606.3	Mid Term-1, Quiz & End Sem Exam
18	potential evapotranspiration over India,	Lecture	BTCE606.3	Mid Term-1, Quiz & End Sem Exam
19	actual evapotranspiration, interception	Lecture	BTCE606.3	Mid Term-1, Quiz & End Sem Exam
20	depression storage, infiltration, infiltration capacity, measurement of infiltration,	Lecture	BTCE606.3	Mid Term-1, Quiz & End Sem Exam
21	modelling infiltration capacity, classification of infiltration capacities, infiltration indices	Lecture	BTCE606.3	Assignment, Quiz & End Sem Exam
22	Runoff - runoff volume,	Lecture	BTCE606.4	Assignment, Quiz & End Sem Exam
23	SCS-CN method of estimating runoff volume	Lecture	BTCE606.4	Assignment, Quiz & End Sem Exam
24	flow duration curve, flow-mass curve	Lecture	BTCE606.4	Assignment, Quiz & End Sem Exam
25	hydrograph, factors affecting runoff hydrograph	Lecture	BTCE606.4	Assignment, Quiz & End Sem Exam

26	components of hydrograph, base flow separation	Lecture	BTCE606.4	Assignment, Quiz & End Sem Exam
27	effective rainfall,	Lecture	BTCE606.4	Assignment, Quiz & End Sem Exam
28	unit hydrograph surface water resources of India	Lecture	BTCE606.4	Assignment, Quiz & End Sem Exam
29	Ground water and well hydrology - forms of subsurface water	Lecture	BTCE606.5	Assignment, Quiz & End Sem Exam
30	saturated formation, aquifer properties, geologic formations of aquifers, well hydraulics: steady state flow in wells,	Lecture	BTCE606.5	Assignment, Quiz & End Sem Exam
31	equilibrium equations for confined and unconfined aquifers, aquifer tests. Design of channels- rigid boundary channels, alluvial channels	Lecture	BTCE606.5	Assignment, Quiz & End Sem Exam
32	Kennedy's and Lacey's theory of regime channels. Water logging: causes, effects, consumptive use, irrigation requirement,	Lecture	BTCE606.5	Assignment, Quiz & End Sem Exam
33	frequency of irrigation; Methods of applying water to the fields	Lecture	BTCE606.5	Assignment, Quiz & End Sem Exam
34	surface, sub-surface	Lecture	BTCE606.5	Assignment, Quiz & End Sem Exam
35	sprinkler and trickle / drip irrigation.	Lecture	BTCE606.5	Assignment, Quiz & End Sem Exam
36	sprinkler and trickle / drip irrigation.	Lecture	BTCE606.5	Assignment, Quiz & End Sem Exam

T. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

BTCE606.1 .	Identify the various components of hydrological cycle and the spatial and temporal variation of rainfall.	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
BTCE606.2.	Determine the different methods and hydrological models to estimate the stream flow.	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE606.3.	Examine the different techniques to calculate the probable maximum flood based on different returned period.	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
BTCE606.4	Evaluate the basic aquifer parameters and groundwater resources for different hydro geological boundary conditions.	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**
BTCE606.5 .	Understand the different methods of irrigation and find the optimum methods of irrigation for judicious use of water resources.	3	3	2	3	3	2	2	-	3	2	3	3	**1**	**2**	**3**

<u>Sample Question Paper</u>

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–VI) 2019-20		
Class: B.Tech.(CE) VI Semester		
Subject Name: BTCE606 HYDROLOGY & WATER	Time: 2 Hrs	Max.Marks:30

RESOURCES ENGINEERING						
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: Identify the various components of hydrological cycle and the spatial and temporal variation of rainfall.

CO2: Determine the different methods and hydrological models to estimate the stream flow.

CO Map	Question No.	Question	Marks
CO1	Q.1	What are the basic data required for hydrological studies? State Hydrologic equation?	3
CO1	Q.2a	Define air mass? Define air front?	3
	Q.2b	Distinguish between continental air mass and maritime air mass	3
CO1	Q.3	Enumerate the methods used to estimate the amount of evaporation from a water surface? Enlist the factors affecting evaporation?	6
CO2	Q.4	Write short notes on evaporimeters?	3
CO2	Q.5a	Enlist the types of evaporimeters?	3
	Q.5b	State the Daltons law of evaporation?	3
CO2	Q6	Name the analytical methods of determining the lake evaporation? How will you reduce the evaporation from a water surface?	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	BTCE606 IRRIGATION ENGINEERING							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U10G10
1	A60215817001	Mr UDDESHYA UPADHYAY	100	50	50	B+	7	3	3	21
2	A60215817003	Ms NEHA KARAIYA	100	50	50	A+	10	3	3	30
3	A60215817005	Mr RAHUL PINGLE	100	50	50	A-	8	3	3	24
4	A60515817001	Mr KARAN SINGH SIKARWAR	100	50	50	A+	10	3	3	30
5	A60515817003	Mr DHANANJAY CHAUHAN	100	50	50	A+	10	3	3	30
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	4	80	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : Computer Applications Lab
Course Code : BTCE620, Crédits : 01, Session :2019-20 (Even Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Imran Ahmad Khan

A. Introduction: The objective of this course is *to* introduce basic soil properties and their significance to the students and to have a understanding of different soil properties and their uses in engineering.

B. Course Outcomes: At the end of the course, students will be able to:

BTCE620.1.Develop a Application of software’s in design and drawings of Civil Engineering structures.

BTCE620.2.Able to proficiency, including the ability to use industry-standard computer software to generate 2D and 3D drawings

BTCE620.3. *U*nderstanding of the theory of orthographic projection and the conventions associated with Civil engineering drawings

BTCE620.4.apply computer-aided design techniques to use computer-aided visualization techniques to prepare.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. **Assessment Plan:**

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. **Syllabus**

Practical Work:

Computer applications in civil engineering by using two dimensional and three dimensional modeling through auto Cadd and Stadd Pro.

1 – Introduction of Staad Pro and its applications.
2 – Study of various commands for modelling and analysis of a beam
3 – Modelling and analysis of continuous beams for different loading conditions.
4 - Modelling of frame structure for different loading conditions.
5 – Modelling and analysis of frame structure for different loading conditions.
6 – Seismic Analysis of a frame structure.
7 – Wind Analysis of a frame structure.
8 – Design of beams according to Indian Standards.
9 - Design of columns according to Indian Standards.
10 – Introduction of different software used in various fields of Civil Engineering.
11 – Introduction of Auto cad used in various types of building planning.

G. **Examination Scheme:**

Components	**IA**				**EE**	
	A	**PR**	**LR**	**V**	**PR**	**V**
Weightage (%)	**5**	**10**	**10**	**5**	**35**	**35**

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

H. **Suggested Text/Reference Books:**

- Soil Mechanics by Craig R.F., Chapman & Hall
- Fundamentals of Soil Engineering by Taylor, John Wiley & Sons

- An Introduction to Geotechnical Engineering, by Holtz R.D. and Kovacs, W.D., Prentice Hall, NJ

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction of Staad Pro and its applications.	Lecture	BTCE620.1	Internal Assessment, Viva &External Exam
2	Study of various commands for modelling and analysis of a beam	Lecture	BTCE620.1	Internal Assessment, Viva &External Exam
3	Modelling and analysis of continuous beams for different loading conditions.	Lecture	BTCE620.1	Internal Assessment, Viva &External Exam
4	Modelling of frame structure for different loading conditions.	Lecture	BTCE620.1	Internal Assessment, Viva &External Exam
5	Modelling and analysis of frame structure for different loading conditions.	Lecture	BTCE620.2	Internal Assessment, Viva &External Exam
6	Seismic Analysis of a frame structure.	Lecture	BTCE620.2	Internal Assessment, Viva &External Exam
7	Wind Analysis of a frame structure.	Lecture	BTCE620.2	Internal Assessment, Viva &External Exam
8	Design of beams according to Indian Standards.	Lecture	BTCE620.2	Internal Assessment, Viva &External Exam
9	Design of columns according to Indian Standards.	Lecture	BTCE620.3	Internal Assessment, Viva &External Exam
10	Introduction of different software used in various fields of Civil Engineering.	Lecture	BTCE620.3	Internal Assessment, Viva &External Exam
11	Introduction of Auto cad used in various types of building planning.	Lecture	BTCE620.3	Internal Assessment, Viva &External Exam
12	Design of beams according to Indian Standards.	Lecture	BTCE620.3	Internal Assessment, Viva &External Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE620. 1.	Develop a Application of software’s in design and drawings of Civil Engineering structures.	3	3	1	3	1	**3**	**2**	**-**	2		2	1	**3**	**1**	**2**
BTCE620. 2.	Able to proficiency, including the ability to use industry-standard computer software to generate 2D and 3D drawings	3	2	2	2	2	**1**	**-**	**-**	2		1	1	**1**	**1**	**3**
BTCE620. 3.	*U*nderstanding of the theory of orthographic projection and the conventions associated with Civil engineering drawings	3	2	2	2	2	**1**	**-**	**1**	3		3	1	**3**	**3**	**2**
BTCE620. 4.	apply computer-aided design techniques to use computer-aided visualization techniques to prepare.	3	3	2	3	2	**-**	**-**	**-**	1		2	1	**1**	**2**	**2**

<u>Sample Question Paper</u>

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–VI) 2019-20
Class: B.Tech.(CE) VI Semester

Subject Name: BTCE620 COMPUTER APPLICATION LAB	Time: 2 Hrs	Max.Marks:30

Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to
CO1: Develop a Application of software's in design and drawings of Civil Engineering structures.
CO2: Able to proficiency, including the ability to use industry-standard computer software to generate 2D and 3D drawings

CO Map	Question No.	Question	Marks
CO1	Q.1	What is the procedure to create user interface?	3
CO1	Q.2a	What is the procedure to draw a line more than one time and save it automatically?	3
	Q.2b	What are the steps need to be taken to replace the buttons on toolbars with smiley?	3
CO1	Q.3	What are the features being corrected by AutoCAD?	6
CO2	Q.4	What are the steps to enable the drag and drop feature in AutoCAD?	3
CO2	Q.5a	What are the steps involved in setting up the default drawing directory?	3
	Q.5b	Why AutoCAD software is used?	3
CO2	Q6	A house measures 15000 mm x 8000 mm in plan view. When drawing the plan view only which one sets of limits would be best to use?	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	BTCE620 COMPUTER APPLICATIONS LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U11G11
1	A60215817001	Mr UDDESHYA UPADHYAY	100	50	50	B+	7	1	1	7
2	A60215817003	Ms NEHA KARAIYA	100	50	50	A+	10	1	1	10
3	A60215817005	Mr RAHUL PINGLE	100	50	50	A	9	1	1	9
4	A60515817001	Mr KARAN SINGH SIKARWAR	100	50	50	A	9	1	1	9
5	A60515817003	Mr DHANANJAY CHAUHAN	100	50	50	A+	10	1	1	10

Total No. of Students	=	5		
Total No. of Students	>60% marks	4	80	%
Attainment Level			Level 3	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : GEOTECHNICAL ENGINEERING LAB
Course Code : BTCE621, Crédits : 01, Session :2019-20 (Even Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Imran Ahmad Khan

K. Introduction: The objective of this course is *t*o introduce basic soil properties and their significance to the students and to have a understanding of different soil properties and their uses in engineering.

L. Course Outcomes: At the end of the course, students will be able to:

BTCE621.1. *To impart the fundamental concepts of soil mechanics and understand the bearing capacity*

BTCE621.2. *To understand the concept of compaction and consolidation of soils*

BTCE621.3. *To understand the design aspects of foundation*

BTCE621.4. *To evaluate the stress developed in the soil medium*

M. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

N. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

O. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

P. Syllabus

Practical Work:

- Specific gravity of coarse and fine grained soils.
- Grain size analysis (a) Sieve analysis (b) Pipette analysis
- Atterberg's limits and indices
- Determination of field density (a) sand replacement method (b) core cutter method

- Determination of coefficient of permeability by
    - Constant head method (b) Variable head method
- Consolidation test
- Compaction test (a) IS light compaction test (b) IS heavy compaction test
- California Bearing Ratio test
- Direct shear test
- Triaxial shear test
- Unconfined compressive strength test
- *Laboratory vane shear test*

Q. Examination Scheme:

Components	IA				EE	
	A	PR	LR	V	PR	V
Weightage (%)	5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

R. Suggested Text/Reference Books:

- Soil Mechanics by Craig R.F., Chapman & Hall
- Fundamentals of Soil Engineering by Taylor, John Wiley & Sons
- An Introduction to Geotechnical Engineering, by Holtz R.D. and Kovacs, W.D., Prentice Hall, NJ

S. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Specific gravity of coarse and fine grained soils.	Lecture	BTCE621.1	Internal Assessment, Viva &External Exam
2	Grain size analysis (a) Sieve analysis (b) Pipette analysis	Lecture	BTCE621.1	Internal Assessment, Viva &External Exam
3	Atterberg's limits and indices	Lecture	BTCE621.1	Internal Assessment, Viva &External Exam
4	Determination of field density (a) sand replacement method (b) core cutter method	Lecture	BTCE621.2	Internal Assessment, Viva &External Exam
5	Determination of coefficient of	Lecture	BTCE621.2	Internal

	permeability by (a) Constant head method (b) Variable head method			Assessment, Viva &External Exam
6	Consolidation test	Lecture	BTCE621.2	Internal Assessment, Viva &External Exam
7	Compaction test (a) IS light compaction test (b) IS heavy compaction test	Lecture	BTCE621.3	Internal Assessment, Viva &External Exam
8	California Bearing Ratio test	Lecture	BTCE621.3	Internal Assessment, Viva &External Exam
9	Direct shear test	Lecture	BTCE621.3	Internal Assessment, Viva &External Exam
10	Triaxial shear test	Lecture	BTCE621.4	Internal Assessment, Viva &External Exam
11	Unconfined compressive strength test	Lecture	BTCE621.4	Internal Assessment, Viva &External Exam
12	Laboratory vane shear test	Lecture	BTCE621.4	Internal Assessment, Viva &External Exam

T. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE621. 1.	*To impart the fundamental concepts of soil mechanics and understand the bearing capacity*	3	3	1	3	1	**3**	**2**	**-**	2		2	1	**3**	**1**	**2**

BTCE621. 2.	*To understand the concept of compaction and consolidation of soils*	3	2	2	2	2	**1**	**-**	**-**	2		1	1	**1**	**1**	**3**
BTCE621. 3.	*To understand the design aspects of foundation*	3	2	2	2	2	**1**	**-**	**1**	3		3	1	**3**	**3**	**2**
BTCE621. 4.	*To evaluate the stress developed in the soil medium*	3	3	2	3	2	**-**	**-**	**-**	1		2	1	**1**	**2**	**2**

Sample Question Paper

<table>
<tr><td colspan="7" align="center">Amity School of Engineering and Technology
Department of Civil Engineering
I MID-SEMESTER (SEM–VI) 2019-20</td></tr>
<tr><td colspan="7" align="center">Class: B.Tech.(CE) VI Semester</td></tr>
<tr><td colspan="2">Subject Name:
BTCE621 GEOTECHNICAL ENGINEERING LAB</td><td colspan="3">Time: 2 Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3</td><td>Q.4</td><td>Q.2,5,6</td><td></td><td></td></tr>
<tr><td colspan="7">Student will be able to
CO1: To impart the fundamental concepts of soil mechanics and understand the bearing capacity
CO2: To understand the concept of compaction and consolidation of soils</td></tr>
</table>

CO Map	Question No.	Question	Marks
CO1	Q.1	Differentiate between representative and undisturbed samples	3
CO1	Q.2a	List any two Disadvantage of static cone penetration Test.	3
	Q.2b	Can you perform classification tests on a Non representative sample? Justify your answer?	3
CO1	Q.3	Explain the corrections that are to be carried out to the observed N-value	6
CO2	Q.4	Give the two corrections to find corrected SPT value	3

CO2	Q.5a	Explain in detail the geographical methods of soil explorations with neat sketch.	3
	Q.5b	Explain the electrical resistivity method in detail.	3
CO2	Q6	What is SPT 'N' value? Discuss in detail how is it interpreted to arrive at the bearing capacity of soil	6

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	BTCE621 GEOTECHNICAL ENGINEERING LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U12G12
1	A60215817001	Mr UDDESHYA UPADHYAY	100	50	50	B+	7	1	1	7
2	A60215817003	Ms NEHA KARAIYA	100	50	50	A	9	1	1	9
3	A60215817005	Mr RAHUL PINGLE	100	50	50	B+	7	1	1	7
4	A60515817001	Mr KARAN SINGH SIKARWAR	100	50	50	A	9	1	1	9
5	A60515817003	Mr DHANANJAY CHAUHAN	100	50	50	A+	10	1	1	10
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	3	60	%	
			Attainment Level					Level 1		

AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : STRUCTURAL STEEL DESIGN
Course Code : BTCE 701, Crédits : 04, Session :2019-20 (Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. P. Mahakavi

K. ***Introduction:*** *The objective of this course is to* to learn the behavior and design of structural steel.To gain an educational and comprehensive experience in the design of steel structures.To apply the principles, procedures and current code requirements to the design of steelstructural members.

L. **Course Outcomes:** At the end of the course, students will be able to:

BTCE701.1.*Understand the behavior and design the framed steel structures*
BTCE701.2.*Identify and compute the design loads for industrial structures*
BTCE701.3.*Understand the design of steel-concrete composite structures*
BTCE701.4.*Develop complete drawings of steel structures including all details of sections and connections.*

M. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

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PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

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PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

N. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

O. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%

Total			**100%**

P. Syllabus

Module I: Design of steel girders

Analysis and design of laterally restrained – unrestrained – simple and compound beams – open web girders – castellated beams–deflection criteria - check for shear.

Module II: Design of compression members

Axially and eccentrically loaded compression members - built up columns - lacings and battens - design of column bases.

A project involving the design and detailing of a Mill bent is envisaged at this stage.

Module III: Roof truss

Introduction to steel roof systems - design of roof trusses – design of roofing elements and purlin – wind bracings.

A project involving the design and detailing of a roof truss is envisaged at this stage.

Module IV: Plastic Analysis

Plastic theory: introduction - plastic hinge concept - plastic modulus - shape factor - redistribution of moments - collapse mechanism - plastic analysis of beams and portal frames by equilibrium and mechanism methods

Q. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

R. Suggested Text/Reference Books:

- Ramchandra, Design of Steel Structures Vol I and II, Standard book house, 1991
- P. Dayaratnam, Design of Steel Structures, (Wheeler), 1998
- M. Raghupathi, Design of Steel Structures, Tata McGraw Hill, 1985
- Lin & Breslar, Design of Steel Structures, John Wiley & Sons, 1963
- BIS codes (IS 800, SP: 6 – Part 1 to 6).

S. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	Analysis and design of laterally restrained	Lecture	BTCE701.1	Mid Term-1, Quiz & End Sem Exam
2	Analysis and design of laterally restrained	Lecture	BTCE701.1	Mid Term-1, Quiz & End Sem Exam
3	unrestrained	Lecture	BTCE701.1	Mid Term-1, Quiz & End Sem Exam

4	unrestrained	Lecture	BTCE701.1	Mid Term-1, Quiz & End Sem Exam
5	simple and compound beams	Lecture	BTCE701.1	Mid Term-1, Quiz & End Sem Exam
6	simple and compound beams	Lecture	BTCE701.1	Mid Term-1, Quiz & End Sem Exam
7	open web girders	Lecture	BTCE701.1	Mid Term-1, Quiz & End Sem Exam
8	open web girders	Lecture	BTCE701.1	Mid Term-1, Quiz & End Sem Exam
9	castellated beams	Lecture	BTCE701.1	Mid Term-1, Quiz & End Sem Exam
10	castellated beams	Lecture	BTCE701.1	Mid Term-1, Quiz & End Sem Exam
11	deflection criteria	Lecture	BTCE701.1	Mid Term-1, Quiz & End Sem Exam
12	check for shear	Lecture	BTCE701.1	Mid Term-1, Quiz & End Sem Exam
13	Axially and eccentrically loaded compression members	Lecture	BTCE701.2	Mid Term-1, Quiz & End Sem Exam
14	Axially and eccentrically loaded compression members	Lecture	BTCE701.2	Mid Term-1, Quiz & End Sem Exam
15	Axially and eccentrically loaded compression members	Lecture	BTCE701.2	Mid Term-1, Quiz & End Sem Exam
16	built up columns	Lecture	BTCE701.2	Mid Term-1, Quiz & End Sem Exam
17	built up columns	Lecture	BTCE701.2	Mid Term-1, Quiz & End Sem Exam
18	built up columns	Lecture	BTCE701.2	Mid Term-1, Quiz & End Sem Exam
19	lacings and battens	Lecture	BTCE701.2	Mid Term-1, Quiz & End Sem Exam
20	lacings and battens	Lecture	BTCE701.2	Mid Term-1, Quiz & End Sem Exam
21	lacings and battens	Lecture	BTCE701.2	Assignment, Quiz & End Sem Exam
22	design of column bases	Lecture	BTCE701.2	Assignment, Quiz & End Sem Exam
23	design of column bases	Lecture	BTCE701.2	Assignment, Quiz & End Sem Exam
24	design of column bases	Lecture	BTCE701.2	Assignment, Quiz & End Sem Exam
25	Introduction to steel roof systems	Lecture	BTCE701.3	Assignment, Quiz & End Sem Exam
26	Introduction to steel roof systems	Lecture	BTCE701.3	Assignment, Quiz & End Sem Exam
27	Introduction to steel roof systems	Lecture	BTCE701.3	Assignment, Quiz & End Sem Exam
28	design of roof trusses	Lecture	BTCE701.3	Assignment, Quiz

				& End Sem Exam
29	design of roof trusses	Lecture	BTCE701.3	Assignment, Quiz & End Sem Exam
30	design of roof trusses	Lecture	BTCE701.3	Assignment, Quiz & End Sem Exam
31	design of roofing elements and purlin	Lecture	BTCE701.3	Assignment, Quiz & End Sem Exam
32	design of roofing elements and purlin	Lecture	BTCE701.3	Assignment, Quiz & End Sem Exam
33	design of roofing elements and purlin	Lecture	BTCE701.3	Assignment, Quiz & End Sem Exam
34	wind bracings	Lecture	BTCE701.3	Assignment, Quiz & End Sem Exam
35	wind bracings	Lecture	BTCE701.3	Assignment, Quiz & End Sem Exam
36	wind bracings	Lecture	BTCE701.3	Mid Term-1, Quiz & End Sem Exam
37	Plastic theory	Lecture	BTCE701.4	Mid Term-1, Quiz & End Sem Exam
38	introduction	Lecture	BTCE701.4	Mid Term-1, Quiz & End Sem Exam
39	plastic hinge concept	Lecture	BTCE701.4	Mid Term-1, Quiz & End Sem Exam
40	plastic modulus	Lecture	BTCE701.4	Mid Term-1, Quiz & End Sem Exam
41	shape factor	Lecture	BTCE701.4	Mid Term-1, Quiz & End Sem Exam
42	redistribution of moments	Lecture	BTCE701.4	Mid Term-1, Quiz & End Sem Exam
43	collapse mechanism	Lecture	BTCE701.4	Mid Term-1, Quiz & End Sem Exam
44	plastic analysis of beams	Lecture	BTCE701.4	Mid Term-1, Quiz & End Sem Exam
45	portal frames by equilibrium	Lecture	BTCE701.4	Mid Term-1, Quiz & End Sem Exam
46	portal frames by equilibrium	Lecture	BTCE701.4	Mid Term-1, Quiz & End Sem Exam
47	mechanism methods	Lecture	BTCE701.4	Mid Term-1, Quiz & End Sem Exam
48	mechanism methods	Lecture	BTCE701.4	Mid Term-1, Quiz & End Sem Exam

T. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES	CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE701.1.	Understand the behavior and design the framed steel structures	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
BTCE701.2.	Identify and compute the design loads for industrial structures	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE701.3.	Understand the design of steel-concrete composite structures	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
BTCE701.4.	Develop complete drawings of steel structures including all details of sections and connections.	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**

Amity University Madhya Pradesh

B.Tech (Civil Engineering)
2016-2020

Exam Result For (Semester) : VII

Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment.No.	Student's Name	BTCE701 STRUCTURAL STEEL DESIGN							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U1G1
1	A60215816004	Mr UTKARSH TOMAR	100	30	70	B-	5	4	4	20
2	A60215816007	Mr KUNAL MUKHARIYA	100	30	70	B+	7	4	4	28
3	A60215816008	Mr DAMODAR SINGH CHAUHAN	100	30	70	B+	7	4	4	28
4	A60215816009	Mr SATENDRA SINGH KUSHWAH	100	30	70	B	6	4	4	24
5	A60215816011	Mr ANUJ PRATAP SINGH PARMAR	100	30	70	B	6	4	4	24
6	A60215816012	Mr HIMANSHU MAHLI	100	30	70	B+	7	4	4	28
7	A60215816013	Mr ANUJ BANSAL	100	30	70	A-	8	4	4	32
8	A60215816014	Mr SHIVAM SHRIVASTAVA	100	30	70	C+	4	4	4	16
9	A60215816015	Mr RAHUL SINGH BAGHEL	100	30	70	A-	8	4	4	32
10	A60215816016	Mr ROHIT BHADORIA	100	30	70	C+	4	4	4	16
11	A60515815002	Mr GURJEET JAIN	100	30	70	B+	7	4	4	28

12	A60515816001	Mr ANUJ SINGH BHADORIA	100	30	70	B+	7	4	4	28
13	A60515816002	Mr kunal kumar	100	30	70	B+	7	4	4	28
14	A60515816003	Mr MONUSHA DHAKAD	100	30	70	A-	8	4	4	32
15	A60515816004	Mr AMAN PARASHAR	100	30	70	B+	7	4	4	28
16	A60515816005	Mr DEEPAK SHARMA	100	30	70	B+	7	4	4	28
17	A60515816006	Mr ANUJ SHARMA	100	30	70	B+	7	4	4	28

Total No. of Students	=	17		
Total No. of Students	>60% marks	3	17.65	%
Attainment Level			-	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : ENVIRONMENTAL ENGINEERING - II
Course Code : BTCE702, Crédits : 03, Session :2019-20 (Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Imran Ahmad Khan

A. ***Introduction:*** *The objective of this course is to* teach students the basic principles and concepts of unit operations and processes involvedin water and wastewater treatment. To develop a student's skill in the basic design of unit operations and processesinvolved in water and wastewater treatment. To develop a student's skill in evaluating the performance of water and wastewater treatmentplants. To teach students the various methods of sludge management

B. **Course Outcomes:** At the end of the course, students will be able to:

BTCE702.1. Able to design individual unit operation or process appropriate to the situation by applying physical, chemical, biological and engineering principles.

BTCE702.2. Able to identify the type of unit operations and processes involved in water and wastewater treatment plants based on the water quality

BTCE702.3. Investigate the performance of various unit operations and processes to meet the desired health and environment related goals.

BTCE702.4. Understand sludge management and disposal

C. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I

Sanitary plumbing – sanitary fixtures – systems of piping – house drainage– connection of house drains and street sewers. Systems of sewerage– Dry weather flow and wet weather flow– sewers and sewer appurtenances – sewage pumping – maintenance of sewers.

Module II

Waste water- Characteristics– sampling – population equivalent — preliminary treatment of waste water – screens – grit chamber – detritus tank – Sedimentation tank.
Biological treatment (process details and design considerations) - Aerobic- Activated Sludge Process- Trickling Filter- Oxidation Ponds

Module III

Anaerobic treatment- Anaerobic digesters- Septic Tanks- Soak pits
Waste water disposal – disposal into stream –fundamentals of stream sanitation- disposal by irrigation – sludge treatment and disposal

Module IV

Solid waste management: Generation- on site handling and storage- transfer and transportprocessing- resource recovery-treatment and disposal.
Air pollution and control – sources –pollutants and their health effects– particulate and gaseous pollution control devices (fundamentals)-Settling chambers- Electrostatic precipitators- Cyclones- Wet Collectors-Gas absorption by tray and packed towers

Module V: Industrial Visit

At least one visit to industry with in India in the field of Civil Engineering maximum three working days duration.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Birdie G. S and Birdie J.S, Water Supply and Sanitary Engineering, Dhanpat Rai and Sons (1998), New Delhi
- Duggal K.N., Elements of Environmental Engineering, S. Chand and Co. Ltd. (2000), New Delhi
- Garg S.K, Environmental Engineering Vol. II¸ Khanna Publications (2001) New Delhi
- Ehlers VM & Steel EW, Municipal & Rural Sanitation, 6th Edn.(1965)McGraw Hill.
- Sawyer and McCarte, Chemistry for Environmental Engineering, Tata McGraw-Hill, (2003) New Delhi,.
- Fair, Geyer & Okun, Water and Waste water Engineering, John Wiley & sons, Inc (1966)
- Metcalf & Eddy, Waste Water Engineering Treatment, Disposal & Reuse, Tata McGraw Hill (1979)

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Sanitary plumbing	Lecture	BTCE702.1	Mid Term-1, Quiz & End Sem Exam
2	sanitary fixtures	Lecture	BTCE702.1	Mid Term-1, Quiz & End Sem Exam
3	systems of piping	Lecture	BTCE702.1	Mid Term-1, Quiz & End Sem Exam

4	house drainage	Lecture	BTCE702.1	Mid Term-1, Quiz & End Sem Exam
5	connection of house drains and street sewers	Lecture	BTCE702.1	Mid Term-1, Quiz & End Sem Exam
6	Systems of sewerage	Lecture	BTCE702.1	Mid Term-1, Quiz & End Sem Exam
7	Dry weather flow and wet weather flow	Lecture	BTCE702.1	Mid Term-1, Quiz & End Sem Exam
8	sewers and sewer appurtenances	Lecture	BTCE702.1	Mid Term-1, Quiz & End Sem Exam
9	sewage pumping – maintenance of sewers	Lecture	BTCE702.1	Mid Term-1, Quiz & End Sem Exam
10	Waste water- Characteristics– sampling	Lecture	BTCE702.2	Mid Term-1, Quiz & End Sem Exam
11	population equivalent	Lecture	BTCE702.2	Mid Term-1, Quiz & End Sem Exam
12	preliminary treatment of waste water	Lecture	BTCE702.2	Mid Term-1, Quiz & End Sem Exam
13	screens – grit chamber	Lecture	BTCE702.2	Mid Term-1, Quiz & End Sem Exam
14	detritus tank – Sedimentation tank	Lecture	BTCE702.2	Mid Term-1, Quiz & End Sem Exam
15	Biological treatment (process details and design considerations)	Lecture	BTCE702.2	Mid Term-1, Quiz & End Sem Exam
16	Aerobic- Activated Sludge Process	Lecture	BTCE702.2	Mid Term-1, Quiz & End Sem Exam
17	Trickling Filter	Lecture	BTCE702.2	Mid Term-1, Quiz & End Sem Exam
18	Oxidation Ponds	Lecture	BTCE702.2	Mid Term-1, Quiz & End Sem Exam
19	Anaerobic treatment	Lecture	BTCE702.3	Mid Term-1, Quiz & End Sem Exam
20	Anaerobic digesters	Lecture	BTCE702.3	Mid Term-1, Quiz & End Sem Exam
21	Septic Tanks- Soak pits	Lecture	BTCE702.3	Assignment, Quiz & End Sem Exam
22	Waste water disposal	Lecture	BTCE702.3	Assignment, Quiz & End Sem Exam
23	disposal into stream	Lecture	BTCE702.3	Assignment, Quiz & End Sem Exam
24	fundamentals of stream l	Lecture	BTCE702.3	Assignment, Quiz & End Sem Exam
25	disposal by irrigation	Lecture	BTCE702.3	Assignment, Quiz & End Sem Exam
26	sludge treatment	Lecture	BTCE702.3	Assignment, Quiz & End Sem Exam
27	disposal	Lecture	BTCE702.3	Assignment, Quiz & End Sem Exam

28	Solid waste management:	Lecture	BTCE702.4	Assignment, Quiz & End Sem Exam
29	Generation- on site handling	Lecture	BTCE702.4	Assignment, Quiz & End Sem Exam
30	storage- transfer	Lecture	BTCE702.4	Assignment, Quiz & End Sem Exam
31	Transportprocessing	Lecture	BTCE702.4	Assignment, Quiz & End Sem Exam
32	resource recovery- treatment and disposal.	Lecture	BTCE702.4	Assignment, Quiz & End Sem Exam
33	Air pollution and control – sources –pollutants and their health effects	Lecture	BTCE702.4	Assignment, Quiz & End Sem Exam
34	particulate and gaseous pollution control devices (fundamentals)-	Lecture	BTCE702.4	Assignment, Quiz & End Sem Exam
35	Settling chambers- Electrostatic precipitators- Cyclones	Lecture	BTCE702.4	Assignment, Quiz & End Sem Exam
36	Wet Collectors-Gas absorption by tray and packed towers	Lecture	BTCE702.4	Mid Term-1, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE702.1.	Able to design individual unit operation or process appropriate to the situation by applying physical, chemical, biological and engineering principles.	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
BTCE702.2.	Able to identify the type of unit operations and processes involved in water and wastewater treatment plants based on the water quality	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**

BTCE702.3.	Investigate the performance of various unit operations and processes to meet the desired health and environment related goals.	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
BTCE702.4.	Understand sludge management and disposal	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**

S. No.	Enrollment.No.	Student's Name	BTCE702 ENVIRONMENTAL ENGINEERING - II							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U2G2
1	A60215816004	Mr UTKARSH TOMAR	100	30	70	B+	7	3	3	21
2	A60215816007	Mr KUNAL MUKHARIYA	100	30	70	A-	8	3	3	24
3	A60215816008	Mr DAMODAR SINGH CHAUHAN	100	30	70	B+	7	3	3	21
4	A60215816009	Mr SATENDRA SINGH KUSHWAH	100	30	70	B	6	3	3	18
5	A60215816011	Mr ANUJ PRATAP SINGH PARMAR	100	30	70	B+	7	3	3	21
6	A60215816012	Mr HIMANSHU MAHLI	100	30	70	B-	5	3	3	15
7	A60215816013	Mr ANUJ BANSAL	100	30	70	B-	5	3	3	15
8	A60215816014	Mr SHIVAM SHRIVASTAVA	100	30	70	B+	7	3	3	21
9	A60215816015	Mr RAHUL SINGH BAGHEL	100	30	70	A	9	3	3	27
10	A60215816016	Mr ROHIT BHADORIA	100	30	70	B+	7	3	3	21
11	A60515815002	Mr GURJEET JAIN	100	30	70	B+	7	3	3	21
12	A60515816001	Mr ANUJ SINGH BHADORIA	100	30	70	A-	8	3	3	24
13	A60515816002	Mr kunal kumar	100	30	70	A-	8	3	3	24
14	A60515816003	Mr MONUSHA DHAKAD	100	30	70	B+	7	3	3	21
15	A60515816004	Mr AMAN PARASHAR	100	30	70	B	6	3	3	18
16	A60515816005	Mr DEEPAK SHARMA	100	30	70	A	9	3	3	27
17	A60515816006	Mr ANUJ SHARMA	100	30	70	B+	7	3	3	21

Total No. of Students	=	17		
Total No. of Students	>60% marks	5	29.41	%
Attainment Level			-	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : DESIGN OF HYDRAULIC STRUCTURES
Course Code : BTCE703, Crédits : 03, Session :2019-20 (Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia, Dr. Imran Ahmad Khan, Dr. Ripunjoy Gogoi, Dr. P. Mahakavi, Mr. Sachin Tiwari

A. **Introduction:** The objective of this course is to understand the various concepts of water resources engineering. The course introduces the concept of hydrology, ground water and then deals with irrigation engineering. It also deals with design of dam.

B. **Course Outcomes:** At the end of the course, students will be able to:

BTCE703.1. Identify different component in an head work and its use

BTCE703.2 Design the head work of an irrigation system

BTCE703.3 Design the drops, escapes and outlet for the canal system

BTCE703.4 Describe various storage zones in an reservoir

BTCE703.5 Calculate different types of forces acting on a dam and design it

C. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Moduls I : Diversion head work

Diversion head works-Location – Essential components of Weir and Barrage – Weirs on permeable foundations- Blighs and khoslas seepage theories – Design procedure.

Moduls II : Earthen Dams and Rock fill Dams

Dams – Types of dams and their selection

Types, causes of failure and design criteria, soils suitable for earth dam construction, construction methods, foundation requirements, typical earth dam sections, estimation of seepage through and below the dam, seepage control, stability of slopes by slip circle method of analysis, pore pressure, sudden draw down, steady seepage and construction pore pressure condition. Rock fill dams: Types, merits and demerits, conditions favourable for their adoption.

Moduls III : Gravity dams

Gravity dam- Analysis and design.

Gravity dams: Design Criteria, forces acting on gravity dams, elementary profile, low and high gravity dams, stability analysis, evaluation of profile by method of zoning, practical profile, foundation treatment, construction joints, galleries in gravity dam

Moduls IV : Spillways

Different types and suitability

Ogee spill way and its design, details of syphon, shaft, chute and side channel spillways, emergency spillways.

Energy dissipatiors and gates: Principles of energy dissipation Energy dissiptors based on tail water rating curve and jump height curves Spillway crest gates- vertical lift and radial gates, their design principles and details. Design of canal regulating structures, Detailed design of Sarda Falls, design of cross drainage works,sphypon aquaduct.

Moduls V : Regulation and control of canal system

Purpose, Types of canal regulation works and their function aspects. Irrigation Outlets- Requirements, Types, non-moular, semi- module and rigid module, selection criterion. River Training – Objective and need, classification of rivers and rivers, and river training works, meandering, stages, methods of river training, bank protection,Methods for measurement of discharge.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Irrigation Engg and Hydraulic Structures by S.K.Garg, Khanna Publishers.
- Irrigation. Water Resources, and water power Engineering By Dr.P.N.Modi, Standard Book House 1990
- Engineering Hydrology by K. Subramanya, TMH.
- Irrigation Water Power and Water Resource Engg. By K.R. Arora.
- Water Resources Engg. By Larry W. Mays, John Wiley India
- Water Resources Engg. By Wurbs and James, John wiley India
- Water Resources Engg. By R.K.Linsely, McGraw Hill
- Irrigation and water Resources Engg.By G L Asawa, New age International Publishers
- Irrigation Theory and practices by A.M.Michel.
- Irrigation and water Power engineering by B.C.Punmia, Laxmi Publishers.

I. Lecture Plan

Lecture	Topics	Mode	Correspon	Mode of

		of Delivery	ding CO	Assessing CO
1	Diversion head works	Lecture	BTCE703.1	Mid Term-1, Quiz & End Sem Exam
2	Location	Lecture	BTCE703.1	Mid Term-1, Quiz & End Sem Exam
3	Essential components of Weir and Barrage	Lecture	BTCE703.1	Mid Term-1, Quiz & End Sem Exam
4	Weirs on permeable foundations	Lecture	BTCE703.1	Mid Term-1, Quiz & End Sem Exam
5	Blighs and khoslas seepage theories	Lecture	BTCE703.1	Mid Term-1, Quiz & End Sem Exam
6	Design procedure	Lecture	BTCE703.1	Mid Term-1, Quiz & End Sem Exam
7	Design procedure	Lecture	BTCE703.1	Mid Term-1, Quiz & End Sem Exam
8	Dams – Types of dams and their selection	Lecture	BTCE703.2	Mid Term-1, Quiz & End Sem Exam
9	Types, causes of failure and design criteria, soils suitable for earth dam construction	Lecture	BTCE703.2	Mid Term-1, Quiz & End Sem Exam
10	construction methods, foundation requirements.	Lecture	BTCE703.2	Mid Term-1, Quiz & End Sem Exam
11	typical earth dam sections, estimation of seepage through and below the dam	Lecture	BTCE703.2	Mid Term-1, Quiz & End Sem Exam
12	seepage control, stability of slopes by slip circle method of analysis, pore pressure	Lecture	BTCE703.2	Mid Term-1, Quiz & End Sem Exam
13	sudden draw down, steady seepage and construction pore pressure condition	Lecture	BTCE703.2	Mid Term-1, Quiz & End Sem Exam
14	Rock fill dams: Types, merits and demerits, conditions favourable for their adoption.	Lecture	BTCE703.2	Mid Term-1, Quiz & End Sem Exam
15	Gravity dam- Analysis and design.	Lecture	BTCE703.3	Mid Term-1, Quiz & End Sem Exam
16	Gravity dams: Design Criteria	Lecture	BTCE703.3	Mid Term-1, Quiz & End Sem Exam
17	forces acting on gravity dams	Lecture	BTCE703.3	Mid Term-1, Quiz & End Sem Exam
18	elementary profile, low and high gravity dams	Lecture	BTCE703.3	Mid Term-1, Quiz & End Sem Exam
19	stability analysis, evaluation of profile by method of zoning,	Lecture	BTCE703.3	Mid Term-1, Quiz & End Sem Exam
20	practical profile, foundation treatment,	Lecture	BTCE703.3	Mid Term-1, Quiz & End Sem Exam
21	construction joints, galleries in gravity dam	Lecture	BTCE703.3	Assignment, Quiz & End Sem Exam
22	Different types and suitability	Lecture	BTCE703.4	Assignment, Quiz & End Sem Exam
23	Ogee spill way and its design, details of syphon	Lecture	BTCE703.4	Assignment, Quiz

				& End Sem Exam
24	shaft, chute and side channel spillways,	Lecture	BTCE703.4	Assignment, Quiz & End Sem Exam
25	emergency spillways. Energy dissipatiors and gates: Principles of energy dissipation	Lecture	BTCE703.4	Assignment, Quiz & End Sem Exam
26	Energy dissiptors based on tail water rating curve and jump height curves Spillway crest gates- vertical lift and radial gates, their design principles and details.	Lecture	BTCE703.4	Assignment, Quiz & End Sem Exam
27	Design of canal regulating structures, Detailed design of Sarda Falls, design of cross drainage works,sphypon aquaduct.	Lecture	BTCE703.4	Assignment, Quiz & End Sem Exam
28	Purpose, Types of canal regulation works and their function aspects.	Lecture	BTCE703.4	Assignment, Quiz & End Sem Exam
29	Irrigation Outlets- Requirements,	Lecture	BTCE703.5	Assignment, Quiz & End Sem Exam
30	Types, non-moular, semi- module and rigid module,	Lecture	BTCE703.5	Assignment, Quiz & End Sem Exam
31	selection criterion. River Training – Objective and need	Lecture	BTCE703.5	Assignment, Quiz & End Sem Exam
32	classification of rivers and rivers	Lecture	BTCE703.5	Assignment, Quiz & End Sem Exam
33	river training works, meandering, stages	Lecture	BTCE703.5	Assignment, Quiz & End Sem Exam
34	methods of river training	Lecture	BTCE703.5	Assignment, Quiz & End Sem Exam
35	bank protection	Lecture	BTCE703.5	Assignment, Quiz & End Sem Exam
36	Methods for measurement of discharge.	Lecture	BTCE703.5	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE703.1	Identify different component in an head work and its use	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**

BTCE703.2	Design the head work of an irrigation system	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE703.3	Design the drops, escapes and outlet for the canal system	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
BTCE703.4	Describe various storage zones in an reservoir	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**
BTCE703.5	Calculate different types of forces acting on a dam and design it	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**

S. No.	Enrollment.No.	Student's Name	BTCE703 DESIGN OF HYDRAULIC STRUCTURES							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U3G3
1	A60215816004	Mr UTKARSH TOMAR	100	30	70	B+	7	3	3	21
2	A60215816007	Mr KUNAL MUKHARIYA	100	30	70	B+	7	3	3	21
3	A60215816008	Mr DAMODAR SINGH CHAUHAN	100	30	70	B-	5	3	3	15
4	A60215816009	Mr SATENDRA SINGH KUSHWAH	100	30	70	A-	8	3	3	24
5	A60215816011	Mr ANUJ PRATAP SINGH PARMAR	100	30	70	A	9	3	3	27
6	A60215816012	Mr HIMANSHU MAHLI	100	30	70	B-	5	3	3	15
7	A60215816013	Mr ANUJ BANSAL	100	30	70	C+	4	3	3	12
8	A60215816014	Mr SHIVAM SHRIVASTAVA	100	30	70	B	6	3	3	18
9	A60215816015	Mr RAHUL SINGH BAGHEL	100	30	70	A-	8	3	3	24
10	A60215816016	Mr ROHIT BHADORIA	100	30	70	B-	5	3	3	15
11	A60515815002	Mr GURJEET JAIN	100	30	70	A	9	3	3	27
12	A60515816001	Mr ANUJ SINGH BHADORIA	100	30	70	B+	7	3	3	21
13	A60515816002	Mr kunal kumar	100	30	70	B+	7	3	3	21
14	A60515816003	Mr MONUSHA DHAKAD	100	30	70	B+	7	3	3	21
15	A60515816004	Mr AMAN PARASHAR	100	30	70	B+	7	3	3	21
16	A60515816005	Mr DEEPAK SHARMA	100	30	70	A-	8	3	3	24
17	A60515816006	Mr ANUJ SHARMA	100	30	70	A	9	3	3	27
			Total No. of Students			=	17			
			Total No. of Students >60% mark			s	6	35.29	%	
			Attainment Level					-		

AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : HYDROLOGY AND FLOOD CONTROL
Course Code : BTCE707, Crédits : 04, Session :2019-20 (Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia, Dr. Imran Ahmad Khan, Dr. Ripunjoy Gogoi, Dr. P. Mahakavi, Mr. Sachin Tiwari

A. ***Introduction:*** The objective of this course is to understand the physical processes that determines the exchange of water at the Earth'ssurface.To become familiar with the physical properties that govern the movement of water throughthe unsaturated zone and how these can be observed in the field and modelled mathematically.To understand the physical factors that control evaporation and their representation usingenergy fluxes and diffusive transfer.To be familiar with the various physical and empirical models used to calculate evaporation& evapotranspiration and the data need to support their use.To be able to understand the processes which influence runoff from catchments and themethods for estimating the runoffTo use measured / estimated data like precipitation, runoff, infiltration, for hydrologic design

B. **Course Outcomes:** At the end of the course, students will be able to:
BTCE707.1*Understand the process and mathematical representation of hydrologic cycle*
BTCE707.2 *Understand the importance of catchment characteristics for runoff estimation*
BTCE707.3. Evaluate the hydrologic abstractions and also learn about the factors affecting various hydrologic abstractions
BTCE707.4 *Implementing the knowledge of precipitation and runoff measurement in hydrologic design*

C. **Programme Outcomes:**
PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be	A	5%

	qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I

Introduction hydrologic cycle, water budget equations, world water balance, application in engineering. Precipitation: Forms of precipitation, measurement, depth-area-duration & intensity- duration- frequency relationships, probable maximum precipitation.

Module II

Abstraction from Precipitation: Evaporation – process, measurement and estimation; Evapotranspiration-measurement and estimation; Initial Losses- Interception & Depression storage; Infiltration- process, capacities, indices, measurement & estimation

Module III: Runoff and Hydrographs

Hydrograph, runoff characteristics of stream, Yield, Rainfall-runoff correlations, flow duration curve, mass curve, droughts and floods. Factors affecting flood hydrographs, unit hydrograph and its analysis, s-curve hydrograph, synthetic and instantaneous unit hydrographs.

Module IV: Flood

Rational method, empirical formulae, unit hydrograph method, flood frequency studies, statistical analysis, regional flood frequency analysis, design storm & design flood, risk/reliability and safety factor; Flood Routing: Basic equation, hydrologic storage routing & attenuation, hydrologic channel routing, flood forecasting & control, hydraulic method of flood routing.

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- ‘‘Hydrology for Engineers’ by Linsley R. K., Kohler M. A. and Paulhus J. L. H.
- ‘Engineering Hydrology’ by K. Subramanya
- ‘Hydrology: Principles. Analysis. Design’ by Raghunath H. M.
- ‘Handbook of Applied Hydrology’ by Chow V. T.
- ‘Irrigation: Theory & Practice’ by Michael A. M.

I. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	Introductionhydrologic cycle	Lecture	BTCE707.1	Mid Term-1, Quiz & End Sem Exam
2	water budget equations	Lecture	BTCE707.1	Mid Term-1, Quiz & End Sem Exam

3	world water balance	Lecture	BTCE707.1	Mid Term-1, Quiz & End Sem Exam
4	application in engineering.	Lecture	BTCE707.1	Mid Term-1, Quiz & End Sem Exam
5	Precipitation	Lecture	BTCE707.1	Mid Term-1, Quiz & End Sem Exam
6	Forms of precipitation	Lecture	BTCE707.1	Mid Term-1, Quiz & End Sem Exam
7	measurement	Lecture	BTCE707.1	Mid Term-1, Quiz & End Sem Exam
8	depth-area-duration	Lecture	BTCE707.1	Mid Term-1, Quiz & End Sem Exam
9	intensity- duration- frequency relationships	Lecture	BTCE707.1	Mid Term-1, Quiz & End Sem Exam
10	probable maximum precipitation	Lecture	BTCE707.1	Mid Term-1, Quiz & End Sem Exam
11	probable maximum precipitation	Lecture	BTCE707.1	Mid Term-1, Quiz & End Sem Exam
12	probable maximum precipitation	Lecture	BTCE707.1	Mid Term-1, Quiz & End Sem Exam
13	Abstraction from Precipitation	Lecture	BTCE707.2	Mid Term-1, Quiz & End Sem Exam
14	Evaporation	Lecture	BTCE707.2	Mid Term-1, Quiz & End Sem Exam
15	process	Lecture	BTCE707.2	Mid Term-1, Quiz & End Sem Exam
16	measurement	Lecture	BTCE707.2	Mid Term-1, Quiz & End Sem Exam
17	estimation	Lecture	BTCE707.2	Mid Term-1, Quiz & End Sem Exam
18	Evapotranspiration	Lecture	BTCE707.2	Mid Term-1, Quiz & End Sem Exam
19	measurement and estimation	Lecture	BTCE707.2	Mid Term-1, Quiz & End Sem Exam
20	Initial Losses	Lecture	BTCE707.2	Mid Term-1, Quiz & End Sem Exam
21	Interception	Lecture	BTCE707.2	Assignment, Quiz & End Sem Exam
22	Depression storage	Lecture	BTCE707.2	Assignment, Quiz & End Sem Exam
23	Infiltration- process, capacities,	Lecture	BTCE707.2	Assignment, Quiz & End Sem Exam
24	indices, measurement & estimation	Lecture	BTCE707.2	Assignment, Quiz & End Sem Exam
25	Hydrograph	Lecture	BTCE707.3	Assignment, Quiz & End Sem Exam
26	runoff characteristics of stream	Lecture	BTCE707.3	Assignment, Quiz & End Sem Exam
27	Yield	Lecture	BTCE707.3	Assignment, Quiz

				& End Sem Exam
28	Rainfall-runoff correlations	Lecture	BTCE707.3	Assignment, Quiz & End Sem Exam
29	flow duration curve, mass curve	Lecture	BTCE707.3	Assignment, Quiz & End Sem Exam
30	droughts and floods	Lecture	BTCE707.3	Assignment, Quiz & End Sem Exam
31	Factors affecting flood hydrographs	Lecture	BTCE707.3	Assignment, Quiz & End Sem Exam
32	unit hydrograph	Lecture	BTCE707.3	Assignment, Quiz & End Sem Exam
33	unit hydrograph and its analysis	Lecture	BTCE707.3	Assignment, Quiz & End Sem Exam
34	s-curve hydrograph	Lecture	BTCE707.3	Assignment, Quiz & End Sem Exam
35	Synthetic hydrographs	Lecture	BTCE707.3	Assignment, Quiz & End Sem Exam
36	instantaneous unit hydrographs	Lecture	BTCE707.3	Assignment, Quiz & End Sem Exam
37	Rational method	Lecture	BTCE707.4	Quiz & End Sem Exam
38	empirical formulae	Lecture	BTCE707.4	Quiz & End Sem Exam
39	unit hydrograph method	Lecture	BTCE707.4	Quiz & End Sem Exam
40	flood frequency studies	Lecture	BTCE707.4	Quiz & End Sem Exam
41	statistical analysis	Lecture	BTCE707.4	Quiz & End Sem Exam
42	regional flood frequency analysis,	Lecture	BTCE707.4	Quiz & End Sem Exam
43	design storm & design flood	Lecture	BTCE707.4	Quiz & End Sem Exam
44	risk/reliability and safety factor	Lecture	BTCE707.4	Quiz & End Sem Exam
45	Flood Routing: Basic equation	Lecture	BTCE707.4	Quiz & End Sem Exam
46	hydrologic storage routing &attenuation	Lecture	BTCE707.4	Quiz & End Sem Exam
47	hydrologic channel routing, flood forecasting & control	Lecture	BTCE707.4	Quiz & End Sem Exam
48	hydraulic method of flood routing	Lecture	BTCE707.4	Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE707.1	Understand the process and mathematical representation of hydrologic cycle	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
BTCE707.2	Understand the importance of catchment characteristics for runoff estimation	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE707.3	Evaluate the hydrologic abstractions and also learn about the factors affecting various hydrologic abstractions	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
BTCE707.4	Implementing the knowledge of precipitation and runoff measurement in hydrologic design	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**

S. No.	**Enrollment.No.**	**Student's Name**	**BTCE707 HYDROLOGY & FLOOD CONTROL**							
			Max Marks	**CE Weigh t Age (%)**	**ET Weigh t Age (%)**	**GO**	**GP**	**ACU**	**ECU**	**U9G9**
1	A60215816004	Mr UTKARSH TOMAR	100	30	70	A+	10	4	4	40
2	A60215816007	Mr KUNAL MUKHARIYA	100	30	70	A	9	4	4	36
3	A60215816008	Mr DAMODAR SINGH CHAUHAN	100	30	70	A	9	4	4	36
4	A60215816009	Mr SATENDRA SINGH	100	30	70	B+	7	4	4	28

		KUSHWAH								
5	A60215816011	Mr ANUJ PRATAP SINGH PARMAR	100	30	70	A	9	4	4	36
6	A60215816012	Mr HIMANSHU MAHLI	100	30	70	A	9	4	4	36
7	A60215816013	Mr ANUJ BANSAL	100	30	70	A	9	4	4	36
8	A60215816014	Mr SHIVAM SHRIVASTAVA	100	30	70	A-	8	4	4	32
9	A60215816015	Mr RAHUL SINGH BAGHEL	100	30	70	A+	10	4	4	40
10	A60215816016	Mr ROHIT BHADORIA	100	30	70	A+	10	4	4	40
11	A60515815002	Mr GURJEET JAIN	100	30	70	A+	10	4	4	40
12	A60515816001	Mr ANUJ SINGH BHADORIA	100	30	70	A+	10	4	4	40
13	A60515816002	Mr kunal kumar	100	30	70	A+	10	4	4	40
14	A60515816003	Mr MONUSHA DHAKAD	100	30	70	A+	10	4	4	40
15	A60515816004	Mr AMAN PARASHAR	100	30	70	A	9	4	4	36
16	A60515816005	Mr DEEPAK SHARMA	100	30	70	A+	10	4	4	40
17	A60515816006	Mr ANUJ SHARMA	100	30	70	A	9	4	4	36

Total No. of Students	=	17		
Total No. of Students	>60 % marks	16	94.12	%
Attainment Level			Level 3	

DEPARTMENT OF CIVIL ENGINEERING

Course Handout

Course : ENVIRONMENTAL ENGINEERING LAB

Course Code : BTCE720 Crédits : 01, Session :2019-20 (Odd Sem.), Class : B.Tech. 4th Year

Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia, Dr. Imran Ahmad Khan, Dr. Ripunjoy Gogoi, Dr. P. Mahakavi, Mr. Sachin Tiwari

A. ***Introduction:*** *The objective of this course is to* teach students the basic principles and concepts of unit operations and processes involvedin water and wastewater treatment. To develop a student's skill in the basic design of unit operations and processesinvolved in water and wastewater treatment. To develop a student's skill in evaluating the performance of water and wastewater treatmentplants. To teach students the various methods of sludge management

B. **Course Outcomes:** At the end of the course, students will be able to:

BTCE720.1. Able to design individual unit operation or process appropriate to the situation by applying physical, chemical, biological and engineering principles.

BTCE720.2. Able to identify the type of unit operations and processes involved in water and wastewater treatment plants based on the water quality

BTCE720.3. Investigate the performance of various unit operations and processes to meet the desired health and environment related goals.

BTCE720.4. Understand sludge management and disposal

U. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

V. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

W. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

X. Syllabus

1. Determination of solids (total, dissolved, organic, inorganic and settleable) in water

2. Determination of turbidity and the optimum coagulant dose

3. Determination of alkalinity and pH of water

4. Determination of hardness and chlorides in water

5. Determination of iron and manganese in water

6. Determination of sulphates and sulphides in water

7. Determination of D.O and B.O.D of waste water

8. Determination of available chlorine in bleaching powder and the chlorine dose required to treat the given water sample

9. Determination of coliforms in water

10. Demonstration of Instrumental methods of pollutant analysis

Y. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Z. Suggested Text/Reference Books:

- Standard method for the examination of water and waste water, 2005, APHA, AWWA, WPCF Publication

AA. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Determination of solids (total, dissolved, organic, inorganic and settleable) in water	Practical	BTCE720.1	Mid Term-1, Quiz & End Sem Exam
2	Determination of turbidity and the optimum coagulant dose	Practical	BTCE720.1	Mid Term-1, Quiz & End Sem Exam
3	Determination of alkalinity and pH of water	Practical	BTCE720.1	Mid Term-1, Quiz & End Sem Exam
4	Determination of hardness and chlorides in water	Practical	BTCE720.2	Mid Term-1, Quiz & End Sem Exam
5	Determination of iron and manganese in water	Practical	BTCE720.2	Mid Term-1, Quiz & End Sem Exam
6	Determination of sulphates and sulphides in water	Practical	BTCE720.2	Mid Term-1, Quiz & End Sem Exam
7	Determination of D.O and B.O.D of waste water	Practical	BTCE720.3	Mid Term-1, Quiz & End Sem Exam
8	Determination of available chlorine in bleaching powder and the chlorine dose required to treat the given water sample	Practical	BTCE720.3	Mid Term-1, Quiz & End Sem Exam
9	Determination of coliforms in water	Practical	BTCE720.3	Mid Term-1, Quiz & End Sem Exam
10	Determination of coliforms in water	Practical	BTCE720.4	Mid Term-1, Quiz & End Sem Exam
11	Demonstration of Instrumental methods of pollutant analysis	Practical	BTCE720.4	Mid Term-1, Quiz & End Sem Exam
12	Demonstration of Instrumental methods of pollutant analysis	Practical	BTCE720.4	Mid Term-1, Quiz & End Sem Exam

BB. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

BTCE720.1	Able to design individual unit operation or process appropriate to the situation by applying physical, chemical, biological and engineering principles.	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
BTCE720.2	Able to identify the type of unit operations and processes involved in water and wastewater treatment plants based on the water quality	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE720.3	Investigate the performance of various unit operations and processes to meet the desired health and environment related goals.	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
BTCE720.4	Understand sludge management and disposal	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**

S. No.	Enrollment.No.	Student's Name	BTCE720 ENVIRONMENTAL ENGINEERING LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U4G4
1	A60215816004	Mr UTKARSH TOMAR	100	30	70	A	9	1	1	9
2	A60215816007	Mr KUNAL MUKHARIYA	100	30	70	A	9	1	1	9
3	A60215816008	Mr DAMODAR SINGH CHAUHAN	100	30	70	A-	8	1	1	8
4	A60215816009	Mr SATENDRA SINGH KUSHWAH	100	30	70	A-	8	1	1	8
5	A60215816011	Mr ANUJ PRATAP SINGH PARMAR	100	30	70	A	9	1	1	9
6	A60215816012	Mr HIMANSHU MAHLI	100	30	70	A	9	1	1	9
7	A60215816013	Mr ANUJ BANSAL	100	30	70	A	9	1	1	9
8	A60215816014	Mr SHIVAM SHRIVASTAVA	100	30	70	A	9	1	1	9
9	A60215816015	Mr RAHUL SINGH BAGHEL	100	30	70	A+	10	1	1	10

10	A60215816016	Mr ROHIT BHADORIA	100	30	70	A-	8	1	1	8
11	A60515815002	Mr GURJEET JAIN	100	30	70	A-	8	1	1	8
12	A60515816001	Mr ANUJ SINGH BHADORIA	100	30	70	A+	10	1	1	10
13	A60515816002	Mr kunal kumar	100	30	70	A	9	1	1	9
14	A60515816003	Mr MONUSHA DHAKAD	100	30	70	A	9	1	1	9
15	A60515816004	Mr AMAN PARASHAR	100	30	70	A-	8	1	1	8
16	A60515816005	Mr DEEPAK SHARMA	100	30	70	A	9	1	1	9
17	A60515816006	Mr ANUJ SHARMA	100	30	70	A+	10	1	1	10
			Total No. of Students		=	17				
			Total No. of Students		>60 % marks	17	100	%		
			Attainment Level				Level 3			

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : STRUCTURAL DETAILING LAB
Course Code : BTCE721 Crédits : 01, Session :2019-20 (Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia, Dr. Imran Ahmad Khan, Dr. Ripunjoy Gogoi, Dr. P. Mahakavi, Mr. Sachin Tiwari

C. ***Introduction:*** *The objective of this course is to* understand the design of columns. To understand the design of beams. To know the importance of the beams and its applications. To apply the numerical techniques for different structural elements. To study the different numerical procedures for calculating the response of structures. To learn the design of frames, slabs.

D. **Course Outcomes:** At the end of the course, students will be able to:

BTCE721.1. Understand the designand theories of slabs.
BTCE721.2. Understand the design and theories of columns.
BTCE721.3. Understand the design and theories of beams.
BTCE721.4. Understand the design and theories of foundations.

CC. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

DD. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

EE. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal	Mid Term 1	CT	15%

Evaluation	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

FF. Syllabus

Preparation of working drawings for the following using any drafting software:

RC Beams- Simply supported, Continuous, Cantilever

T – beam / L-beam floor

Slabs – Simply supported, Continuous, One way and two way slabs.

Columns – Tied Columns and Spirally reinforced columns.

Isolated footings for RC Columns.

Combined rectangular and trapezoidal footings.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

GG. Suggested Text/Reference Books:

- SPurushothaman. P, Reinforced Concrete Structural Elements-, Tata McGraw Hill, 1986
- G.S. Ramaswamy, Design and Construction of Concrete Shell Roofs-CBS publishers, 1986
- Ashok K Jain, Reinforced Concrete –Nem Chand Bros. Roorkee, 1998
- Jain & Jaikrishna, Plain and Reinforced Concrete – Vol I & II, Nem Chand Bros., Roorkee, 2000.
- Taylor C Pere, Reinforced Concrete Chimneys, Concrete publications, 1960
- Design of deep girders, Concrete Association of India, 1960
- Mallick & Gupta, Reinforced Concrete, - Oxford & IBH, 1982
- BIS codes (IS 456, IS 2210, IS 4998, IS 3370, SP 16, SP 24, SP 34).
- IRC Codes (IRC 5, IRC 6, IRC 21)

HH. Lecture Plan

Lecture	**Topics**	**Mode of**	**Correspon ding CO**	**Mode of Assessing CO**

		Delivery		
1	RC Beams- Simply supported, Continuous, Cantileve	Practical	BTCE721.1	Mid Term-1, Quiz & End Sem Exam
2	RC Beams- Simply supported, Continuous, Cantileve	Practical	BTCE721.1	Mid Term-1, Quiz & End Sem Exam
3	T – beam / L-beam floor	Practical	BTCE721.1	Mid Term-1, Quiz & End Sem Exam
4	T – beam / L-beam floor	Practical	BTCE721.2	Mid Term-1, Quiz & End Sem Exam
5	Slabs – Simply supported, Continuous, One way and two way slabs.	Practical	BTCE721.2	Mid Term-1, Quiz & End Sem Exam
6	Slabs – Simply supported, Continuous, One way and two way slabs.	Practical	BTCE721.2	Mid Term-1, Quiz & End Sem Exam
7	Columns – Tied Columns and Spirally reinforced columns.	Practical	BTCE721.3	Mid Term-1, Quiz & End Sem Exam
8	Columns – Tied Columns and Spirally reinforced columns.	Practical	BTCE721.3	Mid Term-1, Quiz & End Sem Exam
9	Isolated footings for RC Column	Practical	BTCE721.3	Mid Term-1, Quiz & End Sem Exam
10	Isolated footings for RC Column	Practical	BTCE721.4	Mid Term-1, Quiz & End Sem Exam
11	Combined rectangular and trapezoidal footings	Practical	BTCE721.4	Mid Term-1, Quiz & End Sem Exam
12	Combined rectangular and trapezoidal footings	Practical	BTCE721.4	Mid Term-1, Quiz & End Sem Exam

II. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE721.1	Understand the design and theories of slabs.	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
BTCE721.2	Understand the design and theories of columns.	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**

BTCE721.3	Understand the design and theories of beams.	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
BTCE721.4	Understand the design and theories of foundations.	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**

S. No.	Enrollment.No.	Student's Name	BTCE721 STRUCTURAL DETAILING LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U5G5
1	A60215816004	Mr UTKARSH TOMAR	100	30	70	B+	7	1	1	7
2	A60215816007	Mr KUNAL MUKHARIYA	100	30	70	A-	8	1	1	8
3	A60215816008	Mr DAMODAR SINGH CHAUHAN	100	30	70	B+	7	1	1	7
4	A60215816009	Mr SATENDRA SINGH KUSHWAH	100	30	70	B+	7	1	1	7
5	A60215816011	Mr ANUJ PRATAP SINGH PARMAR	100	30	70	B+	7	1	1	7
6	A60215816012	Mr HIMANSHU MAHLI	100	30	70	B	6	1	1	6
7	A60215816013	Mr ANUJ BANSAL	100	30	70	B+	7	1	1	7
8	A60215816014	Mr SHIVAM SHRIVASTAVA	100	30	70	B	6	1	1	6
9	A60215816015	Mr RAHUL SINGH BAGHEL	100	30	70	A	9	1	1	9
10	A60215816016	Mr ROHIT BHADORIA	100	30	70	B+	7	1	1	7
11	A60515815002	Mr GURJEET JAIN	100	30	70	B+	7	1	1	7
12	A60515816001	Mr ANUJ SINGH BHADORIA	100	30	70	A-	8	1	1	8
13	A60515816002	Mr kunal kumar	100	30	70	A	9	1	1	9
14	A60515816003	Mr MONUSHA DHAKAD	100	30	70	A-	8	1	1	8
15	A60515816004	Mr AMAN PARASHAR	100	30	70	A-	8	1	1	8
16	A60515816005	Mr DEEPAK SHARMA	100	30	70	A-	8	1	1	8
17	A60515816006	Mr ANUJ SHARMA	100	30	70	A-	8	1	1	8
			Total No. of Students			=	17			
			Total No. of Students			>60% marks	8	47.06	%	
			Attainment Level					-		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **PROJECT**
Course Code : BTCE760, Crédits : 06, Session :2019-20 (Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia, Dr. Imran Ahmad Khan, Dr. Ripunjoy Gogoi, Dr. P. Mahakavi, Mr. Sachin Tiwari

A. Introduction: The objective of project is to enable the student to take up investigative study in the broad field of Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the Department on an individual basis or two/three students in a group, under the guidance of a Supervisor.

B. Course Outcomes: At the end of the course, students will be able to:

BTCE760.1. Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.

BTCE760.2. Design, implement and test the prototype/algorithm in order to solve the conceived problem.

BTCE760.3. Write comprehensive report on project work.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
End Semester Examination	End Semester Examination	EE	100%
Total			**100%**

F. Syllabus

Methodology:

Practical training is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

G. Examination Scheme:

Literature study/ Fabrication/ Experimentation	40
Written Report	20
Viva	15
Presentation	25
Total	**100**

H. Suggested Text/Reference Books: NA

I. Lecture Plan : NA

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE760.1	*Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.*	3	**2**	1	3	1	**-**	**-**	**-**	2		2	1	**1**	**2**	**1**
BTCE760.2	*Design, implement and test the prototype/algorithm in order to solve the conceived problem.*	3	1	2	2	2	**-**	**-**	**-**	2		1	1	**3**	**2**	**3**
BTCE760.3	*Write comprehensive report on project work*	2	2	2	2	2	**-**	**-**	**-**	3		3	1	**3**	**3**	**2**

S. No.	Enrollment.No.	Student's Name	BTCE760 PROJECT Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U10G10
1	A60215816004	Mr UTKARSH TOMAR	100	0	100	A-	8	6	6	48
2	A60215816007	Mr KUNAL MUKHARIYA	100	0	100	A-	8	6	6	48
3	A60215816008	Mr DAMODAR SINGH CHAUHAN	100	0	100	B+	7	6	6	42
4	A60215816009	Mr SATENDRA SINGH KUSHWAH	100	0	100	B+	7	6	6	42
5	A60215816011	Mr ANUJ PRATAP SINGH PARMAR	100	0	100	B+	7	6	6	42
6	A60215816012	Mr HIMANSHU MAHLI	100	0	100	B+	7	6	6	42
7	A60215816013	Mr ANUJ BANSAL	100	0	100	B+	7	6	6	42
8	A60215816014	Mr SHIVAM SHRIVASTAVA	100	0	100	A-	8	6	6	48
9	A60215816015	Mr RAHUL SINGH BAGHEL	100	0	100	A	9	6	6	54
10	A60215816016	Mr ROHIT BHADORIA	100	0	100	A-	8	6	6	48
11	A60515815002	Mr GURJEET JAIN	100	0	100	A-	8	6	6	48
12	A60515816001	Mr ANUJ SINGH BHADORIA	100	0	100	A	9	6	6	54
13	A60515816002	Mr kunal kumar	100	0	100	A	9	6	6	54
14	A60515816003	Mr MONUSHA DHAKAD	100	0	100	A-	8	6	6	48
15	A60515816004	Mr AMAN PARASHAR	100	0	100	B+	7	6	6	42
16	A60515816005	Mr DEEPAK SHARMA	100	0	100	A-	8	6	6	48
17	A60515816006	Mr ANUJ SHARMA	100	0	100	A	9	6	6	54

Total No. of Students	=	17		
Total No. of Students	>60 % marks	11	64.71	%
Attainment Level			Level 1	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **INDUSTRIAL TRAINING**
Course Code : BTCE750, Crédits : 06, Session :2019-20 (Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia, Dr. Imran Ahmad Khan, Dr. Ripunjoy Gogoi, Dr. P. Mahakavi, Mr. Sachin Tiwari

K. **Introduction:** The objective of this course is to enable the students to explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills. It will help them to manage the technical content and work. It will also help them to prepare and present technical report..

L. **Course Outcomes:**At the end of the course, students will be able to:

BTCE750.1. Explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills.

BTCE750.2. Manage the technical content and work.

BTCE750.3. Learn the various administrative process followed in industry and prepare and present technical report.

M. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

N. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

O. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
End Semester Examination	End Semester Examination	EE	100%
Total			**100%**

P. Syllabus

Methodology:

Industrial training is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

Q. Examination Scheme:

Feedback from industry/work place	20
Training Report	40
Viva	15
Presentation	25
Total	**100**

R. Suggested Text/Reference Books: NA

S. Lecture Plan : NA

T. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE750.1	Explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills.	3	**2**	1	3	1	-	-	-	2		2	1	**1**	**2**	**1**
BTCE750.2	Manage the technical content and work.	3	1	2	2	2	-	-	-	2		1	1	**3**	**2**	**3**
BTCE750.3	Learn the various administrative process followed in industry and prepare and present technical report.	2	2	2	2	2	-	-	-	3		3	1	**3**	**3**	**2**

AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

PROGRAMME ARTICULATION MATRIX

4th Year		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
VIII SEM	BTCE-801	3	2	2	-	2	-	-	3	2	-	-	2	3	-	2
	BTCE-802	3	2	2	-	-	-	1	-	-	-	-	2	3	-	2
	BTCE-804	3	2	2	-	2	-	1	-	-	-	-	2	3	-	2
	BTCE-860	3	2	2	-	2	-	1	-	-	-	-	2	3	-	2

S. No.	Enrollment. No.	Student's Name	BTCE750 INDUSTRIAL TRAINING (EVALUATION)							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U11G 11
1	A60215816004	Mr UTKARSH TOMAR	100	0	100	A-	8	6	6	48
2	A60215816007	Mr KUNAL MUKHARIYA	100	0	100	A-	8	6	6	48
3	A60215816008	Mr DAMODAR SINGH CHAUHAN	100	0	100	B+	7	6	6	42
4	A60215816009	Mr SATENDRA SINGH KUSHWAH	100	0	100	B	6	6	6	36
5	A60215816011	Mr ANUJ PRATAP SINGH PARMAR	100	0	100	B+	7	6	6	42
6	A60215816012	Mr HIMANSHU MAHLI	100	0	100	B+	7	6	6	42
7	A60215816013	Mr ANUJ BANSAL	100	0	100	B+	7	6	6	42
8	A60215816014	Mr SHIVAM SHRIVASTAVA	100	0	100	B+	7	6	6	42
9	A60215816015	Mr RAHUL SINGH BAGHEL	100	0	100	A	9	6	6	54
10	A60215816016	Mr ROHIT BHADORIA	100	0	100	B+	7	6	6	42
11	A60515815002	Mr GURJEET JAIN	100	0	100	A-	8	6	6	48
12	A60515816001	Mr ANUJ SINGH BHADORIA	100	0	100	A	9	6	6	54
13	A60515816002	Mr kunal kumar	100	0	100	A	9	6	6	54
14	A60515816003	Mr MONUSHA DHAKAD	100	0	100	A-	8	6	6	48
15	A60515816004	Mr AMAN PARASHAR	100	0	100	B+	7	6	6	42
16	A60515816005	Mr DEEPAK SHARMA	100	0	100	A-	8	6	6	48
17	A60515816006	Mr ANUJ SHARMA	100	0	100	A-	8	6	6	48

Total No. of Students	=	17		
Total No. of Students	>60 % marks	9	52.94	%
Attainment Level			-	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **ADVANCED CONCRETE DESIGN**
Course Code : BTCE 801, Crédits : 04, Session : 2019-20 (Even Sem.), Class : B.Tech. 4th Year
Faculty Name : Mr. Sachin Tiwari

A. Introduction

Design is a plan or drawing produced to show the look and function or workings of a building before it is built. It is also the process of selecting the proper materials and proportioning the different elements of the structure according to state-of-the art engineering science and technology.

B. Course Outcomes: At the end of the course, students will be able to:

- **BTCE 801.1**.Estimate the crack width and deflection with regard to the serviceability. .
- **BTCE 801.2**. Analyse and design a grid floor system. Analyse and design a flat slab system. Discuss fire and seismic resistance of concrete structures

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentt	A	5%

	o be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			100%

F. **Course Content**

Module I Large span concrete roofs: Introduction– classification- behaviour of flat slabs - direct design and equivalent frame method- codal provisions - waffle slabs.

Module II: Deep beams Analysis of deep beams- design as per BIS - design using strut and tie method.

Chimneys Analysis of stresses in concrete chimneys - uncracked and cracked sections- codal provisions- design of chimney. A project involving the design of a deep beam and concrete chimney is envisaged at this stage.

Module III: Water tanks /Bunkers/Silos: Introduction- rectangular and circular with flat bottom- spherical and conical tank roofs- staging- design as per BIS. A project involving the design and detailing of a water tank is envisaged at this stage.

Module IV: Bridges : Design of slab culvert – R.C box culverts –T-beam bridges – Concept on design of continuous bridges, balanced cantilever bridges, arch bridges and rigid frame bridges. A project involving the design and detailing of a slab culvert/ T-beam bridge is envisaged at this stage.

G. **Examination Scheme:**

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. **Suggested Books**

- Purushothaman. P, Reinforced Concrete Structural Elements-, Tata McGraw Hill, 1986
- G.S. Ramaswamy, Design and Construction of Concrete Shell Roofs-CBS publishers, 1986
- Ashok K Jain, Reinforced Concrete –Nem Chand Bros. Roorkee, 1998
- Jain & Jaikrishna, Plain and Reinforced Concrete – Vol I & II, Nem Chand Bros., Roorkee, 2000.
- Taylor C Pere, Reinforced Concrete Chimneys, Concrete publications, 1960

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
2	classification- behaviour of flat slabs.	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
3	classification- behaviour of flat slabs.	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
4	Design and classification- behaviour of flat slabs.	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
5	direct design and equivalent frame method	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
6	direct design and equivalent frame method	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
7	direct design and equivalent frame method	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
8	direct design and equivalent frame method	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
9	codal provisions for design of flat slab	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
10	codal provisions for design of flat slab	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
11	Analysis of deep beams- design as per BIS - design using strut and tie method.	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
12	Analysis of deep beams design as per BIS - design using strut and tie method.	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
13	Analysis of deep beams design as per BIS - design using strut and tie method.	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
14	**Chimneys** Analysis of stresses in concrete chimneys	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
15	**Chimneys** Analysis of stresses in concrete chimneys	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam

16	**Chimneys** Analysis of stresses in concrete chimneys	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
17	uncracked and cracked sections	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
18	uncracked and cracked sections	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
19	codal provisions- design of chimney. A project involving the design of a deep beam and concrete chimney is envisaged at this stage.	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
20	codal provisions- design of chimney. A project involving the design of a deep beam and concrete chimney is envisaged at this stage.	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
21	codal provisions- design of chimney. A project involving the design of a deep beam and concrete chimney is envisaged at this stage.	Lecture	BTCE 801.1	Mid Term-2, Quiz & End Sem Exam
22	Introduction	Lecture	BTCE 801.1	Mid Term-2, Quiz & End Sem Exam
23	Rectangular and circular with flat bottom- spherical and conical tank roofs- staging- design as per BIS.	Lecture	BTCE 801.1	Mid Term-2, Quiz & End Sem Exam
24	Rectangular and circular with flat bottom- spherical and conical tank roofs- staging- design as per BIS.	Lecture	BTCE 801.1	Mid Term-2, Quiz & End Sem Exam
25	Rectangular and circular with flat bottom- spherical and conical tank roofs- staging- design as per BIS.	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
26	Rectangular and circular with flat bottom- spherical and conical tank roofs- staging- design as per BIS.	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
27	A project involving the design and detailing of a water tank is envisaged at this stage.	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
28	A project involving the design and detailing of a water tank is envisaged at this stage.	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
29	A project involving the design and detailing of a water tank is	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam

	envisaged at this stage.			
30	A project involving the design and detailing of a water tank is envisaged at this stage.	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
31	Design of slab culvert – R.C box culverts –T, balanced cantilever bridges, arch bridges and rigid frame bridges.	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
32	Beam bridges – Concept on design of continuous bridges	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
33	Beam bridges – Concept on design of continuous bridges	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
34	Beam bridges – Concept on design of continuous bridges	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
35	balanced cantilever bridges, arch bridges and rigid frame bridges.	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
36	balanced cantilever bridges, arch bridges and rigid frame bridges	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
37	A project involving the design and detailing of a slab culvert/ T-beam bridge is envisaged at this stage	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
38	A project involving the design and detailing of a slab culvert/ T-beam bridge is envisaged at this stage	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
39	A project involving the design and detailing of a slab culvert/ T-beam bridge is envisaged at this stage	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
40	A project involving the design and detailing of a slab culvert/ T-beam bridge is envisaged at this stage	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
41	Beam bridges – Concept on design of continuous bridges	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
42	Beam bridges – Concept on design of continuous bridges	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
43	balanced cantilever bridges, arch bridges and rigid frame bridges.	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
44	balanced cantilever bridges, arch bridges and rigid frame bridges	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
45	A project involving the design and detailing of a slab culvert/ T-beam bridge is envisaged at this stage	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam

46	A project involving the design and detailing of a slab culvert/ T-beam bridge is envisaged at this stage	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
47	A project involving the design and detailing of a slab culvert/ T-beam bridge is envisaged at this stage	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
48	A project involving the design and detailing of a slab culvert/ T-beam bridge is envisaged at this stage	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam

E. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE 801.1	Estimate the crack width and deflection with regard to the serviceability. .	3	3	1	3	1				2		2	1			
BTCE 801.2	Analyse and design a grid floor system. Analyse and design a flat slab system. Discuss fire and seismic resistance of concrete structures	3	2	2	2	2				2		1	1			

Amity University Madhya Pradesh
B.Tech (Civil Engineering)
2016-2020

Exam Result For (Semester) : VIII

Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment. No.	Student's Name	BTCE801 ADVANCED CONCRETE DESIGN Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U1G1
1	A60215816004	Mr UTKARSH TOMAR	100	30	70	A	9	4	4	36
2	A60215816007	Mr KUNAL MUKHARIYA	100	30	70	A+	10	4	4	40
3	A60215816008	Mr DAMODAR SINGH CHAUHAN	100	30	70	A	9	4	4	36
4	A60215816009	Mr SATENDRA SINGH KUSHWAH	100	30	70	A	9	4	4	36
5	A60215816011	Mr ANUJ PRATAP SINGH PARMAR	100	30	70	A-	8	4	4	32
6	A60215816012	Mr HIMANSHU MAHLI	100	30	70	A	9	4	4	36
7	A60215816013	Mr ANUJ BANSAL	100	30	70	A	9	4	4	36
8	A60215816014	Mr SHIVAM SHRIVASTAVA	100	30	70	A+	10	4	4	40
9	A60215816015	Mr RAHUL SINGH BAGHEL	100	30	70	A+	10	4	4	40
10	A60215816016	Mr ROHIT BHADORIA	100	30	70	A+	10	4	4	40
11	A60515815002	Mr GURJEET JAIN	100	30	70	A	9	4	4	36
12	A60515816001	Mr ANUJ SINGH BHADORIA	100	30	70	A+	10	4	4	40
13	A60515816002	Mr kunal kumar	100	30	70	A+	10	4	4	40
14	A60515816003	Mr MONUSHA DHAKAD	100	30	70	A	9	4	4	36
15	A60515816004	Mr AMAN PARASHAR	100	30	70	A	9	4	4	36
16	A60515816005	Mr DEEPAK SHARMA	100	30	70	A+	10	4	4	40
17	A60515816006	Mr ANUJ SHARMA	100	30	70	A+	10	4	4	40

Total No. of Students	=	17		
Total No. of Students	>60 % marks	17	100.00	%
Attainment Level			Level 3	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **ENGINEERING ECONOMICS AND MANAGEMENT**
Course Code : BTCE 802, Crédits : 03, Session : 2019-20 (Even Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Ripunjoy Gogoi

A. Introduction

This course aims to enables the Civil Engineering student to become an entrepreneur by understanding the law of economics. To ensure the students to apply different Methods of appraisal of projects and pricing techniques apart from knowing about various Macroeconomics Model.

Course Outcomes: At the end of the course, students will be able to:

- **BTCE 802.1**.Know the Scope and Method of Managerial economics along with Fundamental Economics and help them to develop a thorough understanding on engineering decision making.
- **BTCE 802.2**. Analyse the demand and supply adopting market strategy
- **BTCE 802.3.** Understand the production function and factors affecting it with various economy conditions of the firm.
- **BTCE 802.4.** Study the different types of market structure and strategies

- **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

B. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage**
Continuous Internal	Mid Term 1	CT	15%

Evaluation			
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentt o be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			100%

C. Course Content

Module I: Organisations and their Economic Environment: Definition of Economics and Managerial Economics – Nature and Scope – Definition and Concept of Good, Want, Value, Wealth, Utility – Utility and Demand – Law of Diminishing Marginal Utility – Assumptions and Importance. Demand and Supply – Law of Demand and Law of Supply. Market price and natural price. Standard market forms- Monopoly, Perfect competition. Organisational forms- Proprietorship, partnership, Joint Stock Company – Cooperative organisation.

Module II: Macroeconomics: Money- nature and functions – Inflation and Deflation – Kinds of Banking – commercial banks – Central banking – Credit instrument - Monetary Policy – International trade Balance of trade and Balance of Payments – taxation – Direct and Indirect taxes – Impact and Incidence of tax- Concept of National Income – Features with reference to developing countries.

Module III: Introduction to Management: Management Theory- Characteristics of management – Systems Approach to management –Concepts of goal, objective, strategies, programmes. Decision making under certainty, uncertainty and risk – Introduction to functional areas of management – Operations management, Human resources management, marketing management.

Module IV: Financial and Inventory Management: Need for Financial Management – Types of financing – Short term and long term Borrowing– Equity financing – Analysis of Financial Statement – balance sheet – Profit and Loss account – Fund flow statement – Ratio Analysis . Investment and Financial decision –Financial control and Job control. Functions and objectives of Inventory management – Decision models – Economic Order Quantity (EOQ) model – sensitivity analysis of EOQ model, Economic production lot size model – inventory model with planned shortages – Periodic order quantity – single period Inventory models – Simulation model for inventory analysis.

Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

D. Suggested Books

- Konni, Donnel C.O. and Weighnrich. H., Management, Eight Edition, McGraw Hill International Book Company, 1997.
- Philip Kotler, Marketing Management, Prentice-Hall of India, Edition 1998.
- G.W. Plossl, Production and inventory control by, Prentice Hall.
- Paul A Samuelson and William D Nardhaus, Economics, McGraw Hill International Edition.
- Barthwal R R, Industrial Economics – An Introductory Text Book, New Age International Pvt Ltd, 2000.
- Aninnya Sen, Microeconomics – Theory and Applications, OUP.
- Sharma J.L., Construction management and accounts, Sathya Prakashan, New Delhi, 1994.
- Srinath,L.S. An Introduction to Project Management, Tata McGraw Hill publications, 1995.

E. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	Definition of Economics and—— Assumptions and. Market price and natural price. Standard market forms-	Lecture	BTCE 802.1	Mid Term-1, Quiz & End Sem Exam
2	Managerial Economics – Nature and Scope	Lecture	BTCE 802.1	Mid Term-1, Quiz & End Sem Exam
3	Managerial Economics – Nature and Scope	Lecture	BTCE 802.1	Mid Term-1, Quiz & End Sem Exam
4	Definition and Concept of Good, Want, Value, Wealth, Utility – Utility and Demand	Lecture	BTCE 802.1	Mid Term-1, Quiz & End Sem Exam
5	Definition and Concept of Good, Want, Value, Wealth, Utility – Utility and Demand	Lecture	BTCE 802.1	Mid Term-1, Quiz & End Sem Exam
6	Law of Diminishing Marginal Utility	Lecture	BTCE 802.1	Mid Term-1, Quiz & End Sem Exam
7	Law of Diminishing Marginal Utility	Lecture	BTCE 802.1	Mid Term-1, Quiz & End Sem Exam
8	Importance. Demand and Supply – Law of Demand and Law of Supply	Lecture	BTCE 802.1	Mid Term-1, Quiz & End Sem Exam

9	Importance. Demand and Supply – Law of Demand and Law of Supply	Lecture	BTCE 802.1	Mid Term-1, Quiz & End Sem Exam
10	Monopoly, Perfect competition. Organisational forms- Proprietorship, partnership, Joint	Lecture	BTCE 802.2	Mid Term-1, Quiz & End Sem Exam
11	Stock Company – Cooperative organisation.	Lecture	BTCE 802.2	Mid Term-1, Quiz & End Sem Exam
12	Stock Company – Cooperative organisation.	Lecture	BTCE 802.2	Mid Term-1, Quiz & End Sem Exam
13	Money- nature and functions –– taxation	Lecture	BTCE 802.2	Mid Term-1, Quiz & End Sem Exam
14	Kinds of Banking – commercial banks – Central banking – Credit instrument.	Lecture	BTCE 802.2	Mid Term-1, Quiz & End Sem Exam
15	Kinds of Banking – commercial banks – Central banking – Credit instrument.	Lecture	BTCE 802.2	Mid Term-1, Quiz & End Sem Exam
16	Inflation and Deflation - Monetary Policy	Lecture	BTCE 802.2	Mid Term-1, Quiz & End Sem Exam
17	Inflation and Deflation - Monetary Policy	Lecture	BTCE 802.2	Mid Term-1, Quiz & End Sem Exam
18	International trade Balance of trade and Balance of Payments	Lecture	BTCE 802.2	Mid Term-1, Quiz & End Sem Exam
19	International trade Balance of trade and Balance of Payments	Lecture	BTCE 802.3	Mid Term-1, Quiz & End Sem Exam
20	Direct and Indirect taxes – Impact and Incidence of tax	Lecture	BTCE 802.3	Mid Term-1, Quiz & End Sem Exam
21	Direct and Indirect taxes – Impact and Incidence of tax	Lecture	BTCE 802.3	Mid Term-2, Quiz & End Sem Exam
22	Concept of National Income – Features with reference to developing countries.	Lecture	BTCE 802.3	Mid Term-2, Quiz & End Sem Exam
23	Concept of National Income – Features with reference to developing countries.	Lecture	BTCE 802.3	Mid Term-2, Quiz & End Sem Exam
24	Management Theory-–, programmes. Operations management.	Lecture	BTCE 802.3	Mid Term-2, Quiz & End Sem Exam
25	Characteristics of management – Systems Approach to management	Lecture	BTCE 802.3	Mid Term-2, Quiz & End Sem Exam
26	Characteristics of management –	Lecture	BTCE 802.3	Mid Term-2, Quiz

	Systems Approach to management			& End Sem Exam
27	Concepts of goal, objective, strategies	Lecture	BTCE 802.3	Mid Term-2, Quiz & End Sem Exam
28	Concepts of goal, objective, strategies	Lecture	BTCE 802.4	Mid Term-2, Quiz & End Sem Exam
29	Decision making under certainty, uncertainty and risk – Introduction to functional areas of management	Lecture	BTCE 802.4	Mid Term-2, Quiz & End Sem Exam
30	Decision making under certainty, uncertainty and risk – Introduction to functional areas of management	Lecture	BTCE 802.4	Mid Term-2, Quiz & End Sem Exam
31	Human resources management, marketing management.	Lecture	BTCE 802.4	Mid Term-2, Quiz & End Sem Exam
32	Need for Financial Management – Types of financing – Short term and long term Borrowing– Equity financing .	Lecture	BTCE 802.4	Mid Term-2, Quiz & End Sem Exam
33	Analysis of Financial Statement – balance sheet – Profit and Loss account – Fund flow statement – Ratio Analysis	Lecture	BTCE 802.4	Mid Term-2, Quiz & End Sem Exam
34	Investment and Financial decision –– Economic Order Quantity (EOQ) model – sensitivity analysis of EOQ model, Economic production lot	Lecture	BTCE 802.4	Mid Term-2, Quiz & End Sem Exam
35	Financial control and Job control. Functions and objectives of Inventory management – Decision models	Lecture	BTCE 802.4	Mid Term-2, Quiz & End Sem Exam
36	size model – inventory model with planned shortages – Periodic order quantity – single period Inventory models – Simulation model for inventory analysis.	Lecture	BTCE 802.4	Mid Term-2, Quiz & End Sem Exam

F. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE802.1	Know the Scope and Method of Managerial economics along with Fundamental Economics and help them to develop a thorough understanding on engineering decision making.	3	3	1	3	1				2		2	1			
BTCE802.2	Analyse the demand and supply adopting market strategy	3	2	2	2	2				2		1	1			
BTCE802.3	Understand the production function and factors affecting it with various economy conditions of the firm.	3	3	1	3	1				2		2	1			
BTCE802.4	Study the different types of market structure and strategies	3	2	2	2	2				2		1	1			

S. No.	Enrollment. No.	Student's Name	BTCE802 ENGINEERING ECONOMICS & MANAGEMENT							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U2G2
1	A60215816004	Mr UTKARSH TOMAR	100	30	70	A-	8	3	3	24
2	A60215816007	Mr KUNAL MUKHARIYA	100	30	70	A-	8	3	3	24
3	A60215816008	Mr DAMODAR SINGH CHAUHAN	100	30	70	A	9	3	3	27
4	A60215816009	Mr SATENDRA SINGH KUSHWAH	100	30	70	A-	8	3	3	24
5	A60215816011	Mr ANUJ PRATAP SINGH PARMAR	100	30	70	A	9	3	3	27
6	A60215816012	Mr HIMANSHU MAHLI	100	30	70	A	9	3	3	27
7	A60215816013	Mr ANUJ BANSAL	100	30	70	A-	8	3	3	24
8	A60215816014	Mr SHIVAM SHRIVASTAVA	100	30	70	A	9	3	3	27
9	A60215816015	Mr RAHUL SINGH BAGHEL	100	30	70	A-	8	3	3	24
10	A60215816016	Mr ROHIT BHADORIA	100	30	70	A	9	3	3	27
11	A60515815002	Mr GURJEET JAIN	100	30	70	A-	8	3	3	24
12	A60515816001	Mr ANUJ SINGH BHADORIA	100	30	70	A	9	3	3	27
13	A60515816002	Mr kunal kumar	100	30	70	A	9	3	3	27
14	A60515816003	Mr MONUSHA DHAKAD	100	30	70	A-	8	3	3	24
15	A60515816004	Mr AMAN PARASHAR	100	30	70	A	9	3	3	27
16	A60515816005	Mr DEEPAK SHARMA	100	30	70	B+	7	3	3	21
17	A60515816006	Mr ANUJ SHARMA	100	30	70	B+	7	3	3	21

Total No. of Students	=	17		
Total No. of Students	>60 % marks	15	88.24	%
Attainment Level			Level 3	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : TRAFFIC ENGINEERING AND MANAGEMENT
Course Code : BTCE804, Crédits : 04, Session : 2019-20 (Even Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Ripunjoy Gogoi

A. Introduction

To provide understanding on basic traffic characteristics and various models describing the relationship among traffic stream parameters. To train students to collect and analyze traffic data. To prepare students to perform capacity and level of service analysis of a highway. To teach students to perform traffic signal design using IRC guidelines. To make students aware of traffic regulations and measures to manage traffic. To enable students to understand the importance of roadway safety and accident analysis

B. Course Outcomes: At the end of the course, students will be able to:

- **BTCE 804.1**.Describe traffic stream parameters and their relationship
- **BTCE 804.2**.Identify various traffic stream models and their application
- **BTCE 804.3.**Collect the traffic data and analyse it using statistical tools.
- **BTCE 804.4.**Evaluate capacity and level of service for a given highway
- **BTCE 804.5**.Design traffic signal using IRC guidelines

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage**
Continuous Internal	Mid Term 1	CT	15%

Evaluation			
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentt o be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			100%

E. Course Content

F. **Module I: Introduction:** Significance and scope, Characteristics of Vehicles and Road Users, Skid Resistance and Braking Efficiency (Problems), Components of Traffic Engineering- Road, Traffic and Land Use Characteristics

Module II: Traffic Surveys and Analysis: Surveys and Analysis - Volume, Capacity, Speed and Delays, Origin and Destination, Parking, Pedestrian Studies, Accident Studies and Safety Level of Services- Basic principles of Traffic Flow.

Module III: Traffic Control: Traffic signs, Road markings, Design of Traffic signals and Signal co-ordination (Problems),Traffic control aids and Street furniture, Street Lighting, Computer applications in Signal design

Module IV: Geometric Design of Intersections: Conflicts at Intersections, Classification of 'At Grade Intersections, - Channallised Intersections- Principles of Intersection Design, Elements of Intersection Design, Rotary design, GradeSeparation and interchanges - Design principles.

Module V: Traffic Management: Traffic Management- Transportation System Management (TSM) - Travel DemandManagement (TDM), Traffic Forecasting techniques, Restrictions on turning movements, OnewayStreets, Traffic Segregation, Traffic Calming, Tidal flow operations, Exclusive Bus Lanes,Introduction to Intelligent Transportation System (ITS).

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva. V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Kadiyali L R, Traffic Engineering and Transport Planning, Khanna Technical Publications,Delhi, 2000.
- Khanna K and Justo C E G, Highway Engineering, Khanna Publishers, Roorkee, 2001.
- Indian Roads Congress (IRC) specifications: Guidelines and special publications on TrafficPlanning and Management
- Guidelines of Ministry of Road Transport and Highways, Government of India.
- Subhash C.Saxena, A Course in Traffic Planning and Design, Dhanpat Rai Publications,New Delhi, 1989.
- Transportation Engineering – An Introduction, C.Jotin Khisty, B.Kent Lall, Prentice Hall ofIndia Pvt Ltd, 2006.
- **Lecture Plan**

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	**Introduction:**, Skid Resistance and	Lecture	BTCE 804.1	Mid Term-1, Quiz & End Sem Exam
2	Significance and scope, Characteristics of Vehicles and Road Users	Lecture	BTCE 804.1	Mid Term-1, Quiz & End Sem Exam
3	Significance and scope, Characteristics of Vehicles and Road Users	Lecture	BTCE 804.1	Mid Term-1, Quiz & End Sem Exam
4	Significance and scope, Characteristics of Vehicles and Road Users	Lecture	BTCE 804.1	Mid Term-1, Quiz & End Sem Exam
5	Braking Efficiency (Problems), Components of Traffic Engineering- Road, Traffic and Land Use Characteristics	Lecture	BTCE 804.1	Mid Term-1, Quiz & End Sem Exam
6	Braking Efficiency (Problems), Components of Traffic Engineering- Road, Traffic and Land Use Characteristics	Lecture	BTCE 804.1	Mid Term-1, Quiz & End Sem Exam
7	Braking Efficiency (Problems), Components of Traffic Engineering- Road, Traffic and Land Use Characteristics	Lecture	BTCE 804.1	Mid Term-1, Quiz & End Sem Exam
8	Braking Efficiency (Problems), Components of Traffic Engineering- Road, Traffic and Land Use Characteristics	Lecture	BTCE 804.1	Mid Term-1, Quiz & End Sem Exam
9	Braking Efficiency (Problems), Components of Traffic Engineering- Road, Traffic and Land Use Characteristics	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam
10	**Traffic Surveys and Analysis:**, Origin and Destination,	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam
11	Surveys and Analysis - Volume, Capacity, Speed and Delays	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam

12	Surveys and Analysis - Volume, Capacity, Speed and Delays	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam
13	Surveys and Analysis - Volume, Capacity, Speed and Delays	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam
14	Parking, Pedestrian Studies, Accident Studies	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam
15	Safety Level of Services- Basic principles of Traffic Flow	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam
16	Safety Level of Services- Basic principles of Traffic Flow	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam
17	Safety Level of Services- Basic principles of Traffic Flow	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam
18	Traffic signs, Road markings	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam
19	Design of Traffic signals and Signal co-ordination	Lecture	BTCE 804.3	Mid Term-1, Quiz & End Sem Exam
20	Design of Traffic signals and Signal co-ordination	Lecture	BTCE 804.3	Mid Term-1, Quiz & End Sem Exam
21	*Design of Traffic signals and Signal co-ordination*	Lecture	BTCE 804.3	Mid Term-2, Quiz & End Sem Exam
22	*Traffic control aids and Street furniture, Street Lighting*	Lecture	BTCE 804.3	Mid Term-2, Quiz & End Sem Exam
23	*Traffic control aids and Street furniture, Street Lighting*	Lecture	BTCE 804.3	Mid Term-2, Quiz & End Sem Exam
24	(Problems, Computer applications in Signal design	Lecture	BTCE 804.3	Mid Term-2, Quiz & End Sem Exam
25	*(Problems, Computer applications in Signal design*	Lecture	BTCE 804.3	Mid Term-2, Quiz & End Sem Exam
26	**Geometric Design of Intersections:** - Channallised Intersections-, Rotary design,.	Lecture	BTCE 804.3	Mid Term-2, Quiz & End Sem Exam
27	*Conflicts at Intersections, Classification of 'At Grade Intersections,*	Lecture	BTCE 804.3	Mid Term-2, Quiz & End Sem Exam
28	*Conflicts at Intersections, Classification of 'At Grade Intersections,*	Lecture	BTCE 804.3	Mid Term-2, Quiz & End Sem Exam
29	*Conflicts at Intersections, Classification of 'At Grade Intersections,*	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam
30	*Principles of Intersection Design, Elements of Intersection Design*	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam
31	Principles of Intersection Design,	Lecture	BTCE 804.4	Mid Term-2, Quiz

	Elements of Intersection Design			& End Sem Exam
32	Grade Separation and interchanges - Design principles	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam
33	Traffic Management- Transportation System Management (TSM)	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam
34	*Travel Demand Management (TDM), Traffic Forecasting techniques*	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam
35	*Restrictions on turning movements, One way Streets, Traffic Segregation*	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam
36	Traffic Calming, Tidal flow operations, Exclusive Bus Lanes, Introduction to Intelligent Transportation System (ITS).	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam
37	*(Problems, Computer applications in Signal design*	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam
38	**Geometric Design of Intersections:** - Channallised Intersections-, Rotary design,.	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam
39	*Conflicts at Intersections, Classification of 'At Grade Intersections,*	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam
40	*Conflicts at Intersections, Classification of 'At Grade Intersections,*	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam
41	*Conflicts at Intersections, Classification of 'At Grade Intersections,*	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam
42	*Principles of Intersection Design, Elements of Intersection Design*	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam
43	Principles of Intersection Design, Elements of Intersection Design	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam
44	Grade Separation and interchanges - Design principles	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam
45	Traffic Management- Transportation System Management (TSM)	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam
46	*Travel Demand Management (TDM), Traffic Forecasting techniques*	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam
47	*Restrictions on turning movements, One way Streets, Traffic Segregation*	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam
48	Traffic Calming, Tidal flow operations, Exclusive Bus Lanes, Introduction to Intelligent Transportation System (ITS).	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam

- **Course Articulation Matrix (Mapping of COs with POs)**

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE 804.1	Describe traffic stream parameters and their relationship	3	3	1	3	1				2		2	1			
BTCE 804.2	Identify various traffic stream models and their application	3	2	2	2	2				2		1	1			
BTCE 804.3	Collect the traffic data and analyse it using statistical tools.	3	3	1	3	1				2		2	1			
BTCE 804.4	Evaluate capacity and level of service for a given highway	3	2	2	2	2				2		1	1			
BTCE 804.5	Design traffic signal using IRC guidelines	3	3	1	3	1				2		2	1			

S. No.	Enrollment. No.	Student's Name	BTCE804 TRAFFIC ENGINEERING & MANAGEMENT							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U7G7
1	A60215816004	Mr UTKARSH TOMAR	100	30	70	A	9	4	4	36
2	A60215816007	Mr KUNAL MUKHARIYA	100	30	70	A	9	4	4	36
3	A60215816008	Mr DAMODAR SINGH CHAUHAN	100	30	70	A	9	4	4	36
4	A60215816009	Mr SATENDRA SINGH KUSHWAH	100	30	70	A	9	4	4	36
5	A60215816011	Mr ANUJ PRATAP SINGH PARMAR	100	30	70	A	9	4	4	36
6	A60215816012	Mr HIMANSHU MAHLI	100	30	70	A	9	4	4	36
7	A60215816013	Mr ANUJ BANSAL	100	30	70	A	9	4	4	36
8	A60215816014	Mr SHIVAM SHRIVASTAVA	100	30	70	A	9	4	4	36
9	A60215816015	Mr RAHUL SINGH BAGHEL	100	30	70	A+	10	4	4	40
10	A60215816016	Mr ROHIT BHADORIA	100	30	70	A	9	4	4	36
11	A60515815002	Mr GURJEET JAIN	100	30	70	A	9	4	4	36
12	A60515816001	Mr ANUJ SINGH BHADORIA	100	30	70	A+	10	4	4	40
13	A60515816002	Mr kunal kumar	100	30	70	A+	10	4	4	40
14	A60515816003	Mr MONUSHA DHAKAD	100	30	70	A	9	4	4	36
15	A60515816004	Mr AMAN PARASHAR	100	30	70	A	9	4	4	36
16	A60515816005	Mr DEEPAK SHARMA	100	30	70	A	9	4	4	36
17	A60515816006	Mr ANUJ SHARMA	100	30	70	A	9	4	4	36

Total No. of Students	=	17		
Total No. of Students	>60 % marks	17	100.00	%
Attainment Level			Level 3	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : Project
Course Code : BTCE860, Crédits : 09, Session : 2019-20 (Even Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Imran Ahmad Khan, Dr. Mohan Kantharia, Dr. P. Mahakavi

A. Introduction

The objective of project is to enable the student to take up investigative study in the broad field of Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the Department on an individual basis or two/three students in a group, under the guidance of a Supervisor.

Course Outcomes: At the end of the course, students will be able to:

BTCE860.1. Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.
BTCE860.2. Design, implement and test the prototype/algorithm in order to solve the conceived problem.
BTCE860.3. Write comprehensive report on project work

B. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

C. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
End Semester Examination	End Semester Examination	EE	100%

Total			**100%**

A. **Syllabus**
Methodology:

Project is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the project the students are to present a report covering various aspects learnt by them and give a presentation on same.

D. **Examination Scheme:**

Literature study/ Fabrication/ Experimentation	**40**
Written Report	**20**
Viva	**15**
Presentation	**25**
Total	**100**

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva. V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

A. **Suggested Text/Reference Books: NA**
B. **Lecture Plan : NA**
C. **Course Articulation Matrix (Mapping of COs with POs)**

E. **Course Articulation Matrix (Mapping of COs with POs)**

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 1	P O 1	P O 1	P S O	P S O	P S O

											0	1	2	1	2	3
BTCE860.1	*Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.*	3	**2**	1	3	1	-	-	-	2		2	1	**1**	**2**	**1**
BTCE860.2	*Design, implement and test the prototype/algorithm in order to solve the conceived problem.*	3	1	2	2	2	-	-	-	2		1	1	**3**	**2**	**3**
BTCE860.3	*Write comprehensive report on project work*	2	2	2	2	2	-	-	-	3		3	1	**3**	**3**	**2**

. No .	Enrollment.No.	Student's Name	BTCE860 PROJECT (DISSERTATION)							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U6G6
1	A60215816004	Mr UTKARSH TOMAR	100	0	100	A-	8	9	9	72
2	A60215816007	Mr KUNAL MUKHARIYA	100	0	100	A-	8	9	9	72
3	A60215816008	Mr DAMODAR SINGH CHAUHAN	100	0	100	A-	8	9	9	72
4	A60215816009	Mr SATENDRA SINGH KUSHWAH	100	0	100	A-	8	9	9	72
5	A60215816011	Mr ANUJ PRATAP SINGH PARMAR	100	0	100	A-	8	9	9	72
6	A60215816012	Mr HIMANSHU MAHLI	100	0	100	A	9	9	9	81
7	A60215816013	Mr ANUJ BANSAL	100	0	100	A-	8	9	9	72

8	A60215816014	Mr SHIVAM SHRIVASTAVA	100	0	100	A	9	9	9	81
9	A60215816015	Mr RAHUL SINGH BAGHEL	100	0	100	A	9	9	9	81
10	A60215816016	Mr ROHIT BHADORIA	100	0	100	A-	8	9	9	72
11	A60515815002	Mr GURJEET JAIN	100	0	100	A-	8	9	9	72
12	A60515816001	Mr ANUJ SINGH BHADORIA	100	0	100	A	9	9	9	81
13	A60515816002	Mr kunal kumar	100	0	100	A	9	9	9	81
14	A60515816003	Mr MONUSHA DHAKAD	100	0	100	A-	8	9	9	72
15	A60515816004	Mr AMAN PARASHAR	100	0	100	A-	8	9	9	72
16	A60515816005	Mr DEEPAK SHARMA	100	0	100	A	9	9	9	81
17	A60515816006	Mr ANUJ SHARMA	100	0	100	A	9	9	9	81

Total No. of Students	=	17		
Total No. of Students	>60 % marks	17	100.00	%
Attainment Level			Level 3	

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR
AMITY SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF CIVIL ENGINEERING

PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Bachelor of Technology (B. Tech.) CE,Academic Year – 2020-21

Programme Educational Objectives

B. Tech (Civil Engineering)

Graduates of the programme B Tech (Civil Engineering) will

PEO 1: Gain knowledge and skills in Civil engineering which will enable them to have a career and professional accomplishment in the public or private sector organizations

PEO 2: Become consultants on complex real life Civil Engineering problems related to Infrastructure development especially housing, construction, water supply, sewerage, transport, spatial planning.

PEO 3: Become entrepreneurs and develop processes and technologies to meet desired infrastructure needs of society and formulate solutions that are technically sound, Economically feasible, and socially acceptable.

PEO 4: Perform investigation for solving Civil Engineering problems by conducting research using modern equipment and software tools.

PEO 5: Function in multi-disciplinary teams and advocate policies, systems, processes and equipment to support civil engineering

Programme Outcomes:

[PO. 1]. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

[PO. 2]. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

[PO. 3]. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

[PO. 4]. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

[PO. 5]. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

[PO. 6]. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

[PO. 7]. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

[PO. 8]. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

[PO. 9]. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

[PO. 10]. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

[PO. 11]. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects

[PO. 12]. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

Note: - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put "- "

PROGRAMMEARTICULATIONMATRIX

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ISEM	MAT101	3	2	3	3	3	-	-	-	2	-	2	3	-	-	-
	CHE101	3	3	3	3	-	3	3	3	3	3	3	3	-	-	-
	CSE104	3	3	3	2	-	-	-	-	-	-	-	3	3	3	3
	BME101	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2
	CIV101	3	2	2	2	-		-	-	1	1	1	2	2	-	-
	CHE121	3	3	2	-	-	-	-	-	-	-	-	2	3	-	2
	CSE124	3	3	3	2	-	-	-	-	-	-	-	3	3	3	3
	BME121	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2
	BCU141	3	2	2	2	-		-	-	1	1	1	2	2	-	-
	EVS142	3	3	2	-	-	-	-	-	-	-	-	2	3	-	2
	BSU143	3	3	2	-	-	-	-	-	-	-	-	2	3	-	2
	FLU144	3	3	3	2	-	-	-	-	-	-	-	3	3	3	3
IISEM	MAT201	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2
	PHY101	3	2	2	2	-		-	-	1	1	1	2	2	-	-
	ECE101	3	3	2	-	-	-	-	-	-	-	-	2	3	-	2
	CSE204	3	3	3	2	-	-	-	-	-	-	-	3	3	3	3
	BME102	3	2	2	-	2	-	-	3	2	-	-	2	3	-	2
	PHY121	3	2	2	-	2	-	-	3	2	-	-	2	3	-	2
	ECE121	3	2	2	-	-	-	1	-	-	-	-	2	3	-	2
	CSE224	3	2	2	-	2	-	1	-	-	-	-	2	3	-	2
	BME122	3	2	2	-	2	-	-	3	2	-	-	2	3	-	2
	BCU241	3	2	2	-	2	-	1	3	2	-	1	2	3	-	2
	EVS242	3	2	2	1	2	-	-	3	2	-	2	2	3	-	2
	BSU243	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2
	FLU244	3	2	2	-	2	-	1	-	-	-	-	2	3	-	2

PROGRAMME ARTICULATION MATRIX

2nd Year		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
III SEM	MAT 301	3	2	1	-	-	-	-	-	-	-	-	2	1	1	1
	CIV 302	3	3	3	2	-	-	-	-	-	-	-	3	3	3	3
	CIV 303	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2
	CIV 304	3	2	2	2	-		-	-	1	1	1	2	2	-	-

	CIV 305	3	3	2	-	-	-	-	-	-	-	-	2	3	-	2
	CIV309	2	2	2	-	3	-	3	2	-	3	-	3	3	2	1
	BME 104	1	2	2	1	1	-	-	-	-	-	-	-	2	-	-
	CIV 322	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2
	ECE 327	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2
IV SEM	CIV 401	3	2	2	-	2	-	-	3	2	-	-	2	3	-	2
	CIV 402	3	2	2	-	-	-	1	-	-	-	-	2	3	-	2
	CIV 403	3	2	2	-	2	-	1	-	-	-	-	2	3	-	2
	CIV 404	3	2	2	-	2	-	-	3	2	-	-	2	3	-	2
	CIV 405	3	2	2	-	2	-	1	3	2	-	1	2	3	-	2
	CIV 406	3	2	2	-	2	-	1	3	2	-	1	2	3	-	2
	CIV 407	3	2	2	1	2	-	-	3	2	-	2	2	3	-	2
	ECE 407	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2
	CIV 421	3	2	2	1	2	-	-	3	2	-	2	2	3	-	2
	CIV 422	3	2	2	1	2	-	-	3	2	-	2	2	3	-	2
	CIV 423	3	2	2	1	2	-	-	3	2	-	2	2	3	-	2
	CIV 424	3	2	2	1	2	-	-	3	2	-	2	2	3	-	2
	ECE 427	3	2	2	1	2	-	-	3	2	-	2	2	3	-	2

PROGRAMME ARTICULATION MATRIX

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
VSEM	CIV 501	3	3	2	3	3	2	2	-	3	2	3	3	3	3	3
	CIV 502	2	2	2	-	3	-	3	2	-	3	-	3	1	2	1
	CIV 503	3	3	1	2	3	3	3	3	3	-	1	3	3	2	2
	CIV 504	2	-	2	-	3	-	3	2	-	3	-	3	3	2	2
	CIV 505	3	3	3	2	2	1	1	-	-	-	-	3	3	3	3
	CIV 506	2	2	2	-	3	-	3	2	-	3	-	3	1	2	1
	CIV 507	3	3	1	2	3	3	3	3	3	-	1	3	3	2	2
	CIV 522	3	3	2	3	3	2	2	-	3	2	3	3	3	3	3
	CIV 524	2	2	2	-	3	-	3	2	-	3	-	3	1	2	1
	CIV 527	3	3	1	2	3	3	3	3	3	-	1	3	3	2	2
	NPT550	3	2	1		1	2	1	-	2	-	1	3	3	3	3
VISEM	CIV 601	3	3	2	3	3	2	2	-	3	2	3	3	1	2	1
	CIV 602	2	2	2	-	3	-	3	2	-	3	-	3	3	2	2
	CIV 603	3	3	1	2	3	3	3	3	3	-	1	3	3	2	2
	CIV 604	2	2	2	-	3	-	3	2	-	3	-	3	3	3	3
	CIV 622	3	3	1	2	3	3	3	3	3	-	1	3	1	2	1
	CIV 623	2	-	2	-	3	-	3	2	-	3	-	3	3	2	2

	CIV 624	3	3	1	2	3	3	3	3	3	-	1	3	3	3	3
	CIV 605	2	2	2	-	3	-	3	2	-	3	-	3	1	2	1
	CIV 606	3	3	1	2	3	3	3	3	3	-	1	3	3	2	2
	CIV 607	3	3	1	2	3	3	3	3	3	-	1	3	3	2	2
	CIV 625	2	2	2	-	3	-	3	2	-	3	-	3	3	3	3
	CIV 626	3	3	1	2	3	3	3	3	3	-	1	3	1	2	1
	CIV 627	2	2	2	-	3	-	3	2	-	3	-	3	3	2	2
	BCH 620															
	NMP660	3	1	2	3	3	1	1	-	-	3	3	3	3	3	2

PROGRAMME ARTICULATION MATRIX																
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
VII SEM	BTCE 701	3	3	2	3	3	2	2	-	3	2	3	3	3	3	3
	BTCE 702	2	2	2	-	3	-	3	2	-	3	-	3	1	2	1
	BTCE 703	2	2	2	-	3	-	3	2	-	3	-	3	1	2	1
	BTCE 707	3	3	2	3	3	2	2	-	3	2	3	3	3	3	3
	BTCE 720	3	2	1		1	2	1	-	2	-	1	3	3	3	3
	BTCE 721	3	2	1		1	2	1	-	2	-	1	3	3	3	3
	BTCE 760	3	2	1		1	2	1	-	2	-	1	3	3	3	3
	BTCE 750	3	2	1		1	2	1	-	2	-	1	3	3	3	3
VIII SEM	BTCE 801	3	3	2	3	3	2	2	-	3	2	3	3	1	2	1
	BTCE 802	2	2	2	-	3	-	3	2	-	3	-	3	3	2	2
	BTCE 804	3	3	1	2	3	3	3	3	3	-	1	3	3	2	2
	BTCE 860	2	-	2	-	3	-	3	2	-	3	-	3	3	2	2

AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENTOF CIVIL ENGINEERING
Course Handout
Course : APPLIED MATHEMATICS – I (CALCULUS AND LINEAR ALGEBRA)
Course Code : MAT101, Crédits : 04, Session :2020-21(Odd Sem.), Class : B.Tech. 1st Year
Faculty Name : Dr. Santosh Kumar Sharma, Dr. Alok Jain, Dr. Girraj Kumar Verma, Dr. RajatVaish,

A. **Introduction:**The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis, and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

B. **Course Outcomes:**At the end of the course, students will be able to:

MAT101.1. Solvetheproblemsofdifferentiationoffunctionsoftwovariablesandknow about the maximization and minimization of functions of severalvariables.

MAT101.2. Cometoknowtheapplicationsofdoubleandtripleintegrationinfindingtheareaandvolume Apart from various applications, they will have a basic understanding of Beta and Gamma functions.

MAT101.3. KnowaboutqualitativeapplicationsofGauss's,Stoke'sandGreen'stheorem

MAT101.4. Able to solve qualitative problems based on vector analysis and matrixanalysissuchasrank, eigen values, diagonalizationetc.

MAT101.5. Use the tools of linear algebra includinglinearindependenceanddependenceofvectors, linear transformations, eigen values, matrix of a linear transformation.

C. **Programme Outcomes:**

[PO.1].**Engineeringknowledge**:Applytheknowledgeofmathematics,science,engineeringfundamentals,andanengineeringspecializationtothesolutionofcomplexengineeringproblems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineeringproblems reaching substantiated conclusions using first principles of mathematics, natural sciences,andengineeringsciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and designsystem components or processes that meet the specified needs with appropriate consideration for thepublichealthandsafety,andthecultural,societal,andenvironmentalconsiderations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of theinformationtoprovidevalidconclusions

[PO.5].**Moderntoolusage**:Create,select,andapplyappropriatetechniques,resources,andmodernengineering and IT tools including prediction and modeling to complex engineering activities with anunderstandingofthelimitations
[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to theprofessionalengineeringpractice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societalandenvironmentalcontexts,anddemonstratetheknowledgeof,andneedforsustainabledevelopment

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities andnorms oftheengineeringpractices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverseteams,andinmultidisciplinarysettings

[PO.10].**Communication**:Communicateeffectivelyoncomplexengineeringactivitieswiththeengineeringcommunity and with society at large, such as, being able to comprehend and write effective reports anddesigndocumentation,makeeffectivepresentations,andgiveandreceiveclearinstructions

[PO.11].**Projectmanagementandfinance**:Demonstrateknowledgeandunderstandingoftheengineeringandmanagementprinciplesandapplythesetoone'sownwork,asamemberandleaderinateam,tomanageprojectsandinmultidisciplinaryenvironments

[PO.12].**Life-longlearning**:Recognizetheneedfor,andhavethepreparationandabilityto engageinindependent andlife-longlearninginthebroadestcontextoftechnologicalchange

D. Programme Specific Outcomes:
PSO1: Will beabletodesign,developandimplementefficientsoftwareforagivenreallifeproblem.

PSO 2: Will be able to apply knowledge of AI, Machine Learning and Data Mining in analyzing big data forextractingusefulinformationfromitandforperformingpredictiveanalysis.

PSO 3: Will be able to design, manage and secure wired/ wireless computer networks for transfer and sharing ofinformation.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%

Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Differential Calculus:

Successive differentiation, Leibnitz Theorem, Rolle's theorem, Mean value theorem, Taylor's and Maclaurin's theorems with remainders, Partial Differentiation, Total derivative; Maxima and minima for two variables.

Module II: Integral Calculus:

Evaluation of definite and improper integrals: Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface, areas and volumes of revolutions, Multiple Integration: Double integrals (Cartesian and polar), Triple integrals (Cartesian).

Module III: Vector Calculus:

Scalar and vector field, Gradient, Divergence and Curl, Directional Derivative, Evaluation of a Line Integral, Green's theorem in plane (without proof), Stoke's theorem (without proof) and Gauss Divergence theorem (without proof).

Module IV: Matrices:

Inverse and Rank of a matrix, Linear systems of equations, Consistency of Linear Simultaneous Equations, linear Independence, Gauss elimination and Gauss-Jordan elimination, Eigen values, eigenvectors, Caley-Hamilton theorem, Diagonalization.

Module V: Linear algebra & Vector spaces:

Linear algebra: Group, ring, field (Definition), Vector Space, linear dependence of vectors, basis, dimension; Linear transformations (maps), range and kernel of a linear map, Inverse of a linear transformation, rank-nullity theorem (without proof), composition of linear maps, Matrix associated with a linear map.

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
- G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
- V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–West press, Reprint 2005.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Differentiation	Lecture	MAT101.1	Mid Term, Quiz & End Sem Exam
2	Successive Differentiation	Lecture	MAT101.1	Mid Term, Quiz & End Sem Exam
3	Leibnitz Theorem	Lecture	MAT101.1	Mid Term, Quiz & End Sem Exam
4	Rolle's theorem	Lecture	MAT101.1	Mid Term, Quiz & End Sem Exam
5	Mean value theorem	Lecture	MAT101.1	Mid Term, Quiz & End Sem Exam
6	Taylor's theorem	Lecture	MAT101.1	Mid Term, Quiz & End Sem Exam
7	Maclaurin's theorems withremainders	Lecture	MAT101.1	Mid Term, Quiz & End Sem Exam
8	Partial Differentiation	Lecture	MAT101.1	Mid Term, Quiz & End Sem Exam
9	Total derivative	Lecture	MAT101.1	Mid Term, Quiz & End Sem Exam
10	Maxima and minima for two variables	Lecture	MAT101.1	Mid Term, Quiz & End Sem Exam
11	Evaluation of definite and improper integrals	Lecture	MAT101.2	Mid Term, Quiz & End Sem Exam
12	Beta and Gamma functions and their properties I	Lecture	MAT101.2	Mid Term, Quiz & End Sem Exam
13	Beta and Gamma functions and their properties-II	Lecture	MAT101.2	Mid Term, Quiz & End Sem Exam
14	Applications of definite integrals to evaluate surface of revolutions	Lecture	MAT101.2	Mid Term, Quiz & End Sem Exam
15	Applications of definite integrals to evaluate areas of revolutions	Lecture	MAT101.2	Mid Term, Quiz & End Sem Exam
16	Applications of definite integrals to evaluate volumes of revolutions	Lecture	MAT101.2	Mid Term, Quiz & End Sem Exam

17	Multiple Integration	Lecture	MAT101.2	Mid Term, Quiz & End Sem Exam
18	Double integrals (Cartesian)	Lecture	MAT101.2	Mid Term, Quiz & End Sem Exam
19	Double integrals (Polar)	Lecture	MAT101.2	Mid Term, Quiz & End Sem Exam
20	Triple integrals (Cartesian)	Lecture	MAT101.2	Mid Term, Quiz & End Sem Exam
21	Scalar and vector field	Lecture	MAT101.3	Home Assignment, Quiz & End Sem Exam
22	Gradient	Lecture	MAT101.3	Home Assignment, Quiz & End Sem Exam
23	Divergence and Curl	Lecture	MAT101.3	Home Assignment, Quiz & End Sem Exam
24	Directional Derivative	Lecture	MAT101.3	Home Assignment, Quiz & End Sem Exam
25	Evaluation of a Line Integral	Lecture	MAT101.3	Home Assignment, Quiz & End Sem Exam
26	Green’s theorem in plane (without proof)	Lecture	MAT101.3	Home Assignment, Quiz & End Sem Exam
27	Stoke’s theorem (without proof)	Lecture	MAT101.3	Home Assignment, Quiz & End Sem Exam
28	Gauss Divergence theorem (without proof)	Lecture	MAT101.3	Home Assignment, Quiz & End Sem Exam
29	Inverse and Rank of a matrix	Lecture	MAT101.4	Home Assignment, Quiz & End Sem Exam
30	Linear systems of equations	Lecture	MAT101.4	Home Assignment, Quiz & End Sem Exam
31	Consistency of Linear Simultaneous Equations	Lecture	MAT101.4	Home Assignment, Quiz & End Sem Exam
32	Linear Independence	Lecture	MAT101.4	Home Assignment, Quiz & End Sem Exam
33	Gauss elimination and Gauss-Jordan elimination	Lecture	MAT101.4	Home Assignment, Quiz & End Sem Exam
34	Eigen values, eigenvectors	Lecture	MAT101.4	Home Assignment, Quiz

				& End Sem Exam
35	Caley-Hamilton theorem	Lecture	MAT101.4	Home Assignment, Quiz & End Sem Exam
36	Diagonalization	Lecture	MAT101.4	Home Assignment, Quiz & End Sem Exam
37	Group	Lecture	MAT101.5	Home Assignment,Quiz & End Sem Exam
38	Ring, field (Definition)	Lecture	MAT101.5	Home Assignment, Quiz & End Sem Exam
39	Vector Space	Lecture	MAT101.5	Home Assignment, Quiz & End Sem Exam
40	Linear dependence of vectors	Lecture	MAT101.5	Home Assignment, Quiz & End Sem Exam
41	Basis	Lecture	MAT101.5	Home Assignment, Quiz & End Sem Exam
42	Dimension	Lecture	MAT101.5	Home Assignment, Quiz & End Sem Exam
43	Linear transformations (maps)	Lecture	MAT101.5	Home Assignment, Quiz & End Sem Exam
44	Range and kernel of a linear map	Lecture	MAT101.5	Home Assignment, Quiz & End Sem Exam
45	Inverse of a linear transformation	Lecture	MAT101.5	Home Assignment, Quiz & End Sem Exam
46	Rank- nullity theorem (without proof)	Lecture	MAT101.5	Home Assignment, Quiz & End Sem Exam
47	Composition of linear maps	Lecture	MAT101.5	Home Assignment, Quiz & End Sem Exam
48	Matrix associated with a linear map	Lecture	MAT101.5	Home Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
MAT 101. 1	Solvetheproblemsofdifferentiationoffunctionsoftwo variablesandknow about the maximization and minimization of functions of severalvariables	3	3	1	3	1				2		2	1			
MAT 101. 2	Cometoknowtheapplicationsofdoubleandtripleintegrationinfindingthe areaandvolume. Apart from various applications, they will have a basic understanding of Beta and Gamma functions.	3	2	2	2	2				2		1	1			
MAT 101. 3	KnowaboutqualitativeapplicationsofGauss's,Stoke'sandGreen'stheorem	3	2	2	2	2				3		3	1			
MAT 101. 4	Able to solve qualitative problems based on vector analysis and matrixanalysissuchasrank, eigen values, diagonalizationetc.	3	3	2	3	2				1		2	1			
MAT 101. 5	Use the tools of linear algebra including linearindependenceanddependenceofvectors, linear transformations, eigen values, matrix of a linear transformation.	2	2	1	2	3				2		2	1			

Attainments		Rubric
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	MAT101 APPLIED MATHEMATICS - I (CALCULUS AND LINEAR ALGEBRA)							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U2G 2
1	A60215820001	Mr ABHI PRATAP	100	30	70	B+	7	4	4	28
2	A60215820002	Mr AMRENDRA SINGH CHAUHAN	100	30	70	A	9	4	4	36
3	A60215820003	Mr SHYAM VEER SINGH	100	30	70	A	9	4	4	36
4	A60215820004	Mr SAHIL SHARMA	100	30	70	A+	10	4	4	40

Total No. of Students	=	4		
Total No. of Students	>60 % marks	3	75.00	%
Attainment Level			Level 2	

AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : BASIC CIVIL ENGINEERING AND APPLIED MECHANICS
Course Code : CIV101, Crédits : 02, Session :2020-21(Odd Semester), Class : B.Tech. 1st Year
Faculty Name : Dr. Mohan Kantharia, Mr. Sachin Tiwari

A. **Introduction:**The objective of this course is to understand the utility of various types of building materials and understand the location, construction detail and suitability of various building elements. It aims to determine the location of object on ground surface and to understand the effects of system of forces on rigid body in static conditions.

B. **Course Outcomes:**At the end of the course, students will be able to:
CIV101.1. Explain concepts and terminologies of building materials, surveying and mechanics.
CIV101.2. Apply various methods for surveying and mechanics.
CIV101.3. Determine the location, area and volume of objects on ground surface.
CIV101.4. Solve the problems of surveying and mechanics by using various methods.
CIV101.5. Analyse the effects of system of forces on rigid bodies in static conditions.

C. **Programme Outcomes:**
[PO.1].**Engineeringknowledge**:Applytheknowledgeofmathematics,science,engineeringfundamentals,andanengineeringspecializationtothesolutionofcomplexengineeringproblems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineeringproblems reaching substantiated conclusions using first principles of mathematics, natural sciences,andengineeringsciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and designsystem components or processes that meet the specified needs with appropriate consideration for thepublichealthandsafety,andthecultural,societal,andenvironmentalconsiderations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of theinformationtoprovidevalidconclusions

[PO.5].**Moderntoolusage**:Create,select,andapplyappropriatetechniques,resources,andmodernengineering and IT tools including prediction and modeling to complex engineering activities with anunderstandingofthelimitations
[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to theprofessionalengineeringpractice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societalandenvironmentalcontexts,anddemonstratetheknowledgeof,andneedforsustainabledevelopment

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities andnorms oftheengineeringpractices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverseteams,andinmultidisciplinarysettings

[PO.10].**Communication**:Communicateeffectivelyoncomplexengineeringactivitieswiththeengineeringcommunity and with society at large, such as, being able to comprehend and write effective reports anddesigndocumentation,makeeffectivepresentations,andgiveandreceiveclearinstructions

[PO.11].**Projectmanagementandfinance**:Demonstrateknowledgeandunderstandingoftheengineeringandmanagementprinciplesandapplythesetoone'sownwork,asamemberandleaderinateam,tomanageprojectsandinmultidisciplinaryenvironments

[PO.12].**Life-longlearning**:Recognizetheneedfor,andhavethepreparationandabilityto engageinindependent andlife-longlearninginthebroadestcontextoftechnologicalchange

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester	End Semester Examination	EE	70%

Examination			
Total			**100%**

F. Syllabus

Module I: Building Materials:
Stones, bricks, cement, timber - types, properties, test & uses, Introduction of concrete properties & laboratory tests on concrete, curing of concrete and mortar materials.
Module II: Surveying & Positioning:
Introduction to surveying, survey stations, measurement of distances; conventional and EDM methods. Measurement of directions by different methods, measurement of elevations by different methods, reciprocal levelling.
Module III: Smart City:
Elements of smart city, role of experts of various discipline of engineering in the development of smart city. Concept of green buildings, including rainwater harvesting, non-conventional sources of energy. Smart transportation and drainage system.
Module IV: Forces and Equilibrium:
Graphical and analytical treatment of concurrent and non-concurrent coplanar forces, free body diagram. Force diagram and Bow's notations. Application of equilibrium concepts. Analysis of plane trusses, method of joints, method of Sections.
Module V: Centre of Gravity and moment of Inertia:
Centroid and centre of gravity, moment of inertia of composite section. Support reactions, shear force and bending moment diagram for cantilever & simply supported beam with concentrated, distributed load and Couple.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Surveying, Vol. – 1, Punmia B.C., Laxmi Publications, 17th edition, 2016
- Building Material, B. C. Punmia, Laxmi Publications,2016
- A textbook of Engineering Mechanics, D. S. Kumar, Katsons Publications, 2013
- Basic Civil Engineering, S. Ramamrutam & R. Narayan, Dhanpat Rai Pub., 3rd edition, 2013
- Applied Mechanics, Prasad I.B., Khanna Publication 17th edition, 1996
- Surveying, Duggal, Tata McGraw Hill New Delhi, 4th edition, 2013
- Engineering Mechanics - Statics & Dynamics, R.C. Hibbler, Pearson Publications, 14th edition, 2015
- Engineering Mechanics - statics dynamics, A. Boresi & Schmidt, Cengage learning,1st edition, 2008.
- Applied Mechanics, R.K. Rajput, Laxmi Publications, 3rd edition, 2016

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO

1	STONES AND BRICKS	Lecture	CIV101.1	Mid Term-1, Quiz & End Sem Exam
2	WOOD AND CEMENT	Lecture	CIV101.1	Mid Term-1, Quiz & End Sem Exam
3	MORTAR AND CONCRETE AGGREGATE	Lecture	CIV101.1	Mid Term-1, Quiz & End Sem Exam
4	TESTING AND PROPERTIES CEMENT	Lecture	CIV101.1	Mid Term-1, Quiz & End Sem Exam
5	USES AND TYPES CONCRETE	Lecture	CIV101.1	Mid Term-1, Quiz & End Sem Exam
6	SURVEY TYPES AND CHAIN	Lecture	CIV101.2	Mid Term-1, Quiz & End Sem Exam
7	COMPASS SURVEY	Lecture	CIV101.2	Mid Term-1, Quiz & End Sem Exam
8	LEVELLING	Lecture	CIV101.2	Mid Term-1, Quiz & End Sem Exam
9	EDM, GPS AND TOTAL STATION	Lecture	CIV101.2	Mid Term-1, Quiz & End Sem Exam
10	SMART CITIES INDICATORS	Lecture	CIV101.3	Mid Term-1, Quiz & End Sem Exam
11	RAINWATER HARVESTING	Lecture	CIV101.3	Mid Term-1, Quiz & End Sem Exam
12	NON-CONVENTIONAL ENERGY SOURCES	Lecture	CIV101.3	Mid Term-1, Quiz & End Sem Exam
13	GREEN BUILDINGS	Lecture	CIV101.3	Mid Term-1, Quiz & End Sem Exam
14	FORCES AND MOMENTS	Lecture	CIV101.4	Mid Term-1, Quiz & End Sem Exam
15	LAMI’S THEOREM AND VARIGNON THEOREM	Lecture	CIV101.4	Mid Term-1, Quiz & End Sem Exam
16	COMPOSITION AND RESOLUTION OF FORCES	Lecture	CIV101.4	Mid Term-1, Quiz & End Sem Exam
17	SUPPORT REACTIONS	Lecture	CIV101.4	Mid Term-1, Quiz & End Sem Exam
18	TRUSSES	Lecture	CIV101.4	Mid Term-1, Quiz & End Sem Exam
19	CENTRE OF GRAVITY AND MOMENTS OF INERTIA	Lecture	CIV101.5	Mid Term-1, Quiz & End Sem Exam
20	PERPENDICULAR AXIS AND PARALLEL AXIS THEOREM	Lecture	CIV101.5	Mid Term-1, Quiz & End Sem Exam
21	TYPES OF LOADS, SUPPORTS, AND BEAM	Lecture	CIV101.5	Mid Term-2, Quiz & End Sem Exam
22	SHEAR FORCE AND BENDIND MOMENT DIAGRAM	Lecture	CIV101.5	Mid Term-2, Quiz & End Sem Exam
23	SF AND BM for POINT LOADS	Lecture	CIV101.5	Mid Term-2, Quiz & End Sem Exam
24	SF AND BM UDL	Lecture	CIV101.5	Mid Term-2, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV101.1	Explain concepts and terminologies of building materials, surveying and mechanics.	3	3	1	3	1	-	-	-	2		2	1			
CIV101.2	Apply various methods for surveying and mechanics.	3	2	2	2	2	-	-	-	2		1	1			
CIV101.3	Determine the location, area and volume of objects on ground surface.	3	2	2	2	2				3		3	1			
CIV101.4	Solve the problems of surveying and mechanics by using various methods.	3	3	2	3	2				1		2	1			
CIV101.5	Analyse the effects of system of forces on rigid bodies in static conditions.	2	2	1	2	3				2		2	1			

SampleQuestionPaper

Amity School of Engineering and Technology
DepartmentofCivilEngineering
IMID-SEMESTER(SEM– I)2020-21

Class:B.Tech.(Civil) ISemester

SubjectName: CIV101 Basic Civil Engineering and Applied Mechanics	Time:2 Hrs	Max.Marks:30

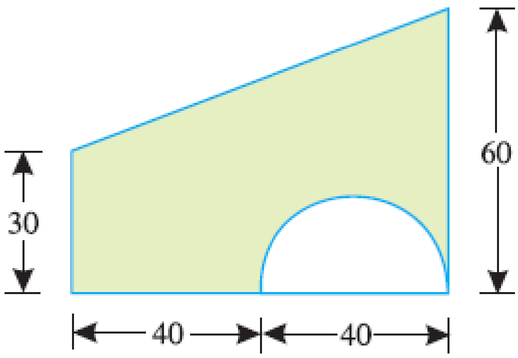
Levels of thequestions as perBloomsTaxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
QuestionMapping	Q.1,2	Q.3,4,5	Q.6			

Student willbeableto

CO1. Explain concepts and terminologies of building materials, surveying and mechanics.

CO2. Apply various methods for surveying and mechanics.

CO3. Determine the location, area and volume of objects on ground surface.

COMap	QuestionNo.	Question	Marks
CO1	Q.1	Write short note on classification of Rocks?	3
CO1	Q.2a	State Varignon’s moment theorem with examples	3
	Q.2b	Derive expression for parallel axis theorem.	3
CO2	Q.3	A semi-circle of 40 mm diameter is cut out from a Trapezium, as shown in the figure. Find the position of centre of gravity of the figure.  	6
CO2	Q.4	Determine the moment of inertia of a triangular section about its base.	3

CO3	Q.5a	Discuss the advantages of green Buildings.	3
	Q.5b	Describe in details the Smart cities in Indian Context.	3
CO3	Q6	The following consecutive reading were taken with a level and 4m levelling staff ground at common interval of 30m as 0.725 on A, 0.935, 2.845, 3.745, 3.935, 0.965, 1.135, 1.785, 2.625,3.845, 0.965, 1.575 and 2.015 on B. The elevation of point A is 220.50m. Make up level book page, apply usual check and calculate the reduced levels of points. Also calculate the gradient of line AB.	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	CIV101 BASIC CIVIL ENGINEERING & APPLIED MECHANICS Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U13
1	A60215820001	Mr ABHI PRATAP	100	30	70	A-	8	2	2	
2	A60215820002	Mr AMRENDRA SINGH CHAUHAN	100	30	70	A	9	2	2	
3	A60215820003	Mr SHYAM VEER SINGH	100	30	70	A	9	2	2	
4	A60215820004	Mr SAHIL SHARMA	100	30	70	A+	10	2	2	
			Total No. of Students			=	4			
			Total No. of Students			>60% marks	4	100.00	%	
			Attainment Level					Level 3		

AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : APPLIEDPHYSICS – I
Course Code : PHY101, Crédits : 04, Session :2020-21(Even Sem.), Class : B.Tech. 1st Year
Faculty Name : Dr. Manisha Singh, Dr. PankajMishra, Dr. SnehalC.Jani

A. **Introduction:**The objective of this course is to familiarize the prospective engineers with fundamentals and applications ofElectromagnetics,Relativity,and Modern Physics. It aims to equip the students with standard concepts at an intermediate to advanced level that that will equip them with requisite skills to apply in solving real life problems.

B. **Course Outcomes:**At the end of the course, students will be able to:

PHY101.1. Solvetheproblems related to time varying electric and magnetic field, and apply its concept in day to day applications.

PHY101.2. Students will develop understanding of relativistic motion and its applications.

PHY101.3. Students will acquire understanding of mechanics involved at microscopic levels

PHY101.4. Students willdevelop understanding of fundamental components of any electronic devices and its applications.

C. **Programme Outcomes:**

[PO.1].Engineeringknowledge:Applytheknowledgeofmathematics,science,engineeringfundamentals,andanengineeringspecializationtothesolutionofcomplexengineeringproblems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyzecomplex engineeringproblems reaching substantiated conclusions using first principles of mathematics, natural sciences,andengineeringsciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and designsystem components or processes that meet the specified needs with appropriate consideration for thepublichealthandsafety,andthecultural,societal,andenvironmentalconsiderations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of theinformationtoprovidevalidconclusions

[PO.5].**Moderntoolusage**:Create,select,andapplyappropriatetechniques,resources,an dmodernengineering and IT tools including prediction and modeling to complex engineering activities with anunderstandingofthelimitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to theprofessionalengineeringpractice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societalandenvironmentalcontexts,anddemonstratetheknowledgeof,andneedforsustai nabledevelopment

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities andnorms oftheengineeringpractices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverseteams,andinmultidisciplinarysettings

[PO.10].**Communication**:Communicateeffectivelyoncomplexengineeringactivitieswith theengineeringcommunity and with society at large, such as, being able to comprehend and write effective reports anddesigndocumentation,makeeffectivepresentations,andgiveandreceiveclearinstruct ions

[PO.11].**Projectmanagementandfinance**:Demonstrateknowledgeandunderstandingof theengineeringandmanagementprinciplesandapplythesetoone'sownwork,asamember andleaderinateam,tomanageprojectsandinmultidisciplinaryenvironments

[PO.12].**Life-longlearning**:Recognizetheneedfor,andhavethepreparationandabilityto engageinindependent andlife-longlearninginthebroadestcontextoftechnologicalchange

D. Programme Specific Outcomes:
A graduate of Civil Engineering Program will demonstrate:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. **Assessment Plan:**

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudent to be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. **Syllabus**

Module I: Electromagnetics:

Scalar and vector fields, gradient of a scalar field, physical significance of gradient, equipotential surface. Line, surface and volume integrals, Divergence and curl of vector field and mathematical analysis physical significance, Electric flux, Gauss' law, Proof and Applications, Gauss divergence and Stokes theorems.

Differential form of Gauss' Law, Amperes' Law, Displacement current, Faradays Law, Maxwell equations in free space & isotropic media (Integral form & differential form), EM wave propagation in free space, Poynting vector..

Module II: Special Theory of Relativity:

Michelson-Morley experiment, Importance of negative result, Inertial & non-inertial frames of reference, Einstein's postulates of Special theory of Relativity, Space-time coordinate system, Relativistic Space Time transformation (Lorentz transformation equation), Transformation of velocity, Addition of velocities, Length contraction and Time dilation, Mass-energy equivalence (Einstein's energy mass relation) & Derivation of Variation of mass with velocity .

Module III: Wave Mechanics:
Wave particle duality, De-Broglie matter waves, phase and group velocity, Heisenberg uncertainty principle, wave function and its physical interpretation, Operators, expectation values. Time dependent & time independent Schrödinger wave equation for free & bound states, square well potential (rigid wall), Step potential.

Module IV: Semiconductor and Electronic Materials:
Band Theory of Solids, Semi-conductors: Intrinsic and Extrinsic,carrler concentration, Direct and indirect band- gaps, Types of Electronic materials, p-n Junction Diode,Diode Equation, Breakdown in p-n Junction Diode: Avalanche and Zener, Zener Diode and its applications photoconductivity and photovoltaics. Superconductivity, Meissner Effect, Type I and Type II Superconductors.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Physics of waves, W. C. Elmore & M. A. Heald
- Introduction to Electrodynamics, D. J. Griffith
- Engineering Physics, Satya Prakash
- Concept of Modern Physics, A. Beiser
- Solid State Physics, S. O. Pallai

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Scalar and vector fields	Lecture	PHY101.1	Mid Term-1, Quiz & End Sem Exam
2	Gradient of a scalar field,physical significance of gradient	Lecture	PHY101.1	Mid Term-1, Quiz & End Sem Exam
3	Equipotential surface.Line, surface and volume integrals,	Lecture	PHY101.1	Mid Term-1, Quiz & End Sem Exam
4	Divergence of vector field(mathematical analysis),physical significance	Lecture/ Tutorials	PHY101.1	Mid Term-1, Quiz & End Sem Exam
5	Curl of vector field(mathematical analysis),physical	Lecture/ Tutorials	PHY101.1	Mid Term-1, Quiz & End Sem Exam

	significance			
6	Electric flux, Gauss' law, Proof and Applications	Lecture	PHY101.1	Mid Term-1, Quiz & End Sem Exam
7	Gauss divergence and Stokes theorems	Lecture	PHY101.1	Mid Term-1, Quiz & End Sem Exam
8	Differential form of Gauss' Law, Amperes' Law	Lecture	PHY101.1	Mid Term-1, Quiz & End Sem Exam
9	Displacement current, Faradays Law	Lecture	PHY101.1	Mid Term-1, Quiz & End Sem Exam
10	Displacement current, Faradays Law	Lecture	PHY101.1	Mid Term-1, Quiz & End Sem Exam
11	EM wave propagation in free space	Lecture	PHY101.1	Mid Term-1, Quiz & End Sem Exam
12	Poynting vector	Lecture	PHY101.1	Mid Term-1, Quiz & End Sem Exam
13	Electromagnetics	Tutorials	PHY101.1	Mid Term-1, Quiz & End Sem Exam
14	Michelson-Morley experiment	Lecture	PHY101.2	Mid Term-1, Quiz & End Sem Exam
15	Michelson-Morley experimentImportance of negative result	Lecture	PHY101.2	Mid Term-1, Quiz & End Sem Exam
16	Inertial & non-inertial frames of reference	Lecture	PHY101.2	Mid Term-1, Quiz & End Sem Exam
17	Einstein's postulates of Special theory of Relativity	Lecture/ Tutorials	PHY101.2	Mid Term-1, Quiz & End Sem Exam
18	Space-time coordinate system	Lecture	PHY101.2	Mid Term-1, Quiz & End Sem Exam
19	Relativistic Space Time transformation (Lorentz transformation equation	Lecture	PHY101.2	Mid Term-1, Quiz & End Sem Exam
20	Transformation of velocity	Lecture	PHY101.2	Mid Term-1, Quiz & End Sem Exam
21	Addition of velocities,	Lecture/ Tutorials	PHY101.2	Mid Term-2, Quiz & End Sem Exam
22	Length contraction and Time dilation	Lecture/ Tutorials	PHY101.2	Mid Term-2, Quiz & End Sem Exam
23	Mass-energy equivalence (Einstein's energy mass relation)	Lecture	PHY101.2	Mid Term-2, Quiz & End Sem Exam
24	Mass-energy equivalence (Einstein's energy mass relation)	Lecture/ Tutorials	PHY101.2	Mid Term-2, Quiz & End Sem Exam
25	Derivation of Variation of mass with velocity,	Lecture	PHY101.2	Mid Term-2, Quiz & End Sem Exam
26	Special Theory of Relativity	Tutorials/Revision	PHY101.2	Mid Term-2, Quiz & End Sem Exam

27	Wave particle duality	Lecture	PHY101.3	Mid Term-2, Quiz & End Sem Exam
28	, De-Broglie matter waves	Lecture	PHY101.3	Mid Term-2, Quiz & End Sem Exam
29	phase and group velocity	Lecture	PHY101.3	Mid Term-2, Quiz & End Sem Exam
30	Heisenberg uncertainty principle	Lecture	PHY101.3	Mid Term-2, Quiz & End Sem Exam
31	wave function and its physical interpretation	Lecture	PHY101.3	Mid Term-2, Quiz & End Sem Exam
32	Operators, expectation values	Lecture/ Tutorials	PHY101.3	Mid Term-2, Quiz & End Sem Exam
33	Time dependent & time independent Schrödinger wave equation for free	Lecture	PHY101.3	Mid Term-2, Quiz & End Sem Exam
34	Time dependent & time independent Schrödinger wave equation for bound states	Lecture	PHY101.3	Mid Term-2, Quiz & End Sem Exam
35	Schrödinger wave equation for free & bound states, square well potential (rigid wall),	Lecture	PHY101.3	Mid Term-2, Quiz & End Sem Exam
36	Schrödinger wave equation for free & bound states, Step potential.	Lecture	PHY101.3	Mid Term-2, Quiz & End Sem Exam
37	Band Theory of Solids	Lecture	PHY101.4	Quiz & End Sem Exam
38	Semi-conductors: Intrinsic and Extrinsic	Lecture	PHY101.4	Quiz & End Sem Exam
39	Carrier concentration	Lecture/ Tutorials	PHY101.4	Quiz & End Sem Exam
40	Direct and indirect band-gaps	Lecture	PHY101.4	Quiz & End Sem Exam
41	Types of Electronic materials	Lecture	PHY101.4	Quiz & End Sem Exam
42	P-N Junction Diode,Diode Equation	Lecture	PHY101.4	Quiz & End Sem Exam
43	Breakdown in p-n Junction Diode: Avalanche and Zener	Lecture	PHY101.4	Quiz & End Sem Exam
44	Zener Diode and its applications	Lecture/ Tutorials	PHY101.4	Quiz & End Sem Exam
45	photoconductivity and photovoltaics	Lecture	PHY101.4	Quiz & End Sem Exam
46	Superconductivity, Meissner Effect	Lecture	PHY101.4	Quiz & End Sem Exam
47	Type I and Type II	Lecture	PHY101.4	Quiz & End Sem

	Superconductors			Exam
48	Semiconductor and Electronic Materials	Revision	PHY101.4	Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
PHY101.1	Solvetheproblemsofdifferentiationoffunctions oftwovariables andknow about the maximization and minimization of functions of severalvariables	3	3	1	2	3	3	2	1	2	1	-	3	-	-	-
PHY101.2	Cometoknowtheapplicationsofdoubleandtripleintegrationinfindingthe areaandvolume. Apart from various applications, they will have a basic understanding of Beta and Gamma functions.	3	3	1	2	3	3	2	1	2	1	-	3	-	-	-
PHY101.3	Knowaboutqualitativeapplicationsof Gauss’s,Stoke’sandGreen’stheorem	3	3	1	2	3	3	2	1	2	1	-	3	-	-	-
PHY101.4	Able to solve qualitative problems based on vector analysis and	3	3	1	2	3	3	2	1	2	1	-	3	-	-	-

	matrixanalysiss uchasrank, eigen values, diagonalization etc.																

S. No.	Enrollment.No.	Student's Name	PHY101 APPLIED PHYSICS – I Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U3G3
1	A60215820001	Mr ABHI PRATAP	100	30	70	B+	7	4	4	28
2	A60215820002	Mr AMRENDRA SINGH CHAUHAN	100	30	70	A	9	4	4	36
3	A60215820003	Mr SHYAM VEER SINGH	100	30	70	A+	10	4	4	40
4	A60215820004	Mr SAHIL SHARMA	100	30	70	A-	8	4	4	32
			Total No. of Students			=	4			
			Total No. of Students			>60% marks	3	75.00	%	
			Attainment Level					Level 2		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : APPLIEDPHYSICS LAB-1
Course Code : PHY121, Crédits : 01, Session :2020-21(Even Sem.), Class : B.Tech. 1st Year
Faculty Name : Dr.ManishaSingh,Dr.PankajMishra,Dr.SnehalC.Jani

A. **Introduction*:*** *Principles of Physics relevant to the study of science and engineering have clarity of understanding through experiments. Learning process and learning outcomes get enhanced through experiments relevant to and commensurate with theoretical knowledge. The lab course is designed to teach the students the basics and advanced chemical principles through experiments. Pysics is the building blocks in engineering and technology and is essential to develop analytical capabilities of students, so that they can transform and apply the fundamental knowledge in their field. All engineering fields have unique applicationsof laws of Physics, insights of matter and space is a key factor in understanding of nature and laws governing it. For electronics and computer science engineering, knowledge of semiconductors and its devices is essentially needed. With this versatile need in view, course has been designed in such a way so that the student should get an insight of the subject starting from the very basic application of principles.*

B. **Course Outcomes:**After successful completion of the course students will have the knowledge and skill to:

PHY 121.1.Apply the fundamentals of semiconductors to understand the conceptEnergy band gap.

PHY 121.2.Apply the fundamentals of physical sciences to understand the importance resonance,and its applications in day to day life.

PHY 121.3.Apply the understanding of varying fieldand determine parameters of significance.

PHY 121.4.Apply the fundaments of semiconductors to understand working of basic electronic devices

PHY 121.5 Apply the fundaments understandings of different types of semiconductors to understand working of basic electronic devices .

PHY 121.6.Apply the fundaments of semiconductors to understand working of basic electronic devices

PHY 121.7.Apply the working principles of electronic components to different types of cct arrangements involved in day to day life.

PHY 121.8.Apply the principles of semiconductor devices as a voltage regulator

PHY 121.9.Apply the principles of semiconductor devices in designing solar cells.

PHY 121.10.Apply the principles of varying electric and magnetic field in day to day life.

C. **Programme Outcomes:**

[PO.1].**Engineeringknowledge**:Applytheknowledgeofmathematics,science,engineeringfundamentals,andanengineeringspecializationtothesolutionofcomplexengineeringproblems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineeringproblems reaching substantiated conclusions using first principles of mathematics, natural sciences,andengineeringsciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and designsystem components or processes that meet the specified needs with appropriate consideration for thepublichealthandsafety,andthecultural,societal,andenvironmentalconsiderations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of theinformationtoprovidevalidconclusions

[PO.5].**Moderntoolusage**:Create,select,andapplyappropriatetechniques,resources,andmodernengineering and IT tools including prediction and modeling to complex engineering activities with anunderstandingofthelimitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to theprofessionalengineeringpractice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societalandenvironmentalcontexts,anddemonstratetheknowledgeof,andneedforsustainabledevelopment

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities andnorms oftheengineeringpractices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverseteams,andinmultidisciplinarysettings

[PO.10].**Communication**:Communicateeffectivelyoncomplexengineeringactivitieswith theengineeringcommunity and with society at large, such as, being able to comprehend and write effective reports anddesigndocumentation,makeeffectivepresentations,andgiveandreceiveclearinstructions

[PO.11].**Projectmanagementandfinance**:Demonstrateknowledgeandunderstandingof theengineeringandmanagementprinciplesandapplythesetoone’sownwork,asamember andleaderinateam,tomanageprojectsandinmultidisciplinaryenvironments

[PO.12].**Life-longlearning**:Recognizetheneedfor,andhavethepreparationandabilityto engageinindependent andlife-longlearninginthebroadestcontextoftechnologicalchange

D. Programme Specific Outcomes:

PSO1: Will beabletodesign,developandimplementefficientsoftwareforagivenreal-lifeproblem.

PSO 2: Will be able to apply knowledge of AI, Machine Learning and Data Mining in analyzing big data forextractingusefulinformationfromitandforperformingpredictiveanalysis.

PSO 3: Will be able to design, manage and secure wired/ wireless computer networks for transfer and sharing ofinformation.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudent to be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

List of experiments: [Any 10]

1. To determine the forbidden band gap energy of a semiconductor.
2. To determine the frequency of AC mains using sonometer.
3. To determine the value of specific charge (ratio of e/m) of an electron by Thomson method.
4. To study the common base characteristics of a PNP junction transistor, by drawinginput characteristic curves andoutput characteristic curves.
5. To study the common emitter characteristics of a NPN junction transistor, by drawinginput characteristic curves andoutput characteristic curves.
6. To study a series /parallel resonant LCR circuit, its resonate frequency and quality factor
7. To study the voltage regulation characteristics of a zener diode.
8. To study the characteristics of a solar cell.
9. To draw V – I characteristics of a photocell and to verify the inverse square law of radiation.
10. To plot graph showing the variation of magnetic field with distance along the axis of a circular coil carrying current, and hence estimate the radius of the coil.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Physics Practical, Gupta and Kumar

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	To determine the forbidden band gap energy of a semiconductor	Practical	PHY121.1	Mid Term-1, Quiz & End Sem Exam
2	To determine the frequency of AC mains using sonometer	Practical	PHY121.2	Mid Term-1, Quiz & End Sem Exam
3	To determine the value of specific charge (ratio of e/m) of an electron by Thomson method.	Practical	PHY121.3	Mid Term-1, Quiz & End Sem Exam
4	To study the common base characteristics of a PNP junction transistor, by drawinginput characteristic curves andoutput	Practical	PHY121.4	Mid Term-1, Quiz & End Sem Exam

	characteristic curves			
5	To study the common emitter characteristics of a NPN junction transistor, by drawinginput characteristic curves andoutput characteristic curves.	Practical	PHY21.5	Mid Term-1, Quiz & End Sem Exam
6	To study a series /parallel resonant LCR circuit, its resonate frequency and quality factor	Practical	PHY121.6	Mid Term-1, Quiz & End Sem Exam
7	To study the voltage regulation characteristics of a zener diode.	Practical	PHY121.7	Mid Term-1, Quiz & End Sem Exam
8	To study the characteristics of a solar cell	Practical	PHY121.8	Mid Term-1, Quiz & End Sem Exam
9	To draw V – I characteristics of a photocell and to verify the inverse square law of radiation	Practical	PHY121.9	Mid Term-1, Quiz & End Sem Exam
10	To plot graph showing the variation of magnetic field with distance along the axis of a circular coil carrying current, and hence estimate the radius of the coil.	Practical	PHY121.10	Mid Term-1, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
PHY 121.1	Determination the forbidden band gap energy of a semiconductor	3	3	3	2	2	1	1	1	1	3	3	3	-	-	-
PHY 121.2	To determine the frequency of AC mains using sonometer	3	3	3	2	2	1	1	1	1	3	3	3	-	-	-
PHY 121.3	To determine the value of specific charge (ratio of e/m) of an electron	3	3	3	2	2	1	1	1	1	3	3	3	-	-	-

	by Thomson method.															
PHY 121.4	To study the common base characteristics of a PNP junction transistor, by drawinginput characteristic curves andoutput characteristic curves	3	3	3	2	2	1	1	1	1	3	3	3	-	-	-
PHY 121.5	To study the common emitter characteristics of a NPN junction transistor, by drawinginput characteristic curves andoutput characteristic curves.	3	3	3	2	2	1	1	1	1	3	3	3	-	-	-
PHY 121.6	To study a series /parallel resonant LCR circuit, its resonate frequency and quality factor	3	3	3	2	2	1	1	1	1	3	3	3	-	-	-
PHY 121.7	To study the voltage regulation characteristics of a zener diode.	3	3	3	2	2	1	1	1	1	3	3	3	-	-	-
PHY 121.8	To study the characteristics of a solar cell	3	3	3	2	2	1	1	1	1	3	3	3	-	-	-
PHY 121.9	To draw V – I characteristics of a photocell and to verify the inverse square law of radiation	3	3	3	2	2	1	1	1	1	3	3	3	-	-	-
PHY 121.10	To plot graph showing the variation of magnetic field with distance along the axis of a circular coil carrying current, and hence estimate the radius of the coil.	3	3	3	2	2	1	1	1	1	3	3	3	-	-	-

S. No.	Enrollment.No.	Student's Name	PHY121 APPLIED PHYSICS LAB – I							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U7G
1	A60215820001	Mr ABHI PRATAP	100	30	70	A	9	1	1	
2	A60215820002	Mr AMRENDRA SINGH CHAUHAN	100	30	70	A	9	1	1	
3	A60215820003	Mr SHYAM VEER SINGH	100	30	70	A+	10	1	1	1
4	A60215820004	Mr SAHIL SHARMA	100	30	70	A	9	1	1	

Total No. of Students	=	4		
Total No. of Students	>60% marks	4	100.00	%
Attainment Level			Level 3	

AMITY UNIVERSITY
MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENTOF CIVIL ENGINEERING
Course Handout
Course : APPLIED MATHEMATICS – III (PROBABILITY, STATISTICS AND NUMERICAL METHODS)
Course Code : MAT301, Crédits : 03, Session :2020-21(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Santosh Kumar Sharma, Dr. Alok Jain, Dr. Girraj Kumar Verma, Dr. Rajat Vaish, Dr. Ram Kumar

K. Introduction: The objective of this course is to familiarize the prospective engineers with techniques in basic statistics, probability, testing of significance, and numerical methods for differentiation, integration, equations and ordinary differential equations. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

L. Course Outcomes: At the end of the course, students will be able to:

MAT301.1. Solve the problems of real life applications using measures of central tendency and to find out the correlation between various factors.

MAT301.2. Come to know the applications of basics of probability and related concepts in real problems.

MAT301.3. Come to know the applications of probability distribution functions in various sampling methods.

MAT301.4. Solve problems of sampling for large and small sampling using test of significance based on normal and chi-square statistics.

MAT301.5. Find the interpolated values of dependent variable, derivative at certain point, solution of equations and solution of simultaneous equations. Use the tools of numerical methods to solve definite integration and ordinary differential equations.

M. Programme Outcomes:

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modernengineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage inindependent and life-long learning in the broadest context of technological change

N. Programme Specific Outcomes:

PSO 1: Will be able to design, develop and implement efficient software for a given real life problem.

PSO 2: Will be able to apply knowledge of AI, Machine Learning and Data Mining in analyzing big data forextracting useful information from it and for performing predictive analysis.

PSO 3: Will be able to design, manage and secure wired/ wireless computer networks for transfer and sharing ofinformation.

O. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a studentto be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

P. Syllabus

Module I : Basic Statistics

Measures of Central tendency: Moments, skewness and Kurtosis, Correlation and regression – Rank correlation.

Applied Statistics : Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves.

Module II : Basic Probability and expectation

Discrete and Continuous random variables and their properties, Dependent and Independent random variables. Probability spaces, conditional probability, the multinomial distribution, Poisson approximation to the binomial distribution, infinite sequences of Bernoulli trials, sums of independent random variables.

Expectation of Discrete Random Variables; Moments, Variance of a sum, Correlation coefficient.

Module III: Probability distributions and probability density function (p. d. f.) for discrete and continuous variable

Probability distributions and probability density function for discrete variable: For Binomial and Poisson's distribution and evaluation of statistical parameters.

Probability distributions and probability density function for continuous variable: For Normal distribution and evaluation of its statistical parameters.

Module IV : Test of significance for Small and large samples

Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.

Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

Module V : Numerical Methods

Solution of simultaneous linear equations by numerical techniques; Jacobi's and Gauss-Seidel method. Solution of algebraic and transcendental equations – Bi-section method, Newton-Raphson method and Regula-Falsi method.

Interpolation : Finite differences, Relation between operators, Interpolation using Newton's forward and backward difference formula.

Interpolation for unequal intervals: Newton's divided difference and Lagrange's formulae.

Numerical differentiation and integration: Picard's method, Trapezoidal rule and Simpson's 1/3rd and 3/8 rules.

Solution of Ordinary differential equation : Taylor's series, Euler's and modified Euler's methods, Runge-Kutta method of fourth order, Milne's and Adam's predicator-corrector methods.

Q. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

R. Suggested Text/Reference Books:

- Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,

2006.

- P.G. Hoel, S.C. Port and C.J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003(Reprint).
- S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
- W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968.
- N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
- T. Veerarajan, Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi, 2010.

S. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Measures of Central tendency	Lecture	MAT301.1	Mid Term-1, Quiz & End Sem Exam
2	Moments, skewness and Kurtosis	Lecture	MAT301.1	Mid Term-1, Quiz & End Sem Exam
3	Correlation and regression	Lecture	MAT301.1	Mid Term-1, Quiz & End Sem Exam
4	Rank Correlation	Lecture	MAT301.1	Mid Term-1, Quiz & End Sem Exam
5	Curve fitting by the method of least squares	Lecture	MAT301.1	Mid Term-1, Quiz & End Sem Exam
6	Straight Line	Lecture	MAT301.1	Mid Term-1, Quiz & End Sem Exam
7	Parabola and More curves	Lecture	MAT301.1	Mid Term-1, Quiz & End Sem Exam
8	Discrete and Continuous random variables	Lecture	MAT301.2	Mid Term-1, Quiz & End Sem Exam
9	Dependent and Independent random variables	Lecture	MAT301.2	Mid Term-1, Quiz & End Sem Exam
10	Probability spaces, conditional probability	Lecture	MAT301.2	Mid Term-1, Quiz & End Sem Exam
11	Sums of independent random variables, Expectation of Discrete Random Variables	Lecture	MAT301.2	Mid Term-1, Quiz & End Sem Exam
12	Poisson approximation to the binomial distribution, Variance, Correlation Coefficient	Lecture	MAT301.2	Mid Term-1, Quiz & End Sem Exam
13	Probability distributions and probability density function	Lecture	MAT301.3	Mid Term-1, Quiz & End Sem Exam

14	Binomial distribution	Lecture	MAT301.3	Mid Term-1, Quiz & End Sem Exam
15	Poisson’s distribution	Lecture	MAT301.3	Mid Term-1, Quiz & End Sem Exam
16	Evaluation of statistical parameters	Lecture	MAT301.3	Mid Term-1, Quiz & End Sem Exam
17	Normal distribution	Lecture	MAT301.3	Mid Term-1, Quiz & End Sem Exam
18	Evaluation of statistical parameters	Lecture	MAT301.3	Mid Term-1, Quiz & End Sem Exam
19	Large sample test for single proportion	Lecture	MAT301.4	Quiz & End Sem Exam
20	difference of proportions, single mean	Lecture	MAT301.4	Quiz & End Sem Exam
21	difference of means and standard deviations	Lecture	MAT301.4	Quiz & End Sem Exam
22	Test for single mean, difference of means	Lecture	MAT301.4	Quiz & End Sem Exam
23	Test for ratio of variances	Lecture	MAT301.4	Quiz & End Sem Exam
24	Chi-square test for goodness of fit	Lecture	MAT301.4	Quiz & End Sem Exam
25	Independence of attributes	Lecture	MAT301.4	Quiz & End Sem Exam
26	Jacobi’s and Gauss-Seidel method	Lecture	MAT301.5	Quiz & End Sem Exam
27	Bi-section method, Newton-Raphson method, Regula-Falsi method	Lecture	MAT301.5	Quiz & End Sem Exam
28	Finite differences, Relation between operators, Newton’s forward and backward difference formula	Lecture	MAT301.5	Quiz & End Sem Exam
29	Newton’s divided difference, Lagrange’s formulae	Lecture	MAT301.5	Quiz & End Sem Exam
30	Picard’s method	Lecture	MAT301.5	Quiz & End Sem Exam
31	Trapezoidal rule	Lecture	MAT301.5	Quiz & End Sem Exam
32	Simpson’s 1/3rd and 3/8 rules	Lecture	MAT301.5	Quiz & End Sem Exam
33	Taylor’s series and Euler’s method	Lecture	MAT301.5	Quiz & End Sem Exam
34	modified Euler’s methods	Lecture	MAT301.5	Quiz & End Sem Exam
35	Runge-Kutta method of fourth order	Lecture	MAT301.5	Quiz & End Sem Exam
36	Milne’s and Adam’s predicator-corrector methods	Lecture	MAT301.5	Quiz & End Sem Exam

T. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
MAT301.1	Solve the problems of real life applications using measures of central tendency and to find out the correlation between various factors.	3	3	2	3	2						2		**3**	**2**	**1**
MAT301.2	Come to know the applications of basics of probability and related concepts in real problems.	3	1	2	3	3						2		**3**	**2**	**1**
MAT301.3	Come to know the applications of probability distribution functions in various sampling methods.	3	1	2	3	3						2		**3**	**2**	**1**
MAT301.4	Solve problems of sampling for large and small sampling using test of significance based on normal and chi-square statistics.	3	1	1	3	3						1		**3**	**2**	**1**

MAT301.5	Find the interpolated values of dependent variable, derivative at certain point, solution of equations and solution of simultaneous equations. Use the tools of numerical methods to solve definite integration and ordinary differential equations.	3	2	2	3	2						2		**3**	**2**	**1**

S. No.	Enrollment.No.	Student's Name	MAT301 APPLIED MATHEMATICS-III (PROBABILITY, STATISTICS AND NUMERICAL METHODS)							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U4G4
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A+	10	3	3	30
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A	9	3	3	27
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	A-	8	3	3	24
4	A60215819004	Ms RIYA NAMDEV	100	30	70	B+	7	3	3	21
5	A60215819005	Mr YASH YOGI	100	30	70	B+	7	3	3	21
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	3	60.00	%	
			Attainment Level					Level 1		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **COMPUTER-AIDED CIVIL ENGINEERING DRAWING**
Course Code : CIV 302, Crédits : 03, Session : 2020-21 (Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Mohan Khantharia

A. Introduction

The objective of the course is to develop the capability for carrying out independent design. Information in the form of sketch and images to be illustrated as a part of discussion.

B. Course Outcomes: At the end of the course, students will be able to:

- **CIV302.1**. Applying software's in design and drawings of Civil Engineering structures.
- **CIV302.2**. Able to proficiency, including the ability to use industry-standard computer software to generate 2D and 3D drawings.
- **CIV302.3**. Understanding of the theory of orthographic projection and the conventions associated with Civil engineering drawings.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D.

Component of Evaluation	**Description**	**Code**	**Weightag e %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/H A	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastu dentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

E. Course Content

F. Module I: Basics of Auto Cad (2-D) and Auto Cad (3-D): Two-dimensional drafting work to be handled in detail on Auto Cad. Complete Drafting, Editing and modification work to be done and presentations be made.Basic commands and usage of 3d Auto Cad drawing. Drafting basic geometrical forms and combinations of the same in three dimensions and their editing.

Module II: Elements of Building Drawing: Symbols and sing Conventions used for materials, plumbing, rebar drawing, electrical fittings. Masonry Bonds details, one brick wall and one and half brick wall, wall connections, . RCC beam, column, footings, foundation plan, load wearing wall.

Module III:Building Drawing: Detail drawing of single story building Plan, Elevation, Sectional Elevation. Standard fittings, drawings of different types of buildings. .

Module IV: Building Bye-laws: Building Planning – Provisions of National Building Code, open area,setbacks, FAR terminology, principles of planning, orientation. site selection, types of drawings. Types of buildings. Classification of structure, Load bearing structure, Framed structure, Composite structure.

Module V: Perspective Drawing: Elements of perspective drawing involving simple problems, one point and two point perspectives.

G. Examination Scheme:

Components	A	CT	S/V/Q/ HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- Building Drawing Shah M. G. Kale C. M, Tata McGraw-Hill Education
- Planning & Designing of Building Sane Y. S, Allies Book Stall
- Architectural Design Ernest Pickering, J. Wiley & Sons
- National Building Code-2005

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Two-dimensional drafting work to be handled in detail on Auto Cad.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
2	Complete Drafting.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
3	Basic commands and usage of 3d Auto Cad drawing	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
4	Drafting basic geometrical forms	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
5	combinations of the same in three dimensions and their editing.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
6	Editing and modification work to be done and presentations be made.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
7	Symbols and sing Conventions	Lecture	CIV 302.1	Mid Term-1, Quiz

	used for materials,., , .			& End Sem Exam
8	plumbing, rebar drawing, electrical fittings.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
9	plumbing, rebar drawing, electrical fittings.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
10	Masonry Bonds details, one brick wall and one and half brick wall.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
11	Masonry Bonds details, one brick wall and one and half brick wall.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
12	wall connections.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
13	RCC beam.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
14	Rcc column, footings.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
15	Foundation plan, load Bearing wall.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
16	Detail drawing of single story building Plan,	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
17	Elevation, of buildings	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
18	Sectional Elevation.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
19	Standard fittings.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
20	Drawings of different types of buildings	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
21	Building Planning Types of buildings.	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
22	Provisions of National Building Code.	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
23	Provisions of National Building Code.	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
24	Open area,setbacks	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
25	FAR terminology	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
26	Principles of planning, orientation	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
27	Site selection, types of drawings.	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
28	*Classification of structure, Load bearing structure,*	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
29	Framed structure, Composite structure.	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
30	Elements of perspective drawing involving simple	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam

	problems, one point and two point perspectives.			
31	Elements of perspective drawing involving simple problems, one point and two point perspectives.	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
32	Elements of perspective drawing involving simple problems, one point and two point perspectives. Elements of perspective drawing involving simple problems, one point and two point perspectives.	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
33	Elements of perspective drawing involving simple problems, one point and two point perspectives.	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
34	Elements of perspective drawing involving simple problems, one point and two point perspectives.	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
35	Elements of perspective drawing involving simple problems, one point and two point perspectives.	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
36	Elements of perspective drawing involving simple problems, one point and two point perspectives.	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam

J.

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV302.1	Application of software's in design and drawings of Civil Engineering structures.	3	3	1	3	1				2		2	1			

CIV302.2	Able to proficiency, including the ability to use industry-standard computer software to generate 2D and 3D drawings	3	2	2	2	2				2		1	1			
CIV302.3	Understanding of the theory of orthographic projection and the conventions associated with Civil engineering drawings.	3	2	2	2	2				3		3	1			

Sample Question Paper

<table>
<tr><td colspan="8">Amity School of Engineering and Technology
Department of CIVIL Engineering
MID-SEMESTER(SEM–III)2020-21</td></tr>
<tr><td colspan="8">Class: B.Tech (CE) 3rd Semester</td></tr>
<tr><td colspan="3">Subjec tName:
CIV 302 Computer Aided Civil Engg drawing</td><td colspan="3">Time:1.5Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td colspan="2">Levels of thequestions as perBloomsTaxo nomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td colspan="2">Question Mapping</td><td>Q.1,4</td><td>Q.2,3,6</td><td>Q.4</td><td>Q.2,5</td><td></td><td></td></tr>
<tr><td colspan="8">Student will be able to
CO1: Using the software for the design of buildings, making plans.
CO2: Applying the basic concept of drawing
CO3: Understanding the various projections.</td></tr>
<tr><td>COMap</td><td>QuestionNo.</td><td colspan="5">Question</td><td>Marks</td></tr>
<tr><td>CO1</td><td>Q.1</td><td colspan="5">Use Auto CADD to make 2-D plan of building</td><td>3</td></tr>
<tr><td rowspan="2">CO1</td><td>Q.2a</td><td colspan="5">What are various software used for the design of building.</td><td>3</td></tr>
<tr><td>Q.2b</td><td colspan="5">Write down various commands in Auto-CADD</td><td>3</td></tr>
<tr><td>CO1</td><td>Q.3</td><td colspan="5">What is use of line command ?</td><td>6</td></tr>
<tr><td>CO2</td><td>Q.4</td><td colspan="5">Discuss various types of projections.</td><td>3</td></tr>
<tr><td rowspan="2">CO2</td><td>Q.5a</td><td colspan="5">Draw orthographic projections.</td><td>3</td></tr>
<tr><td>Q.5b</td><td colspan="5">Discuss various types of elements of building drawing.</td><td>3</td></tr>
<tr><td>CO3</td><td>Q6</td><td colspan="5">What do you mean by 2-d and 3-d projections.</td><td>6</td></tr>
</table>

Attainments		Rubric
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	CIV302 COMPUTER-AIDED CIVIL ENGINEERING DRAWING							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U14G14
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A	9	2	2	18
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A-	8	2	2	16
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	B+	7	2	2	14
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A-	8	2	2	16
5	A60215819005	Mr YASH YOGI	100	30	70	B-	5	2	2	10
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	3	60.00	%	
			Attainment Level					Level 1		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **ENGINEERING MECHANICS**
Course Code : CIV 303, Credits : 04, Session : 2020-21(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Mohan Khantharia, Mr. Sachin Tiwari

A. Introduction

The course also covers the simple and compound stresses due to forces, stresses and deflection in beams due to bending, torsion in circular section, strain energy, different theories of failure, stress in thin cylinder thick cylinder and spheres due to external and internal pressure.

B. Course Outcomes: At the end of the course, students will be able to:

- **CIV303.1** Able to know the importance of seismic activity consideration in terrain.
- **CIV303.2** Able to understand various techniques to determine engineering properties of rocks and distinguish different types of rocks and minerals.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects.

D.

Component of Evaluation	**Description**	**Code**	**Weightag e %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/H A	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastu dentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

E. Module I: Introduction to Engineering Mechanics Covering: Introduction to Engineering Mechanics covering, Force Systems Basic concepts, Particle equilibrium in 2-D & 3-D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces, Components in Space – Resultant- Moment of Forces and its Application; Couples and Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems; Static Indeterminacy.

Module II:Centroid and Centre of Gravity Covering: Centroid and Centre of Gravity covering, Centroid of simple figures from first principle, centroid of composite sections; Centre of Gravity and its implications; Area moment of inertia- Definition, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections; Mass moment inertia of circular plate, Cylinder, Cone, Sphere, Hook.

Module III: Basic Structural Analysis: Basic Structural Analysis covering, Equilibrium in three dimensions; Method of Sections; Method of Joints; How to determine if a member is in tension or compression; Simple Trusses; Zero force members; Beams & types of beams; Frames & Machines, Friction covering, Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, wedge friction, screw jack & differential screw jack;

Module IV: Virtual Work and Energy Method: Virtual Work and Energy Method- Virtual displacements, principle of virtual work for particle and ideal system of rigid bodies, degrees of freedom. Active force diagram, systems with friction, mechanical efficiency. Conservative forces and potential energy (elastic and gravitational), energy equation for equilibrium. Applications of energy method.

Module V: Review of Particle Kinematics, Dynamics and **Mechanical Vibrations:**Introduction to Kinematics of Rigid Bodies covering, Basic terms, general principles in dynamics; Types of motion, Instantaneous centre of rotation in plane motion and simple problems; D'Alembert's principle and its applications in plane motion and connected bodies; Work energy principle and its application in plane motion of connected bodies; Kinetics of rigid body rotation; Review of particle dynamics- Rectilinear motion; Plane curvilinear motion (rectangular, path, and polar coordinates). 3-D curvilinear motion; Relative and constrained motion; Newton's 2nd law (rectangular, path, and polar coordinates). Work-kinetic energy, power, potential energy. Impulse-momentum (linear, angular); Impact (Direct and oblique), Mechanical Vibrations covering, Basic terminology, free and forced vibrations, resonance and its effects; Degree of freedom; Derivation for frequency and amplitude of free vibrations without damping and single degree of freedom system, simple problems, types of pendulum, use of simple, compound and torsion pendulums.

F. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/ HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

G. Text Books

- Jindal U.C., "Strength of Materials", Galgotia Publication, New Delhi, 1998.
- Ryder G.H., "Strength of Materials", Macmillan, Delhi, 2003.
- R.K. Bansal, "Strength of Materials", Laxmi Publication, New Delhi, 2001.

- Sadhu Singh, “Strength of Materials”, Khanna Publishers, New Delhi, 2000.
- Timoshenko S.P., “Elements of Strength of Materials”, East-West affiliated, New Delhi, 2000.
- Hibbler R.C., “Mechanics of Materials”, Prentice Hall, New Delhi, 1994.

H.

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction to Engineering Mechanics covering.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
2	Force Systems Basic concepts	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
3	Particle equilibrium in 2-D & 3-D.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
4	Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
5	Components in Space – Resultant- Moment of Forces and its Application.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
6	Couples and Resultant of Force System, Equilibrium of System of Forces	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
7	Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
8	Static Indeterminacy.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
9	Centroid and Centre of Gravity covering.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
10	Centroid of simple figures.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
11	from first principle, centroid of composite sections.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
12	Centre of Gravity and its implications.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
13	Area moment of inertia- Definition.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
14	Moment of inertia of plane sections from first principles.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
15	Theorems of moment of inertia.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
16	Moment of inertia of standard sections and composite sections	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
17	Mass moment inertia of circular plate, Cylinder,	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
18	Mass moment inertia Cone, Sphere, Hook.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
19	Basic Structural Analysis covering.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
20	Equilibrium in three dimensions.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
21	Method of Sections.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam

22	Method of Joints; How to determine if a member is in tension or compression	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
23	Simple Trusses; Zero force members.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
24	Beams & types of beams; Frames & Machines	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
25	Friction covering, Types of friction, Limiting friction.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
26	Friction, Static and Dynamic Friction	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
27	Laws of; Motion of Bodies, wedge friction.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
28	screw jack & differential screw jack	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
29	Method of Joints; How to determine if a member is in tension.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
30	Virtual Work and Energy Method-for. (	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
31	Virtual displacements, principle of virtual work.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
32	particle and ideal system of rigid bodies.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
33	degrees of freedom.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
34	Active force diagram, systems with friction.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
35	Mechanical efficiency. Conservative forces and potential energy.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
36	Elastic and gravitational), energy equation for equilibrium. Applications of energy method.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
37	Introduction to Kinematics of Rigid Bodies covering, Basic terms, general principles in dynamics.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
38	Mechanical Vibrations covering, Basic terminology, free and forced vibrations.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
39	Resonance and its effects; Degree of freedom.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
40	Derivation for frequency and amplitude of free vibrations without damping and single degree of freedom system.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam

I.

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES	CORRELATION WITH PROGRAMME SPECIFIC

														OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV303.1	Able to know the importance of seismic activity consideration in terrain.	3	3	1	3	1				2		2	1			
CIV303.2	Able to understand various techniques to determine engineering properties of rocks and distinguish different types of rocks and minerals	3	2	2	2	2				2		1	1			

Sample Question Paper

<table>
<tr><td colspan="7">Amity School of Engineering and Technology
Department of CIVIL Engineering
MID-SEMESTER(SEM–III)2020-21</td></tr>
<tr><td colspan="7">Class: B.Tech (CE) 3rd Semester</td></tr>
<tr><td colspan="2">Subject t Name:
CIV 303 Engineering Mechanics</td><td colspan="3">Time:1.5Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3,6</td><td>Q.4</td><td>Q.2,5</td><td></td><td></td></tr>
<tr><td colspan="7">Student will be able to
CO1: Understand the basic concept of stress and strain
CO2: Analyze the basic properties of different materials.</td></tr>
</table>

CO Map	Question No.	Question	Marks
CO1	Q.1	What is force and it system?	3
CO1	Q.2a	What is concurrent and coplanar forces?	3
	Q.2b	What do you mean by free body diagram?	3
CO1	Q.3	What is stress and strain?	6
CO2	Q.4	What is Kinetics of rigid body and also Review of particle dynamics.	3

CO2	Q.5a	What is centre of gravity.	3
	Q.5b	What is curvilinear motion, Relative and constrained motion.	3
CO2	Q6	What is Newton's 2nd law (rectangular, path, and polar coordinates).	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	CIV303 ENGINEERING MECHANICS							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U6G6
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A+	10	4	4	40
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A+	10	4	4	40
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	A	9	4	4	36
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A+	10	4	4	40
5	A60215819005	Mr YASH YOGI	100	30	70	A	9	4	4	36
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	5	100.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **ENERGY SCIENCE AND ENGINEERING**
Course Code : CIV 304, Credits : 04, Session : 2020-21 (Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Mohan Khantharia, Mr. Sachin Tiwari

A. Introduction

Energy-efficient construction implies the development of energy-efficient technological and other measures that are aimed at streamlining the processes of using energy resources at all stages of construction. One of their effective directions is the construction of "green" buildings with zero energy consumption.

B. Course Outcomes: At the end of the course students will be able to learn

- **CIV 304.1** Understand the basic of civil engineering and different types of conventional and non conventional energy sources.
- **CIV 304.2** Understand basic of different resources available for the sustainable construction, how to reduce green house effect.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects.

D. Programme Specific Outcomes:

PSO1: Students will be able to understand the different types of construction ancient and modern in recent trends.

PSO2: Students will able to apply all the concepts to develop green construction and to use energy efficiently.

PSO3: It will help student to understand the different types of construction.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/ HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25%includesalltypesofleaves Including medical leaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F.

Module I: Introduction: What is Civil Engineering/ Infrastructure? Basics of Engineering and Civil Engineering; Broad disciplines of Civil Engineering; Importance of Civil Engineering, Possible scopes for a career. Early constructions and developments over time; Ancient monuments & Modern marvels; Development of various materials of construction and methods of construction; Works of Eminent civil engineers. Introduction to Energy Science: Scientific principles and historical interpretation to place energy use in the context of pressing societal, environmental and climate issues.

Module II: Energy Sources: Overview of energy systems, sources, transformations, efficiency, and storage. Fossil fuels (coal, oil, oil-bearing shale and sands, coal gasification) - past, present & future, Remedies & alternatives for fossil fuels - biomass, wind, solar, nuclear, wave, tidal and hydrogen; Sustainability and environmental trade-offs of different energy systems; possibilities for energy storage or regeneration (Ex. Pumped storage hydro power projects, superconductor-based energy storages, high efficiency batteries)

Module III: Energy & Environment: Energy efficiency and conservation; introduction to clean energy technologies and its importance in sustainable development; Carbon footprint, energy consumption and sustainability; introduction to the economics of energy;; How future energy use can be influenced by economic, environmental, trade, and research policy.

Module IV: Civil Engineering Projects connected with the Energy Sources: Coal mining technologies, Oil exploration offshore platforms, Underground and under-sea oil pipelines, solar chimney project, wave energy caissons, coastal installations for tidal power, wind mill towers; hydro power stations above-ground and underground along with associated dams, tunnels, penstocks, etc.; Nuclear reactor; Spent Nuclear fuel storage and disposal systems.

Module V: Engineering for Energy Conservation: Concept of Green Building and Green Architecture; Green building concepts; LEED ratings. Energy Audit of Facilities and optimization of energy consumption: Aesthetics in Civil Engineering, Examples of great architecture, fundamentals of architectural design & town planning; Building Systems (HVAC, Acoustics, Lighting, etc.); LEED ratings; Development of Smart cities.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- Patil, B.S.(1974), Legal Aspects of Building and Engineering Contract
- The National Building Code, BIS, (2017)
- RERA Act, (2017)
- Meena Rao (2006), Fundamental concepts in Law of Contract, 3rd Edn. Professional Offset
- Chandiramani, Neelima (2000), The Law of Contract: An Outline, 2nd Edn. Avinash Publications Mumbai
- Boyle, Godfrey (2004), Renewable Energy (2nd edition). Oxford UniversityPress

I. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Corresponding CO**	**Mode of Assessing CO**
1	What is Civil Engineering/ and Civil Engineering;	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
2	Infrastructure? Basics of Engineering	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam

3	Broad disciplines of Civil Engineering.	Lecture	CIV304.1	Mid Term-1, Quiz & End Sem Exam
4	Importance of Civil Engineering,	Lecture	CIV304.1	Mid Term-1, Quiz & End Sem Exam
5	Early constructions and developments over time	Lecture	CIV304.1	Mid Term-1, Quiz & End Sem Exam
6	Ancient monuments & Modern marvels	Lecture	CIV304.1	Mid Term-1, Quiz & End Sem Exam
7	Development of various materials of construction and methods of construction	Lecture	CIV304.1	Mid Term-1, Quiz & End Sem Exam
8	Works of Eminent civil engineers. Introduction to Energy Science	Lecture	CIV304.1	Mid Term-1, Quiz & End Sem Exam
9	Scientific principles and historical interpretation to place energy use in the context of pressing societal	Lecture	CIV304.1	Mid Term-1, Quiz & End Sem Exam
10	Environmental and climate issues.	Lecture	CIV304.1	Mid Term-1, Quiz & End Sem Exam
11	Possible scopes for a career.	Lecture	CIV304.1	Mid Term-1, Quiz & End Sem Exam
12	Overview of energy systems, and storage., coal gasification)	Lecture	CIV304.1	Mid Term-1, Quiz & End Sem Exam
13	Overview of energy systems, sources, transformations, efficiency	Lecture	CIV307.1	Mid Term-1, Quiz & End Sem Exam
14	Fossil fuels (coal, oil, oil-bearing shale and sands.	Lecture	CIV304.1	Mid Term-1, Quiz & End Sem Exam
15	past, present & future, remedies & alternatives for fossil fuels	Lecture	CIV304.1	Mid Term-1, Quiz & End Sem Exam
16	Biomass, wind, solar, nuclear, wave, tidal and hydrogen.	Lecture	CIV304.1	Mid Term-1, Quiz & End Sem Exam
17	Sustainability and environmental trade-offs of different energy systems	Lecture	CIV304.1	Mid Term-1, Quiz & End Sem Exam
18	possibilities for energy storage or regeneration (Ex. Pumped storage hydro power project	Lecture	CIV304.1	Mid Term-1, Quiz & End Sem Exam
19	superconductor-based energy storages, high efficiency batteries)	Lecture	CIV304.1	Mid Term-1, Quiz & End Sem Exam
20	Energy efficiency and conservation;, environmental,	Lecture	CIV304.1	Mid Term-1, Quiz & End Sem Exam
21	introduction to clean energy technologies	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam
22	introduction to clean energy technologies and its importance in sustainable development	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam
23	Carbon footprint, energy consumption and sustainability	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam
24	introduction to the economics of energy	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam
25	How future energy use can be	Lecture	CIV304.1	Mid Term-2, Quiz

	influenced by economic			& End Sem Exam
26	Trade, and research policy.	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam
27	Coal mining technologies, Oil exploration offshore platforms, , solar,; tunnels, penstocks, etc.;	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam
28	Underground and under-sea oil pipelines	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam
29	chimney project, wave energy caissons	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam
30	coastal installations for tidal power, wind mill towers	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam
31	hydro power stations above-ground and underground along with associated dams,	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam
32	Nuclear reactor; Spent Nuclear fuel storage and disposal systems.	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam
33	Nuclear reactor; Spent Nuclear fuel storage and disposal systems.	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam
34	Concept of Green Building and Green Architecture.:,	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam
35	Green building concepts	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam
36	LEED ratings	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam
37	Energy Audit of Facilities and optimization of energy consumption	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam
38	Aesthetics in Civil Engineering, Examples of great architecture	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam
39	fundamentals of architectural design & town planning; Building Systems	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam
40	(HVAC, Acoustics, Lighting, etc.); LEED ratings; Development of Smart cities.	Lecture	CIV304.1	Mid Term-2, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

CIV304.1	Understand the basic concept of sustainable construction with different materials.	3	3	1	3	1				2		2	1		1	1
CIV304.2	Students will able to visualize the difference between ancient and modern construction.	3	2	2	2	2				2		1	1		2	1
CIV304.3	Understanding the basic of different structural components and their usage.	3	2	2	2	2				2		1	1		1	2

Question Paper

<table>
<tr><td colspan="7" align="center">Amity School of Engineering and Technology
Department of CIVIL Engineering
MID-SEMESTER(SEM–III)2020-21</td></tr>
<tr><td colspan="7" align="center">Class: B.Tech (CE) 3rd Semester</td></tr>
<tr><td colspan="2">Subjec tName:
CIV 304 Energy Science and Engineering</td><td colspan="3">Time:1.5Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3,6</td><td>Q.4</td><td>Q.2,5</td><td></td><td></td></tr>
<tr><td colspan="7">Student will be able to
CO1: Understand the basic difference between modern and ancient constructions
CO2: Understand basic of different energy sources and their origin</td></tr>
</table>

<table>
<tr><td>CO Map</td><td>Question No.</td><td>Question</td><td>Marks</td></tr>
<tr><td>CO1</td><td>Q.1</td><td>What do you understand by modern construction materials?</td><td>3</td></tr>
<tr><td rowspan="2">CO1</td><td>Q.2a</td><td>What do you understand by carbon foortprint?</td><td>3</td></tr>
<tr><td>Q.2b</td><td>What are different types of construction materials?</td><td>3</td></tr>
<tr><td>CO1</td><td>Q.3</td><td>What do you mean by wind energy?</td><td>6</td></tr>
<tr><td>CO2</td><td>Q.4</td><td>What are different conventional energy sources?</td><td>3</td></tr>
<tr><td rowspan="2">CO2</td><td>Q.5a</td><td>Discuss origin of fossil fuels and its use.</td><td>3</td></tr>
<tr><td>Q.5b</td><td>Discuss tidal energy, solar energy and wind energy.</td><td>3</td></tr>
</table>

CO2	Q6	Discuss conventional and non conventional energy sources.	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	**Enrollment.No.**	**Student's Name**	**CIV304 ENERGY SCIENCE & ENGINEERING**							
			Max Marks	**CE Weight Age (%)**	**ET Weight Age (%)**	**GO**	**GP**	**ACU**	**ECU**	**U16G16**
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A	9	2	2	18
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A-	8	2	2	16
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	A-	8	2	2	16
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A	9	2	2	18
5	A60215819005	Mr YASH YOGI	100	30	70	B+	7	2	2	14
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	4	80.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **BASIC CIVIL Engineering**
Course Code : CIV 305, Credits : 04, Session : 2020-21 (Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Mohan Khantharia, Mr. Sachin Tiwari

A. **Introduction:** Energy-efficient construction implies the development of energy-efficient technological and other measures that are aimed at streamlining the processes of using energy resources at all stages of construction. One of their effective directions is the construction of "green" buildings with zero energy consumption.

B. **Course Outcomes: At the end of the course students will be able to learn**

- **CIV 305.** Introduction to what constitutes Civil Engineering
- Identifying the various areas available to pursue and specialize within the overall field of Civil Engineering
- **CIV 305.2** Highlighting the depth of engagement possible within each of these areas, Exploration of the various possibilities of a career in this field

C. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects.

F. Programme Specific Outcomes:

PSO1: Students will be able to understand the different types of construction ancient and modern in recent trends.

PSO2: Students will able to apply all the concepts to develop green construction and to use energy efficiently.

PSO3: It will help student to understand the different types of construction.

G.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/ HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25%includesalltypesofleaves Including medical leaves.	A	5%
End Semester	End Semester	EE	70%

Examination	Examination		
Total			**100%**

Module 1: Basic Understanding: What is Civil Engineering/ Infrastructure? Basics of Engineering and Civil Engineering; Broad disciplines of Civil Engineering; Importance of Civil Engineering, Possible scopes for a career. Early constructions and developments over time; Ancient monuments & Modern marvels; Development of various materials of construction and methods of construction; Works of Eminent civil engineers.

Module 2: Fundamentals of Architecture & Town Planning: Aesthetics in Civil Engineering, Examples of great architecture, fundamentals of architectural design & town planning; Building Systems (HVAC, Acoustics, Lighting, etc.); LEED ratings; Development of Smart cities.

Module 3: Fundamentals of Building Materials: Stones, bricks, mortars, Plain, Reinforced & Prestressed Concrete, Construction Chemicals; Structural Steel, High Tensile Steel, Carbon Composites; Plastics in Construction; 3D printing; Recycling of Construction & Demolition wastes. Types of buildings; tall structures; various types of bridges; Water retaining structures; Other structural systems; Experimental Stress Analysis; Wind tunnel studies.

Module 4: Environmental Engineering & Sustainability: Water treatment systems; Effluent treatment systems; Solid waste management; Sustainability in Construction; **Geotechnical Engineering:**-(Basics of soil mechanics, rock mechanics and geology; various types of foundations) **Hydraulics, Hydrology &Water Resources Engineering: (**Fundamentals of fluid flow, basics of water supply systems; Underground Structures)

Module 5: Surveying & Geometrics: Traditional surveying techniques, Total Stations, Development of Digital Terrain Models; GPS, LIDAR**. Traffic &Transportation Engineering: (**Development in India for different modes of transport; Developments and challenges in integrated transport development in India: road, rail, port and harbour and airport sector; PPP in transport sector; Intelligent Transport Systems; Urban Public and Freight Transportation; Road Safety under heterogeneous traffic; Sustainable and resilient pavement materials)

Module 6: Repairs & Rehabilitation of Structures: Basics of corrosion phenomena and other structural distress mechanisms; some simple systems of rehabilitation of structures; Non- Destructive testing systems; Use of carbon fibre wrapping and carbon composites in repairs. Typical software used in Civil Engineering- Finite Element Method, Modelling; highlighting typical available software systems (SAP, STAAD, ABAQUS, MATLAB, ETAB, REVIT, AUTOCAD, PRIMAVERA)

Module 7: Industrial Visit.

At least one day visit to local industry in the field of Civil Engineering.

G.Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

I. Suggested Books

- Patil, B.S.(1974), Legal Aspects of Building and Engineering Contract
- The National Building Code, BIS, (2017)
- RERA Act, (2017)
- Meena Rao (2006), Fundamental concepts in Law of Contract, 3rd Edn. Professional Offset
- Chandiramani, Neelima (2000), The Law of Contract: An Outline, 2nd Edn. Avinash Publications Mumbai
- Boyle, Godfrey (2004), Renewable Energy (2nd edition). Oxford UniversityPress

J. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	What is Civil Engineering/ Infrastructure? Ancient monuments & Modern marvels	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
2	Basics of Engineering and Civil Engineering	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
3	Broad disciplines of Civil Engineering; Importance of Civil Engineering	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
4	Broad disciplines of Civil Engineering; Importance of Civil Engineering	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
5	Possible scopes for a career. Early constructions and developments over time	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
6	Possible scopes for a career. Early constructions and developments over time	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
7	Development of various materials of construction and methods of construction	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
8	Development of various materials of construction and methods of construction	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
9	Works of Eminent civil engineers.	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
10	Aesthetics in Civil Engineering,; Building Systems	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
11	Examples of great architecture	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
12	fundamentals of architectural design & town planning	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
13	fundamentals of architectural design & town planning	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
14	HVAC, Acoustics, Lighting, etc.); LEED ratings	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
15	HVAC, Acoustics, Lighting, etc.); LEED ratings	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
16	Development of Smart cities.	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
17	Development of Smart cities.	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
18	Stones, bricks, mortars, Plain, Reinforced & Prestressed Concrete	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
19	Plain, Reinforced & Prestressed Concrete	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
20	Construction Chemicals; Structural Steel, High Tensile Steel	Lecture	CIV305.1	Mid Term-1, Quiz & End Sem Exam
21	Construction Chemicals; Structural Steel, High Tensile Steel	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam
22	Carbon Composites; Plastics in Construction; 3D printing	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam

23	Recycling of Construction & Demolition wastes	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam
24	Types of buildings; tall structures; various types of bridges	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam
25	Water retaining structures; Other structural systems	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam
26	Water retaining structures; Other structural systems	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam
27	Experimental Stress Analysis; Wind tunnel studies	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam
28	Water treatment systems; Effluent treatment systems	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam
29	Solid waste management; Sustainability in Construction	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam
30	**Geotechnical Engineering:**-(Basics of soil mechanics, rock mechanics and geology.	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam
31	**Hydraulics, Hydrology &Water Resources Engineering: (**Fundamentals of fluid flow, basics of water supply systems.	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam
32	various types of foundations); Underground Structures)	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam
33	Traditional surveying techniques, Total Stations, Development of Digital Terrain Models; GPS, LIDAR**.**	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam
34	Development in India for different modes of transport; Developments and challenges in integrated transport development in India	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam
35	road, rail, port and harbour and airport sector; PPP in transport sector; Intelligent Transport Systems	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam
36	Urban Public and Freight Transportation; Road Safety under heterogeneous traffic; Sustainable and resilient pavement materials)	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam
37	Basics of corrosion phenomena and other structural distress mechanisms; some simple systems of rehabilitation of structures	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam
38	Non- Destructive testing systems; Use of carbon fibre wrapping and carbon composites in repairs	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam
39	. Typical software used in Civil Engineering- Finite Element Method	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam
40	Modelling; highlighting typical available software systems (SAP, STAAD, ABAQUS, MATLAB, ETAB,	Lecture	CIV305.1	Mid Term-2, Quiz & End Sem Exam

	REVIT, AUTOCAD, PRIMAVERA)			

K. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV305.1	Introduction to what constitutes Civil Engineering Identifying the various areas available to pursue and specialize within the overall field of Civil Engineering Exploration of the various possibilities of a career in this field.	3	3	1	3	1				2		2	1		1	1
CIV305.2	Students will able to visualize the difference between ancient and modern construction.	3	2	2	2	2				2		1	1		2	1
CIV305.3	Highlighting the depth of engagement possible within each of these areas.	3	2	2	2	2				2		1	1		1	2

Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–III)2020-21						
Class: B.Tech (CE) 3rd Semester						
Subjec tName: CIV 305 Basic Civil Engineering		Time:1.5Hrs			Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		
Student will be able to CO1: Understand the basic difference between modern and ancient constructions						

CO2: Understand basic of different energy sources and their origin. CO3: Analyze the difference between modern and ancient construction techniques.			
CO Map	Question No.	Question	Marks
CO1	Q.1	What do you understand by modern construction materials?	3
CO1	Q.2a	What do you understand by cement?	3
	Q.2b	What are different types of construction materials?	3
CO1	Q.3	What do you mean by concrete?	6
CO2	Q.4	What do you understand by LEED?	3
CO2	Q.5a	What do you understand by smart city? Discuss in detail.	3
	Q.5b	Discuss cement manufacturing process.	3
CO3	Q6	Discuss Green building concept.	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	CIV305 BASIC CIVIL ENGINEERING Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U17G17
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A+	10	2	2	20
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A	9	2	2	18
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	B+	7	2	2	14
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A+	10	2	2	20
5	A60215819005	Mr YASH YOGI	100	30	70	A	9	2	2	18
			Total No. of Students			=	5			
			Total No. of Students >60% marks				4	80.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **MECHANICAL ENGINEERING**
Course Code : BME 104, Credits : 02, Session : 2020-21(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Nagendra Kumar Sharma

A. Introduction

Mechanical engineering is **one of the broadest engineering disciplines**. Mechanical engineers design, develop, build, and test. They deal with anything that moves, from components to machines to the human body.

B. Course Outcomes: At the end of the course students will be able to learn

- **BME 104.1** Ability to design and conduct experiments, as well as to analyze and interpret data.
- **BME 104.2** Ability to apply modern engineering tools, techniques and resources to solve complex mechanical engineering activities with an understanding of the limitations.
- **BME 104.3** Ability to comprehend the thermodynamics and their corresponding processes that influence the behaviour and response of structural components.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects.

D. Programme Specific Outcomes:

PSO1: Apply basic knowledge of mathematics, science and engineering principles to solve technical problems.

PSO2: Design and analyze a system component, or process to meet desired needs in Mechanical Engineering. Design a system and conduct experiments to find suitable solution in the field of mechanical engineering.

PSO3: Identify, visualize, formulate and solve engineering problems in the field of mechanical Engineering

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/ HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25%includesalltypesofleaves Including medical leaves.	A	5%

End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F.Course Content

Module I: Basic Concepts- Basic concepts: concept of continuum, macroscopic approach, Thermodynamic systems - closed, open and isolated. Property, state, path and process, quasistatic process, work, modes of work. Zeroth law of thermodynamics, concept of temperature and heat. Concept of ideal and real gases.

Module II: First Law of Thermodynamics: Concepts of Internal Energy, Specific Heat Capacities, Enthalpy. Energy Balance for Closed and Open Systems, Energy Balance for Steady-Flow Systems. Steady-Flow Engineering Devices. Energy Balance for Unsteady- Flow

Module III: Second Law of Thermodynamics: Thermal energy reservoirs, heat engines energy conversion, Kelvin's and Clausius statements of second law, the Carnot cycle, the Carnot Theorem, Carnot heat engine, efficiency, the Carnot refrigerator and heat pump, COP. Clausius inequality, concept of entropy, reversible and irreversible processes, Entropy change of pure substances, isentropic processes.

Module IV: Properties of Pure Substance: Properties of pure substances. Thermodynamic properties of pure substances in solid, liquid and vapour phases. Phase rule, P-V, P-T, T-V, T-S, H-S diagrams, PVT surfaces. Thermodynamic properties of steam. Calculations of work done and heat transfer in non- flow and flow processes

Module V: Power Cycles: Vapour and combined power cycles, including the Carnot vapor cycle, Rankine cycle, Gas power cycles, Otto cycle, diesel engine cycle, gas-turbine Brayton cycle.

G.Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att Attendance

H.Suggested Books:

- Nag.P.K., "Engineering Thermodynamics", Tata McGraw-Hill, NewDelhi.
- Cengel, Thermodynamics - AnEngineeringApproach*Tata McGraw Hill, New*Delhi.
- Sonntag, R. E., Borgnakke, C., &Wylen, G. J. V. Fundamentals of thermodynamics: Wiley.
- Moran, M. J., Shapiro, H. N., Boettner, D. D., & Bailey, M. Fundamentals of Engineering
- Thermodynamics: John Wiley & Sons.

I.lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	concept of continuum, macroscopic approach concept of temperature and heat.	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
2	Thermodynamic systems - closed, open and isolated. Property, state,	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam

3	Path and process, quasistatic process, work, modes of work.	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
4	Zeroth law of thermodynamics.	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
5	Concept of ideal and real gases.	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
6	Concepts of Internal Energy, Specific Heat Capacities, Enthalpy,	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
7	Energy Balance for Closed and Open Systems	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
8	Energy Balance for Steady-Flow Systems	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
9	Steady-Flow Engineering Devices	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
10	Energy Balance for Unsteady-Flow.	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
11	Thermal energy reservoirs, the Carnot Theorem,. Clausius inequality, concept of entropy,.	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
12	Kelvin's and Clausius statements of second law.	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
13	heat engines energy conversion, , the Carnot cycle,	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
14	Carnot heat engine, efficiency, the Carnot refrigerator and heat pump, COP.	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
15	reversible and irreversible processes, Entropy change of pure substances, isentropic processes	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
16	Properties of pure substances. Thermodynamic properties of pure substances in solid, liquid and vapour phases.	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
17	Phase rule, P-V, P-T, T-V, T-S, H-S diagrams, PVT surfaces. Thermodynamic properties of steam	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
18	Calculations of work done and heat transfer in non- flow and flow processes.	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
19	Vapour and combined power cycles, including the Carnot vapor cycle,	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
20	Rankine cycle, Gas power cycles, Otto cycle, diesel engine cycle, gas-turbine Brayton cycle.	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam

E. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BME104.1	Explain the basic concepts and laws of thermodynamics. Distinguish the properties of ideal and real gases.	3	3	1	3	1				2		2	1	1	2	1
BME104.2	Apply the concept of enthalpy and entropy in thermal systems, Calculate the properties of pure substance and explain the working of steam cycles.	3	2	2	2	2				2		1	1	2	2	1
BME104.3	Problems in psychrometric processes and gas mixtures. Apply thermodynamic laws for real time applications	2	1	1	2	2				2		1	1	2	2	1

S. No.	Enrollment.No.	Student's Name	BME104 MECHANICAL ENGINEERING							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U5G5
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A+	10	2	2	20
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A+	10	2	2	20
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	B+	7	2	2	14
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A+	10	2	2	20
5	A60215819005	Mr YASH YOGI	100	30	70	A	9	2	2	18
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	4	80.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **BASIC ELECTRONICS**
Course Code : ECE 307, Credits : 02, Session : 2020-21(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Narendra Kumar Garg, Mrs.Shally Goyal, Dr. Ajay Dadoria

A. Introduction

Electronics is about **manipulating electricity to accomplish a particular task** and is very much a hands-on endeavor. Since the result of building electronic circuits is usually a device that performs a task, this hands-on aspect should be self-evident.

B. Course Outcomes: At the end of the course students will be able to learn

- **ECE307.1** Understand and Know broadly the concepts and functionalities of the electronic devices, tools and instruments.
- **ECE307.2** Understand use, general specifications and deploy abilities of the electronic devices, and assemblies.
- **ECE307.3** Analyse usage of electronic devices, tools and instruments in engineering applications.

C. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects.

D. Programme Specific Outcomes:

PSO1: Apply principles of Engineering Mathematics, Physics and core engineering including applications appropriate to the Electronics & Communication Engineering.

PSO2: Apply basic knowledge related to Electronic Devices & Circuits, Electromagnetics, Digital Signal Processing, Communication Engineering and Embedded Systems to solve engineering problems.

PSO3: Demonstrate proficiency in use of software and hardware required in reallife applications.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/ HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25%includesalltypesofleaves Including medical leaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module 1: Diodes and Applications: Semiconductor Diode - Ideal versus Practical, Diode Equivalent Circuits, Load Line Analysis; Diode as a Switch, Diode as a Rectifier, Half Wave and Full Wave Rectifiers; Breakdown Mechanisms, Zener Diode – Operation and Applications; Opto-Electronic Devices – LEDs, Clipper and clampers.

Module 2: Transistor Characteristics: Bipolar Junction Transistor (BJT) –Construction, Operation, Amplifying Action, Common Base, Common Emitter and Common Collector Configurations, Operating Point, Introduction to FET, Feedback Amplifiers – Principle, Advantages of Negative Feedback.

Module 3: Operational Amplifiers and Applications: Introduction to Op-Amp, Differential Amplifier Configurations, CMRR, PSRR, Slew Rate; Block Diagram, Pin Configuration of 741 Op-Amp, Characteristics of Ideal Op-Amp, Concept of Virtual Ground; inverting and non-inverting amplifier applications: summing and difference amplifier, unity gain buffer, comparator.

Module 4: Digital Electronics Fundamentals: Difference between analog and digital signals, Boolean algebra, Basic and Universal Gates, Symbols, Truth tables, logic expressions, Logic simplification using K-map, half and full adder/subtractor, multiplexers, de- multiplexer.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Books

- David. A. Bell (2003), Laboratory Manual for Electronic Devices and Circuits, Prentice Hall, India
- SantiramKal (2002), Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India
- Thomas L. Floyd and R. P. Jain (2009), Digital Fundamentals by Pearson Education,
- Paul B. Zbar, A.P. Malvino and M.A. Miller (2009), Basic Electronics – A Text-Lab. Manual, TMH
- R. T. Paynter (2009), Introductory Electronic Devices & Circuits, Conventional Flow Version, Pearson

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Semiconductor Diode - Ideal versus Practical,;; Breakdown Mechanisms.	Lecture	ECE 307.1	Mid Term-1, Quiz & End Sem Exam
2	Diode Equivalent Circuits, Load Line Analysis.	Lecture	ECE 307.1	Mid Term-1, Quiz & End Sem Exam
3	Diode as a Switch, Diode as a Rectifier, Half Wave and Full Wave Rectifiers.	Lecture	ECE 307.1	Mid Term-1, Quiz & End Sem Exam
4	Zener Diode – Operation and Applications.	Lecture	ECE 307.1	Mid Term-1, Quiz & End Sem Exam

5	Opto-Electronic Devices – LEDs.	Lecture	ECE 307.1	Mid Term-1, Quiz & End Sem Exam
6	Clipper and clampers.	Lecture	ECE 307.1	Mid Term-1, Quiz & End Sem Exam
7	Bipolar Junction Transistor (BJT)	Lecture	ECE 307.1	Mid Term-1, Quiz & End Sem Exam
8	Construction, Operation, Amplifying Action.	Lecture	ECE 307.1	Mid Term-1, Quiz & End Sem Exam
9	Common Base, Common Emitter and Common Collector Configurations.	Lecture	ECE 307.1	Mid Term-1, Quiz & End Sem Exam
10	Operating Point, Introduction to FET.	Lecture	ECE 307.1	Mid Term-1, Quiz & End Sem Exam
11	Feedback Amplifiers – Principle.	Lecture	ECE 307.1	Mid Term-1, Quiz & End Sem Exam
12	Advantages of Negative Feedback.			Mid Term-2, Quiz & End Sem Exam
13	Introduction to Op-Amp, Differential Amplifier Configurations.	Lecture	ECE 307.1	Mid Term-2, Quiz & End Sem Exam
14	CMRR, PSRR, Slew Rate; Block Diagram, Pin Configuration of 741 Op-Amp	Lecture	ECE 307.1	Mid Term-2, Quiz & End Sem Exam
15	Characteristics of Ideal Op-Amp, Concept of Virtual Ground.	Lecture	ECE 307.1	Mid Term-2, Quiz & End Sem Exam
16	inverting and non-inverting amplifier applications	Lecture	ECE 307.1	Mid Term-2, Quiz & End Sem Exam
17	summing and difference amplifier, unity gain buffer, comparator.	Lecture	ECE 307.1	Mid Term-2, Quiz & End Sem Exam
18	Difference between analog and digital signals, Boolean algebra,	Lecture	ECE 307.1	Mid Term-2, Quiz & End Sem Exam
19	Logic simplification using K-map, half and full adder/subtractor, multiplexers, de- multiplexer	Lecture	ECE 307.1	Mid Term-2, Quiz & End Sem Exam
20	Basic and Universal Gates, Symbols, Truth tables, logic expressions	Lecture	ECE 307.1	Mid Term-2, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES	CORRELATION WITH PROGRAMME

														SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ECE307.1	Apply the knowledge of mathematics, science, engineering Know broadly the concepts and functionalities of the electronic devices, tools and instruments.	3	3	1	3	1				2		2	1	1	2	1
ECE307.2	Understand use, general specifications and deploy abilities of the electronic devices, and assemblies.	3	2	2	2	2				2		1	1	2	2	1
ECE307.3	Confidence in handling and usage of electronic devices, tools and instruments in engineering applications.	2	1	1	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–III)2020-21		
Class: B.Tech (CE) 3rd Semester		
Subjec tName: ECE 307 Basic Electronics	Time:1.5Hrs	Max.Marks:30

Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		

Student will be able to
CO1: Understand and Know broadly the concepts and functionalities of the electronic devices, tools and instruments.

CO2: Understand use, general specifications and deploy abilities of the electronic devices, and assemblies.

CO3: Analyse usage of electronic devices, tools and instruments in engineering applications.

CO Map	Question No.	Question	Marks

CO1	Q.1	State operation of PNP transistor in detail using suitable diagrams.	3
CO1	Q.2a	Explain AND gate with their graphic symbol, algebraic function and truth table.	3
	Q.2b	Draw the schematic block diagram of OP-AMP stages.	3
CO1	Q.3	Give introduction to FET. State the advantages of FET over the conventional transistor	6
CO2	Q.4	Define Demulti plexer and draw a 1:4 DEMUX. How may select lines are required for 1:4 Demux?	3
CO2	Q.5a	What do you understand by intrinsic and extrinsic semiconductor? Draw the classification	3
	Q.5b	Discuss construction of Bipolar Junction Transistor along with its parts in detail.	3
CO3	Q6	Explain "OR" gate with their graphic symbol, algebraic function and truth table.	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	ECE307 BASIC ELECTRONICS							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U7 G7
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A+	10	2	2	20
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A+	10	2	2	20
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	B+	7	2	2	14
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A+	10	2	2	20
5	A60215819005	Mr YASH YOGI	100	30	70	B+	7	2	2	14

Total No. of Students	=	5		
Total No. of Students	>60% marks	3	60.00	%
Attainment Level			Level 1	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **COMPUTER-AIDED CIVIL ENGINEERING DRAWING LAB**
Course Code : CIV322, Credits : 01, Session : 2020-21(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Sachin Tiwari, Mr. Mohan Kantharia

A. Introduction

Engineering drawing, most commonly referred to as engineering graphics, is the art of manipulation of designs of a variety of components, especially those related to engineering.

B. Course Outcomes: At the end of the course, students will be able to:

- **CIV322.1**. Application of software's in design and drawings of Civil Engineering structures.
- **CIV322.2**. Able to proficiency, including the ability to use industry-standard computer software to generate 2D and 3D drawings
- **CIV322.3**. Understanding of the theory of orthographic projection and the conventions associated with Civil engineering drawings.

C. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Function as design consultants in construction industry for the design of civil engineering structures.

PSO2: Provide sustainable solutions to the Civil Engineering Problems

PSO3: It. will help students to analyze and Provide concrete solution to environmental problem

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

- Basic of 2-D Auto CAD **(2 Hours)**
- Drawing of Elements of Buildings, column, beam, footings by 2-D Auto CAD**. (2 Hours)**
- Drawing of RCC Details by Auto CAD **(2 Hours)**
- Drawing of Residential Building, and school Building by Auto CAD. **(2 Hours**)
- Types of stair, RCC stair case, septic tank, Soak pit. **(2 Hours)**
- Paneled, doors, windows and ventilators in wood, Glazed paneled, wooden doors: **(2 Hours)**
- Residential building- with load wearing walls, including details of doors and windows: **(2 Hours)**
- Preparation of site plans and service plans as per Building Rules: **(2 Hours**)
- Roof trusses. Industrial buildings:**(2 Hours)**
- Perspective view of single story buildings.**(2 Hours)**

G. Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Books

- National Building Code of India
- Local Building Bye-laws
- Callender, John Hancock, Time Saver Standards for Architectural design Data, Tata McGraw Hill.
- Chiara, Callender, John Hancock, Time Saver Standards for Building Type, McGraw Hill

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Basic of 2-D Auto CAD	Practical	CIV322.1	Mid Term-1, Quiz & End Sem Exam
2	Drawing of Elements of Buildings, column, beam, footings by 2-D Auto CAD.	Practical	CIV322.1	Mid Term-1, Quiz & End Sem Exam
3	Drawing of RCC Details by Auto CAD.	Practical	CIV322.1	Mid Term-1, Quiz & End Sem Exam
4	Drawing of Residential Building, and school Building by Auto CAD.	Practical	CIV322.1	Mid Term-1, Quiz & End Sem Exam
5	Types of stair, RCC stair case, septic tank, Soak pit.	Practical	CIV322.1	Mid Term-1, Quiz & End Sem Exam
6	Paneled, doors, windows and ventilators in wood, Glazed paneled, wooden doors:	Practical	CIV322.1	Mid Term-1, Quiz & End Sem Exam
7	Residential building- with load wearing walls, including details of doors and windows.	Practical	CIV322.1	Mid Term-1, Quiz & End Sem Exam
8	Preparation of site plans and service plans as per Building Rules	Practical	CIV322.1	Mid Term-1, Quiz & End Sem Exam
9	Roof trusses. Industrial buildings	Practical	CIV322.1	Mid Term-1, Quiz & End Sem Exam
10	Perspective view of single story buildings.			

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV322.1	Function as design consultants in construction industry for the design of civil engineering structures.	3	3	1	3	1				2		2	1	1	2	1
CIV322.2	Provide sustainable solutions to the Civil Engineering Problems	3	2	2	2	2				2		1	1	2	2	1

Sample Question Paper

<table>
<tr><td colspan="7">Amity School of Engineering and Technology
Department of CIVIL Engineering
MID-SEMESTER(SEM–III)2020-21</td></tr>
<tr><td colspan="7">Class: B.Tech (CE) 3rd Semester</td></tr>
<tr><td colspan="2">Subject Name:
CIV 322 Computer Aided Civil Engg drawing Lab</td><td colspan="3">Time:1.5Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3,6</td><td>Q.4</td><td>Q.2,5</td><td></td><td></td></tr>
<tr><td colspan="7">Student will be able to
CO1: Using the software for the design of buildings, making plans.
CO2: Applying the basic concept of drawing
CO3: Understanding the various projections.</td></tr>
</table>

CO Map	Question No.	Question	Marks
CO1	Q.1	Use Auto CADD to make 2-D plan of building	3
CO1	Q.2a	Discuss various key elements for building design.	3
	Q.2b	Write down various commands in Auto-CADD	3
CO1	Q.3	Discuss different building bye law in detail.	6
CO2	Q.4	Discuss drawing detail of single storey R.C.C building.	3
CO2	Q.5a	Draw orthographic projections.	3
	Q.5b	Discuss drawing detail of different types of paneled doors.	3
CO3	Q6	What do you mean by 2-d and 3-d projections. Discuss orthographic projection.	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	CIV322 COMPUTER-AIDED CIVIL ENGINEERING DRAWING LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U15G15
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A+	10	1	1	10
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A+	10	1	1	10
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	A	9	1	1	9
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A+	10	1	1	10
5	A60215819005	Mr YASH YOGI	100	30	70	A-	8	1	1	8

Total No. of Students	=	5		
Total No. of Students	>60% marks	5	100.00	%
Attainment Level			Level 3	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **BASIC ELECTRONICS LAB**
Course Code : ECE 327, Credits : 01, Session : 2020-21(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Narendra Kumar Garg, Dr. Ajay Dadoria

A. Introduction

The objective of the job is to train students of making drawings using computer. The drawings are to be prepared as per specifications.

B. Course Outcomes: At the end of the course, students will be able to:

- **ECE327.1** Understand the concepts and functionalities of the electronic devices, tools and instruments.
- **ECE327.2** Understand use, general specifications and deploy abilities of the electronic devices, and assemblies.
- **ECE327.3** Confidence in handling and usage of electronic devices, tools and instruments in engineering applications

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Function as design consultants in construction industry for the design of civil engineering structures.

PSO2: Provide sustainable solutions to the Civil Engineering Problems

PSO3: It. will help students to analyze and Provide concrete solution to environmental problem.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

- To study and verify the VI characteristic of a diode. **(2 Hours)**
- To study the Zener diode in breakdown region. **(2 Hours)**
- To study diode as a half wave rectifier. **(2 Hours)**
- To study diode as a full wave rectifier. **(2 Hours)**
- To study the characteristics of a CE Transistor. **(2 Hours)**
- To study the VI characteristic of CB &CC Transistor **(2 Hours)**
- To study transistor as an a amplifiers **(2 Hours)**
- To study the JFET operation. **(2 Hours)**

- To study OP Amp. As inverting and non-inverting Amp. **(2 Hours)**
- To study OP Amp in open loop and close loop. **(2 Hours)**

G. Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

H. Suggested Books

- David. A. Bell (2003), Laboratory Manual for Electronic Devices and Circuits, Prentice Hall, India
- SantiramKal (2002), Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India
- Thomas L. Floyd and R. P. Jain (2009), Digital Fundamentals by Pearson Education,

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	To study and verify the VI characteristic of a diode.	Practical	ECE327.1	Mid Term-1, Quiz & End Sem Exam
2	To study the Zener diode in breakdown region.	Practical	ECE327.1	Mid Term-1, Quiz & End Sem Exam
3	To study diode as a half wave rectifier.	Practical	ECE327.1	Mid Term-1, Quiz & End Sem Exam
4	To study diode as a full wave rectifier.	Practical	ECE327.1	Mid Term-1, Quiz & End Sem Exam
5	To study the characteristics of a CE Transistor.	Practical	ECE327.1	Mid Term-1, Quiz & End Sem Exam
6	To study the VI characteristic of CB &CC Transistor	Practical	ECE327.1	Mid Term-1, Quiz & End Sem Exam
7	To study transistor as an a amplifiers	Practical	ECE327.1	Mid Term-1, Quiz & End Sem Exam
8	To study the JFET operation	Practical	ECE327.1	Mid Term-1, Quiz & End Sem Exam
9	To study OP Amp. As inverting and non-inverting Amp	Practical	ECE327.1	Mid Term-1, Quiz & End Sem Exam
10	To study OP Amp in open loop and close loop	Practical	ECE327.1	Mid Term-1, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ECE327.1	An ability to design, implement and evaluate Electronics and Communication systems for public health and safety, cultural, societal and environmental considerations.	3	3	1	3	1				2		2	1	1	2	1
ECE327.2	An ability to design electronic circuits and conduct investigations, as well as to analyze and interpret data.	3	2	2	2	2				2		1	1	2	2	1

Sample Question Paper

<table>
<tr><td colspan="7">Amity School of Engineering and Technology
Department of Electronics and Communication Engineering
MID-SEMESTER(SEM–IV)2020-21</td></tr>
<tr><td colspan="7">Class: B.Tech.(CE) IV Semester</td></tr>
<tr><td colspan="2">Subject Name:
ECE 327 Basic Electronics Lab</td><td colspan="3">Time:2 Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1, 2</td><td>Q.1, 2</td><td>Q. 1,2</td><td>Q.1,2</td><td>Q.1,2</td><td>Q.1,2</td></tr>
<tr><td colspan="7">Student will be able to attain CO1 to 4</td></tr>
</table>

COMap	QuestionNo.	Question	Marks
CO1-4	Q.1	Discuss construction of Bipolar Junction Transistor along with its parts in detail.	15
CO1-4	Q2	Explain “OR” gate with their graphic symbol, algebraic function and truth table.	15

Attainments		Rubric
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	**Enrollment.No.**	**Student's Name**	**ECE327 BASIC ELECTRONICS LAB**							
			Max Marks	**CE Weight Age (%)**	**ET Weight Age (%)**	**GO**	**GP**	**ACU**	**ECU**	**U13G13**
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A+	10	1	1	10
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A+	10	1	1	10
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	A	9	1	1	9
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A+	10	1	1	10
5	A60215819005	Mr YASH YOGI	100	30	70	A	9	1	1	9
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	5	100.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **MATERIALS, TESTING & EVALUATION**
Course Code : CIV 401, Credits : 02, Session : 2020-21(EVEN Sem) Class : B.Tech. 2nd Year
Faculty Name : Mr. Shashank Gupta, Mr. Mohan Kantharia

A. Introduction

Materials testing helps us to understand and quantify whether a specific material or treatment is suitable for a particular application. With the wide variety of materials and treatments available in the marketplace, testing can help narrow down the choices to the most appropriate selection for the intended use.

B. At the end of the course students will able to learn:

- **CIV 401.1** Understand the electronic sensors, Operate a data acquisition system.
- **CIV 401.2** Analyse various types of testing machines, Configure a testing machine to measure tension or compression behaviour.
- **CIV 401.3** Apply and Compute engineering values (e.g. stress or strain) from laboratory measures, Analyze a stress versus strain curve for modulus, yield strength and other related attributes

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Identify the properties of engineering materials like cement, sand, concrete, ceramics, bitumen, structural steel etc.

PSO2: Explain the classification of engineering materials and uses of materials

PSO3: Understand the manufacturing process of cement, concrete, bitumen, glass, plastics, metals, paints and other engineering materials.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module I: **Introduction to Engineering Materials Covering:** Cements, M-Sand, Concrete (plain, reinforced and steel fibre/ glass fibre-reinforced, light-weight concrete, High Performance Concrete, Polymer Concrete) Ceramics, and Refractories, Bitumen and asphaltic materials, Timbers, Glass and Plastics, Structural Steel and other Metals, Paints and Varnishes, Acoustical material and geo-textiles, rubber and asbestos, laminates and adhesives, Graphene, Carbon composites and other engineering materials including properties and uses of these.

Module II: **Introduction to Material Testing Covering**: What is the " Material Engineering" ?; Mechanical behavior and mechanical characteristics; Elasticity – principle and characteristics; Plastic deformation of metals; Tensile test – standards for different material (brittle, quasi-brittle, elastic and so on) True stress – strain interpretation of tensile test; hardness tests; Bending and torsion test; strength of ceramic.

Module III: **Introduction to Material Testing Covering**: Internal friction, creep – fundaments and characteristics; Brittle fracture of steel – temperature transition approach; Background of fracture mechanics; Discussion of fracture toughness testing – different materials; concept of fatigue of materials; Structural integrity assessment procedure and fracture mechanics

Module IV: **Standard Testing & Evaluation Procedures Covering:** Laboratory for mechanical testing; Discussion about mechanical testing; Naming systems for various irons, steels and nonferrous metals; Discussion about elastic deformation; Plastic deformation; Impact test and transition temperatures; Fracture mechanics – background; Fracture toughness – different materials; Fatigue of material; Creep.

Module V: Testing: from the above modules covering, Understanding i) Tests & testing of bricks, ii) Tests & testing of sand, iii) Tests & testing of concrete, iv) Tests & testing of soils, v) Tests & testing of bitumen & bituminous mixes, vi) Tests & testing of polymers and polymer based materials, vii) Tests & testing of metals & viii) Tests & testing of other special materials, composites and cementitious materials. Explanation of mechanical behavior of these materials.

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- Chudley, R., Greeno (2006), 'Building Construction Handbook' (6th ed.),R. Butterworth- Heinemann
- Khanna, S.K., Justo, C.E.G and Veeraragavan, A, ' Highway Materials and Pavement Testing', Nem Chand& Bros, FifthEdition
- Various related updated & recent standards of BIS, IRC, ASTM, RILEM, AASHTO, etc. corresponding to materialsused for Civil Engineeringapplications
- Kyriakos Komvopoulos (2011), Mechanical Testing of Engineering Materials,Cognella
- E.N. Dowling (1993), Mechanical Behaviour of Materials,Prentice Hall International Edition
- AmericanSocietyforTestingandMaterials(ASTM),*AnnualBookofASTMStandards* (post 2000)
- Related papers published in international journals

I. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	Cements, M-Sand, Concrete (plain, reinforced and steel fibre/ glass fibre-reinforced, Paints and Varnishes, Graphene.	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
2	light-weight concrete, High Performance Concrete, Polymer Concrete) Ceramics, and Refractories	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
3	Bitumen and asphaltic materials, Timbers.	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
4	Glass and Plastics, Structural Steel	Lecture	CIV401.1	Mid Term-1, Quiz

	and other Metals			& End Sem Exam
5	Acoustical material and geo-textiles, rubber and asbestos, laminates and adhesives	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
6	Carbon composites and other engineering materials including properties and uses of these.	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
7	What is the " Material Engineering" ?;; Elasticity –;and so on);	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
8	Mechanical behavior and mechanical characteristics	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
9	principle and characteristics.	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
10	Plastic deformation of metals; Tensile test – standards for different material (brittle, quasi-brittle, elastic.	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
11	True stress – strain interpretation of tensile test	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
12	hardness tests; Bending and torsion test; strength of ceramic.	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
13	Internal friction, creep – fundaments and characteristics;;;; concept of fatigue of materials;	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
14	Brittle fracture of steel – temperature transition approach.	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
15	Background of fracture mechanics.	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
16	Discussion of fracture toughness testing – different materials.	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
17	Structural integrity assessment procedure and fracture mechanics	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
18	For mechanical testing; Discussion about mechanical testing; Naming systems for various irons.	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
19	steels and nonferrous metals; Discussion about elastic deformation; Plastic deformation.	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
20	Impact test and transition temperatures; Fracture mechanics – background; Fracture toughness – different materials; Fatigue of material; Creep.	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
21	Tests & testing of bitumen & bituminous mixes, vi) Tests & testing of polymers and polymer based materials, vii)	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam
22	Tests & testing of metals & viii) Tests & testing of other special materials, composites	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam

	and cementitious materials.			
23	Explanation of mechanical behavior of these materials.	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam
24	Tests & testing of bricks, ii) Tests & testing of sand, iii) Tests & testing of concrete, iv) Tests & testing of soils, v)	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam

J.Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV401.1	Explain standards for different materials, stress-strain interpretation. Describe the fundamentals of internal friction, creep, brittle fracture of steel. Describe the testing procedures of fresh and hardened concrete	3	3	1	3	1				2		2	1	1	2	1
CIV401.2	Understand the concept of fatigue of materials, structural integrity assessment procedure. Perform the mechanical testing of various metals like iron, steel and non-ferrous metals.	3	2	2	2	2				2		1	1	2	2	1
CIV401.3	Explain elastic deformation and plastic deformation of metals. Understand the impact testing, fatigue and creep of materials. Explain fracture toughness of different materials like steel and non-ferrous metals. Explain the testing procedures of bricks and	2	1	1	2	2				2		1	1	2	2	1

	sand.															

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–IV)2020-21						
Class: B.Tech (CE) 4th Semester						
Subject t Name: CIV 401 MATERIALS, TESTING & EVALUATION		Time:1.5Hrs		Max.Marks:30		
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		
Student will be able to CO1: Understand the basic concept of stress and strain CO2: Analysis of various types of materials properties and machines. CO3: Calculation of various parameters Young's Modulus, Yield strength						

CO Map	Question No.	Question	Marks
CO1	Q.1	What is stress and different types of stress?	3
CO1	Q.2a	Discuss relation between stress and strain.	3
	Q.2b	What do you understand by fracture modes of steel?	3
CO1	Q.3	What do you understand by fracture toughness?	6
CO2	Q.4	Calculate the stress and strain value for different grades of steel.	3
CO2	Q.5a	Calculate fracture toughness value for given steel specimen.	3
	Q.5b	Discuss various tests used to find the strength of steel.	3
CO3	Q6	Calculate the Yield and Young's modulus value for different grades of steel.	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1

Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	**Enrollment.No.**	**Student's Name**	**CIV401 MATERIALS, TESTING & EVALUATION**							
			Max Marks	**CE Weight Age (%)**	**ET Weight Age (%)**	**GO**	**GP**	**ACU**	**ECU**	**U4G4**
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A	9	2	2	18
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A	9	2	2	18
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	B+	7	2	2	14
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A	9	2	2	18
5	A60215819005	Mr YASH YOGI	100	30	70	A	9	2	2	18
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	4	80.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **ENGINEERING GEOLOGY**
Course Code : CIV 402, Credits : 02, Session : 2020-21(EVEN Sem), Class : B.Tech. 2nd Year
Faculty Name : Mr. Shashank Gupta, Mr. Mohan Kantharia, Mr. Sachin Tiwari

A. Introduction

Engineering Geology is the application of the geologic sciences to engineering practice to **assure the safe location, design, construction, operation and maintenance of engineering works**, which may not be adversely affected by potential geological problems.

B. At the end of the course students will able to learn:

- **CIV 402.1** Understand the Site characterization and how to collect, analyze, and report geologic data using standards in engineering practice,The fundamentals of the engineering properties of earth materials and fluids.
  The mechanics of soils and fluids and their influence on settlement, liquefaction, and soil slope stability.
- **CIV 402.2** Analyse Rock mass characterization and the mechanics of planar rock slide sand topples.
- **CIV 402.3** Apply Soil characterization and the Unified Soil Classification System.

C. P**rogramme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Function as design consultants in construction industry for the design of civil engineering structures.

PSO2: Provide sustainable solutions to the Civil Engineering Problems

PSO3: It. will help students to analyze and Provide concrete solution to environmental problem.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal	Mid Term 1	CT	15%

Evaluation	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module I: Branches and scope of geology, Physical Geology: Structure of the earth, Geological agents and their action, physical and chemical weathering, geological work done by wind, river, river meandering, glacial formation, coastal formation, underground water.

Module II: Mineralogy and Elements of Crystallography: Study of properties of minerals, formation, various groups of minerals, silicate, Felspar, pyroxene, mica. Various important minerals hornblende, Muscovite, Quartz, Corundum, calcite, Anthophyllite etc. Elements of a crystal, Cristallographique Axis, Crystal classes and system, Isométric, Tétragonal, Hexagonal, Orthorhombic, Monoclinic, Triclinic, System.

Module III: Petrology: Study of Igneous, Sedimentary, and metamorphic Rocks. Their texture, classification structure, forms, and engineering Use, Important rocks Granite, Gabbro, Dolerite, Pegmatite, Breccia, Sandstone, Shale, Limestone, Coals, Gypsum, Slate, Gneiss, Quartzite,

Module IV: Structural Geology and Ground Water: Types of folds, faults and joints, their classification and causes. Earthquake, volcanism and plate tectonics,Slope failures and landslides, elements of rock Mechanics.HydrogeologyGroundwater and occurrence, investigations, quality, artificial recharge

Module V: Geology in Civil Engineering, Stratigraphy and Geology of India: Tunnels, dams, reservoirs, Tunnels, Roads. Types of structures and classification and their effect on civil Engineering projects. Types, age and occurrence of rock formations and economic importance, study of Cuddapah, Vindhyan Dharwar, Deccan, and Gondwana group. Indian mineral deposits Coal, Petroleum, metallic and nonmetallic ores.

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- R. Vaidyanathan, P. Perumal, Comprehensive Structural Analysis Vol. I & II, Laxmi Publications, New Delhi
- Reddy C.S., Basic Structural Analysis, 2nd ed., Tata McGraw Hill, New Delhi (2004).

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Structure of the earth, geological work done by wind, river,	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
2	Geological agents and their action	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
3	physical and chemical weathering	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
4	River meandering, glacial formation.	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
5	coastal formation, underground water	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
6	Study of properties of minerals, mica.	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
7	various groups of minerals.	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
8	formation, silicate, Felspar, pyroxene	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
9	Various important minerals hornblende, Muscovite, Quartz	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
10	Elements of a crystal, Cristallographique Axis, Crystal classes and system.	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
11	Anthophyllite etc. , Isométric, Tétragonal, Hexagonal, Orthorhombic	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
12	Corundum, calcite, Monoclinic, Triclinic, System.	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
13	Study of Igneous, Sedimentary, and metamorphic Rocks.	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
14	Important rocks Granite, Gabbro, Dolerite, Pegmatite, Breccia, Sandstone.	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
15	classification structure, forms, and engineering Use, Shale, Limestone	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
16	Coals, Gypsum, Slate, Gneiss, Quartzite	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
17	Rocks and Their texture.	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
18	Structural Geology and Ground Water:	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
19	Earthquake, volcanism and plate tectonics,Slope failures and landslides, elements of rock Mechanics.	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
20	Hydrogeology Groundwater and occurrence, investigations, quality,	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam

	artificial recharge			
21	Types of folds, faults and joints, their classification and causes.	Lecture	CIV402.1	Mid Term-2, Quiz & End Sem Exam
22	Tunnels, dams, reservoirs, Tunnels, Roads. Types of structures and classification and their effect on civil Engineering projects..	Lecture	CIV402.1	Mid Term-2, Quiz & End Sem Exam
23	Types, age and occurrence of rock formations and economic importance, study of Cuddapah, Vindhyan Dharwar, Deccan, and Gondwana group	Lecture	CIV402.1	Mid Term-2, Quiz & End Sem Exam
24	Indian mineral deposits Coal, Petroleum, metallic and nonmetallic ores.	Lecture	CIV402.1	Mid Term-2, Quiz & End Sem Exam

J.Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV402.1	Students will able to understand the presence of different types of rocks and their classification.	3	3	1	3	1				2		2	1	1	2	1
CIV402.2	To get a understanding of different types of geological formation and have knowledge of different types of minerals.	3	2	2	2	2				2		1	1	2	2	1
CIV402.3	To have a clears idea about the different geomorphic process.	2	1	1	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–IV)2020-21		
Class: B.Tech (CE) 4^{th} Semester		
Subject t Name: CIV 402 Engineering Geology	Time:1.5Hrs	Max.Marks:30

Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		

Student will be able to
CO1: Understand the basic concept and different properties of rocks
CO2: Analyze different types of materials and rocks.
CO3: Understand the soil formation and characterization.

CO Map	Question No.	Question	Marks
CO1	Q.1	What do you understand by geology?	3
CO1	Q.2a	What is rock? Discuss different types of rocks.	3
	Q.2b	Discuss different classification of rocks and its properties.	3
CO1	Q.3	Discuss Types of folds, faults and joints, their classification and causes.	6
CO2	Q.4	Discuss various types of geological formation in detail.	3
CO2	Q.5a	Discuss Earthquake, volcanism and plate tectonic in details.	3
	Q.5b	Discuss Slope failures and landslides with neat sketch.	3
CO3	Q6	Discuss Hydrogeology Groundwater and artificial recharge.	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	CIV402 ENGINEERING GEOLOGY Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U5G5
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A	9	2	2	18
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A	9	2	2	18
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	A+	10	2	2	20
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A+	10	2	2	20
5	A60215819005	Mr YASH YOGI	100	30	70	A+	10	2	2	20

Total No. of Students	=	5		
Total No. of Students	>60% marks	5	100.00	%
Attainment Level	Level 3			

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **SURVEYING**
Course Code : CIV 403, Credits : 03, Session : 2020-21(EVEN Sem), Class : B.Tech. 2nd Year
Faculty Name : Dr. Mohan Kantharia, Mr. Sachin Tiwari, Dr. Ripunjoy Gogoi

A. Introduction

Surveying is **the process of determining the relative position of natural and man- made features on or under the earth's surface**, the presentation of this information either graphically in the form of plans or numerically in the form of tables, and the setting out of measurements on the earth's surface.

B. At the end of the course students will able to learn:

CIV403.1 Apply the knowledge, techniques, skills, and applicable tools of the discipline to engineering and surveying activities.

CIV403.2 Relate the knowledge on Surveying to the new frontiers of science like Hydrographic surveying, Electronic Distance Measurement, Global Positioning System, Photo grammetry and Remote Sensing.

C. P**rogramme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: apply the knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve well-defined surveying problems appropriate to the discipline.

PSO2: design solutions for well-defined technical problems and assist with engineering design of systems, components, or processes appropriate to the discipline

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module I: Introduction to Surveying: Principles, Linear, angular and graphical methods, Survey stations, Survey lines- ranging, bearing of survey lines, Levelling: Plane table surveying, Principles of levelling- booking and reducing levels; differential, reciprocal leveling, profile levelling and cross sectioning. Digital and Auto

Level, Errors in levelling; contouring: Characteristics, methods, uses; areas and volumes. Theodolite survey: Instruments, Measurement of horizontal and vertical angle; Horizontal and vertical control - methods - triangulation - network- Signals. Baseline - choices - instruments and accessories - extension of base lines - corrections - Satellite station - reduction to centre - Intervisibility of height and distances - Trigonometric leveling - Axis single corrections.

Module II: **Curves:** Elements of simple and compound curves – Method of setting out– Elements of Reverse curve - Transition curve – length of curve – Elements of transition curve - Vertical curve.

Module III: **Modern Field Survey Systems:** Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments, Distomat, Total Station – Parts of a Total Station – Accessories –Advantages and Applications, Field Procedure for total station survey, Errors in Total Station Survey; Global Positioning Systems- Segments, GPS measurements, errors and biases, Surveying with GPS, Co-ordinate transformation, accuracy considerations.

Module IV: Photogrammetry Surveying: Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; Stereoscopy, ground control extension for photographic mapping- aerial triangulation, radial triangulation, methods; photographic mapping- mapping using paper prints, mapping using stereoplotting instruments, mosaics, map substitutes.

Module V: **Remote Sensing:** Introduction –Electromagnetic Spectrum, interaction of electromagnetic radiation with the atmosphere and earth surface, remote sensing data acquisition: platforms and sensors; visual image interpretation; digital image processing.

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/ HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- Madhu, N, Sathikumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson India,2006.
- Manoj, K. Arora and Badjatia, Geomatics Engineering, Nem Chand & Bros,2011
- Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International,2010
- Chandra, A.M., Higher Surveying, Third Edition, New Age International (P) Limited, 2002.
- Anji Reddy, M., Remotesensing and Geographical information system, B.S. Publications,2001.
- Arora, K.R., Surveying, Vol-I, II and III, Standard Book House,2015.

I. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	Principles, Linear, angular and graphical methods, Survey stations, Survey lines- ranging,; differential.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
2	bearing of survey lines, Levelling: Plane table	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam

	surveying, Principles of levelling- booking and reducing levels			
3	contouring: Characteristics, methods, uses; areas and volumes. Theodolite survey.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
4	Reciprocal leveling, profile levelling and cross sectioning. Digital and Auto Level, Errors in levelling	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
5	Instruments, Measurement of horizontal and vertical angle; Horizontal and vertical control - methods -triangulation - network- Signals.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
6	Baseline - choices - instruments and accessories - extension of base lines - corrections	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
7	Satellite station - reduction to centre - Intervisibility of height and distances - Trigonometric leveling - Axis single corrections.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
8	Elements of simple and compound curves. Elements of transition curve - Vertical curve.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
9	Method of setting out	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
10	Elements of Reverse curve	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
11	Transition curve – length of curve.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
12	Principle of Electronic Distance Measurement.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
13	Types of EDM instruments.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
14	Modulation, Distomat, Total Station – Parts of a Total Station.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
15	Accessories –Advantages and Applications, Field Procedure for total station survey.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
16	Co-ordinate transformation, accuracy considerations	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
17	Global Positioning Systems-Segments, GPS measurements	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
18	Errors in Total Station Survey.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
19	Errors and biases, Surveying with GPS.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
20	Introduction, Basic concepts, perspective geometry of aerial photograph.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam

21	Basic concepts, perspective geometry of aerial photograph	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
22	relief and tilt displacements	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
23	terrestrial photogrammetry, flight planning.	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
24	Stereoscopy, ground control extension for photographic mapping.	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
25	Aerial triangulation, radial triangulation, methods.	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
26	photographic mapping- mapping using paper prints	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
27	Mapping using stereoplotting instruments, mosaics, map substitutes	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
28	mapping using stereoplotting instruments, mosaics, map substitutes	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
29	Introduction, –Electromagnetic Spectrum.	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
30	Electromagnetic Spectrum	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
31	Interaction of electromagnetic radiation with the atmosphere and earth surface.	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
32	Interaction of electromagnetic radiation with the atmosphere and earth surface.	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
33	Remote sensing data acquisition.	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
34	Platforms and sensors; visual image.	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
35	Interpretation; digital image processing.	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
36	Interpretation; digital image processing.	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam

J.Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 1	P O 1	P O 1	P S O	P S O	P S O

											0	1	2	1	2	3
CIV403.1	Student will able to learn about different process of angle measurement in vertical and horizontal plane with manually and by using various devices.	3	3	1	3	1				2		2	1	1	2	1
CIV403.2	Setting out the correct orientation of any structural components and different distances measurement techniques.	3	2	2	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–IV)2020-21		
Class: B.Tech (CE) 4th Semester		
Subject t Name: CIV 403 SURVEYING	Time:1.5Hrs	Max.Marks:30

Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		

Student will be able to
CO1: Understand basic principles of surveying and tools.
CO2: Analyze different forms of science with new technique and instruments.

CO Map	Question No.	Question	Marks
CO1	Q.1	What is principle of surveying?	3
CO1	Q.2a	What do you understand by theodlite survey?	3
	Q.2b	Elements of simple and compound curves – Method of setting out curves.	3
CO1	Q.3	Discuss Elements of Reverse curve.	6
CO2	Q.4	Discuss Transition curve – length of curve Elements of	3

		transition curve.	
CO2	Q.5a	Discuss Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments.	3
	Q.5b	Discuss principle of aerial survey and its importance.	3
CO2	Q6	Discuss remote sensing data acquisition, platforms and sensors.	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	**Enrollment.No.**	**Student's Name**	**CIV403 SURVEYING**							
			Max Marks	**CE Weight Age (%)**	**ET Weight Age (%)**	**GO**	**GP**	**ACU**	**ECU**	**U6G6**
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A+	10	2	2	20
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A-	8	2	2	16
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	B+	7	2	2	14
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A+	10	2	2	20
5	A60215819005	Mr YASH YOGI	100	30	70	A-	8	2	2	16
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	4	80.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **FLUID MECHANICS**
Course Code : CIV 404, Credits : 03, Session : 2020-21(EVEN Sem), Class : B.Tech. 2nd Year
Faculty Name : Mr. Sachin Tiwari, Dr. Ripunjoy Gogoi

A. Introduction

Fluid mechanics is **the study of fluids either in motion (fluid dynamics) or at rest (fluid statics)**. Both liquids and gases are classified as fluids. There is a theory available for fluid flow problems, but in all cases it should be backed up by experiment. It is a highly visual subject with good instrumentation.

B. Students will be able to learn after completion of this course

- **CIV404.1** Understand the properties of fluids, pressure measurement devices, hydraulic forces on surfaces, bouncy and flotation in fluids.
- **CIV404.2** Analyse kinematics and static behavior of fluids, dimension and model analysis, laminar and turbulent flow.
- **CIV404.3** Understand low through pipes and orifices, boundary layer theory.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Calculate Hydrostatic Force and its Location for a given geometry and orientation of plane surface. Examine the possibility of a flow using continuity equation.

PSO2: Employ Archimedes principle to solve numerical examples on Buoyancy, Identify and interpret different flows with relevant equations

PSO3: Distinguish velocity potential function and stream function and solve for velocity and acceleration of a fluid at a given location in a fluid flow, Examine stability of a floating body by determining its metacentric height.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module I: Basic Concepts and Definitions: Distinction between a fluid and a solid; Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; variation of viscosity with temperature, Newton law of viscosity; vapour pressure, boiling point, cavitation; surface tension, capillarity, Bulk modulus of elasticity, compressibility.

Module II: Fluid Statics: Fluid Pressure: Pressure at a point, Pascals law, pressure variation with temperature, density and altitude. Piezometer, U-Tube Manometer, Single Column Manometer, U-Tube Differential Manometer, Micromanometers. pressure gauges, Hydrostatic pressure and force: horizontal, vertical and inclined surfaces. Buoyancy and stability of floating bodies.

Module III: Fluid Kinematics: Classification of fluid flow: steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one, two and three dimensional flows; Stream line, path line, streak line and stream tube; stream function, velocity potential function. One-, two- and three -dimensional continuity equations in Cartesian coordinate.

Module III: Fluid Dynamics: Surface and body forces; Equations of motion - Euler's equation; Bernoulli's equation – derivation; Energy Principle; Practical applications of Bernoulli's equation: venturimeter, orifice meter and pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend; Vortex Flow – Free and Forced; Dimensional Analysis and Dynamic Similitude - Definitions of Reynolds Number, Froude Number, Mach Number, Weber *Number and Euler Number; Buckingham's* π-Theorem. Notches and Weirs.

Module IV: Fluid Dynamics: Boundary layer theory, drag and lift force, drag on a sphere, rough and smoothboundaries, concept of mixinglength, boundary layer distribution for various shapes and for variousReynold'snumber.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- R.K. Bansal, "Fluid Mechanics & Hydraulic Machines", Laxmi Publications (P) Ltd., 2002.
- Gupta, S. C., Fluid Mechanics and Hydraulic Machines, Pearson Education, 2007
- D.S. Kumar, "Fluid Mechanics and Fluid Power Engineering", S.K. Kataria& Sons, 2000.
- F. M. White, Introduction to Fluid Mechanics, McGraw Hill

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Distinction between a fluid and a solid.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
2	Density, Specific weight, Specific gravity	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
3	Kinematic and dynamic viscosity.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
4	variation of viscosity with temperature.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
5	Newton law of viscosity; vapour pressure.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
6	boiling point, cavitation; surface tension.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam

7	capillarity, Bulk modulus of elasticity, compressibility.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
8	Fluid Pressure . pressure gauges..	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
9	Pressure at a point	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
10	Pascals law, pressure variation with temperature.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
11	Piezometer, U-Tube Manometer.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
12	Single Column Manometer.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
13	U-Tube Differential Manometer.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
14	Density and altitude. Micromanometers.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
15	Hydrostatic pressure and force	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
16	Hydrostatic pressure and force horizontal, vertical and inclined surfaces	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
17	Buoyancy and stability of floating bodies.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
18	Buoyancy and stability of floating bodies.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
19	Classification of fluid flow: steady and unsteady flow.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
20	Uniform and non-uniform flow.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
21	laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow.	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
22	Ideal and real fluid flow; one, two and three dimensional flows.	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
23	Stream line, path line, streak line and stream tube; stream function, velocity potential function.	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
24	One-, two- and three -dimensional continuity equations in Cartesian coordinate	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
25	Surface and body forces;; Momentum principle; Forces exerted by fluid flow on pipe bend; Vortex Flow -.	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
26	Equations of motion - Euler's equation; Bernoulli's equation – derivation	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
27	Energy Principle; Practical applications of Bernoulli's	Lecture	CIV 404.1	Mid Term-2, Quiz

	equation: venture-meter, orifice meter and pitot tube.			& End Sem Exam
28	Free and Forced; Dimensional Analysis and Dynamic Similitude	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
29	Definitions of Reynolds Number, Froude Number, Mach Number, Weber Number and Euler Number; Buckingham's π-Theorem. Notches and Weirs.	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
30	**Fluid Dynamics:**	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
31	Boundary layer theory, drag and lift force.	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
32	drag on a sphere, rough and smooth boundaries.	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
33	concept of mixing length,	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
34	boundary layer distribution for various shapes and for various Reynold's number.	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
35	boundary layer distribution for various shapes and for various Reynold's number.	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
36	boundary layer distribution for various for various Reynold's number.	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam

J.Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV404.1	Examine Bernoulli's equation for ideal and real fluids and evaluate the direction of flow. Distinguish between major loss and minor loss. Employ Darcy-Weichbach and Chezy's equation to calculate friction losses.	3	3	1	3	1				2		2	1	1	2	1

CIV404.2	Interpret different pipe fittings and evaluate the fluid velocity considering major and minor losses. Sketch HGL and TEL for a given pipe setting	3	2	2	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–IV)2020-21		
Class: B.Tech (CE) IV Semester		
SubjectName: CIV 404 Fluid Mechanics	Time:1.5Hrs	Max.Marks:30

Levels of thequestions as perBloomsTaxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
QuestionMapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student willbeableto
CO1:Understand the different types of fluid and their nature
CO2: Use of different types of pressure measuring devices

COMap	QuestionNo.	Question	Marks
CO1	Q.1	Discuss different types of fluid	3
CO1	Q.2a	What are different types of flow	3
	Q.2b	Discuss Newton’s law of viscosity	3
CO1	Q.3	What is Rehology?	6
CO2	Q.4	What do you mean by Barometer?	3
CO2	Q.5a	What is kinematic and dynamic viscosity	3
	Q.5b	Write different flow conditions.	3
CO2	Q6	Different types of manometers	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	CIV404 FLUID MECHANICS							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U7G7
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A+	10	2	2	20
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A+	10	2	2	20
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	A-	8	2	2	16
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A+	10	2	2	20
5	A60215819005	Mr YASH YOGI	100	30	70	A	9	2	2	18
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	5	100.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **SOLID MECHANICS**
Course Code : CIV 405, Credits : 02, Session : 2020-21(EVEN Sem), Class : B.Tech. 2nd Year
Faculty Name : Mr. Mohan Kantharia, Dr. Ripunjoy Gogoi, Dr. Imran Ahmad Khan

A. Introduction

The course also covers the simple and compound stresses due to forces, stresses and deflection in beams due to bending, torsion in circular section, strain energy, different theories of failure, stress in thin cylinder thick cylinder and spheres due to external and internal pressure.

B. Course Outcomes: At the end of the course, students will be able to:

- **CIV405.1** Able to know the importance of seismic activity consideration in terrain.
- **CIV405.2** Able to understand various techniques to determine engineering properties of rocks and distinguish different types of rocks and minerals.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate

consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects.

D.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home	S/V/Q/HA	10%

	Assignment		
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

E.

Module I: Simple stresses and strains Concept of stress and strain; Hooke's law, Young's modulus, Poisson ratio, stress at a point, stress and strains in bars subjected to axial loading. Modulus of elasticity, stress produced in compound bars subject to axial loading. Temperature stress and strain calculations due to applications of axial loads and variation of temperature in single and compound walls. Impact loading.

Module II: Compound stress and strains The two dimensional system; stress at a point on a plane, principal stresses and principal planes; Mohr's circle of stress. Graphical and Analytical methods for stresses on oblique section of body. Shear force and bending moment diagrams for cantilever, simply supported and overhanging beams.

Module III Theory of bending stresses in beams due to bending, assumptions in the simple bending theory, derivation of formula: its application to beams of rectangular, circular and channel sections, composite / flitched beams, bending and shear stresses in composite beams.

Module IV: Torsion Derivation of torsion equation and its assumptions. Applications of the equation of the hollow and solid circular shafts torsional rigidity, combined torsion and bending of circular shafts principal stress and maximum shear stresses under combined loading of bending and torsion, analysis of close-coiled-helical springs.

Module V: Thin cylinders and spheres Derivation of formulae and calculation of hoop stress, longitudinal stress in a cylinder and sphere subjected to internal pressure.

Module VI: Columns and struts Columns and failure of columns, Euler's formulas; Rankine-Gordon's formula, Johnson's empirical formula for axially loaded columns and their applications.

Module VII: Slope and deflection Relationship between moment, slope and deflection, Mohr's theorem; Moment area method; method of integration; Macaulay's method: Use of all these methods to calculate slope and deflection for the following:

- Cantilevers
- Simply supported beams with or without overhang
- Under concentrated loads, uniformly distributed loads or combination of concentrated and uniformly distributed loads.

F. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/ HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

G.

- Jindal U.C., "Strength of Materials", Galgotia Publication, New Delhi, 1998.
- Ryder G.H., "Strength of Materials", Macmillan, Delhi, 2003.
- R.K. Bansal, "Strength of Materials", Laxmi Publication, New Delhi, 2001.
- Sadhu Singh, "Strength of Materials", Khanna Publishers, New Delhi, 2000.
- Timoshenko S.P., "Elements of Strength of Materials", East-West affiliated, New Delhi, 2000.
- Hibbler R.C., "Mechanics of Materials", Prentice Hall, New Delhi, 1994.

H.

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Concept of stress and strain	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
2	Hooke's law, Young's modulus, Poisson ratio, stress at a point	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
3	stress and strains in bars subjected to axial loading	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
4	Modulus of elasticity, stress produced in compound bars subject to axial loading.	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
5	Temperature stress and strain calculations due to applications of axial loads	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
6	variation of temperature in single and compound walls	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
7	Impact loading.	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
8	The two dimensional system., simply supported and overhanging beams	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
9	stress at a point on a plane	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
10	Principal stresses and principal planes	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
11	Mohr's circle of stress.	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
12	Graphical and Analytical methods for stresses on oblique section of body	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
13	Shear force and bending moment diagrams for cantilever	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
14	Shear force and bending moment diagrams overhanging beams	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
15	Theory of bending stresses in	Lecture	CIV 405.1	Mid Term-1, Quiz

	beams due to bending,			& End Sem Exam
16	Theory of bending stresses in beams assumption	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
17	In the simple bending theory	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
18	Derivation of formula: its application to beams of rectangular	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
19	circular and channel sections, composite / flitched	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
20	Beams, bending and shear stresses in composite beams.	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
21	Derivation of torsion equation . torsional and torsion.	Lecture	CIV 405.1	Mid Term-2, Quiz & End Sem Exam
22	Derivation of torsion assumptions	Lecture	CIV 405.1	Mid Term-2, Quiz & End Sem Exam
23	Applications of the equation of the hollow and solid circular shafts	Lecture	CIV 405.1	Mid Term-2, Quiz & End Sem Exam
24	Rigidity, combined torsion and bending of circular shafts	Lecture	CIV 405.1	Mid Term-2, Quiz & End Sem Exam
25	Principal stress	Lecture	CIV 405.1	Mid Term-2, Quiz & End Sem Exam
26	Maximum shear stresses under combined loading of bending	Lecture	CIV 405.1	Mid Term-2, Quiz & End Sem Exam
27	Analysis of close-coiled-helical springs	Lecture	CIV 405.1	Mid Term-2, Quiz & End Sem Exam
28	Derivation of formulae and calculation of hoop stress.	Lecture	CIV 405.1	Mid Term-2, Quiz & End Sem Exam
29	Longitudinal stress in a cylinder	Lecture	CIV 405.1	Mid Term-2, Quiz & End Sem Exam
30	Sphere subjected to internal pressure.	Lecture	CIV 405.1	Mid Term-2, Quiz & End Sem Exam
31	Columns and failure of columns.	Lecture	CIV 405.1	Mid Term-2, Quiz & End Sem Exam
32	Euler’s formulas	Lecture	CIV 405.1	Mid Term-2, Quiz & End Sem Exam
33	Rankine-Gordon’s formula.	Lecture	CIV 405.1	Mid Term-2, Quiz & End Sem Exam
34	Johnson’s empirical formula	Lecture	CIV 405.1	Mid Term-2, Quiz & End Sem Exam
35	For axially loaded columns and their applications	Lecture	CIV 405.1	Mid Term-2, Quiz & End Sem Exam
36	For axially loaded columns and their applications	Lecture	CIV 405.1	Mid Term-2, Quiz & End Sem Exam

I.

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV405.1	Able to know the importance of seismic activity consideration in terrain.	3	3	1	3	1				2		2	1			
CIV405.2	Able to understand various techniques to determine engineering properties of rocks and distinguish different types of rocks and minerals	3	2	2	2	2				2		1	1			

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–IV)2020-21						
Class: B.Tech (CE) 4th Semester						
Subject t Name: CIV 405 Solid Mechanics		Time:1.5Hrs		Max.Marks:30		
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		
Student will be able to CO1: Understand the basic of stress and strain for different materials. CO2: Apply basic concept to find engineering properties of materials. CO3: Calculate different stress and strength parameters.						
CO Map	Question No.	Question				Marks

CO1	Q.1	Calculate Poission's ratio for steel and concrete.	3
CO1	Q.2a	What is volumetric stress and strain? Discuss.	3
	Q.2b	What do you mean by free body diagram?	3
CO1	Q.3	What is stress and strain?	6
CO2	Q.4	What is shear force and bending moment?	3
CO2	Q.5a	What is thin and thick shell calculate hoop stress value?	3
	Q.5b	Discuss bending moment diagram for simply supported beam with Point load.	3
CO3	Q6	Calculate torsional strength for circular shaft.	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	CIV405 SOLID MECHANICS Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U8G8
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	B+	7	2	2	14
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A	9	2	2	18
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	B-	5	2	2	10
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A	9	2	2	18
5	A60215819005	Mr YASH YOGI	100	30	70	B+	7	2	2	14

Total No. of Students	=	5		
Total No. of Students	>60 % marks	2	40.00	%
Attainment Level			-	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **DISASTER PREPAREDNESS & PLANNING MANAGEMENT**
Course Code : CIV406, Credits : 02, Session : 2020-21(EVEN Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Mohan Kantharia, Dr. Ripunjoy Gogoi

A. Introduction

The overall aim of this course is to provide broad understanding about the basic concepts of Disaster Management with preparedness as a Civil Engineer. Further, the course introduces the various natural hazards that can pose risk to property, lives, and livestock, etc. and understanding of the social responsibility as an engineer towards preparedness as well as mitigating the damages.

After completion of this course students will able to learn

- **CIV406.1** Understanding the concept of Disaster planning and its management.
- **CIV406.2** Analyzing Relationship between Development and Disasters
- **CIV406.3** Ability to understand Categories of Disasters and realization of the responsibilities to society.

A. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

B. Programme Specific Outcomes:

PSO1 Associate various measures for enhancing the build environment, thereby improving quality of life of the occupants.

PSO2: Evaluate the potential of Civil Engineering for employment creation and its contribution to the GDP.

C.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

D. Course Content

Module I:Introduction to Course and Overview: Understanding the past to look into the future: Pre-industrial revolution days, Agricultural revolution, first and second industrial revolutions, IT revolution; Recent major Civil Engineering breakthroughs and innovations; Present day world and future projections, Evaluating future requirements for various resources; GIS and applications for monitoring systems; Human Development Index and Ecological Footprint of India Vs other countries and analysis.

Module II:Understanding the importance of Civil Engineering in Shaping and Impacting the World: The ancient and modern Marvels and Wonders in the field of Civil Engineering; Future Vision for CivilEngineering

Module III: Infrastructure - Habitats, Megacities, Smart Cities, Futuristic Visions: Transportation (Roads, Railways & Metros, Airports, Seaports, River ways, Sea canals, Tunnels (below ground, under water); Futuristic systems (ex, Hyper Loop)); Energy generation (Hydro, Solar (Photovoltaic, Solar Chimney), Wind, Wave, Tidal, Geothermal, Thermal energy); Water provisioning; Telecommunication needs (towers, above-ground and underground cabling).

Module IV: Environment: Traditional & futuristic methods; Solid waste management, Water purification, Wastewater treatment & Recycling, Hazardous waste treatment; Flood control (Dams, Canals, River interlinking), Multi-purpose water projects, Atmospheric pollution;

Module V: Built Environment: Recycling, Temperature/ Sound control in built environment, Conservation, Repairs & Rehabilitation of Structures & Heritage structures; Innovations and methodologies for ensuring Sustainability

Module VI: Civil Engineering Projects: Environmental Impact Analysis procedures; Waste (materials, manpower, equipment) avoidance/ Efficiency increase; Advanced construction techniques for better sustainability; Techniques for reduction of Green House Gas emissions in various aspects of Civil Engineering Projects; contribution of Civil Engineering to GDP.

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- Pradeep Sahni, 2004, Disaster Risk Reduction in South Asia, PrenticeHall.
- Singh B.K., 2008, Handbook of Disaster Management: Techniques & Guidelines, Rajat Publication.
- Ghosh G.K., 2006, Disaster Management, APH PublishingCorporation
- Disaster Medical Systems Guidelines. Emergency Medical Services Authority, State of California, EMSA no.214, June2003
- Inter Agency Standing Committee (IASC) (Feb. 2007). IASC Guidelines on Mental Health and Psychosocial Support in Emergency Settings. Geneva:IASC

I.Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Understanding the past to look into the future.	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
2	Pre-industrial revolution days, Agricultural revolution, first and second industrial revolutions	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
3	IT revolution; Recent major Civil Engineering breakthroughs and innovations	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
4	Present day world and future projections, Evaluating future requirements for various resources	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
5	GIS and applications for monitoring systems	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
6	Human Development Index and Ecological Footprint of India Vs other countries and analysis.	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
7	The ancient and modern Marvels and Wonders in the field of Civil Engineering.	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
8	Future Vision for Civil Engineering	Lecture	CIV 406.1	Mid Term-1, Quiz

				& End Sem Exam
9	Future Vision for Civil Engineering	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
10	Transportation (Roads, Railways & Metros, ,;);, Geothermal, Thermal energy);	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
11	Airports, Seaports, River ways, Sea canals.	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
12	Tunnels (below ground, under water)	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
13	Futuristic systems (ex, Hyper Loop)	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
14	Energy generation (Hydro, Solar (Photovoltaic, Solar Chimney), Wind, Wave, Tidal	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
15	Water provisioning; Telecommunication needs (towers, above-ground and underground cabling).	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
16	Water provisioning; Telecommunication needs (towers, above-ground and underground cabling).	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
17	Traditional & futuristic methods; Solid waste management, Water purification, Wastewater treatment & Recycling.	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
18	Hazardous waste treatment; Flood control (Dams, Canals, River interlinking), Multi-purpose water projects.	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
19	Innovations and methodologies for ensuring Sustainability	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
20	Atmospheric pollution; & Rehabilitation of Structures & Heritage structures	Lecture	CIV 406.1	Mid Term-1, Quiz & End Sem Exam
21	Recycling, Temperature/ Sound control in built environment, Conservation, Repairs	Lecture	CIV 406.1	Mid Term-2, Quiz & End Sem Exam
22	Environmental Impact Analysis procedures; Waste (materials, manpower, equipment) avoidance/ Efficiency increase;	Lecture	CIV 406.1	Mid Term-2, Quiz & End Sem Exam
23	Advanced construction techniques for better sustainability; Techniques for reduction of Green House Gas	Lecture	CIV 406.1	Mid Term-2, Quiz & End Sem Exam
24	emissions in various aspects of Civil Engineering Projects; contribution of Civil Engineering to GDP.	Lecture	CIV 406.1	Mid Term-2, Quiz & End Sem Exam

J.Course Articulation Matrix (Mapping of COs with POs

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES	CORRELATION WITH PROGRAMME

														SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV406.1	Ability to understand Categories of Disasters and realization of the responsibilities to society	3	3	1	3	1				2		2	1	1	2	1
CIV406.2	Ability to understand Categories of Disasters and realization of the responsibilities to society	3	2	2	2	2				2		1	1	2	2	1
CIV406.3	Ability to understand Categories of Disasters and realization of the responsibilities to society		2	1	3	2				2		1	1	2	1	

S. No.	Enrollment.No.	Student's Name	CIV406 DISASTER PREPAREDNESS & PLANNING							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U9G9
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A-	8	2	2	16
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A-	8	2	2	16
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	B+	7	2	2	14
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A-	8	2	2	16
5	A60215819005	Mr YASH YOGI	100	30	70	A	9	2	2	18
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	4	80.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **CIVIL ENGINEERING – SOCIETAL & GLOBAL IMPACT**
Course Code : CIV407, Credits : 02, Session : 2020-21(EVEN Sem) Class : B.Tech. 2nd Year
Faculty Name : Dr. Mohan Kantharia, Dr. Ripunjoy Gogoi

A. Introduction

The course is designed to provide a better understanding of the impact which Civil Engineering has on the Society at large and on the global arena. Civil Engineering projects have an impact on the Infrastructure, Energy consumption and generation, Sustainability of the Environment, Aesthetics of the environment, Employment creation, Contribution to the GDP, and on a more perceptible level, the Quality of Life.

B. After completion of this course students will able to learn

- **CIV407.1** Understand the impact which Civil Engineering projects have on the Society at large and on the global arena and using resources efficiently and effectively.
- **CIV407.2** Understand extent of Infrastructure, its requirements for energy and how they are met: past, present and future, the Sustainability of the Environment, including its Aesthetics.
- **CIV407.3** Analyse potentials of Civil Engineering for Employment creation and its Contribution to the GDP,the Built Environment and factors impacting the Quality of Life.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1 Associate various measures for enhancing the build environment, thereby improving quality of life of the occupants.

PSO2: Evaluate the potential of Civil Engineering for employment creation and its contribution to the GDP.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module I:Introduction to Course and Overview: Understanding the past to look into the future: Pre-industrial revolution days, Agricultural revolution, first and second industrial revolutions, IT revolution; Recent major Civil Engineering breakthroughs and innovations; Present day world and future projections, Evaluating future requirements for various resources; GIS and applications for monitoring systems; Human Development Index and Ecological Footprint of India Vs other countries and analysis.

Module II:Understanding the importance of Civil Engineering in Shaping and Impacting the World: The ancient and modern Marvels and Wonders in the field of Civil Engineering; Future Vision for CivilEngineering

Module III: Infrastructure - Habitats, Megacities, Smart Cities, Futuristic Visions: Transportation (Roads, Railways & Metros, Airports, Seaports, River ways, Sea canals, Tunnels (below ground, under water); Futuristic systems (ex, Hyper Loop)); Energy generation (Hydro, Solar (Photovoltaic, Solar Chimney), Wind, Wave, Tidal, Geothermal, Thermal energy); Water provisioning; Telecommunication needs (towers, above-ground and underground cabling).

Module IV: Environment: Traditional & futuristic methods; Solid waste management, Water purification, Wastewater treatment & Recycling, Hazardous waste treatment; Flood control (Dams, Canals, River interlinking), Multi-purpose water projects, Atmospheric pollution;

Module V: Built Environment: Recycling, Temperature/ Sound control in built environment, Conservation, Repairs & Rehabilitation of Structures & Heritage structures; Innovations and methodologies for ensuring Sustainability

Module VI: Civil Engineering Projects: Environmental Impact Analysis procedures; Waste (materials, manpower, equipment) avoidance/ Efficiency increase; Advanced construction techniques for better sustainability; Techniques for reduction of Green House Gas emissions in various aspects of Civil Engineering Projects; contribution of Civil Engineering to GDP.

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

I. Suggested Books

Brito, Ciampi, Vasconcelos, Amarol, Barros (2013) Engineering impacting Social, Economic and Working Environment, 120th ASEE Annual Conference and Exposition.

NAE Grand Challenges for Engineering (2006), Engineering for the Developing World, The Bridge, Vol 34, No.2, Summer2004.

Allen M. (2008) Cleansing the city. Ohio University Press. Athens Ohio.

I.Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	Understanding the past to look into the future: Pre-industrial revolution days, Agricultural revolution, first and second industrial revolutions;	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
2	IT revolution; Recent major Civil Engineering breakthroughs and innovations	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
3	Present day world and future projections	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
4	GIS and applications for monitoring systems; Human Development Index and Ecological Footprint of India Vs other countries and analysis.	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
5	Evaluating future requirements for various resources.	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam

6	The ancient and modern Marvels and Wonders in the field of Civil Engineering.	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
7	Future Vision for Civil Engineering	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
8	*Human Development Index and Ecological Footprint of India*	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
9	Transportation (Roads, Railways & Metros.);, Tidal, Geothermal, Thermal energy);	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
10	Airports, Seaports, River ways, Sea canals.	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
11	Tunnels (below ground, under water.	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
12	Futuristic systems (ex, Hyper Loop)	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
13	Energy generation (Hydro, Solar (Photovoltaic, Solar Chimney), Wind, Wave	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
14	Water provisioning; Telecommunication needs (towers, above-ground and underground cabling).	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
15	Traditional & futuristic methods; Solid waste management, Water purification.	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
16	Wastewater treatment & Recycling, Hazardous waste treatment	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
17	Recycling, Temperature/ Sound control in built environment, Conservation,;	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
18	Innovations and methodologies for ensuring Sustainability	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
19	Innovatins and methodologies for ensuring Sustainability Flood control (Dams, Canals, River interlinking), Multi-purpose water projects, Atmospheric pollution	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
20	Repairs & Rhabilitation of Structures & Heritage structures	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
21	Repairs & Rehabilitation of Structures & Heritage structures	Lecture	CIV 407.1	Mid Term-2, Quiz & End Sem Exam
22	Environmental Impact Analysis procedures; Waste (materials, manpower, equipment) avoidance/	Lecture	CIV 407.1	Mid Term-2, Quiz & End Sem Exam
23	emissions in various aspects of Civil Engineering Projects; contribution of Civil Engineering to GDP	Lecture	CIV 407.1	Mid Term-2, Quiz & End Sem Exam
24	Efficiency increase; Advanced	Lecture	CIV 407.1	Mid Term-2, Quiz

	construction techniques for better sustainability; Techniques for reduction of Green House Gas			& End Sem Exam

J.Course Articulation Matrix (Mapping of COs with POs

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV407.1	Students will be able to develop new idea about civil engineering and its impact on social life.	3	3	1	3	1				2		2	1	1	2	1
CIV407.2	Different types of energy sources linked to the development of society	3	2	2	2	2				2		1	1	2	2	1
CIV407.3	A new methods to reduce the effects of green house gases on the environment and its impact on human life.		2	1	3	2				2		1	1	2	1	

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–IV)2020-21						
Class: B.Tech (CE) 4th Semester						
Subject t Name: CIV 407 Civil Engg societal and global Impact		Time:1.5Hrs		Max.Marks:30		
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		
Student will be able to CO1: Understand the impact of society on global arena. CO2: Analyze the needs of resource and energy for the society. CO3: Understand the potentials of civil engineering projects and its impact on social life.						
CO Map	Question No.	Question				Marks

CO1	Q.1	What do you understand by innovations in civil engineering?	3
CO1	Q.2a	Discuss ancient and modern civil engineering construction.	3
	Q.2b	Discuss application of GIS and GPS on global society.	3
CO1	Q.3	Discuss waste water treatment process in detail.	6
CO2	Q.4	Discuss water handling and purification scheme.	3
CO2	Q.5a	Discuss techniques of reduction for green house gases.	3
	Q.5b	What do you understand by solid waste management?	3
CO3	Q6	What do you mean by sustainable sonstruction?	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	CIV407 CIVIL ENGINEERING - SOCIETAL & GLOBAL IMPACT							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U16G16
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A+	10	2	2	20
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A+	10	2	2	20
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	A+	10	2	2	20
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A+	10	2	2	20
5	A60215819005	Mr YASH YOGI	100	30	70	A+	10	2	2	20

Total No. of Students	=	5		
Total No. of Students	>60% marks	5	100.00	%
Attainment Level			Level 3	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **INSTRUMENTATION & SENSOR TECHNOLOGIES FOR CIVIL ENGINEERING APPLICATIONS**
Course Code : ECE 407, Credits : 02, Session : 2020-21(EVEN Sem) Class : B.Tech. 2nd Year
Faculty Name : Dr. Ajay Dadoria, Dr. Narendra Kumar Garg

A. Introduction

Sensors and Instrumentation research area encompasses the development and optimisation of new or existing devices that detect and measure changes in temperature, pressure, vibration and light. It also includes the integration and optimisation of these devices into a new system or instrument.

B. After completion of this course students will able to learn

- **ECE 407.1** Apply the concepts and functionalities of the electronic devices, tools and instruments.
- **ECE 407.2** Understand use, general specifications and deploy abilities of the electronic devices, and assemblies.
- **ECE 407.3** Understand handling and usage of electronic devices, tools and instruments in engineering applications.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Students will able to learn about the different types of sensors present to detect different natural phenomenon.

PSO2: Students will able to utilize the knowledge to detect natural and artificial calamities and to reduce the risk of their impact.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/H A	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

E. Course Content

Module 1: Diodes and Applications: (5 Hours)

Semiconductor Diode - Ideal versus Practical, Diode Equivalent Circuits, Load Line Analysis; Diode as a Switch, Diode as a Rectifier, Half Wave and Full Wave Rectifiers; Breakdown Mechanisms, Zener Diode – Operation and Applications; Opto-Electronic Devices – LEDs, Clipper and clampers.

Module 2: Transistor Characteristics: (5 Hours)

Bipolar Junction Transistor (BJT) –Construction, Operation, Amplifying Action, Common Base, Common Emitter and Common Collector Configurations, Operating Point,
Introduction to FET, Feedback Amplifiers – Principle, Advantages of Negative Feedback,

Module 3: Operational Amplifiers and Applications: (5 Hours)
Introduction to Op-Amp, Differential Amplifier Configurations, CMRR, PSRR, Slew Rate; Block Diagram, Pin Configuration of 741 Op-Amp, Characteristics of Ideal Op-Amp, Concept of Virtual Ground; inverting and non-inverting amplifier applications: summing and difference amplifier, unity gain buffer, comparator,

Module 4: Digital Electronics Fundamentals: (5 Hours)
Difference between analog and digital signals, Boolean algebra, Basic and Universal Gates, Symbols, Truth tables, logic expressions, Logic simplification using K- map, half and full adder/subtractor, multiplexers, de- multiplexers

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- David. A. Bell (2003), Laboratory Manual for Electronic Devices and Circuits, Prentice Hall, India
- SantiramKal (2002), Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India
- Thomas L. Floyd and R. P. Jain (2009), Digital Fundamentals by Pearson Education,
- Paul B. Zbar, A.P. Malvino and M.A. Miller (2009), Basic Electronics – A Text-Lab. Manual, TMH.

I. **Lecture Plan**

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	Semiconductor Diode - Ideal versus Practical,Breakdown Mechanisms	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
2	Diode Equivalent Circuits, Load Line Analysis	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
3	Diode as a Switch, Diode as a Rectifier, Half Wave and Full Wave Rectifiers.	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
4	*Zener Diode – Operation and Applications*	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam

5	Opto-Electronic Devices – LEDs,	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
6	Clipper and clampers.	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
7	Bipolar Junction Transistor (BJT)	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
8	Bipolar Junction Transistor (BJT) - Operation, Amplifying Action.	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
9	Common Base, Common Emitter and Common Collector	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
10	Construction, , Configurations, Operating Point	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
11	Introduction to FET, Feedback Amplifiers	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
12	Principle, Advantages of Negative Feedback.	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
13	Introduction to Op-Amp, Block inverting and non-inverting gain buffer, comparator	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
14	Configurations, CMRR, PSRR	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
15	Differential Amplifier, Slew Rate.	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
16	Diagram, Pin Configuration of 741 Op-Amp.	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
17	Characteristics of Ideal Op-Amp, Concept of Virtual Ground.	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
18	amplifier applications: summing and difference amplifier, unity	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
19	amplifier applications: summing and difference amplifier, unity	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
20	Difference between analog and digital signals,	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
21	Boolean algebra, Basic and Universal Gates.	Lecture	ECE 407.1	Mid Term-2, Quiz & End Sem Exam
22	Symbols, Truth tables, logic expressions.	Lecture	ECE 407.1	Mid Term-2, Quiz & End Sem Exam
23	Logic simplification using K-map, half and full adder/subtractor.	Lecture	ECE 407.1	Mid Term-2, Quiz & End Sem Exam
24	multiplexers, de- multiplexers	Lecture	ECE 407.1	Mid Term-2, Quiz & End Sem Exam

J.Course Articulation Matrix (Mapping of COs with POs

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ECE 407.1	To enable students to acquire in-depth knowledge in the field of Instrumentation Engineering with an ability to integrate existing and new knowledge with the advancement of the technology.	3	3	1	3	1				2		2	1	1	2	1
ECE 407.2	To train students to conduct research and experiments by applying appropriate techniques and tools with an understanding of the limitations for sustainable development of society.	3	2	2	2	2				2		1	1	2	2	1
ECE 407.3	To prepare students to act as a member and leader of the team to contribute positively to manage projects efficiently in the field of Instrumentation Engineering		2	1	3	2				2		1	1	2	1	

Sample Question Paper

Amity School of Engineering and Technology Department of Electronics & Communication Engineering IMID-SEMESTER(SEM–IV)2020-21
Class: B.Tech.(CE) IV Semester

ECE 407 :INSTRUMENTATION & SENSOR TECHNOLOGIES FOR CIVIL ENGINEERING APPLICATIONS	Time:1.30 Hrs	Max.Marks:30

Levels of thequestions as perBloomsTaxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
QuestionMapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student willbeableto
CO1:To analyze the errors during measurements
CO2:To specify the requirements in the calibration of sensors and instruments
CO5:To describe the requirements during the transmission of measured signals
CO7:To suggest proper sensor technologies for specific applications
CO8:To design and set up measurement systems and do the studies

COMap	QuestionNo.	Question	Marks
CO1	Q.1	What is difference between accuracy and precision of a measuring instruments.	3
CO2,CO8	Q.2a	What is IR Sensors? Explain active and passive IR sensors.	3
	Q.2b	What are the factors to be taken into account while performing measurement?	3
CO7	Q.3	Explain the basic working principles of temperature sensors. List types of temperature sensors. Explain any one in detail.	6
CO5	Q.4	What is the approach used for sensor installation explain it	3
CO2,CO8	Q.5a	Describe the order and methodology used for sensors installation.	3
	Q.5b	What are the factors to be taken into account while performing measurement?	3
CO7	Q6	Draw the classification of error in measurements and discuss in detail.	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	ECE407 INSTRUMENTATION & SENSOR TECHNOLOGIES FOR CIVIL ENGINEERING APPLICATIONS							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U17G17
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A	9	2	2	18
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A-	8	2	2	16
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	B+	7	2	2	14
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A+	10	2	2	20
5	A60215819005	Mr YASH YOGI	100	30	70	A-	8	2	2	16
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	4	80.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **MATERIAL TESTING AND EVALUATION LAB**
Course Code : CIV 421, Credits : 01, Session : 2020-21(EVEN Sem), Class : B.Tech. 2nd Year
Faculty Name : Dr. Mohan Kantharia, Dr. Imran Ahmad Khan

A. Introduction

Materials testing **helps us to understand and quantify whether a specific material or treatment is suitable for a particular application**. With the wide variety of materials and treatments available in the marketplace, testing can help narrow down the choices to the most appropriate selection for the intended use.

B. Course Outcomes: At the end of the course, students will be able to:

- **CIV421.1**. Understand the Gradation of coarse and fine aggregates ,Different corresponding tests and need/application of these tests in design and quality control.
- **CIV421.2**. Apply Tensile Strength of materials &concrete composites.
- **CIV421.3**. Analyse Compressive strength test on aggregates.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Function as design consultants in construction industry for the design of civil engineering structures.

PSO2: Provide sustainable solutions to the Civil Engineering Problems

PSO3: It. will help students to analyze and Provide concrete solution to environmental problem

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

- Gradation of course and fineaggregates. Different corresponding tests and need/ application of these tests in design and quality control**. (2 Hours)**
- Concrete permeability test, and tiles abrasion test **(1 Hour)**
- Tensile Strength of materials & concretecomposites. Compressive strength test onaggregates**(1 Hour)**
- Tension I-Elastic Behaviour of metals & materials. Tension II-Failure of CommonMaterials: **(2 Hours)**
- Direct Shear-Frictional Behaviour. Concrete I-Early Age Properties: **(2 Hours)**
- Concrete II-Compression and Indirect Tension. Compression-Directionality: **(2 Hours)**
- Soil Classification. Consolidation and Strength Tests: **(2 Hours)**
- Tension III-Heat Treatment. Torsion test: **(2 Hours)**
- Hardness tests (Brinnel's and Rockwell). Tests on closely coiled and open coiled springs: **(2 Hours)**
- Theories of Failure and Corroboration with Experiments. Tests on unmodified bitumen and modified binders with polymers: **(2 Hours)**
- Bituminous Mix Design and Tests on bituminous mixes – Marshall method. Concrete Mix Design as per BIS: **(2 Hours)**

G. Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Books

- National Building Code of India
- Local Building Bye-laws
- Callender, John Hancock, Time Saver Standards for Architectural design Data, Tata McGraw Hill.
- Chiara, Callender, John Hancock, Time Saver Standards for Building Type, McGraw Hill

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Gradation of course and fineaggregates. Different corresponding tests and need/ application of these tests in design and quality control.	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam
2	Concrete permeability test, and tiles abrasion	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam
3	Tensile Strength of materials & concrete composites. Compressive strength test on aggregates	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam
4	Tension I-Elastic Behaviour of metals & materials. Tension II-Failure of Common Materials	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam
5	Direct Shear-Frictional Behaviour. Concrete I-Early Age Properties	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam
6	Concrete II-Compression and Indirect Tension. Compression-Directionality.	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam
7	Soil Classification. Consolidation and Strength Tests: Tension III-Heat Treatment. Torsion test	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam
8	Hardness tests (Brinnel's and Rockwell). Tests on closely coiled and open coiled springs	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam
9	Theories of Failure and Corroboration with Experiments. Tests on unmodified bitumen and modified binders with polymers	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam
10	Bituminous Mix Design and Tests on bituminous mixes – Marshall method. Concrete Mix Design as per BIS	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV421.1	Function as design consultants in construction industry for the design of civil engineering structures.	3	3	1	3	1				2		2	1	1	2	1
CIV421.2	Provide sustainable solutions to the Civil Engineering Problems related with materials and their strength.	3	2	2	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of Electronics and Communication Engineering MID-SEMESTER(SEM–IV)2020-21						
Class: B.Tech.(CE) IV Semester						
Subject Name: CIV 421 Material Testing and Evaluation Lab		Time:2 Hrs		Max.Marks:30		
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1, 2,3	Q.1, 2,3	Q. 1,2,3	Q.1,2,3	Q.1,2,3	Q.1,2,3
Student will be able to attain CO1 to 3						

CO Map	Question No.	Question	Marks
CO1-3	Q.1	Tensile Strength of materials & concrete composites. Compressive strength test on aggregates	10
CO1-3	Q2	Tension I-Elastic Behaviour of metals & materials. Tension II-Failure of Common Materials.	10
CO1-3	Q3	Theories of Failure and Corroboration with Experiments. Tests	10

		on unmodified bitumen and modified binders with polymers.	

Attainments		Rubric
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	CIV421 MATERIALS TESTING AND EVALUATION LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U11G11
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A+	10	1	1	10
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A+	10	1	1	10
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	A	9	1	1	9
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A+	10	1	1	10
5	A60215819005	Mr YASH YOGI	100	30	70	A	9	1	1	9

Total No. of Students	=	5		
Total No. of Students	>60% marks	5	100.00	%
Attainment Level			Level 3	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **ENGINEERING GEOLOGY LAB**
Course Code : CIV 422, Credits : 01, Session : 2020-21(EVEN Sem), Class : B.Tech. 2nd Year
Faculty Name : Dr. Mohan Kantharia, Dr. Ripunjoy Gogoi

A. Introduction

The study of various types of rock formation and its physical properties. Topics such as rocks and minerals, soils, and earthquake activities are discussed with special reference to local geological problems. This lab course also focuses on physical properties of minerals.

B. Course Outcomes: At the end of the course, students will be able to:

- **CIV422.1**. To understand the various types of rocks (Igneous Petrology), Identification of rocks (Sedimentary Petrology)
- **CIV422.2**. Analyze the difference of rocks (Metamorphic Petrolody), Minerals and crystallography

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. **Programme Specific Outcomes:**

PSO1: Students will able to understand the basic of rocks and various geological formations.

PSO2: Differentiate between different types of rocks and their origin and properties.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. **Course Content**

- Study of physical properties ofminerals: **(2 Hours)**
- Study of spgravity of minerals and rocks **(2 Hours)**

- Study of different group ofminerals:**(2 Hours)**
- Study of Crystal and Crystalsystem:**(2 Hours)**
- Identification of minerals: Silica group: Quartz, Amethyst, Opal; Feldspar group: Orthoclase, Plagioclase; Cryptocrystalline group: Jasper; Carbonate group: Calcite; Element group: Graphite; Pyroxene group: Talc; Mica group: Muscovite; Amphibole group: Asbestos, Olivine, Hornblende, Magnetite, Hematite, Corundum, Kyanite, Garnet, Galena,Gypsum:**(2 Hours)**
- Identification of rocks (Igneous Petrology): Acidic Igneous rock: Granite and its varieties, Syenite, Rhyolite, Pumice, Obsidian, Scoria, Pegmatite, Volcanic Tuff. Basic rock: Gabbro, Dolerite, Basalt and its varieties,Trachyte.**(2 Hours)**
- Identification of rocks (Sedimentary Petrology): Conglomerate, Breccia, Sandstone and its varieties, Laterite, Limestone and its varieties, Shales and itsvarieties: **(2 Hours)**
- Identification of rocks (Metamorphic Petrolody): Marble, slate, Gneiss and its varieties, Schist and its varieties. Quartzite,Phyllite: **(2 Hours)**
- Study of topographical features from Geological maps. Identification of symbols inmaps: **(2 Hours)**
- Field study of foulds and faults:**(2 Hours)**

G. Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Books

- Parbin Singh, Engineering & General Geology, S.K. Kataria& Sons, New Delhi (2008)
- Bangar, K.M., Principles of Engineering Geology, Standard Publishers Distributors, Delhi (2009)
- Billings, Marland P., Structural Geology, 3rd ed., Prentice-Hall India, New Delhi.
- Todd, D.K., Ground Water Hydrology, 2nd ed., Wiley India, New Delhi (2008)

I. **Lecture Plan**

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Study of physical properties of minerals, Study of sp gravity of minerals and rocks	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam
2	Study of different group of minerals.	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam
3	Study of Crystal and Crystal system	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam
4	Identification of minerals: Silica group: Quartz, Amethyst, Opal; Feldspar group: Orthoclase, Plagioclase; Cryptocrystalline	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam

	group: Jasper; Carbonate group: Calcite; Element group: Graphite; Pyroxene group: Talc; Mica group: Muscovite.			
5	Identification of rocks (Igneous Petrology): Acidic Igneous rock: Granite and its varieties, Syenite, Rhyolite, Pumice, Obsidian, Scoria, Pegmatite, Volcanic Tuff. Basic rock: Gabbro, Dolerite, Basalt and its varieties.	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam
6	Identification of rocks (Sedimentary Petrology): Conglomerate, Breccia, Sandstone and its varieties, Laterite, Limestone and its varieties, Shales and itsvarieties	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam
7	Study of topographical features from Geological maps.	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam
8	Identification of rocks (Metamorphic Petrolody): Marble, slate, Gneiss and its varieties, Schist and its varieties. Quartzite.	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam
9	Identification of symbols in maps	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam
10	Field study of foulds and faults	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV422.1	To understand the difference of rocks (Igneous Petrology), Identification of rocks (Sedimentary Petrology)	3	3	1	3	1				2		2	1	1	2	1
CIV422.2	Analyze the various types of rocks (Metamorphic Petrolody), Minerals and crystallography.	3	2	2	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of Electronics and Communication Engineering MID-SEMESTER(SEM–IV)2020-21						
Class: B.Tech.(CE) IV Semester						
Subject Name: CIV 422 Engineering Geology Lab		Time:2 Hrs		Max.Marks:30		
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1, 2	Q.1, 2	Q. 1,2	Q.1,2	Q.1,2	Q.1,2
Student will be able to attain CO1 to 3						

CO Map	Question No.	Question	Marks
CO1-2	Q.1	Identification of rocks (Sedimentary Petrology): Conglomerate, Breccia, Sandstone and its varieties, Laterite, Limestone and its varieties, Shales and itsvarieties:	15
CO1-2	Q2	Study of topographical features from Geological maps. Identification of symbols inmaps: Field study of foulds and faults	15

Attainments		Rubric
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	CIV422 ENGINEERING GEOLOGY LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U10G10
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A+	10	1	1	10
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A+	10	1	1	10
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	A	9	1	1	9
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A+	10	1	1	10
5	A60215819005	Mr YASH YOGI	100	30	70	A	9	1	1	9
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	5	100.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **SURVEYING LAB**
Course Code : CIV 423, Credits : 01, Session : 2020-21(EVEN Sem), Class : B.Tech. 2nd Year
Faculty Name : Dr. Mohan Kantharia, Dr. Ripunjoy Gogoi

A. Introduction

Surveying Lab offers additional experience in fundamental land surveying measurement methods for surveying courses, including precision steel taping methods to perform horizontal measurements, digital theodolites to perform angular measurements and traditional and automatic levels for elevation measurements.

B. At the end of the course students will able to learn following idea’s

Course Outcomes: At the end of the course, students will be able to:

- **CIV422.1** Understand the Chain survey - Traversing and plotting of details. Chain survey – Measurement of Area by offsetting.
- **CIV422.2**. Analyze the Compass survey - Traversing with compass and calculation of Interior angles. The use of advance survey instrument, Total station, theodolite etc.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Students will able to understand the basic of different types of methods for measuring the distances and elevations of different points.

PSO2: Student will apply practical knowledge for determining the various control points.

E.

Component of Evaluation	**Description**	**Code**	**Weightag e %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/H A	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

- Chain survey-Traversing and plotting of details: **(2 Hours)**
- Chain survey-Measurement of Area by offsetting: **(2 Hours)**
- Compass survey - Traversing with compass and calculation of Interior angles: **(2 Hours)**
- Plane table survey-Method of Radiation: **(2 Hours)**
- Plane table survey-Method of Intersection: **(2 Hours)**
- Leveling Fly Leveling-Plane of collimation method: **(2 Hours)**
- Leveling Fly leveling-Rise and Fall method: **(2 Hours)**
- Total station uses in angles and sop distance measurement.: **(2 Hours)**
- Total station leveling and Contour surveying, Topographical maps.: **(2 Hours)**
- Theodolite surveying-Measurement of horizontal angle by method of repetition and reiteration:**(2 Hours)**

G. Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Books

- Madhu, N, Sathikumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson India,2006.
- Manoj, K. Arora and Badjatia, Geomatics Engineering, Nem Chand & Bros,2011
- Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International,2010
- Chandra, A.M., Higher Surveying, Third Edition, New Age International (P) Limited, 2002.
- Anji Reddy, M., Remote sensing and Geographical information system, B.S. Publications,2001.
- Arora, K.R., Surveying, Vol-I, II and III, Standard Book House,2015.

I. **Lecture Plan**

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Chain survey-Traversing and plotting of details.	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam
2	Chain survey-Measurement of Area by offsetting.	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam
3	Compass survey - Traversing with compass and calculation of Interior angles.	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam
4	Plane table survey-Method of Radiation.	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam
5	Plane table survey-Method of Intersection.	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam
6	Leveling Fly Leveling-Plane of collimation method	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam
7	Leveling Fly leveling-Rise and Fall method.	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam
8	*Total station uses in angles and sop distance measurement.*	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam
9	Total station leveling and Contour surveying, Topographical maps	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam
10	Theodolite surveying-Measurement of horizontal angle by method of repetition and reiteration.	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

CIV423.1	Understand the Chain survey - Traversing and plotting of details. Chain survey – Measurement of Area by offsetting.	3	3	1	3	1				2		2	1	1	2	1
CIV423.2	Analyze the Compass survey - Traversing with compass and calculation of Interior angles. The use of advance survey instrument, Total station, theodolite etc.	3	2	2	2	2				2		1	1	2	2	1

Sample Question Paper

<table>
<tr><td colspan="7">Amity School of Engineering and Technology
Department of Electronics and Communication Engineering
MID-SEMESTER(SEM–IV)2020-21</td></tr>
<tr><td colspan="7">Class: B.Tech.(CE) IV Semester</td></tr>
<tr><td colspan="2">Subject Name:
CIV 423 Surveying Lab</td><td colspan="3">Time:2 Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1, 2</td><td>Q.1, 2</td><td>Q. 1,2</td><td>Q.1,2</td><td>Q.1,2</td><td>Q.1,2</td></tr>
<tr><td colspan="7">Student will be able to attain CO1 to 3</td></tr>
</table>

CO Map	Question No.	Question	Marks
CO1-2	Q.1	• Chain survey-Traversing and plotting of details • Chain survey-Measurement of Area by offsetting	15
CO1-2	Q2	• Compass survey - Traversing with compass and calculation of Interior angles • Plane table survey-Method of Radiation • Plane table survey-Method of Intersection	15

<table>
<tr><th colspan="2">Attainments</th><th>Rubric</th></tr>
<tr><td>Level</td><td>1</td><td>IF60%ofstudentssecuremorethan60%marksthenlevel1</td></tr>
</table>

Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	**Enrollment.No.**	**Student's Name**	**CIV423 SURVEYING LAB**							
			Max Marks	**CE Weight Age (%)**	**ET Weight Age (%)**	**GO**	**GP**	**ACU**	**ECU**	**U12G12**
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A+	10	1	1	10
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A	9	1	1	9
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	A+	10	1	1	10
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A+	10	1	1	10
5	A60215819005	Mr YASH YOGI	100	30	70	A-	8	1	1	8
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	5	100.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **FLUID MECHANICS LAB**
Course Code : CIV 424, Credits : 01, Session : 2020-21(EVEN Sem), Class : B.Tech. 2nd Year
Faculty Name : Dr. Ripunjoy Gogoi, Mr. Sachin Tiwari

A. Introduction

The Fluid Mechanics laboratory is designed to examine the properties of fluids and to conduct experiments involving both incompressible and compressible flow.

B. At the end of the course students will able to learn following idea's

Course Outcomes: At the end of the course, students will be able to:

- **CIV422.1** Understand the different types of fluid exists in nature their behaviour and characteristics.
- **CIV422.2**. Analyze the various types of losses and different types of flow conditions, calculate different types of forces observed by moving bodies in different flow conditions.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Students will able to understand the basic of different types of methods for measuring the pressure with the help of different devices.

PSO2: Student will apply practical knowledge for determining the discharge from various sections and pipes.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

- Measurement of viscosity: **(2 Hours)**
- Study of Pressure MeasuringDevices: **(2 Hours)**
- Stability of FloatingBody: (2 **Hours**)

- Hydrostatics Force on Flat Surfaces/ CurvedSurfaces: (2 **Hours**)
- Verification of Bernoulli'sTheorem: (2 **Hours)**
- Venturimeter: (2 **Hours**)
- Orificemeter: (2 **Hours**)
- Impacts ofjets: (2 **Hours**)
- Flow Visualisation–IdealFlow: (2 **Hours**)
- Length of establishment offlow, velocity distribution inpipes, LaminarFlow: (2 **Hours**)

G. Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Books

- R.K. Bansal, "Fluid Mechanics & Hydraulic Machines", Laxmi Publications (P) Ltd., 2002.
- Gupta, S. C., Fluid Mechanics and Hydraulic Machines, Pearson Education, 2007
- D.S. Kumar, "Fluid Mechanics and Fluid Power Engineering", S.K. Kataria& Sons, 2000.
- F. M. White, Introduction to Fluid Mechanics, McGraw Hill

I. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Corresponding CO**	**Mode of Assessing CO**
1	Measurement of viscosity	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam
2	Study of Pressure Measuring Devices	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam
3	Stability of Floating Body:	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam
4	Hydrostatics Force on Flat Surfaces/ Curved Surfaces	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam
5	Verification of Bernoulli'sTheorem:	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam
6	Venturimeter	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam
7	Orificemeter	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam
8	Impacts of jets:	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam
9	Flow Visualisation–Ideal Flow:	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam
10	Length of establishment off low, velocity distribution in pipes, Laminar Flow	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV424.1	Understand the different types of fluid exists in nature their behaviour and characteristics.	3	3	1	3	1				2		2	1	1	2	1
CIV424.2	Analyze the various types of losses and different types of flow conditions, calculate different types of forces observed by moving bodies in different flow conditions.	3	2	2	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of Electronics and Communication Engineering MID-SEMESTER(SEM–IV)2020-21						
Class: B.Tech.(CE) IV Semester						
Subject Name: CIV 424 Fluid Mechanics Lab		Time:2 Hrs		Max.Marks:30		
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1, 2	Q.1, 2	Q. 1,2	Q.1,2	Q.1,2	Q.1,2
Student will be able to attain CO1 to 3						

CO Map	Question No.	Question	Marks
CO1-2	Q.1	• Measurement of viscosity • Study of Pressure Measuring Devices • Stability of Floating Body	15
CO1-2	Q2	• Hydrostatics Force on Flat Surfaces/ Curved Surfaces	15

		• Verification of Bernoulli's Theorem	

Attainments		Rubric
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	CIV424 FLUID MECHANICS LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U18G18
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A+	10	1	1	10
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A+	10	1	1	10
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	A+	10	1	1	10
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A+	10	1	1	10
5	A60215819005	Mr YASH YOGI	100	30	70	A+	10	1	1	10
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	5	100.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **INSTRUMENTATION & SENSOR TECHNOLOGIES FOR CIVIL ENGINEERING APPLICATIONS LABORATORY**
Course Code : ECE 427, Credits : 01, Session : 2020-21(EVEN Sem), Class : B.Tech. 2nd Year
Faculty Name : Dr. Ajay Dadoria, Mr. Narendra Kumar Garg

A. Introduction

Sensors and Instrumentation research area encompasses the development and optimisation of new or existing devices that detect and measure changes in temperature, pressure, vibration and light. It also includes the integration and optimisation of these devices into a new system or instrument.

B. At the end of the course students will able to learn following idea's

Course Outcomes: At the end of the course, students will be able to:

- **CIV422.1** Understand the different types of sensors exist and their use in advanced technology. To analyze the errors during measurements
- **CIV422.2**. Analyze the various types of losses and Measure the resolution and sensitivity of thermocouple, thermistor and LVDT To specify the requirements in the calibration of sensors and instruments. To describe the measurement of electrical variables.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Students will able to understand the basic of different types of sensors and methods for measuring the losses from sensors

PSO2: Student will apply practical knowledge to find out the various new advancement in the field of sensors.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

- Measurement of resolution and sensitivity of thermocouple: **(2 Hours)**
- Measurement of resolution, sensitivity and non-linearity of thermistor: **(2 Hours)**
- Measurement of thickness of LVDT: **(2 Hours)**
- Measurement of resolution of LVDT (and displacement measurement): **(2 Hours)**
- Vibration measurement by stroboscope: **(2 Hours)**
- Angular frequency (speed of rotating objects) measurement by stroboscope: **(2 Hours)**
- Pressure transducer study and calibration: **(2 Hours)**
- Proving ring (force measurement): **(2 Hours)**
- Study of Torque cell: **(2 Hours)**
- Closed loop study of an electric circuit: **(2 Hours)**

G. Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Books

- David. A. Bell (2003), Laboratory Manual for Electronic Devices and Circuits, Prentice Hall, India
- SantiramKal (2002), Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India
- Thomas L. Floyd and R. P. Jain (2009), Digital Fundamentals by Pearson Education,
- Paul B. Zbar, A.P. Malvino and M.A. Miller (2009), Basic Electronics – A Text-Lab. Manual, TMH
- R. T. Paynter (2009), Introductory Electronic Devices & Circuits, Conventional Flow Version, Pearson

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Measurement of resolution and sensitivity of thermocouple:	Practical	ECE 427.1	Mid Term-1, Quiz & End Sem Exam
2	Measurement of resolution, sensitivity and non-linearity of thermistor:	Practical	ECE 427.1	Mid Term-1, Quiz & End Sem Exam
3	Measurement of thickness of LVDT:	Practical	ECE 427.1	Mid Term-1, Quiz & End Sem Exam
4	Measurement of resolution of LVDT (and displacement measurement):	Practical	ECE 427.1	Mid Term-1, Quiz & End Sem Exam
5	Vibration measurement by stroboscope:	Practical	ECE 427.1	Mid Term-1, Quiz & End Sem Exam
6	Angular frequency (speed of rotating objects) measurement by stroboscope:	Practical	ECE 427.1	Mid Term-1, Quiz & End Sem Exam
7	Pressure transducer study and calibration:	Practical	ECE 427.1	Mid Term-1, Quiz & End Sem Exam

8	Proving ring (force measurement):	Practical	ECE 427.1	Mid Term-1, Quiz & End Sem Exam
9	Study of Torque cell:	Practical	ECE 427.1	Mid Term-1, Quiz & End Sem Exam
10	Closed loop study of an electric circuit:	Practical	ECE 427.1	Mid Term-1, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ECE427.1	At the end of the course, students will be able to: Understand the different types of sensors exist and their use in advanced technology. To analyze the errors during measurements	3	3	1	3	1				2		2	1	1	2	1
ECE427.2	Analyze the various types of losses and Measure the resolution and sensitivity of thermocouple, thermistor and LVDT To specify the requirements in the calibration of sensors and instruments. To describe the measurement of electrical variables.	3	2	2	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of Electronics and Communication Engineering MID-SEMESTER(SEM–IV)2020-21		
Class: B.Tech.(CE) IV Semester		
Subject Name: ECE 427 Instrumentation & Sensor Technologies for Civil Engineering Applications Lab	Time:2 Hrs	Max.Marks:30

Levels of thequestions as perBloomsTaxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
QuestionMapping	Q.1, 2	Q.1, 2	Q. 1,2	Q.1,2	Q.1,2	Q.1,2

Student willbeableto attain CO1 to 4

COMap	QuestionNo.	Question	Marks
CO1-4	Q.1	Measurement of resolution and sensitivity of thermocouple:	15
CO1-4	Q2	Measurement of resolution of LVDT (and displacement measurement)	15

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	ECE427 INSTRUMENTATION & SENSOR TECHNOLOGIES FOR CIVIL ENGINEERING APPLICATIONS LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U19G19
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A	9	1	1	9
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A+	10	1	1	10
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	A	9	1	1	9
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A+	10	1	1	10
5	A60215819005	Mr YASH YOGI	100	30	70	A	9	1	1	9

Total No. of Students	=	5		
Total No. of Students	>60 % marks	5	100.00	%
Attainment Level			Level 3	

AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : MECHANICS OF MATERIALS
Course Code : CIV 501, Crédits : 03, Session :2020-21 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia, Dr. P. Mahakavi, Mr. Sachin Tiwari

U. **Introduction:**The objective of this course is to *provide the basic concepts and principles of strength of materials.* It aims to equip the students *to give an ability to calculate stresses and deformations of objects under external loadings and also to give an ability to apply the knowledge of strength of materials on engineering applications and design problems.*

V. Course Outcomes: At the end of the course, students will be able to:
CIV501.1. *Understand the fundamental concepts of stress and strain*
CIV501.2. *Evaluate the problems relating to pure and uniform bending of beams and other simple structures*
CIV501.3. *Examine the deflection of beams under various loading condition.*
CIV501.4. *Understand the concept of crushing and buckling*
CIV501.5. *Analyse the structural elements using Energy methods*

W. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

X. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

Y. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves Includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

Z. Syllabus

Module 1: Introduction to Stress and Strain: (8 hours)

Deformation and Strain covering description of finite deformation, Infinitesimal deformation; Analysis of statically determinate trusses; Stability of dams, retaining walls and chimneys; Stress analysis of thin, thick and compound cylinder.

Module 2: Failure Theories: (7 hours)

Generalized state of stress and strain: Stress and strain tensor, Yield criteria and theories of failure; Tresca, Von-Mises, Hill criteria, Heigh-Westerguard's stress space.

Module 3: Bending Moments Diagrams: (5 hours)

Momentum Balance and Stresses covering Forces and Moments Transmitted by Slender Members, Shear Force and Bending Moment Diagrams, Momentum Balance, Stress States / Failure Criterion.

Module 4:Determinacy and Indeterminacy of Structures: (5 hours)

Mechanics of Deformable Bodies covering Force-deformation Relationships and Static Indeterminacy, Uniaxial Loading and Material Properties, Trusses and Their Deformations, Statically Determinate and Indeterminate Trusses,

Module 5:Pressure Vessels and Torsion: (5 hours)

Force-Stress-Equilibrium covering Multiaxial Stress and Strain, Thin-walled Pressure Vessels,Stress and strain Transformations and Principal Stress, Failure of Materials. Statically Indeterminate Beams, Shear and Torsion, Torsion and Twisting.

AA. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

BB. Suggested Text/Reference Books:

- Norris, C.H. and Wilber, J. B. and Utku, S. "Elementary Structural Analysis" Mc Graw Hill, Tokyo, Japan.
- Timoshenko, S. and Young, D. H., "Elements of Strength of Materials", DVNC, New York, USA. 3. Kazmi, S. M. A., 'Solid Mechanics" TMH, Delhi, India.
- Hibbeler, R. C. Mechanics of Materials. 6th ed. East Rutherford, NJ: Pearson Prentice Hall, 2004

CC. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Deformation	Lecture	CIV501.1	Mid Term-1, Quiz & End Sem Exam
2	Strain covering description of finite deformation,	Lecture	CIV501.1	Mid Term-1, Quiz & End Sem Exam
3	Analysis of statically determinate trusses;	Lecture	CIV501.1	Mid Term-1, Quiz & End Sem Exam
4	Stability of dams,	Lecture	CIV501.1	Mid Term-1, Quiz & End Sem Exam
5	Infinitesimal deformation;	Lecture	CIV501.1	Mid Term-1, Quiz & End Sem Exam

6	retaining walls	Lecture	CIV501.1	Mid Term-1, Quiz & End Sem Exam
7	chimneys;	Lecture	CIV501.1	Mid Term-1, Quiz & End Sem Exam
8	Stress analysis of thin and thick compound cylinder	Lecture	CIV501.1	Mid Term-1, Quiz & End Sem Exam
9	Generalized state of stress	Lecture	CIV501.2	Mid Term-1, Quiz & End Sem Exam
10	Generalized state of strain:	Lecture	CIV501.2	Mid Term-1, Quiz & End Sem Exam
11	Stress and strain tensor	Lecture	CIV501.2	Mid Term-1, Quiz & End Sem Exam
12	Yield criteria	Lecture	CIV501.2	Mid Term-1, Quiz & End Sem Exam
13	Theories of failure	Lecture	CIV501.2	Mid Term-1, Quiz & End Sem Exam
14	Tresca, Von-Mises	Lecture	CIV501.2	Mid Term-1, Quiz & End Sem Exam
15	Hill criteria	Lecture	CIV501.2	Mid Term-1, Quiz & End Sem Exam
16	Heigh-Westerguard's stress space	Lecture	CIV501.2	Mid Term-1, Quiz & End Sem Exam
17	Momentum Balance Stresses covering Forces	Lecture	CIV501.3	Mid Term-1, Quiz & End Sem Exam
18	Moments Transmitted by Slender Members,	Lecture	CIV501.3	Mid Term-1, Quiz & End Sem Exam
19	Shear Force and Bending Moment Diagrams	Lecture	CIV501.3	Mid Term-1, Quiz & End Sem Exam
20	Momentum Balance and Stresses covering Forces	Lecture	CIV501.3	Mid Term-1, Quiz & End Sem Exam
21	Shear Force and Bending Moment Diagrams	Lecture	CIV501.3	Assignment, Quiz & End Sem Exam
22	Momentum Balance, Stress States / Failure Criterion.	Lecture	CIV501.3	Assignment, Quiz & End Sem Exam
23	Mechanics of Deformable Bodies covering Force-deformation Relationships	Lecture	CIV501.4	Assignment, Quiz & End Sem Exam
25	Static Indeterminacy	Lecture	CIV501.4	Assignment, Quiz & End Sem Exam
26	Uniaxial Loading and Material Properties	Lecture	CIV501.4	Assignment, Quiz & End Sem Exam
27	Trusses and Their Deformations	Lecture	CIV501.4	Assignment, Quiz & End Sem Exam
28	Statically Determinate and Indeterminate Trusses	Lecture	CIV501.4	Assignment, Quiz & End Sem Exam
29	Force-deformation Relationships	Lecture	CIV501.5	Assignment, Quiz & End Sem Exam
30	Force-Stress-Equilibrium	Lecture	CIV501.5	Assignment, Quiz

				& End Sem Exam
31	Multiaxial Stress and Strain	Lecture	CIV501.5	Assignment, Quiz & End Sem Exam
32	Thin-walled Pressure Vessels	Lecture	CIV501.5	Assignment, Quiz & End Sem Exam
33	Stress and strain Transformations	Lecture	CIV501.5	Assignment, Quiz & End Sem Exam
34	Principal Stress	Lecture	CIV501.5	Assignment, Quiz & End Sem Exam
35	Failure of Materials and Statically Indeterminate Beams	Lecture	CIV501.5	Assignment, Quiz & End Sem Exam
36	Shear, Torsion and Twisting	Lecture	CIV501.5	Assignment, Quiz & End Sem Exam

DD. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV501.1.	Understand the fundamental concepts of stress and strain	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
CIV501.2.	Evaluate the problems relating to pure and uniform bending of beams and other simple structures	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
CIV501.3.	Examine the deflection of beams under various loading condition.	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
CIV501.4.	Understand the concept of crushing and buckling	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**
CIV501.5.	Analyse the structural elements using Energy methods.	3	3	2	3	3	2	2	-	3	2	3	3	**1**	**2**	**3**

<u>Sample Question Paper</u>

Amity School of Engineering and Technology
Department of Civil Engineering
I MID-SEMESTER (SEM–V) 2020-21

Class: B.Tech.(CE) V Semester

Subject Name: CIV501 Mechanics of Materials	Time: 2 Hrs	Max.Marks:30

Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to
CO1: Understand the fundamental concepts of stress and strain
CO2: Evaluate the problems relating to pure and uniform bending of beams and other simple structures

CO Map	Question No.	Question	Marks
CO1	Q.1	Discuss about the use of Mohr's circle?	3
CO1	Q.2a	State the relationship between young's modulus and modulus of rigidity.	3
	Q.2b	Define principal planes and principal stresses.	3
CO1	Q.3	A Mild steel rod of 20 mm diameter and 300 mm long is enclosed centrally inside a hollow copper tube of external diameter 30 mm and internal diameter 25 mm. The ends of the rod and tube are brazed together, and the composite bar is subjected to an axial pull of 40 kN. If E for steel and copper is 200 GN/m2 and 100 GN/m2 respectively, find the stresses developed in the rod and the tube also find the extension of the rod.	6
CO2	Q.4	Write down relations for maximum shear force and bending moment in case of a cantilever beam subjected to uniformly distributed load running over entire span	3
CO2	Q.5a	Define shear force and bending moment.	3
	Q.5b	Draw the shear force diagram for a cantilever beam of span 4 m and carrying a point load of 50 KN at mid span	3
CO2	Q6	A cantilever 1.5m long is loaded with a uniformly distribution load of 2 kN/m run over a length of 1.25m from the free end it also carries a point load of 3kn at a distance of 0.25m from the free end. Draw the shear force and bending moment diagram of the cantilever.	6

Attainments	**Rubric**

Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	CIV501 MECHANICS OF MATERIALS							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U3G3
1	A60215818001	Mr NAMAN GOYAL	100	30	70	B+	7	3	3	21
2	A60215818003	Mr SADAV KHAN	100	30	70	B-	5	3	3	15
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	B+	7	3	3	21
			Total No. of Students			=	3			
			Total No. of Students >60% marks				0	0.00	%	
			Attainment Level					-		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : HYDRAULIC ENGINEERING
Course Code : CIV 502, Crédits : 02, Session :2020-21 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Mr. Sachin Tiwari

A. Introduction: The objective of this course is to provide and train students of hydraulic engineering. The course will introduce students to various fluid properties, and their behavior under different condition.

B. Course Outcomes: At the end of the course, students will be able to:

CIV502.1. Analyse various hydraulic systems by applying the fundamental laws of fluid statics and
CIV502.2. Solve the fluid flow governing equations by taking suitable constraints and assumptions
CIV502.3. Evaluate major and minor losses in pipes and analyse the practical significance of open channel flows and Interpret the boundary layer aspects of laminar and turbulent flows
CIV502.4. Perform dimensional analysis on any real life problems
CIV502.5. Experimentally determine the fluid properties and flow parameters using various experimental setups.

C. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module 1:Introduction to Different Types of Flow: (5 Hours)
Laminar Flow- Laminar flow through: circular pipes, annulus and parallel plates. Stoke's law, Measurement of viscosity.

Module 2:Flow Types and Profile Determination: (5 Hours)
Turbulent Flow- Reynolds experiment, Transition from laminar to turbulent flow. Definition of turbulence, scale and intensity, Causes of turbulence, instability, mechanism of turbulence and effect of turbulent flow in pipes. Reynolds stresses, semi-empirical theories of turbulence, Prandtl's mixing length theory, universal velocity distribution equation. Resistance to flow of fluid in smooth and rough pipes, Moody's diagram.

Module 3:Boundary Layer Theory: (5 Hours)
Boundary Layer Analysis-Assumption and concept of boundary layer theory. Boundary-layer thickness, displacement, momentum & energy thickness, laminar and Turbulent boundary layers on a flat plate; Laminar sub-layer, smooth and rough boundaries. Local and average friction coefficients. Separation and Control.

Module 4:Different Types of Model Law: (5 Hours)
Dimensional Analysis and Hydraulic Similitude: Dimensional homogeneity, Rayleigh method, Buckingham's Pi method and other methods. Dimensionless groups. Similitude, Model studies, Types of models. Application of dimensional analysis and model studies to fluid flow problem. AICTE Model Curriculum for Undergraduate degree in Civil Engineering (Engineering & Technology) 133 | Page

Module 5:Introduction to Open Channel Flow: (4 Hours)
Introduction to Open Channel Flow-Comparison between open channel flow and pipe flow, Loss of head through pipes, Darcy-Wiesbatch equation, minor losses, total energy equation, hydraulic

gradient line, Pipes in series, equivalent pipes, pipes in parallel, flow through laterals, flows in dead end pipes, siphon, power transmission through pipes, nozzles.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Hydraulics and Fluid Mechanics, P.M. Modi and S.M. Seth, Standard Book House
- Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill.
- Open channel Flow, K. Subramanya, Tata McGraw Hill.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Laminar Flow- Laminar flow through: circular pipes	Lecture	CIV 502.1	Mid Term-1, Quiz & End Sem Exam
2	Annulus and parallel plates. Stoke's law,	Lecture	CIV 502.1	Mid Term-1, Quiz & End Sem Exam
3	Measurement of viscosity.	Lecture	CIV 502.1	Mid Term-1, Quiz & End Sem Exam
4	*Turbulent Flow- Reynolds experiment, Transition from laminar to turbulent flow*	Lecture	CIV 502.2	Mid Term-1, Quiz & End Sem Exam
5	Definition of turbulence, scale and intensity, Causes of turbulence, instability, mechanism of turbulence and effect of turbulent flow in pipes	Lecture	CIV 502.2	Mid Term-1, Quiz & End Sem Exam
6	Reynolds stresses, semi-empirical theories of turbulence, Prandtl's mixing length theory	Lecture	CIV 502.2	Mid Term-1, Quiz & End Sem Exam
7	universal velocity distribution equation	Lecture	CIV 502.2	Mid Term-1, Quiz & End Sem Exam
8	Resistance to flow of fluid in smooth and rough pipes, Moody's diagram	Lecture	CIV 502.2	Mid Term-1, Quiz & End Sem Exam
9	Boundary Layer Analysis- Assumption and concept of	Lecture	CIV 502.3	Mid Term-1, Quiz & End Sem Exam

	boundary layer theory			
10	Boundary-layer thickness, displacement, momentum & energy thickness	Lecture	CIV 502.3	Mid Term-1, Quiz & End Sem Exam
11	laminar and Turbulent boundary layers on a flat plate	Lecture	CIV 502.3	Mid Term-1, Quiz & End Sem Exam
12	Laminar sub-layer, smooth and rough boundaries	Lecture	CIV 502.3	Mid Term-1, Quiz & End Sem Exam
13	Local and average friction coefficients. Separation and Control.	Lecture	CIV 502.3	Mid Term-1, Quiz & End Sem Exam
14	Dimensional Analysis and Hydraulic Similitude: Dimensional homogeneity	Lecture	CIV 502.4	Mid Term-1, Quiz & End Sem Exam
15	Rayleigh method, Buckingham's Pi method and other methods. Dimensionless groups	Lecture	CIV 502.4	Mid Term-1, Quiz & End Sem Exam
16	Similitude, Model studies, Types of models	Lecture	CIV 502.4	Mid Term-1, Quiz & End Sem Exam
17	Application of dimensional analysis and model studies to fluid flow problem.	Lecture	CIV 502.4	Mid Term-1, Quiz & End Sem Exam
18	Introduction to Open Channel Flow-Comparison between open channel flow and pipe flow	Lecture	CIV 502.5	Mid Term-1, Quiz & End Sem Exam
19	Loss of head through pipes, Darcy-Wiesbatch equation, minor losses	Lecture	CIV 502.5	Mid Term-1, Quiz & End Sem Exam
20	total energy equation, hydraulic gradient line, Pipes in series, equivalent pipes, pipes in parallel	Lecture	CIV 502.5	Mid Term-1, Quiz & End Sem Exam
21	Pipes in series, equivalent pipes,	Lecture	CIV 502.5	Assignment, Quiz & End Sem Exam
22	pipes in parallel	Lecture	CIV 502.5	Assignment, Quiz & End Sem Exam
23	flow through laterals, flows in dead end pipes	Lecture	CIV 502.5	Assignment, Quiz & End Sem Exam
24	siphon, power transmission through pipes, nozzles.	Lecture	CIV 502.5	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV502.1.	Analyse various hydraulic systems by applying the fundamental laws of fluid statics and	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
CIV502.2.	Solve the fluid flow governing equations by taking suitable constraints and assumptions	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
CIV502.3.	Evaluate major and minor losses in pipes and analyse the practical significance of open channel flows and Interpret the boundary layer aspects of laminar and turbulent flows	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
CIV502.4.	Perform dimensional analysis on any real life problems	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**
CIV502.5.	Experimentally determine the fluid properties and flow parameters using various experimental setups. .	3	3	2	3	3	2	2	-	3	2	3	3	**1**	**2**	**3**

Sample Question Paper

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–V) 2020-21
Class: B.Tech.(CE) V Semester

Subject Name: CIV502 Hydraulics Engineering	Time: 2 Hrs	Max.Marks:30

Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: Analyse various hydraulic systems by applying the fundamental laws of fluid statics and

CO2. Solve the fluid flow governing equations by taking suitable constraints and assumptions

CO Map	Question No.	Question	Marks
CO1	Q.1	Define open channel flow with examples.	3
CO1	Q.2a	.Distinguish between critical, sub critical and subcritical flows.	3
	Q.2b	Differentiate prismatic and non-prismatic channels.	3
CO1	Q.3	Calculate the Specific energy ,Critical depth and the velocity of the flow of 10 m 3 in a cement lined rectangular channel 2.5m wide with 2 m depth of water. Is the given flow is sub critical or super critical	6
CO2	Q.4	List the factors affecting Manning‟s roughness coefficient.	3
CO2	Q.5a	What are the condition for obtaining most economical circular channel section for maximum velocity and discharge?	3
	Q.5b	A channel is designed to carry a discharge of 20 m 3 /s with Manning‟s n = 0.015 and bed slope of 1 in 1000 (for trapezoidal channel side slope M = 1/√3). Find the channel dimensions of the most efficient section if the channel is (i) trapezoidal (ii) rectangular.	3
CO2	Q6	A V - shaped open channel of included angle 90° conveys a discharge of 0.05 m 3 /s when the depth of flow at the center is 0.225 m. Assuming that C = 50 m 1/2 /s in the Chezy‟s equation, calculate the slope of the channel.	6

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	CIV502 HYDRAULIC ENGINEERING							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U4G4
1	A60215818001	Mr NAMAN GOYAL	100	30	70	A	9	2	2	18
2	A60215818003	Mr SADAV KHAN	100	30	70	A	9	2	2	18
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	A+	10	2	2	20

Total No. of Students	=	3		
Total No. of Students	>60% marks	3	100.00	%
Attainment Level			Level 3	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : STRUCTURAL ENGINEERING
Course Code : CIV 503, Crédits : 03, Session :2020-21 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. P. Mahakavi, Mr. Sachin Tiwari

A. Introduction: The objective of this course is to understand the basic concepts of Limit state design and to obtain the knowledge of using Indian standard codes and special publication. It aims to equip the students to know the design concepts of all the structural members and learn economical design for materials saving and to know the design methodologies by limit state design for the beams, slabs, column and footings. The objective of this course is to learn the design of structural members such as prestress concrete members.

B. Course Outcomes: At the end of the course, students will be able to:

CIV503.1. Apply the usage of IS codes in design of reinforced concrete structures and Identify the types and design of beams and slabs

CIV503.2 Design the uniaxial and biaxial bending of column. and Design the simple footings and combined footings

CIV503.3 Develop skills in design of different types of steel connections

CIV503.4 Design the compression and tension member

CIV503.5 Design the prestress concrete elements

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves	A	5%

	includingmedicalleaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module 1: Introduction Concepts of Energy Principles: (6 Hours)
Introduction- concepts of energy principles, safety, sustainable development in performance; what makes a structure; principles of stability, equilibrium; what is a structural engineer, role of engineer, architect, user, builder; what are the functions' what do the engineers design, first principles of process of design

Module 2:Different Types of Loads on Structures: (6 Hours)
Planning and Design Process; Materials, Loads, and Design Safety; Behaviour and Properties of Concrete and Steel; Wind and Earthquake Loads.

Module 3:Structural Design Criteria: (6 Hours)
Materials and Structural Design Criteria: Introduction to the analysis and design of structural systems. Analyses of determinate and indeterminate trusses, beams, and frames, and design philosophies for structural engineering. Laboratory experiments dealing with the analysis of determinate and indeterminate structures.

Module 4: Different Types of Structural Elements: (6 Hours)
Design of Structural Elements; Concrete Elements, Steel Elements, Structural Joints; Theories and concepts of both concrete and steel design and analysis both at the element and system levels. Approximate Analysis Methods as a Basis for Design; Design of AICTE Model Curriculum for Undergraduate degree in Civil Engineering (Engineering & Technology) 135 | Page Reinforced Concrete Beams for Flexure; Design of Reinforced Concrete Beams for Shear; Bond, Anchorage, and Serviceability; Reinforced Concrete Columns; Reinforced Concrete Slabs; Introduction to Steel Design; Tension Members and Connections; Bending Members; Structural Systems.

Module 5: Prestress Concrete Design: (6 Hours)
System Design Concepts; Special Topics that may be Covered as Part of the Design Project Discussions; Cable Structures; Prestressed Concrete Bridges; Constructability and Structural Control; Fire Protection.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
- G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
- V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–West press, Reprint 2005.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Introduction- concepts of energy principles, safety	Lecture	CIV503.1	Mid Term-1, Quiz & End Sem Exam
2	sustainable development in performance	Lecture	CIV503.1	Mid Term-1, Quiz & End Sem Exam
3	what makes a structure; principles of stability	Lecture	CIV503.1	Mid Term-1, Quiz & End Sem Exam
4	architect, user, builder;	Lecture	CIV503.1	Mid Term-1, Quiz & End Sem Exam
5	*what are the functions'*	Lecture	CIV503.1	Mid Term-1, Quiz & End Sem Exam
6	equilibrium; what is a structural engineer, role of engineer	Lecture	CIV503.1	Mid Term-1, Quiz & End Sem Exam
7	what do the engineers design, first principles of process of design	Lecture	CIV503.1	Mid Term-1, Quiz & End Sem Exam
8	Planning and Design Process	Lecture	CIV503.2	Mid Term-1, Quiz & End Sem Exam
9	Materials, Loads, and Design Safety	Lecture	CIV503.2	Mid Term-1, Quiz & End Sem Exam
10	Behaviour and Properties of Concrete	Lecture	CIV503.2	Mid Term-1, Quiz & End Sem Exam
11	Behaviour and Properties of Concrete	Lecture	CIV503.2	Mid Term-1, Quiz & End Sem Exam
12	Behaviour and Properties of Steel	Lecture	CIV503.2	Mid Term-1, Quiz & End Sem Exam
13	Wind and Earthquake Loads.	Lecture	CIV503.2	Mid Term-1, Quiz & End Sem Exam
14	Wind and Earthquake Loads.	Lecture	CIV503.2	Mid Term-1, Quiz & End Sem Exam
15	Materials and Structural Design Criteria	Lecture	CIV503.3	Mid Term-1, Quiz & End Sem Exam
16	Introduction to the analysis and design of structural systems	Lecture	CIV503.3	Mid Term-1, Quiz & End Sem Exam

17	Analyses of determinate and indeterminate trusse	Lecture	CIV503.3	Mid Term-1, Quiz & End Sem Exam
18	beams, and frames, and design philosophies for structural engineering	Lecture	CIV503.3	Mid Term-1, Quiz & End Sem Exam
19	philosophies for structural engineering	Lecture	CIV503.3	Mid Term-1, Quiz & End Sem Exam
20	analysis of determinate structures	Lecture	CIV503.3	Mid Term-1, Quiz & End Sem Exam
21	Laboratory experiments dealing with the analysis of indeterminate structures	Lecture	CIV503.3	Assignment, Quiz & End Sem Exam
22	Design of Structural Elements; Concrete Elements, Steel Elements, Structural Joints;	Lecture	CIV503.4	Assignment, Quiz & End Sem Exam
23	Theories and concepts of both concrete and steel ign and analysis both at the element and system levels	Lecture	CIV503.4	Assignment, Quiz & End Sem Exam
24	Approximate Analysis Methods as a Basis for Design	Lecture	CIV503.4	Assignment, Quiz & End Sem Exam
25	Reinforced Concrete Beams for Flexure; Design of Reinforced Concrete Beams for Shear; Bond, Anchorage, and Serviceability	Lecture	CIV503.4	Assignment, Quiz & End Sem Exam
26	Reinforced Concrete Columns; Reinforced Concrete Slabs; Introduction to Steel Design	Lecture	CIV503.4	Assignment, Quiz & End Sem Exam
27	Tension Members and Connections; Bending Members;	Lecture	CIV503.4	Assignment, Quiz & End Sem Exam
28	Structural Systems.	Lecture	CIV503.4	Assignment, Quiz & End Sem Exam
29	System Design Concepts;	Lecture	CIV503.5	Assignment, Quiz & End Sem Exam
30	Special Topics that may be Covered as Part of the Design Project Discussions;	Lecture	CIV503.5	Assignment, Quiz & End Sem Exam
31	Cable Structures;	Lecture	CIV503.5	Assignment, Quiz & End Sem Exam
32	Prestressed Concrete Bridges;	Lecture	CIV503.5	Assignment, Quiz & End Sem Exam
33	Constructability	Lecture	CIV503.5	Assignment, Quiz

				& End Sem Exam
34	Structural Control;	Lecture	CIV503.5	Assignment, Quiz & End Sem Exam
35	Fire Protection.	Lecture	CIV503.5	Assignment, Quiz & End Sem Exam
36	System Design Concepts;	Lecture	CIV503.5	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV503.1	Apply the usage of IS codes in design of reinforced concrete structures and Identify the types and design of beams and slabs	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
CIV503.2	Design the uniaxial and biaxial bending of column. and Design the simple footings and combined footings	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
CIV503.3	Develop skills in design of different types of steel connections	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
CIV503.4	Design the compression and tension member	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**

CIV503.5	Design the prestress concrete elements	3	3	2	3	3	2	2	-	3	2	3	3	**1**	**2**	**3**

Sample Question Paper

<table>
<tr><td colspan="7" align="center">Amity School of Engineering and Technology
Department of Civil Engineering
I MID-SEMESTER (SEM–V) 2020-21</td></tr>
<tr><td colspan="7" align="center">Class: B.Tech.(CE) V Semester</td></tr>
<tr><td colspan="2">Subject Name:
CIV503 Structural Engineering</td><td colspan="3">Time: 2 Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3</td><td>Q.4</td><td>Q.2,5,6</td><td></td><td></td></tr>
<tr><td colspan="7">Student will be able to
CO1: Apply the usage of IS codes in design of reinforced concrete structures and Identify the types and design of beams and slabs
CO2: Design the uniaxial and biaxial bending of column. and Design the simple footings and combined footings</td></tr>
</table>

<table>
<tr><th>CO Map</th><th>Question No.</th><th>Question</th><th>Marks</th></tr>
<tr><td>CO1</td><td>Q.1</td><td>Write short note on ultimate strength method of design of reinforced concrete structure?</td><td>3</td></tr>
<tr><td rowspan="2">CO1</td><td>Q.2a</td><td>: Explain the various difference between design load and characteristic load using suitable diagram</td><td>3</td></tr>
<tr><td>Q.2b</td><td>Define characteristic strength and design strength using suitable diagram.</td><td>3</td></tr>
<tr><td>CO1</td><td>Q.3</td><td>Describe the following in detail:
(a) Steps involved in the Indian Standard recommendations for mix design
(b) Behaviour of concrete under uniaxial compression.
(c) Modulus of elasticity and Poisson's Ratio</td><td>6</td></tr>
<tr><td>CO2</td><td>Q.4</td><td>Distinguish between static modulus and dynamic modulus of elasticity of concrete.?</td><td>3</td></tr>
<tr><td>CO2</td><td>Q.5a</td><td>What does ‘creep of concrete’ mean explain in detail? Is creep harmful or beneficial?.</td><td>3</td></tr>
</table>

	Q.5b	Discuss the role of water in producing 'good' concrete.	3
CO2	Q6	Describe the various aspects of Design stress-strain curve for the following material: (a) Reinforcing Steel (b) Concrete	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	**Enrollment.No.**	**Student's Name**	**CIV503 STRUCTURAL ENGINEERING**							
			Max Marks	**CE Weight Age (%)**	**ET Weight Age (%)**	**GO**	**GP**	**ACU**	**ECU**	**U5G5**
1	A60215818001	Mr NAMAN GOYAL	100	30	70	B+	7	3	3	21
2	A60215818003	Mr SADAV KHAN	100	30	70	B+	7	3	3	21
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	B+	7	3	3	21
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	0	0.00	%	
			Attainment Level					-		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : GEOTECHNICAL ENGINEERING
Course Code : CIV 504, Crédits : 02, Session :2020-21 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Imran Ahmad Khan

A. Introduction: The objective of this course is to impart the fundamental concepts of soil mechanics and understand the bearing capacity and to understand the concept of compaction and consolidation of soils. It aims to understand the design aspects of foundation and to evaluate the stress developed in the soil medium.

B. Course Outcomes: At the end of the course, students will be able to:

CIV504.1*Compare the various engineering and index properties of soil.*

CIV504.2 *Explain the hydraulic conductivity of the soil and seepage actions*

CIV504.3. E*xamine the stress distribution at any point below the ground level.*

CIV504.4 *Evaluate the shear strength of the soil using Mohr Soil.*

CIV504.5 *Discuss the soil investigation techniques for advanced explorations and to conduct the field test like SPT & PLT.*

CIV504.6 *Evaluate the safe bearing capacity of shallow foundations*

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module 1:Introduction–Types of Soils, Their Formation and Deposition: (3 Hours)

Introduction–Types of soils, their formation and deposition, Definitions: soil mechanics, soil engineering, rock mechanics, geotechnical engineering. Scope of soil engineering. Comparison and difference between soil and rock. Basic Definitions and Relationships-Soil as three-phase system in terms of weight, volume, voids ratio. porosity. Definitions: moisture content, unit weights, degree of saturation, voids ratio, porosity, specific gravity, mass specific gravity.

Module 2:Different Soil Properties and Relations: (4 Hours)
Plasticity Characteristics of Soil - Introduction to definitions of: plasticity of soil, consistency limits-liquid limit, plastic limit, shrinkage limit, plasticity, liquidity and consistency indices, flow & toughness indices, definitions of activity and sensitivity. Determination of: liquid limit, plastic limit and shrinkage limit. Use of consistency limits. Classification of Soils-Introduction of soil classification: particle size classification, textural classification, unified soil classification system, Indian standard soil classification system.

Module 3:Determination of Coefficient of Permeability: (4 Hours)
Permeability of Soil - Darcy's law, validity of Darcy's law. Determination of coefficient of permeability: Laboratory method: constant-head method, falling-head method. Field method: pumping- in test, pumping- out test. Permeability aspects: permeability of stratified soils, factors affecting permeability of soil. Seepage Analysis- Introduction, stream and potential functions, characteristics of flow nets.
Module 4: Stresses Coming on Soil Specimen: (4 Hours)
Effective Stress Principle - Introduction, effective stress principle, nature of effective stress, effect of water table. Fluctuations of effective stress, effective stress in soils saturated by capillary action, seepage pressure, quick sand condition.

Module 5:Compaction of Soil: (2 Hours)
Compaction of Soil-Introduction, theory of compaction, laboratory determination of optimum moisture content and maximum dry density. Compaction in field, compaction specifications and field control.

Module 6: Consolidation of Soil: (3 Hours)
Consolidation of Soil - Introduction, comparison between compaction and consolidation, initial, primary & secondary consolidation, spring analogy for primary consolidation, interpretation of consolidation test results, Terzaghi's theory of consolidation, final settlement of soil deposits, computation of consolidation settlement and secondary consolidation. Introduction, stresses due to point load, line load, strip load, uniformly loaded circular area, rectangular loaded area. Influence factors, Isobars, Boussinesq's equation, Newmark's Influence Chart.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Soil Mechanics by Craig R.F., Chapman & Hall
- Fundamentals of Soil Engineering by Taylor, John Wiley & Sons
- An Introduction to Geotechnical Engineering, by Holtz R.D. and Kovacs, W.D., Prentice Hall, NJ 4. Principles of Geotechnical Engineering, by Braja M. Das, Cengage Learning

- Principles of Foundation Engineering, by Braja M. Das, Cengage Learning

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction–Types of soils, their formation and deposition	Lecture	CIV504.1	Mid Term-1, Quiz & End Sem Exam
2	Definitions: soil mechanics, soil engineering, rock mechanics, geotechnical engineering.	Lecture	CIV504.1	Mid Term-1, Quiz & End Sem Exam
3	Scope of soil engineering. Comparison and difference between soil and rock	Lecture	CIV504.1	Mid Term-1, Quiz & End Sem Exam
4	*Basic Definitions and Relationships-Soil as three-phase system in terms of weight, volume, voids ratio*	Lecture	CIV504.1	Mid Term-1, Quiz & End Sem Exam
5	Definitions: moisture content, unit weights, degree of saturation, voids ratio, porosity, specific gravity, mass specific gravity.	Lecture	CIV504.1	Mid Term-1, Quiz & End Sem Exam
6	Plasticity Characteristics of Soil - Introduction to definitions of: plasticity of soil,	Lecture	CIV504.2	Mid Term-1, Quiz & End Sem Exam
7	consistency limits-liquid limit, plastic limit, shrinkage limit, plasticity, liquidity and consistency indices, flow & toughness indices	Lecture	CIV504.2	Mid Term-1, Quiz & End Sem Exam
8	definitions of activity and sensitivity. Determination of: liquid limit, plastic limit and shrinkage limit. Use of consistency units	Lecture	CIV504.2	Mid Term-1, Quiz & End Sem Exam
9	Classification of Soils-Introduction of soil classification: particle size classification, textural classification, unified soil classification system, Indian standard soil classification system.	Lecture	CIV504.2	Mid Term-1, Quiz & End Sem Exam
10	Permeability of Soil - Darcy’s law, validity of	Lecture	CIV504.3	Mid Term-1, Quiz & End Sem Exam

	Darcy's law			
11	Determination of coefficient of permeability: Laboratory method: constant-head method, falling-head method	Lecture	CIV504.3	Mid Term-1, Quiz & End Sem Exam
12	Field method: pumping- in test, pumping- out test. Permeability aspects: permeability of stratified soils, factors affecting permeability of soil	Lecture	CIV504.3	Mid Term-1, Quiz & End Sem Exam
13	Seepage Analysis- Introduction, stream and potential functions, characteristics of flow nets.	Lecture	CIV504.3	Mid Term-1, Quiz & End Sem Exam
14	Effective Stress Principle -	Lecture	CIV504.4	Mid Term-1, Quiz & End Sem Exam
15	Introduction, effective stress principle, nature of effective stress	Lecture	CIV504.4	Mid Term-1, Quiz & End Sem Exam
16	effect of water table. Fluctuations of effective stress	Lecture	CIV504.4	Mid Term-1, Quiz & End Sem Exam
17	effective stress in soils saturated by capillary action	Lecture	CIV504.4	Mid Term-1, Quiz & End Sem Exam
18	seepage pressure, quick sand condition.	Lecture	CIV504.4	Mid Term-1, Quiz & End Sem Exam
19	Compaction of Soil- Introduction, theory of compaction	Lecture	CIV504.5	Mid Term-1, Quiz & End Sem Exam
20	laboratory determination of optimum moisture content ; maximum dry density. Compaction in field,	Lecture	CIV504.5	Mid Term-1, Quiz & End Sem Exam
21	compaction specifications and field control	Lecture	CIV504.5	Assignment, Quiz & End Sem Exam
22	Consolidation of Soil - Introduction, comparison between compaction and consolidation, initial, primary & secondary consolidation, spring analogy for primary consolidation, interpretation of consolidation test results,	Lecture	CIV504.6	Assignment, Quiz & End Sem Exam
23	Terzaghi's theory of consolidation, final	Lecture	CIV504.6	Assignment, Quiz & End Sem Exam

	settlement of soil deposits, computation of consolidation settlement and secondary consolidation. Introduction, stresses due to point load, line load, strip load, uniformly loaded circular area, rectangular loaded area			
24	Influence factors, Isobars, Boussinesq's equation, Newmark's Influence Chart.	Lecture	CIV504.6	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV504.1	Compare the various engineering and index properties of soil.	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
CIV504.2	Explain the hydraulic conductivity of the soil and seepage actions	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
CIV504.3.	**Examine the stress distribution at any point below the ground level.**	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
CIV504.4	**Evaluate the shear strength of the soil using Mohr Soil.**	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**
CIV504.5	**Discuss the soil investigation techniques for advanced**	3	3	2	3	3	2	2	-	3	2	3	3	**1**	**2**	**3**

	explorations and to conduct the field test like SPT & PLT.															
CIV504.6	Evaluate the safe bearing capacity of shallow foundations	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**

<u>Sample Question Paper</u>

<table>
<tr><td colspan="7" align="center">Amity School of Engineering and Technology
Department of Civil Engineering
I MID-SEMESTER (SEM–V) 2020-21</td></tr>
<tr><td colspan="7" align="center">Class: B.Tech.(CE) V Semester</td></tr>
<tr><td colspan="2">Subject Name:
Civ504 Geotechnical Engineering</td><td colspan="3">Time: 2 Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3</td><td>Q.4</td><td>Q.2,5,6</td><td></td><td></td></tr>
<tr><td colspan="7">Student will be able to
CO1: Compare the various engineering and index properties of soil.
CO2: Explain the hydraulic conductivity of the soil and seepage actions</td></tr>
</table>

<table>
<tr><td>CO Map</td><td>Question No.</td><td>Question</td><td>Marks</td></tr>
<tr><td>CO1</td><td>Q.1</td><td>Describe in detail: Soil Formation in Geological cycle</td><td>3</td></tr>
<tr><td rowspan="2">CO1</td><td>Q.2a</td><td>Define following terms: 1. Water content of soil, 2. Bulk unit weight, 3. Specific Gravity, 4. Void ratio, 5. Density Index</td><td>3</td></tr>
<tr><td>Q.2b</td><td>What are the basic requirements of Soil Classification?</td><td>3</td></tr>
<tr><td>CO1</td><td>Q.3</td><td>What do you mean by Compaction? Explain theory of Compaction.
List out all factors affecting Compaction. Explain each in detail.</td><td>6</td></tr>
<tr><td>CO2</td><td>Q.4</td><td>Differentiate between Standard Proctor and Modified Proctor</td><td>3</td></tr>
<tr><td rowspan="2">CO2</td><td>Q.5a</td><td>Explain: Effects of Compaction on Properties of Soil.</td><td>3</td></tr>
<tr><td>Q.5b</td><td>What are the different methods of Compaction used in field? Explain each in detail</td><td>3</td></tr>
</table>

CO2	Q6	What are the different methods of Compaction used in field? Explain each in detail	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	**Enrollment.No.**	**Student's Name**	**CIV504 GEOTECHNICAL ENGINEERING**							
			Max Marks	**CE Weight Age (%)**	**ET Weight Age (%)**	**GO**	**GP**	**ACU**	**ECU**	**U6G6**
1	A60215818001	Mr NAMAN GOYAL	100	30	70	A+	10	2	2	20
2	A60215818003	Mr SADAV KHAN	100	30	70	A+	10	2	2	20
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	A+	10	2	2	20

Total No. of Students	=	3		
Total No. of Students	>60% marks	3	100.00	%
Attainment Level			Level 3	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : HYDROLOGY & WATER RESOURCES ENGINEERING
Course Code : CIV 505 Crédits : 03, Session :2020-21 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Mr. Sachin Tiwari

A. **Introduction:** The objective of this course is *to motivate the students to identify, formulate, solve the complex problem to manage the water resource related issues and to prepare the students to synthesize data and technical concepts to apply in water resources engineering. It aims to develop the ability of the students to conduct appropriate experiments, analyse and interpret data and use engineering judgement to draw conclusions in water resources problems.*

B. **Course Outcomes:** At the end of the course, students will be able to:

CIV505.1. Identify the various components of hydrological cycle and the spatial and temporal variation of rainfall.
CIV505.2. Determine the different methods and hydrological models to estimate the stream flow.
CIV505.3. Examine the different techniques to calculate the probable maximum flood based on different returned period.
CIV505.4. Evaluate the basic aquifer parameters and groundwater resources for different hydro geological boundary conditions.
CIV505.5. Understand the different methods of irrigation and find the optimum methods of irrigation for judicious use of water resources.

C. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves	A	5%

	includingmedicalleaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. **Syllabus**

Module 1:Introduction to Hydrology: (5 Hours)
Introduction - hydrologic cycle, water-budget equation, history of hydrology, world water balance, applications in engineering, sources of data**.**

Module 2:Different Forms of Precipitation: (5 Hours)
Precipitation - forms of precipitation, characteristics of precipitation in India, measurement of precipitation, rain gauge network, mean precipitation over an area, deptharea-duration relationships, maximum intensity/depth-duration-frequency relationship, Probable Maximum Precipitation (PMP), rainfall data in India.

Module 3:Different Methods for Rainfall Calculation: (7 Hours)
Abstractions from precipitation - evaporation process, evaporimeters, analytical methods of evaporation estimation, reservoir evaporation and methods for its reduction, evapotranspiration, measurement of evapotranspiration, evapotranspiration equations, potential evapotranspiration over India, actual evapotranspiration, interception, depression storage, infiltration, infiltration capacity, measurement of infiltration, modelling infiltration capacity, classification of infiltration capacities, infiltration indices.

Module 4: SCS-CN Method of Estimating Runoff: (6 Hours)
Runoff - runoff volume, SCS-CN method of estimating runoff volume, flow duration curve, flow-mass curve, hydrograph, factors affecting runoff hydrograph, components of hydrograph, base flow separation, effective rainfall, unit hydrograph surface water resources of India, environmental flows.

Module 5:Ground Water and Well Hydrology: (7 Hours)
Ground water and well hydrology - forms of subsurface water, saturated formation, aquifer properties, geologic formations of aquifers, well hydraulics: steady state flow in wells, equilibrium equations for confined and unconfined aquifers, aquifer tests. Design of channels- rigid boundary channels, alluvial channels, Kennedy's and Lacey's theory of regime channels. Water logging: causes, effects, consumptive use, irrigation requirement, frequency of irrigation; Methods of applying water to the fields: surface, sub-surface, sprinkler and trickle / drip irrigation.

G. **Examination Scheme:**

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. **Suggested Text/Reference Books:**

- K Subramanya, Engineering Hydrology, Mc-Graw Hill.
- K N Muthreja, Applied Hydrology, Tata Mc-Graw Hill.
- K Subramanya, Water Resources Engineering through Objective Questions, Tata McGraw Hill.

- G L Asawa, Irrigation Engineering, Wiley Eastern

I. **Lecture Plan**

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction - hydrologic cycle,	Lecture	CIV505.1	Mid Term-1, Quiz & End Sem Exam
2	water-budget equation,	Lecture	CIV505.1	Mid Term-1, Quiz & End Sem Exam
3	history of hydrology,	Lecture	CIV505.1	Mid Term-1, Quiz & End Sem Exam
4	*world water balance,*	Lecture	CIV505.1	Mid Term-1, Quiz & End Sem Exam
5	applications in engineering, sources of data.	Lecture	CIV505.1	Mid Term-1, Quiz & End Sem Exam
6	Precipitation - forms of precipitation, characteristics of precipitation in India	Lecture	CIV505.1	Mid Term-1, Quiz & End Sem Exam
7	measurement of precipitation	Lecture	CIV505.1	Mid Term-1, Quiz & End Sem Exam
8	rain gauge network, mean precipitation over an area	Lecture	CIV505.2	Mid Term-1, Quiz & End Sem Exam
9	deptharea-duration relationships	Lecture	CIV505.2	Mid Term-1, Quiz & End Sem Exam
10	maximum intensity/depth	Lecture	CIV505.2	Mid Term-1, Quiz & End Sem Exam
11	duration-frequency relationship	Lecture	CIV505.2	Mid Term-1, Quiz & End Sem Exam
12	Probable Maximum Precipitation (PMP),	Lecture	CIV505.2	Mid Term-1, Quiz & End Sem Exam
13	rainfall data in India.	Lecture	CIV505.2	Mid Term-1, Quiz & End Sem Exam
14	Abstractions from precipitation - evaporation process	Lecture	CIV505.2	Mid Term-1, Quiz & End Sem Exam
15	evaporimeters, analytical methods of evaporation estimation,	Lecture	CIV505.3	Mid Term-1, Quiz & End Sem Exam
16	Reservoir evaporation and methods for its reduction	Lecture	CIV505.3	Mid Term-1, Quiz & End Sem Exam
17	evapotranspiration, measurement of evapotranspiration, evapotranspiration	Lecture	CIV505.3	Mid Term-1, Quiz & End Sem Exam
18	potential evapotranspiration over India,	Lecture	CIV505.3	Mid Term-1, Quiz & End Sem Exam
19	actual evapotranspiration,	Lecture	CIV505.3	Mid Term-1, Quiz

	interception			& End Sem Exam
20	depression storage, infiltration, infiltration capacity, measurement of infiltration,	Lecture	CIV505.3	Mid Term-1, Quiz & End Sem Exam
21	modelling infiltration capacity, classification of infiltration capacities, infiltration indices	Lecture	CIV505.3	Assignment, Quiz & End Sem Exam
22	Runoff - runoff volume,	Lecture	CIV505.4	Assignment, Quiz & End Sem Exam
23	SCS-CN method of estimating runoff volume	Lecture	CIV505.4	Assignment, Quiz & End Sem Exam
24	flow duration curve, flow-mass curve	Lecture	CIV505.4	Assignment, Quiz & End Sem Exam
25	hydrograph, factors affecting runoff hydrograph	Lecture	CIV505.4	Assignment, Quiz & End Sem Exam
26	components of hydrograph, base flow separation	Lecture	CIV505.4	Assignment, Quiz & End Sem Exam
27	effective rainfall,	Lecture	CIV505.4	Assignment, Quiz & End Sem Exam
28	unit hydrograph surface water resources of India	Lecture	CIV505.4	Assignment, Quiz & End Sem Exam
29	Ground water and well hydrology - forms of subsurface water	Lecture	CIV505.5	Assignment, Quiz & End Sem Exam
30	saturated formation, aquifer properties, geologic formations of aquifers, well hydraulics: steady state flow in wells,	Lecture	CIV505.5	Assignment, Quiz & End Sem Exam
31	equilibrium equations for confined and unconfined aquifers, aquifer tests. Design of channels- rigid boundary channels, alluvial channels	Lecture	CIV505.5	Assignment, Quiz & End Sem Exam
32	Kennedy’s and Lacey’s theory of regime channels. Water logging: causes, effects, consumptive use, irrigation requirement,	Lecture	CIV505.5	Assignment, Quiz & End Sem Exam
33	frequency of irrigation; Methods of applying water to the fields	Lecture	CIV505.5	Assignment, Quiz & End Sem Exam
34	surface, sub-surface	Lecture	CIV505.5	Assignment, Quiz & End Sem Exam
35	sprinkler and trickle / drip	Lecture	CIV505.5	Assignment, Quiz

	irrigation.			& End Sem Exam
36	sprinkler and trickle / drip irrigation.	Lecture	CIV505.5	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV505.1.	Identify the various components of hydrological cycle and the spatial and temporal variation of rainfall.	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
CIV505.2.	Determine the different methods and hydrological models to estimate the stream flow.	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
CIV505.3.	Examine the different techniques to calculate the probable maximum flood based on different returned period.	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
CIV505.4	Evaluate the basic aquifer parameters and groundwater resources for different hydro geological boundary conditions.	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**

CIV505.5.	Understand the different methods of irrigation and find the optimum methods of irrigation for judicious use of water resources.	3	3	2	3	3	2	2	-	3	2	3	3	**1**	**2**	**3**

Sample Question Paper

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–V) 2020-21		
Class: B.Tech.(CE) V Semester		
Subject Name: CIV505 Hydrology & Water Resources Engineering	Time: 2 Hrs	Max.Marks:30

Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: . Identify the various components of hydrological cycle and the spatial and temporal variation of rainfall.

CO2: Determine the different methods and hydrological models to estimate the stream flow.

CO Map	Question No.	Question	Marks
CO1	Q.1	Explain the different methods of determining the average rainfall over catchment due to a storm	3
CO1	Q.2a	How is precipitation measured? Discuss the three methods which convert the point precipitation to areal precipitation and comment on the best method	3
	Q.2b	What are the precautions to be taken in selection a site for the location of a rain gauge? Explain	3
CO1	Q.3	Explain with the help of a neat sketch about the hydrological cycle with its various components	6
CO2	Q.4	Elaborate on the factor affecting infiltration and different methods of infiltration	3
	Q.5a	Explain briefly about the O - Index and W - Index.	3

CO2	Q.5b	Differentiate the reservoir evaporation from the agricultural field Evaporation	3
CO2	Q6	What are the factors should be considered in selecting a site for a stream gauging station? Explain the dilution method of flow measurement	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	CIV505 HYDROLOGY & WATER RESOURCES ENGINEERING							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U14G14
1	A60215818001	Mr NAMAN GOYAL	100	30	70	A+	10	3	3	30
2	A60215818003	Mr SADAV KHAN	100	30	70	A+	10	3	3	30
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	A+	10	3	3	30
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	3	100.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : Environmental Engineering – I
Course Code : CIV 506, Crédits : 03, Session : 2020-21 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : DDr. Mohan Kantharia, Dr. Imran Ahmad Khan,

A. **Introduction:** The objective of this course is to teach students the basic principles and concepts of unit operations and processes involved in water and wastewater treatment and to develop a student's skill in the basic design of unit operations and processes involved in water and wastewater treatment. It aims to develop a student's skill in evaluating the performance of water and wastewater treatment plants and to teach students the various methods of sludge management.

B. **Course Outcomes:**At the end of the course, students will be able to:

CIV506.1. Examine the type and size of reactor required for various unit operations and processes involved in water and wastewater treatment

CIV506.2. Able to design individual unit operation or process appropriate to the situation by applying physical, chemical, biological and engineering principles.

CIV506.3. Able to identify the type of unit operations and processes involved in water and wastewater treatment plants based on the water quality

CIV506.4. Prepare the layout of water and wastewater treatment plants and evaluate the water and wastewater treatment plants

CIV507.5. Investigate the performance of various unit operations and processes to meet the desired health and environment related goals.

C. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance	A	5%

	isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module 1:Basic water Qualities: (6 Hours)
Water: -Sources of Water and quality issues, water quality requirement for different beneficial uses, Water quality standards, water quality indices, water safety plans, Water Supply systems, Need for planned water supply schemes, Water demand industrial and agricultural water requirements, Components of water supply system; Transmission of water, Distribution system, Various valves used in W/S systems, service reservoirs and design. Water Treatment: aeration, sedimentation, coagulation flocculation, filtration, disinfection, advanced treatments like adsorption, ion exchange, membrane processes.

Module 2:Sewage and Its Disposal: (6 Hours)
Sewage- Domestic and Storm water, Quantity of Sewage, Sewage flow variations. Conveyance of sewage- Sewers, shapes design parameters, operation and maintenance of sewers, Sewage pumping; Sewerage, Sewer appurtenances, Design of sewerage systems. Small bore systems, Storm Water-Quantification and design of Storm water; Sewage and Sullage, Pollution due to improper disposal of sewage, National River cleaning plans.

Module 3: Air Quality and Pollutants: (6 Hours)
Air - Composition and properties of air, Quantification of air pollutants, Monitoring of air pollutants, Air pollution- Occupational hazards, Urban air pollution automobile pollution, Chemistry of combustion, Automobile engines, quality of fuel, operating conditions and interrelationship. Air quality standards, Control measures for Air pollution, construction and limitations

Module 4:Solid Waste Management: (4 Hours)
Noise- Basic concept, measurement and various control methods. Government authorities and their roles in water supply, sewerage disposal. Solid waste management and monitoring/control of environmental pollution.

Module 5: Physical and Methods for Waste Management: (5 Hours)
Solid waste management-Municipal solid waste, Composition and various chemical and physical parameters of MSW, MSW management: Collection, transport, treatment and disposal of MSW. Special MSW: waste from commercial establishments and other urban areas, solid waste from construction activities, biomedical wastes, Effects of solid waste on environment: effects on air, soil, water surface and ground health hazards. Disposal of solid waste-segregation, reduction at source, recovery and recycle. Disposal methods Integrated solid waste management. Hazardous waste: Types and nature of hazardous waste as per the HW Schedules of regulating authorities.

Module 6: Home Plumbing Systems for Water Supply: (3 Hours)
Building Plumbing-Introduction to various types of home plumbing systems for water supply and waste water disposal, high rise building plumbing, Pressure reducing valves, Break pressure tanks, Storage tanks, Building drainage for high rise buildings, various kinds of fixtures and fittings used.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

Introduction to Environmental Engineering and Science by Gilbert Masters, Prentice Hall, New Jersey.
Introduction to Environmental Engineering by P. Aarne Vesilind, Susan M. Morgan, Thompson /Brooks/Cole; Second Edition 2008.
Peavy, H.s, Rowe, D.R, Tchobanoglous, G. Environmental Engineering, Mc-Graw - Hill International Editions, New York 1985.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Water: -Sources of Water and quality issues, water quality requirement for different beneficial uses,	Lecture	CIV506.1	Mid Term-1, Quiz & End Sem Exam
2	Water quality standards, water quality indices, water safety plans, Water Supply systems, Need for planned water supply schemes	Lecture	CIV506.1	Mid Term-1, Quiz & End Sem Exam
3	Water demand industrial and agricultural water requirements, Components of water supply system; Transmission of water	Lecture	CIV506.1	Mid Term-1, Quiz & End Sem Exam
4	*Distribution system, Various valves used in W/S systems, service reservoirs and design*	Lecture	CIV506.1	Mid Term-1, Quiz & End Sem Exam
5	Water Treatment: aeration, sedimentation, coagulation flocculation	Lecture	CIV506.1	Mid Term-1, Quiz & End Sem Exam
6	filtration, disinfection, advanced treatments like adsorption, ion exchange, membrane processes.	Lecture	CIV506.1	Mid Term-1, Quiz & End Sem Exam
7	Sewage- Domestic and Storm water, Quantity of Sewage, Sewage flow	Lecture	CIV506.2	Mid Term-1, Quiz & End Sem Exam

	variations			
8	Conveyance of sewage-Sewers, shapes design parameters, operation and maintenance of sewers	Lecture	CIV506.2	Mid Term-1, Quiz & End Sem Exam
9	Sewage pumping; Sewerage, Sewer appurtenances, Design of sewerage systems	Lecture	CIV506.2	Mid Term-1, Quiz & End Sem Exam
10	Small bore systems, Storm Water- Quantification and design of Storm water	Lecture	CIV506.2	Mid Term-1, Quiz & End Sem Exam
11	Sewage and Sullage, Pollution due to improper disposal of sewage	Lecture	CIV506.2	Mid Term-1, Quiz & End Sem Exam
12	National River cleaning plans	Lecture	CIV506.2	Mid Term-1, Quiz & End Sem Exam
13	Air - Composition and properties of air, Quantification of air pollutants	Lecture	CIV506.3	Mid Term-1, Quiz & End Sem Exam
14	Monitoring of air pollutants, Air pollution-Occupational hazards, Urban air pollution automobile pollution	Lecture	CIV506.3	Mid Term-1, Quiz & End Sem Exam
15	Chemistry of combustion, Automobile engines, quality of fuel, operating conditions and interrelationship	Lecture	CIV506.3	Mid Term-1, Quiz & End Sem Exam
16	Air quality standards, Control measures for Air pollution, construction and limitations	Lecture	CIV506.3	Mid Term-1, Quiz & End Sem Exam
17	Noise- Basic concept, measurement and various control methods.	Lecture	CIV506.4	Mid Term-1, Quiz & End Sem Exam
18	Government authorities and their roles in water supply, sewerage disposal	Lecture	CIV506.4	Mid Term-1, Quiz & End Sem Exam
19	Solid waste management and monitoring/control of environmental pollution.	Lecture	CIV506.4	Mid Term-1, Quiz & End Sem Exam
20	Solid waste management-Municipal solid waste,	Lecture	CIV506.5	Mid Term-1, Quiz & End Sem Exam
21	Composition and various chemical and physical parameters of MSW, MSW management:	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
22	Collection, transport,	Lecture	CIV506.5	Assignment, Quiz

	treatment and disposal of MSW.			& End Sem Exam
23	Special MSW: waste from commercial establishments and other urban areas	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
24	solid waste from construction activities	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
25	biomedical wastes,	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
26	Effects of solid waste on environment: effects on air, soil,	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
27	water surface and ground health hazards	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
28	Disposal of solid waste-segregation	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
29	reduction at source, recovery and recycle	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
30	Disposal methods Integrated solid waste management	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
31	Hazardous waste	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
32	Types and nature of hazardous waste as per the HW Schedules of regulating authorities.	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
33	Building Plumbing-Introduction to various types of home plumbing systems for water supply and waste water disposal,	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
34	high rise building plumbing, Pressure reducing valves, Break pressure tanks,	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
35	Storage tanks, Building drainage for high rise buildings	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
36	various kinds of fixtures and fittings used	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES	CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV506.1.	Examine the type and size of reactor required for various unit operations and processes involved in water and wastewater treatment	3	2	3	1	2	-	1	-	3	2	3	3	**3**	**2**	**1**
CIV506.2.	Able to design individual unit operation or process appropriate to the situation by applying physical, chemical, biological and engineering principles.	3	3	2	2	3	2	2	-	3	2	3	3	**3**	**1**	**2**
CIV506.3.	Able to identify the type of unit operations and processes involved in water and wastewater treatment plants based on the water quality	3	3	2	2	3	-	1	2	-	2	3	3	**2**	**2**	**1**
CIV506.4.	Prepare the layout of water and wastewater treatment plants and evaluate the water and wastewater treatment plants	3	3	2	1	1	2	1	-	1	2	3	3	**3**	**2**	**1**
CIV507.5.	Investigate the performance of various unit operations and processes to meet the desired health and	3	3	2	3	3	2	2	-	2	2	3	3	**3**	**2**	**3**

	environment related goals														

Sample Question Paper

<table>
<tr><td colspan="7">Amity School of Engineering and Technology
Department of Civil Engineering
I MID-SEMESTER (SEM–V) 2020-21</td></tr>
<tr><td colspan="7">Class: B.Tech.(CE) V Semester</td></tr>
<tr><td colspan="3">Subject Name:
CIV506 Environmental Engineering - I</td><td colspan="2">Time: 2 Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3</td><td>Q.4</td><td>Q.2,5,6</td><td></td><td></td></tr>
<tr><td colspan="7">Student will be able to
CO1: Examine the type and size of reactor required for various unit operations and processes involved in water and wastewater treatment
CO2: Able to design individual unit operation or process appropriate to the situation by applying physical, chemical, biological and engineering principles.</td></tr>
</table>

CO Map	Question No.	Question	Marks
CO1	Q.1	Draw the sketch of spigot and socket joint showing the position of materials used in making it water tight?	3
CO1	Q.2a	How will you calculate the total head in the design of pumps for water supply scheme?	3
	Q.2b	What are the advantages expected in using pressure conduit instead of gravity conduict?	3
CO1	Q.3	Mention the situation in which pumps will be connected in (a) Series (b) Parallel?	6
CO2	Q.4	What is an intake structure? List out various types of intake and discuss in detail about submerged Intake?	3
CO2	Q.5a	What is Sustainable Development?	3
	Q.5b	What is meant by economic diameter of a pumping main?	3
CO2	Q6	Explain the Intake structures based on sources of water supply with diagrams?	6

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	CIV506 ENVIRONMENTAL ENGINEERING – I							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U7G7
1	A60215818001	Mr NAMAN GOYAL	100	30	70	A	9	3	3	27
2	A60215818003	Mr SADAV KHAN	100	30	70	A	9	3	3	27
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	A+	10	3	3	30
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	3	100.00	%	
			Attainment Level					Level 3		

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : TRANSPORTATION ENGINEERING
Course Code : CIV 507, Crédits : 02, Session :2020-21 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Ripunjoy Gogoi, Dr. P. Mahakavi

A. Introduction: The objective of this course is to expose the students with various transportation modes and their advantages and disadvantages and to facilitate students to decide highway alignment and design highway geometry. It aims to enable students to select suitable materials for highway pavements and design the pavement and to explain students with various components of a railway track.

B. Course Outcomes: At the end of the course, students will be able to:

CIV507.1. Classify basic design of highway geometry according to the design specifications.

CIV507.2. Design a flexible pavement using IRC method and Describe various components of railways and their functions.

CIV507.3. Design a railway geometry according to the design specifications.

CIV507.4. Classify various components of an airport and identify the alignment and the required length of a runway.

CIV507.5. Identify various components of a harbor and their functions.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module 1:Highway Planning: (4 Hours)

Highway development and planning-Classification of roads, road development in India, Current road projects in India; highway alignment and project preparation.

Module 2:Geometric Properties of Highway: (4 Hours)
Geometric design of highways-: Introduction; highway cross section elements; sight distance, design of horizontal alignment; design of vertical alignment; design of intersections, problems

Module 3: Traffic Engineering & Control: (4 Hours)
Traffic engineering & control- Traffic Characteristics, traffic engineering studies, traffic flow and capacity, traffic regulation and control; design of road intersections; design of parking facilities; highway lighting; problems

Module 4:Pavement Design: (4 Hours)
Pavement materials- Materials used in Highway Construction- Soils, Stone aggregates, bituminous binders, bituminous paving mixes; Portland cement and cement concrete: desirable properties, tests, requirements for different types of pavements. Problems

Module 5:Flexible and IRC Guidelines: (4 Hours)
Design of pavements- Introduction; flexible pavements, factors affecting design and performance; stresses in flexible pavements; design of flexible pavements as per IRC; rigid pavements- components and functions; factors affecting design and performance of CC pavements; stresses in rigid pavements; design of concrete pavements as per IRC; problems.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Khanna, S.K., Justo, C.E.G and Veeraragavan, A, 'Highway Engineering', Revised 10th Edition, Nem Chand & Bros, 2017
- Kadiyalai, L.R., ' Traffic Engineering and Transport Planning', Khanna Publishers.
- Partha Chakraborty, ' Principles Of Transportation Engineering, PHI Learning,

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Highway development and planning	Lecture	CIV507.1	Mid Term-1, Quiz & End Sem Exam
2	Classification of roads, road development in India,	Lecture	CIV507.1	Mid Term-1, Quiz & End Sem Exam
3	Current road projects in India	Lecture	CIV507.1	Mid Term-1, Quiz & End Sem Exam
4	*highway alignment and project preparation*	Lecture	CIV507.1	Mid Term-1, Quiz & End Sem Exam
5	Geometric design of	Lecture	CIV507.2	Mid Term-1, Quiz

	highways			& End Sem Exam
6	Introduction; highway cross section elements	Lecture	CIV507.2	Mid Term-1, Quiz & End Sem Exam
7	sight distance, design of horizontal alignment	Lecture	CIV507.2	Mid Term-1, Quiz & End Sem Exam
8	design of vertical alignment	Lecture	CIV507.2	Mid Term-1, Quiz & End Sem Exam
9	; design of intersections, problems	Lecture	CIV507.2	Mid Term-1, Quiz & End Sem Exam
10	Traffic engineering & control	Lecture	CIV507.3	Mid Term-1, Quiz & End Sem Exam
11	Traffic Characteristics, traffic engineering studies	Lecture	CIV507.3	Mid Term-1, Quiz & End Sem Exam
12	traffic flow and capacity	Lecture	CIV507.3	Mid Term-1, Quiz & End Sem Exam
13	traffic regulation and control	Lecture	CIV507.3	Mid Term-1, Quiz & End Sem Exam
14	design of road intersections	Lecture	CIV507.3	Mid Term-1, Quiz & End Sem Exam
15	design of parking facilities; highway lighting; problems	Lecture	CIV507.3	Mid Term-1, Quiz & End Sem Exam
16	Pavement materials	Lecture	CIV507.4	Mid Term-1, Quiz & End Sem Exam
17	Materials used in Highway Construction	Lecture	CIV507.4	Mid Term-1, Quiz & End Sem Exam
18	Soils, Stone aggregates	Lecture	CIV507.4	Mid Term-1, Quiz & End Sem Exam
19	bituminous binders, bituminous paving mixes;	Lecture	CIV507.4	Mid Term-1, Quiz & End Sem Exam
20	Portland cement and cement concrete: desirable properties,	Lecture	CIV507.4	Mid Term-1, Quiz & End Sem Exam
21	tests, requirements for different types of pavements. Problems	Lecture	CIV507.4	Assignment, Quiz & End Sem Exam
22	Design of pavements- Introduction; flexible pavements, factors affecting design and performance; stresses in flexible pavements	Lecture	CIV507.5	Assignment, Quiz & End Sem Exam
23	design of flexible pavements as per IRC; rigid pavements- components and functions; factors affecting design and performance of CC pavements	Lecture	CIV507.5	Assignment, Quiz & End Sem Exam

24	stresses in rigid pavements; design of concrete pavements as per IRC; problems.	Lecture	CIV507.5	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CIV507.1.	Classify basic design of highway geometry according to the design specifications.	3	3	2	2	3	-	1	2	-	2	3	3	**2**	**2**	**1**
CIV507.2.	Design a flexible pavement using IRC method and Describe various components of railways and their functions.	3	3	2	1	1	2	1	-	1	2	3	3	**3**	**2**	**1**
CIV507.3.	Design a railway geometry according to the design specifications.	3	3	2	3	3	2	2	-	2	2	3	3	**3**	**2**	**3**
CIV507.4.	Classify various components of an airport and identify the alignment and the required length of a runway.	3	2	3	1	2	-	1	-	3	2	3	3	**3**	**2**	**1**
CIV507.5.	Identify various components of a harbor and their functions.	3	3	2	2	3	2	2	-	3	2	3	3	**3**	**1**	**2**

<u>Sample Question Paper</u>

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–V) 2020-21						
Class: B.Tech.(CE) V Semester						
Subject Name: CIV507 TRANSPORTATION ENGINEERINGt		Time: 2 Hrs		Max.Marks:30		
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		
Student will be able to CO1: Classify basic design of highway geometry according to the design specifications. **CO2:** Design a flexible pavement using IRC method and Describe various components of railways and their functions.						

CO Map	Question No.	Question	Marks
CO1	Q.1	Explain briefly main features of Indian Road Congress.	3
CO1	Q.2a	Write a short note on Carriageway width?	3
	Q.2b	How the excavation is done in highway construction?	3
CO1	Q.3	Explain briefly the calculation of length of the transition curve.	6
CO2	Q.4	Evaluate grain size analysis on highway materials.	3
CO2	Q.5a	What are the objectives of Highway Research Board?	3
	Q.5b	How the map study is done? Discuss.	3
CO2	Q6	While aligning a highway in a built up area, it was necessary to provide a horizontal circular curve of radius 446 m. The design speed is 85 Kmph, the length of wheel base is 8m and the pavement width is 12m. Design super elevation, extra widening and length of transition curve.	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	CIV507 TRANSPORTATION ENGINEERING							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U13G13
1	A60215818001	Mr NAMAN GOYAL	100	30	70	A	9	2	2	18
2	A60215818003	Mr SADAV KHAN	100	30	70	A	9	2	2	18
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	A+	10	2	2	20
			Total No. of Students			=	3			
			Total No. of Students			>60 % marks	3	100.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING

Course Handout

Course : HYDRAULIC ENGINEERING LAB

Course Code : CIV 522, Crédits : 02, Session :2020-21 (Odd Sem.), Class : B.Tech. 3rd Year

Faculty Name : Dr. Vimal Kumar Gupta, Mr. Sachin Tiwari

A. Introduction: T*he objective of this course is to To introduce the students to various hydraulic engineering problems like open channel flows and hydraulic machines. At the completion of the course, the student should be able to relate the theory and practice of problems in hydraulic engineering*

B. Course Outcomes: At the end of the course, students will be able to:

CIV522.1. Analyse various hydraulic systems by applying the fundamental laws of fluid statics.
CIV522.2. Solve the fluid flow governing equations by taking suitable constraints and assumptions
CIV522.3. Evaluate major and minor losses in pipes
CIV522.4. Analyse the practical significance of open channel flows 5. Perform dimensional analysis on any real life problems
CIV522.5. Interpret the boundary layer aspects of laminar and turbulent flows and experimentally determine the fluid properties and flow parameters using various experimental setups.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Practical Work:

i. Flow Visualization**: (2 Hours)**
ii. Studies in Wind Tunnel**: (2 Hours)**
iii. Boundary Layer**: (2 Hours)**
iv. Flow around an Aerofoil / circular cylinder**: (2 Hours)**
v. Uniform Flow**: (2 Hours)**
vi. Velocity Distribution in Open channel flow**: (2 Hours)**
vii. Venturi Flume**,** Standing Wave, Flume**: (2 Hours)**
viii. Gradually Varied Flow, Flow through pipes**: (2 Hours)**
ix. Turbulent flow through pipes**: (2 Hours)**
x. Flow visualization**: (2 Hours)**

G. Examination Scheme:

Components	**IA**				**EE**	
	A	**PR**	**LR**	**V**	**PR**	**V**
Weightage (%)	**5**	**10**	**10**	**5**	**35**	**35**

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

H. Suggested Text/Reference Books:

- Hydraulics and Fluid Mechanics, P.M. Modi and S.M. Seth, Standard Book House
- Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill.
- Open channel Flow, K. Subramanya, Tata McGraw Hill.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Flow Visualization	Lecture	CIV522.1	Internal Assessment, Viva &External Exam
2	Flow Visualization	Lecture	CIV522.1	Internal Assessment, Viva &External Exam
3	Studies in Wind Tunnel:	Lecture	CIV522.1	Internal Assessment, Viva &External Exam
4	Studies in Wind Tunnel:	Lecture	CIV522.1	Internal Assessment, Viva &External Exam
5	Boundary Layer	Lecture	CIV522.2	Internal Assessment, Viva &External Exam
6	*Boundary Layer*	Lecture	CIV522.2	Internal Assessment, Viva &External Exam
7	*Flow around an Aerofoil / circular cylinder*	Lecture	CIV522.2	Internal Assessment, Viva &External Exam
8	Flow around an Aerofoil / circular cylinder	Lecture	CIV522.2	Internal Assessment, Viva &External Exam
9	Uniform Flow	Lecture	CIV522.3	Internal Assessment, Viva &External Exam
10	Uniform Flow	Lecture	CIV522.3	Internal Assessment, Viva &External Exam
11	Velocity Distribution in Open channel flow	Lecture	CIV522.3	Internal Assessment, Viva &External Exam
12	Velocity Distribution in Open channel flow	Lecture	CIV522.3	Internal Assessment, Viva &External Exam
13	Venturi Flume**,** Standing Wave, Flume	Lecture	CIV522.3	Internal Assessment, Viva &External Exam
14	Venturi Flume**,** Standing Wave, Flume	Lecture	CIV522.3	Internal Assessment, Viva &External Exam
15	Gradually Varied Flow,	Lecture	CIV522.4	Internal Assessment, Viva &External Exam

16	Gradually Varied Flow,	Lecture	CIV522.4	Internal Assessment, Viva &External Exam
17	Turbulent flow through pipes	Lecture	CIV522.4	Internal Assessment, Viva &External Exam
18	Turbulent flow through pipes	Lecture	CIV522.4	Internal Assessment, Viva &External Exam
19	Flow visualization:	Lecture	CIV522.4	Internal Assessment, Viva &External Exam
20	Flow visualization:	Lecture	CIV522.4	Internal Assessment, Viva &External Exam
21	Venturi Flume, Standing Wave, Flume	Lecture	CIV522.5	Internal Assessment, Viva &External Exam
22	Flow through pipes:	Lecture	CIV522.5	Internal Assessment, Viva &External Exam
23	Flow through pipes:	Lecture	CIV522.5	Internal Assessment, Viva &External Exam
24	Flow around an Aerofoil / circular cylinder	Lecture	CIV522.5	Internal Assessment, Viva &External Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV522.1.	CIV522.1. Analyse various hydraulic systems by applying the fundamental laws of fluid statics.	3	3	2	2	3	-	1	2	-	2	3	3	**2**	**2**	**1**
CIV522.2	CIV522.2. Solve the fluid flow governing equations by taking suitable constraints and assumptions	3	3	2	1	1	2	1	-	1	2	3	3	**3**	**2**	**1**

CIV522.3 .	CIV522.3. Evaluate major and minor losses in pipes	3	3	2	2	3	2	2	-	3	2	3	3	**3**	**1**	**2**
CIV522.4 .	Analyse the practical significance of open channel flows 5. Perform dimensional analysis on any real life problems	3	3	2	3	3	2	2	-	2	2	3	3	**3**	**2**	**3**
CIV522.5 .	*Interpret the boundary layer aspects of laminar and turbulent flows and experimentally determine the fluid properties and flow parameters using various experimental setups.*	3	2	3	1	2	-	1	-	3	2	3	3	**3**	**2**	**1**

Sample Question Paper

<table>
<tr><td colspan="7">Amity School of Engineering and Technology
Department of Civil Engineering
I MID-SEMESTER (SEM–V) 2020-21</td></tr>
<tr><td colspan="7">Class: B.Tech.(CE) V Semester</td></tr>
<tr><td colspan="2">Subject Name:
CIV522 Hydraulic Engineering Lab</td><td colspan="3">Time: 2 Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3</td><td>Q.4</td><td>Q.2,5,6</td><td></td><td></td></tr>
<tr><td colspan="7">Student will be able to
CO1: Analyse various hydraulic systems by applying the fundamental laws of fluid statics and
CO2. Solve the fluid flow governing equations by taking suitable constraints and assumptions</td></tr>
</table>

CO Map	Question No.	Question	Marks
CO1	Q.1	Differentiate closed flow closed conduit flow and open channel flow	3

CO1	Q.2a	What is meant by Hydraulic jump	3
	Q.2b	. Find the critical depth for a specific energy of 1.5 m in: (1) Rectangular channel of bottom width 2m (2)Triangular channel of side slope 1:1.5	3
CO1	Q.3	How do you classify open channels? Explain in detail. Also explain the velocity distribution in open channel.	6
CO2	Q.4	Write down the Manning"s formula for determining velocity of flow in an open channel.	3
CO2	Q.5a	Explain the concept of uniform flow with all the details	3
	Q.5b	Differentiate prismatic and non-prismatic channels	3
CO2	Q6	Explain the computation of uniform flow using Manning"s and Chezy"s method	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	CIV522 HYDRAULIC ENGINEERING LAB Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U8G8
1	A60215818001	Mr NAMAN GOYAL	100	30	70	A+	10	1	1	10
2	A60215818003	Mr SADAV KHAN	100	30	70	A+	10	1	1	10
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	A+	10	1	1	10
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	3	100.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : GEOTECHNICAL ENGINEERING LAB
Course Code : CIV 524, Crédits : 02, Session :2020-21 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Imran Ahmad Khan

A. **Introduction:** The objective of this course is *t*o introduce basic soil properties and their significance to the students and to have a understanding of different soil properties and their uses in engineering..

B. Course Outcomes: At the end of the course, students will be able to:

CIV524.1. *To impart the fundamental concepts of soil mechanics and understand the bearing capacity*

CIV524.2. *To understand the concept of compaction and consolidation of soils*

CIV524.3. *To understand the design aspects of foundation*

CIV524.4. *To evaluate the stress developed in the soil medium*

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Practical Work:

1. Field Density using Core Cutter method**: (1 Hour)**
2. Field Density using Sand replacement method**:(1 Hour)**
3. Natural moisture content using Oven Drying method**:(1 Hour)**
4. Field identification of Fine Grained soils**:(1 Hour)**
5. Specific gravity of Soils**:(1 Hour)**

6. Grain size distribution by Sieve Analysis:**(1 Hour)**
7. Grain size distribution by Hydrometer Analysis:**(2 Hours)**
8. Consistency limits by Liquid limit:**(2 Hours)**
9. Consistency limits by Plastic limit:**(2 Hours)**
2. Consistency limits by Shrinkage limit:**(2 Hours)**
3. Permeability test using Constant-head test method:**(2 Hours)**
4. Permeability test using Falling-head. Triaxial Test (UU) :**(2 Hours)**
5. Vane Shear Test:**(1 Hours)**
6. Direct Shear Test:**(1 Hours)**

G. Examination Scheme:

Components	**IA**				**EE**	
	A	**PR**	**LR**	**V**	**PR**	**V**
Weightage (%)	**5**	**10**	**10**	**5**	**35**	**35**

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

H. Suggested Text/Reference Books:

- Soil Mechanics by Craig R.F., Chapman & Hall
- Fundamentals of Soil Engineering by Taylor, John Wiley & Sons
- An Introduction to Geotechnical Engineering, by Holtz R.D. and Kovacs, W.D., Prentice Hall, NJ

I. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	Field Density using Core Cutter method:	Lecture	CIV524.1	Internal Assessment, Viva &External Exam
2	Field Density using Core Cutter method:	Lecture	CIV524.1	Internal Assessment, Viva &External Exam
3	Field Density using Sand replacement method:	Lecture	CIV524.1	Internal Assessment, Viva &External Exam
4	Field Density using Sand replacement method:	Lecture	CIV524.1	Internal Assessment, Viva &External Exam
5	Natural moisture content using Oven	Lecture	CIV524.2	Internal Assessment, Viva

	Drying method:			&External Exam
6	Natural moisture content using Oven Drying method:	Lecture	CIV524.2	Internal Assessment, Viva &External Exam
7	*Field identification of Fine Grained soils:*	Lecture	CIV524.2	Internal Assessment, Viva &External Exam
8	Field identification of Fine Grained soils:	Lecture	CIV524.2	Internal Assessment, Viva &External Exam
9	Specific gravity of Soils	Lecture	CIV524.3	Internal Assessment, Viva &External Exam
10	Specific gravity of Soils	Lecture	CIV524.3	Internal Assessment, Viva &External Exam
11	Grain size distribution by Sieve Analysis	Lecture	CIV524.3	Internal Assessment, Viva &External Exam
12	Grain size distribution by Sieve Analysis	Lecture	CIV524.3	Internal Assessment, Viva &External Exam
13	Grain size distribution by Hydrometer Analysis:	Lecture	CIV524.3	Internal Assessment, Viva &External Exam
14	Grain size distribution by Hydrometer Analysis:	Lecture	CIV524.3	Internal Assessment, Viva &External Exam
15	Consistency limits by Liquid limit	Lecture	CIV524.4	Internal Assessment, Viva &External Exam
16	Consistency limits by Liquid limit	Lecture	CIV524.4	Internal Assessment, Viva &External Exam
17	Consistency limits by Plastic limit:	Lecture	CIV524.4	Internal Assessment, Viva &External Exam
18	Consistency limits by Plastic limit:	Lecture	CIV524.4	Internal Assessment, Viva &External Exam
19	Consistency limits by Shrinkage limit:	Lecture	CIV524.4	Internal Assessment, Viva &External Exam
20	Consistency limits by Shrinkage limit:	Lecture	CIV524.4	Internal Assessment, Viva &External Exam
21	Permeability test using Constant-head test method:	Lecture	CIV524.4	Internal Assessment, Viva &External Exam

22	Permeability test using Falling-head. Triaxial Test (UU) **:**	Lecture	CIV524.4	Internal Assessment, Viva &External Exam
23	Vane Shear Test	Lecture	CIV524.4	Internal Assessment, Viva &External Exam
24	Direct Shear Test**:**	Lecture	CIV524.4	Internal Assessment, Viva &External Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV524.1.	*To impart the fundamental concepts of soil mechanics and understand the bearing capacity*	3	3	1	3	1	**3**	**2**	**-**	2		2	1	**3**	**1**	**2**
CIV524.2.	*To understand the concept of compaction and consolidation of soils*	3	2	2	2	2	**1**	**-**	**-**	2		1	1	**1**	**1**	**3**
CIV524.3.	*To understand the design aspects of foundation*	3	2	2	2	2	**1**	**-**	**1**	3		3	1	**3**	**3**	**2**
CIV524.4.	*To evaluate the stress developed in the soil medium*	3	3	2	3	2	**-**	**-**	**-**	1		2	1	**1**	**2**	**2**

Sample Question Paper

Amity School of Engineering and Technology
Department of Civil Engineering
I MID-SEMESTER (SEM–V) 2020-21

Class: B.Tech.(CE) V Semester						
Subject Name: Civ524 Geotechnical Engineering Lab		Time: 2 Hrs			Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: *Compare the various engineering and index properties of soil.*

CO2: Explain *the hydraulic conductivity of the soil and seepage actions*

CO Map	Question No.	Question	Marks
CO1	Q.1	Explain: Chemical weathering. Explain: Physical weathering	3
CO1	Q.2a	What do you mean by Consistency limits? What is Particle size Distribution of soil?	3
	Q.2b	What are the basic requirements of Soil Classification?	3
CO1	Q.3	Explain with neat sketches: 1. Total head, 2. Hydraulic head, 3. Hydraulic Gradient, 4. Seepage, 5. Seepage Velocity	6
CO2	Q.4	What do you mean by Quick sand condition?	3
CO2	Q.5a	Explain in detail: Piping	3
	Q.5b	Explain In detail: Darcy's Law.	3
CO2	Q6	What do you mean by Placement water Content? Describe in detail. Differentiate between Standard Proctor and Modified Proctor.	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	CIV524 GEOTECHNICAL ENGINEERING LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U9G9
1	A60215818001	Mr NAMAN GOYAL	100	30	70	A+	10	1	1	10
2	A60215818003	Mr SADAV KHAN	100	30	70	A+	10	1	1	10
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	A	9	1	1	9
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	3	100.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : TRANSPORTATION ENGINEERING LAB
Course Code : CIV 527, Crédits : 02, Session :2020-21 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Ripunjoy Gogoi, Dr. P. Mahakavi

A. Introduction: The objective of this course is to impart knowledge about different geometric properties of highway and different highway materials used in the construction..

B. Course Outcomes: At the end of the course, students will be able to:

CIV527.1. Understand the properties of materials used for construction of highways and airports.

CIV527.2. Understand the transportation characteristics, operations, design, planning, and maintenance.

C. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**

Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

i. Los Angles Abrasion Test**: (2 Hours)**
ii. Crushing test**: (2 Hours)**
iii. Impact test for aggregates**: (2 Hours)**
iv. Elongation and flakiness index test**: (2 Hours)**
v. Marshall Stability test**: (2 Hours)**
vi. Flash point test**: (2 Hours)**
vii. Fire Test**: (2 Hours)**
viii. Ductility test**: (2 Hours)**
ix. Penetration test for bitumen**: (1 Hour)**
x. Specific gravity and water absorption of Aggregate**: (1 Hour)**
xi. Viscosity test**: (1 Hours)**
xii. Aggregate crushing value**: (1 Hour)**

G. Examination Scheme:

Components	**IA**				**EE**	
	A	**PR**	**LR**	**V**	**PR**	**V**
Weightage (%)	**5**	**10**	**10**	**5**	**35**	**35**

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

H. Suggested Text/Reference Books:

- Khanna, S.K., Justo, C.E.G and Veeraragavan, A, 'Highway Engineering', Revised 10th Edition, Nem Chand & Bros, 2017
- Kadiyalai, L.R., ' Traffic Engineering and Transport Planning', Khanna Publishers.
- Partha Chakraborty, ' Principles Of Transportation Engineering, PHI Learning

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Los Angles Abrasion Test:	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
2	Los Angles Abrasion Test:	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
3	Crushing test:	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
4	Crushing test:	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
5	Impact test for aggregates	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
6	Impact test for aggregates	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
7	*Elongation and flakiness index test:*	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
8	*Elongation and flakiness index test:*	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
9	Marshall Stability test	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
10	Marshall Stability test	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
11	Flash point test	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
12	Flash point test	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
13	Fire Test:	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
14	Fire Test:	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
15	Ductility test:	Lecture	CIV527.1 &	Internal Assessment, Viva

			CIV527.2	&External Exam
16	Ductility test**:**	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
17	Penetration test for bitumen	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
18	Penetration test for bitumen	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
19	Specific gravity and water absorption of Aggregate	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
20	Specific gravity and water absorption of Aggregate	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
21	Viscosity test**:**	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
22	Viscosity test**:**	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
23	Aggregate crushing value	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
24	Aggregate crushing value	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV527.1.	Understand the properties of materials used for construction of highways and airports.	3	**2**	1	2	1	**-**	**1**	**-**	2		2	1	**2**	**1**	**3**

CIV527.2.	*Understand the transportation characteristics, operations, design, planning, and maintenance.*	3	2	1	2	2	**1**	**-**	**-**	2		1	1	**3**	**1**	**1**

Sample Question Paper

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–V) 2020-21						
Class: B.Tech.(CE) V Semester						
Subject Name: CIV527 TRANSPORTATION ENGINEERING Lab		Time: 2 Hrs			Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: Classify basic design of highway geometry according to the design specifications.

CO2: Design a flexible pavement using IRC method and Describe various components of railways and their functions.

CO Map	Question No.	Question	Marks
CO1	Q.1	Discuss about maximum wheel load	3
CO1	Q.2a	How the excavation is done in highway construction?	3
	Q.2b	Derive an expression of summit curve for SSD	3
CO1	Q.3	Explain spot speed, running sped, space mean speed, time mean speed and average speed. How is spot speed studies carried out?	6
CO2	Q.4	Evaluate grain size analysis on highway materials.	3
	Q.5a	Write a short note on setting out of a transition curve.	3

CO2	Q.5b	Explain the role of kerb.	3
CO2	Q6	Explain briefly three different tests carried out to determine the abrasion of aggregates	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.			**CIV527 TRANSPORTATION ENGINEERING LAB**								
	Enrollment.No.	**Student's Name**	**Max Marks**	**CE Weight Age (%)**	**ET Weight Age (%)**	**GO**	**GP**	**ACU**	**ECU**	**U15G15**	
1	A60215818001	Mr NAMAN GOYAL	100	30	70	A+	10	1	1	10	
2	A60215818003	Mr SADAV KHAN	100	30	70	A+	10	1	1	10	
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	A	9	1	1	9	
			Total No. of Students			=	3				
			Total No. of Students			>60% marks	3	100.00	%		
			Attainment Level					Level 3			

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **INDUSTRIAL PRACTICAL TRAINING – I**
Course Code : NPT550, Crédits : 03, Session :2020-21 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia, Dr. Imran Ahmad Khan, Dr. Ripunjoy Gogoi, Dr. P. Mahakavi, Mr. Sachin Tiwari

A. Introduction: The objective of this course is to enable the students to explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills. It will help them to manage the technical content and work. It will also help them to prepare and present technical report..

B. Course Outcomes: At the end of the course, students will be able to:

NPT550.1. Explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills.

NPT550.2. Manage the technical content and work.

NPT550.3. Learn the various administrative process followed in industry and prepare and present technical report.

C. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
End Semester Examination	End Semester Examination	EE	100%
Total			**100%**

F. Syllabus

Methodology:

Practical training is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

G. Examination Scheme:

Feedback from industry/work place	20
Training Report	40
Viva	15
Presentation	25
Total	**100**

H. Suggested Text/Reference Books: NA

I. Lecture Plan : NA

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
NPT550.1	Explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills.	3	**2**	1	3	1	-	-	-	2		2	1	**1**	**2**	**1**
NPT550.2	Manage the technical content and work.	3	1	2	2	2	-	-	-	2		1	1	**3**	**2**	**3**
NPT550.3	Learn the various administrative process followed in industry.	2	2	2	2	2	-	-	-	3		3	1	**3**	**3**	**2**
NPT550.4	Prepare and present technical report.	1	2	1	-	-	-	-	-	-	-	-	-	**1**	**2**	**3**

S. No.	Enrollment.No.	Student's Name	NPT550 INDUSTRIAL PRACTICAL TRAINING I (EVALUATION)							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U16G16
1	A60215818001	Mr NAMAN GOYAL	100	0	100	A+	10	3	3	30
2	A60215818003	Mr SADAV KHAN	100	0	100	A	9	3	3	27
3	A60215818004	Mr SHASHWAT MOHANTY	100	0	100	A	9	3	3	27
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	3	100.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : CONSTRUCTION ENGINEERING & MANAGEMENT
Course Code : CIV601, Crédits : 03, Session :2020-21 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia

A. Introduction: The objective of this course is to to train the students with the latest and the best in the rapidly changing fields of Construction Engineering, Technology and Management and to prepare the students to be industry leaders who implement the best engineering and management practices and technologies in the construction industry. It aims to continually work with industry to enhance the program's effectiveness and the opportunities for innovation in the construction industry and to conduct research to develop advanced technologies and management approaches.

B. Course Outcomes: At the end of the course, students will be able to:

CIV601.1.*Able to describe the requirement of planning and management.*

CIV601.2.*Able to recognize the critical path and pert suitability for research projects and able to determine projects schedule and estimate the activity time of CPM.*

CIV601.3.*Able to illustrate various construction equipments, machinery and their utility*

CIV601.4.*Able to discuss resource scheduling and planning of civil engineering. Projects*

CIV601.5.*Perform rate analysis as required in preparing specifications, detailed estimate and tender documents etc*

C. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. **Programme Specific Outcomes:**

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Construction Management and its features(6 Hours)
Basics of Construction- Unique features of construction, construction projects types and features, phases of a project, agencies involved and their methods of execution;

Module II: PERT and CPM (6 Hours)
Construction project planning- Stages of project planning: pre-tender planning, pre-construction planning, detailed construction planning, role of client and contractor, level of detail. Process of development of plans and schedules, work break-down structure, activity lists, assessment of work content, concept of productivities, estimating durations; Networks: basic terminology, types of precedence relationships, preparation of CPM networks: activity on link and activity on node representation, computation of float values, critical and semi critical paths, calendaring networks. PERT- Assumptions underlying PERT analysis, determining three time estimates, analysis, slack computations.

Module III: Methods of Constructions (6 Hours)
Construction Methods basics: Types of foundations and construction methods; Basics of Formwork and Staging; Common building construction methods (conventional walls and slabs; conventional framed structure with blockwork walls; Modular construction methods for repetitive works; Precast concrete construction methods; Basics of Slip forming for tall structures; Basic construction methods for steel structures; Basics of construction methods for Bridges. Construction Equipment basics: Conventional construction methods Vs Mechanized methods and advantages of latter; Equipment for Earthmoving, Dewatering; Concrete mixing, transporting & placing; Cranes, Hoists

and other equipment for lifting; Equipment for transportation of materials. Equipment Productivities.

Module IV: Construction Site and Resources (6 Hours)
Planning and organizing construction site and resources- Site: site layout including enabling structures, developing site organization, Documentation at site; Manpower: planning, organizing, staffing, motivation; Materials: concepts of planning, procurement and inventory control; Equipment: basic concepts of planning and organizing; Funds: cash flow, sources of funds; Histograms and S-Curves. Earned Value; Resource Scheduling- Bar chart, line of balance technique, resource constraints and conflicts; resource aggregation, allocation, smoothening and leveling. Common Good Practices in Construction

Module V: Contracts (6 Hours)
Contracts Management basics: Importance of contracts; Types of Contracts, parties to a contract; Common contract clauses (Notice to proceed, rights and duties of various parties, notices to be given, Contract Duration and Price. Performance parameters; Delays, penalties and liquidated damages; Force Majeure, Suspension and Termination. Changes & variations, Dispute Resolution methods. Construction Costs: Make-up of construction costs; Classification of costs, timecost trade-off in construction projects, compression and decompression.

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Varghese, P.C., “Building Construction”, Prentice Hall India, 2007.
- National Building Code, Bureau of Indian Standards, New Delhi, 2017.
- Chudley, R., Construction Technology, ELBS Publishers, 2007.
- Peurifoy, R.L. Construction Planning, Methods and Equipment, McGraw Hill, 2011
- Nunnally, S.W. Construction Methods and Management, Prentice Hall, 2006
- Jha, Kumar Neeraj., Construction Project management, Theory & Practice, Pearson Education India, 2015
- Punmia, B.C., Khandelwal, K.K., Project Planning with PERT and CPM, Laxmi Publications, 2016.

I. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Corresponding CO**	**Mode of Assessing CO**
1	Basics of Construction	Lecture	CIV601.1	Mid Term-1, Quiz & End Sem Exam
2	Unique features of construction	Lecture	CIV601.1	Mid Term-1, Quiz & End Sem Exam
3	construction projects types and features	Lecture	CIV601.1	Mid Term-1, Quiz & End Sem Exam

4	*phases of a project, agencies involved and their methods of execution*	Lecture	CIV601.1	Mid Term-1, Quiz & End Sem Exam
5	Construction project planning- Stages of project planning: pre-tender planning, pre-construction planning, detailed construction planning	Lecture	CIV601.2	Mid Term-1, Quiz & End Sem Exam
6	role of client and contractor, level of detail. Process of development of plans and schedules	Lecture	CIV601.2	Mid Term-1, Quiz & End Sem Exam
7	work break-down structure, activity lists, assessment of work content	Lecture	CIV601.2	Mid Term-1, Quiz & End Sem Exam
8	concept of productivities, estimating durations; Networks: basic terminology	Lecture	CIV601.2	Mid Term-1, Quiz & End Sem Exam
9	types of precedence relationships, preparation of CPM networks: activity on link and activity on node representation	Lecture	CIV601.2	Mid Term-1, Quiz & End Sem Exam
10	computation of float values, critical and semi critical paths, calendaring networks.	Lecture	CIV601.2	Mid Term-1, Quiz & End Sem Exam
11	PERT- Assumptions underlying PERT analysis, determining three time estimates, analysis, slack computations	Lecture	CIV601.2	Mid Term-1, Quiz & End Sem Exam
12	Construction Methods basics: Types of foundations and construction methods	Lecture	CIV601.3	Mid Term-1, Quiz & End Sem Exam
13	Formwork and Staging; Common building construction methods (conventional walls and slabs; conventional framed structure with blockwork walls	Lecture	CIV601.3	Mid Term-1, Quiz & End Sem Exam
14	Modular construction methods for repetitive works; Precast concrete	Lecture	CIV601.3	Mid Term-1, Quiz & End Sem Exam

	construction methods; Basics of Slip forming for tall structures			
15	Basic construction methods for steel structures; Basics of construction methods for Bridges	Lecture	CIV601.3	Mid Term-1, Quiz & End Sem Exam
16	Construction Equipment basics: Conventional construction methods Vs Mechanized methods and advantages of latter; Equipment for Earthmoving, Dewatering	Lecture	CIV601.3	Mid Term-1, Quiz & End Sem Exam
17	Concrete mixing, transporting & placing; Cranes, Hoists and other equipment for lifting	Lecture	CIV601.3	Mid Term-1, Quiz & End Sem Exam
18	Equipment for transportation of materials. Equipment Productivities.	Lecture	CIV601.3	Mid Term-1, Quiz & End Sem Exam
19	Planning and organizing construction site and resources- Site: site layout including enabling structures, developing site organization	Lecture	CIV601.4	Mid Term-1, Quiz & End Sem Exam
20	Documentation at site; Manpower: planning, organizing, staffing, motivation; Materials: concepts of planning, procurement and inventory control	Lecture	CIV601.4	Mid Term-1, Quiz & End Sem Exam
21	Equipment: basic concepts of planning and organizing	Lecture	CIV601.4	Assignment, Quiz & End Sem Exam
22	Funds: cash flow, sources of funds; Histograms and S-Curves. Earned Value; Resource Scheduling	Lecture	CIV601.4	Assignment, Quiz & End Sem Exam
23	Bar chart, line of balance technique, resource constraints and conflicts	Lecture	CIV601.4	Assignment, Quiz & End Sem Exam
24	resource aggregation, allocation, smoothening and leveling. Common Good Practices in Construction	Lecture	CIV601.4	Assignment, Quiz & End Sem Exam
25	Contracts Management basics: Importance of	Lecture	CIV601.5	Assignment, Quiz & End Sem Exam

	contracts			
26	Types of Contracts, parties to a contract; Common contract clauses	Lecture	CIV601.5	Assignment, Quiz & End Sem Exam
27	Performance parameters; Delays, penalties and liquidated damages; Force Majeure,	Lecture	CIV601.5	Assignment, Quiz & End Sem Exam
28	Notice to proceed, rights and duties of various parties, notices to be given, Contract Duration and Price	Lecture	CIV601.5	Assignment, Quiz & End Sem Exam
29	Performance parameters; Delays, penalties and liquidated damages; Force Majeure,	Lecture	CIV601.5	Assignment, Quiz & End Sem Exam
30	Suspension and Termination. Changes & variations, Dispute Resolution methods	Lecture	CIV601.5	Assignment, Quiz & End Sem Exam
31	Construction Costs: Make-up of construction costs; Classification of costs	Lecture	CIV601.5	Assignment, Quiz & End Sem Exam
32	timecost trade-off in construction projects, compression and decompression	Lecture	CIV601.5	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV601.1.	Able to describe the requirement of planning and management.	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**

CIV601.2.	Able to recognize the critical path and pert suitability for research projects and able to determine projects schedule and estimate the activity time of CPM.	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
CIV601.3.	Able to illustrate various construction equipments, machinery and their utility	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
CIV601.4.	Able to discuss resource scheduling and planning of civil engineering. Projects	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**
CIV601.5.	Perform rate analysis as required in preparing specifications, detailed estimate and tender documents etc	3	3	2	3	3	2	2	-	3	2	3	3	**1**	**2**	**3**

<u>Sample Question Paper</u>

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–VI) 2020-21						
Class: B.Tech.(CE) VI Semester						
Subject Name: CIV 601 CONSTRUCTION ENGINEERING & MANAGEMENT		Time: 2 Hrs			Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: Able to describe the requirement of planning and management.

CO2: *Able to recognize the critical path and pert suitability for research projects and able to determine projects schedule and estimate the activity time of CPM.*

CO Map	Question No.	Question	Marks
CO1	Q.1	What is mean by geometric design?	3
CO1	Q.2a	What are the elements in geometric design?	3
	Q.2b	What are the design factors are allowed in geometric design?	3
CO1	Q.3	What is meant by centrifugal ratio and effects of ratio?	6
CO2	Q.4	What are the categories allowed in gradients?	3
CO2	Q.5a	What are the factors considered in horizontal alignment?	3
	Q.5b	Define the formula for centrifugal force?	3
CO2	Q6	Define design speed. Define gradient.	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	CIV601 CONSTRUCTION ENGINEERING &MANAGEMENT Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U2G2
1	A60215818001	Mr NAMAN GOYAL	100	30	70	A	9	3	3	27
2	A60215818003	Mr SADAV KHAN	100	30	70	A-	8	3	3	24
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	A	9	3	3	27
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	3	100.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : GEOMETRIC DESIGN OF HIGHWAYS
Course Code : CIV602, Crédits : 03, Session :2020-21 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name :, Dr. Ripunjoy Gogoi, Dr. P. Mahakavi

A. **Introduction:** The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis, and lin,ear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

B. **Course Outcomes:** At the end of the course, students will be able to:

CIV602.1. *Gain knowledge about highways, and able to design the roads & bridges by geometric method*

CIV602.2. *Know the different types of points and crossings used in railway track and Knowledge of signalling systems in railway stations and yards.*

CIV602.3. *design and orient airport runways and apply various visual aids in the designing of airport*

C. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Introduction: Classification of rural highways and urban roads. Objectives and requirements of highway geometric design; Design Controls: Topography, vehicle characteristics and design vehicle, driver characteristics, speed, traffic flow and capacity, levels of service, pedestrian and other facilities, environmental factors; Design Elements: Sight distances**: (5 Hours)**

Module II: Horizontal alignment - design considerations, stability at curves, super elevation, widening, transition curves; curvature at intersections, vertical alignment - grades, ramps, design of summit and valley curves, combination of vertical and horizontal alignment including design of hair pin bends, design of expressways**: (5 Hours)**

Module III: IRC standards and guidelines for design problems; Cross Section Elements: Right of way and width considerations, roadway, shoulders, kerbs traffic barriers, medians, frontage roads; Facilities for pedestrians, bicycles, buses and trucks, Pavement surface characteristics - types, cross slope, skid resistance, unevenness; Design Considerations: Design considerations for rural and urban arterials, freeways, and other rural and urban roads; Design Of Intersections: Characteristics and design considerations of at-grade intersections;; Rotary intersections; Grade separations and interchanges -; Design of Parking lots**: (10 Hours)**

Module IV: Aircraft characteristics; Aircraft performance characteristics: Airport planning and air travel demand forecasting: Airport Site Selection; Geometric Design of the Airfield: Determination of Runway Capacity and Delay - Taxiway and Gate Capacity - Holding Aprons - Terminal Aprons – Airport drainage - Function of Airport Passenger and Cargo Terminal - Design of Air Freight Terminals - Airport access - Airport Landside planning - Capacity**: (10 Hours)**

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Khanna, S.K., Justo, C.E.G and Veeraragavan, A, 'Highway Engineering', Revised 10th Edition, Nem Chand & Bros, 2017
- Kadiyalai, L.R., ' Traffic Engineering and Transport Planning', Khanna Publishers.
- Partha Chakraborty, ' Principles Of Transportation Engineering, PHI Learning, Tomlinson
- Fred L. Mannering, Scott S. Washburn, Walter P. Kilareski,'Principles of Highway Engineering and Traffic Analysis', 4th Edition, John Wiley
- Srinivasa Kumar, R, Textbook of Highway Engineering, Universities Press, 2011.
- Paul H. Wright and Karen K. Dixon, Highway Engineering, 7th Edition, Wiley Student Edition, 2009.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Classification of rural highways and urban roads	Lecture	CIV602.1	Mid Term-1, Quiz & End Sem Exam
2	Objectives and requirements of highway geometric design; Design Controls	Lecture	CIV602.1	Mid Term-1, Quiz & End Sem Exam
3	Topography, vehicle characteristics and design vehicle, driver characteristics, speed	Lecture	CIV602.1	Mid Term-1, Quiz & End Sem Exam
4	*traffic flow and capacity, levels of service, pedestrian and other facilities*	Lecture	CIV602.1	Mid Term-1, Quiz & End Sem Exam
5	Design Elements: Sight distances	Lecture	CIV602.1	Mid Term-1, Quiz & End Sem Exam
6	Horizontal alignment - design considerations, stability at curves, super elevation	Lecture	CIV602.1	Mid Term-1, Quiz & End Sem Exam
7	widening, transition curves; curvature at intersections, vertical alignment	Lecture	CIV602.1	Mid Term-1, Quiz & End Sem Exam
8	grades, ramps, design of summit and valley curves, combination of vertical and horizontal alignment including design of hair pin bends, design of expressways	Lecture	CIV602.1	Mid Term-1, Quiz & End Sem Exam
9	IRC standards and guidelines for design problems; Cross Section Elements	Lecture	CIV602.2	Mid Term-1, Quiz & End Sem Exam
10	Right of way and width considerations, roadway, shoulders, kerbs traffic barriers, medians, frontage roads	Lecture	CIV602.2	Mid Term-1, Quiz & End Sem Exam
11	Facilities for pedestrians, bicycles, buses and trucks,	Lecture	CIV602.2	Mid Term-1, Quiz & End Sem Exam
12	types, cross slope,	Lecture	CIV602.2	Mid Term-1, Quiz & End Sem Exam
13	Design Considerations: Design considerations for	Lecture	CIV602.2	Mid Term-1, Quiz & End Sem Exam

	rural and urban arterials			
14	Pavement surface characteristics	Lecture	CIV602.2	Mid Term-1, Quiz & End Sem Exam
15	skid resistance, unevenness	Lecture	CIV602.2	Mid Term-1, Quiz & End Sem Exam
16	freeways, and other rural and urban roads	Lecture	CIV602.2	Mid Term-1, Quiz & End Sem Exam
17	Design Of Intersections: Characteristics	Lecture	CIV602.2	Mid Term-1, Quiz & End Sem Exam
18	design considerations of at-grade intersections	Lecture	CIV602.2	Mid Term-1, Quiz & End Sem Exam
19	Rotary intersections;	Lecture	CIV602.2	Mid Term-1, Quiz & End Sem Exam
20	Grade separations and interchanges	Lecture	CIV602.2	Mid Term-1, Quiz & End Sem Exam
21	Design of Parking lots	Lecture	CIV602.2	Assignment, Quiz & End Sem Exam
22	Aircraft characteristics	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
23	Aircraft performance characteristics	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
24	Airport planning	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
25	Airport Site Selection	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
26	Geometric Design of the Airfield	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
27	Determination of Runway Capacity and Delay	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
28	Taxiway and Gate Capacity	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
29	Holding Aprons	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
30	Terminal Aprons	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
31	Airport drainage	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
32	Function of Airport Passenger and Cargo Terminal	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
33	Design of Air Freight Terminals	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
34	Airport access	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
35	Airport Landside planning - Capacity	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
36	air travel demand forecasting	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV602.1.	**Gain knowledge about highways, and able to design the roads & bridges by geometric method**	3	**2**	1	**1**	1	**2**	**-**	**-**	2	**1**	2	1	**3**	**2**	**3**
CIV602.2.	**Know the different types of points and crossings used in railway track and Knowledge of signalling systems in railway stations and yards.**	3	2		2	2				2		1	1	**2**	**3**	**2**
CIV602.3.	**design and orient airport runways and apply various visual aids in the designing of airport**	3	2		2	2				3		3	1	**3**	**1**	**3**

<u>Sample Question Paper</u>

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–VI) 2020-21						
Class: B.Tech.(CE) VI Semester						
Subject Name: CIV 602 GEOMETRIC DESIGN OF HIGHWAYS		Time: 2 Hrs			Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: Gain knowledge about highways, and able to design the roads & bridges by geometric method

CO2: *Know the different types of points and crossings used in railway track and Knowledge of signalling systems in railway stations and yards.*

CO Map	Question No.	Question	Marks
CO1	Q.1	What do you understand by non-passing sight distance?	3
CO1	Q.2a	Write down the requirements of an ideal transition curve.	3
	Q.2b	What is mean by minimum gradient in highway? Why it is provided?	3
CO1	Q.3	What is the factor governing super elevation of a road surface? What is mean by super elevation?	6
CO2	Q.4	Define stopping sight distance.	3
CO2	Q.5a	State PIEV theory	3
	Q.5b	What is transition curve?	3
CO2	Q6	Briefly explain illumination sight distance.	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	CIV602 GEOMETRIC DESIGN OF HIGHWAYS								
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U3G3
1	A60215818001	Mr NAMAN GOYAL	100	30	70	A+	10	3	3	30
2	A60215818003	Mr SADAV KHAN	100	30	70	A	9	3	3	27
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	A	9	3	3	27
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	3	100.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : ENVIRONMENTAL ENGINEERING – II
Course Code : CIV603, Crédits : 03, Session :2020-21 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia

A. Introduction: The objective of the course is to make students gain insight into how the water and wastewater gets transported through conduits and open channels, and use the same for the design, operation and maintenance of these systems, to provide an in depth understanding of physical and physico-chemical processes used for water and wastewater treatment systems and to provide capability to design such systems..

B. Course Outcomes: At the end of the course, students will be able to:

CIV603.1. Know about sewerage system and its drainage.

CIV603.2.Implement technology related with purification of waste water according to IS parameters and low cost sanitation systems.

CIV603.3. Understand various fundamental scientific processes underlying the design and operation of waste water treatment plants.

CIV603.4 Understand chemical and biological principles behind unit processes used in waste water treatment unit processes.

C. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. **Assessment Plan:**

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. **Syllabus**

Module I: Water Quality Engineering. Fundamental theory underlying the unit processes utilized in the treatment of water for domestic and industrial usage, and in the treatment of domestic and industrial wastewaters**: (5 Hours)**

Module II: Transport of wastewater: Sanitary Sewerage Systems: Flow estimation, sewer materials, hydraulics of flow in sewers, sewer lay out, sewer transitions, materials for sewers, appurtenances, manholes, sewer design, conventional and model based design, sewage pumps and pumping stations, corrosion prevention, operation and maintenance, safety. Storm water Drainage Systems: Drainage layouts, storm runoff estimation, hydraulics of flow in storm water drains, materials, cross sections, design of storm water drainage systems, inlets, storm water pumping, operation and maintenance**: (10 Hours)**

Module III: Physico-Chemical Processes for wastewater treatment.
Water purification in natural systems, physical processes, chemical processes and biological processes. Primary, secondary and tertiary treatment. Unit operations, unit processes. Aeration and gas transfer. Sedimentation, different types of settling, sedimentation tank design. Coagulation and flocculation, coagulation processes, stability of colloids, destabilization of colloids, destabilization in water and wastewater treatment, transport of colloidal particles, design aspects**: (5 Hours)**

Module IV: Biological processes for contaminant removal
Characterization of waste. Aerobic, anaerobic and anoxic systems. Suspended and attached growth biological systems. Activated Sludge processand process modifications, Process design considerations, Treatment Ponds and aerated Lagoons, aerobic pond, facultative pond, anaerobic ponds, polishing ponds, constructed wet lands etc. Attached Growth Biological Treatment Systems, Trickling Filters, Rotating Biological Contactors, Activated Biofilters, Moving bed biological reactor (MBBR), Sequential Batch reactors (SBR), Membrane Biological Reactors (MBR) etc. Anaerobic

processes, Process fundamentals, Standard, high rate and hybrid reactors, Anaerobic filters, Expanded /fluidized bed reactors, Upflow anaerobic sludge blanket reactors, Performance and design aspects, Expanded granular bed reactors, Two stage/phase anaerobic reactors. Sludge Digestion, anaerobic digestion, aerobic digestion**: (10 Hours)**

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Introduction to Environmental Engineering and Science by Gilbert Masters, Prentice Hall, New Jersey.
- Introduction to Environmental Engineering by P. Aarne Vesilind, Susan M. Morgan, Thompson /Brooks/Cole; Second Edition 2008.
- Peavy, H.s, Rowe, D.R, Tchobanoglous, G. *Environmental Engineering*, Mc-Graw - Hill International Editions, New York 1985.
- MetCalf and Eddy. Wastewater Engineering, Treatment, Disposal and Reuse, Tata McGraw-Hill, New Delhi.
- Manual on Water Supply and Treatment. Ministry of Urban Development, New Delhi.
- Plumbing Engineering. Theory, Design and Practice, S.M. Patil, 1999
- Integrated Solid Waste Management, Tchobanoglous, Theissen & Vigil. McGraw Hill Publication
- Manual on Sewerage and Sewage Treatment Systems, Part A, B and C. Central Public Health and Environmental Engineering Organization, Ministry of Urban Development.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Fundamental theory underlying the unit processes utilized in the treatment of water for domestic usage	Lecture	CIV603.1	Mid Term-1, Quiz & End Sem Exam
2	Fundamental theory underlying the unit processes utilized in the treatment of water for industrial usage	Lecture	CIV603.1	Mid Term-1, Quiz & End Sem Exam
3	treatment of domestic and industrial wastewaters	Lecture	CIV603.1	Mid Term-1, Quiz & End Sem Exam

4	*treatment of domestic and industrial wastewaters*	Lecture	CIV603.1	Mid Term-1, Quiz & End Sem Exam
5	Sanitary Sewerage Systems	Lecture	CIV603.2	Mid Term-1, Quiz & End Sem Exam
6	Flow estimation, sewer materials	Lecture	CIV603.2	Mid Term-1, Quiz & End Sem Exam
7	hydraulics of flow in sewers, sewer lay out	Lecture	CIV603.2	Mid Term-1, Quiz & End Sem Exam
8	sewer transitions, materials for sewers	Lecture	CIV603.2	Mid Term-1, Quiz & End Sem Exam
9	appurtenances, manholes	Lecture	CIV603.2	Mid Term-1, Quiz & End Sem Exam
10	sewer design, conventional and model based design	Lecture	CIV603.2	Mid Term-1, Quiz & End Sem Exam
11	sewage pumps and pumping stations	Lecture	CIV603.2	Mid Term-1, Quiz & End Sem Exam
12	corrosion prevention, operation and maintenance	Lecture	CIV603.2	Mid Term-1, Quiz & End Sem Exam
13	Storm water Drainage Systems: Drainage layouts, storm runoff estimation	Lecture	CIV603.2	Mid Term-1, Quiz & End Sem Exam
14	hydraulics of flow in storm water drains, materials, cross sections	Lecture	CIV603.2	Mid Term-1, Quiz & End Sem Exam
15	design of storm water drainage systems, inlets, storm water pumping, operation and maintenance	Lecture	CIV603.3	Mid Term-1, Quiz & End Sem Exam
16	Water purification in natural systems	Lecture	CIV603.3	Mid Term-1, Quiz & End Sem Exam
17	physical processes, chemical processes and biological processes	Lecture	CIV603.3	Mid Term-1, Quiz & End Sem Exam
18	Primary, secondary and tertiary treatment	Lecture	CIV603.3	Mid Term-1, Quiz & End Sem Exam
19	Unit operations, unit processes. Aeration and gas transfer	Lecture	CIV603.3	Mid Term-1, Quiz & End Sem Exam
20	Sedimentation, different types of settling, sedimentation tank design	Lecture	CIV603.3	Mid Term-1, Quiz & End Sem Exam
21	Coagulation and flocculation, coagulation processes	Lecture	CIV603.3	Assignment, Quiz & End Sem Exam
22	stability of colloids, destabilization of colloids,	Lecture	CIV603.3	Assignment, Quiz & End Sem Exam
23	destabilization in water and	Lecture	CIV603.3	Assignment, Quiz

	wastewater treatment			& End Sem Exam
24	transport of colloidal particles, design aspects:	Lecture	CIV603.3	Assignment, Quiz & End Sem Exam
25	Characterization of waste. Aerobic, anaerobic and anoxic systems	Lecture	CIV603.4	Assignment, Quiz & End Sem Exam
26	Suspended and attached growth biological systems. Activated Sludge processand process modifications, Process design considerations	Lecture	CIV603.4	Assignment, Quiz & End Sem Exam
27	Treatment Ponds and aerated Lagoons, aerobic pond	Lecture	CIV603.4	Assignment, Quiz & End Sem Exam
28	facultative pond, anaerobic ponds, polishing ponds	Lecture	CIV603.4	Assignment, Quiz & End Sem Exam
29	constructed wet lands etc. Attached Growth Biological Treatment Systems	Lecture	CIV603.4	Assignment, Quiz & End Sem Exam
30	Trickling Filters	Lecture	CIV603.4	Assignment, Quiz & End Sem Exam
31	Rotating Biological Contactors	Lecture	CIV603.4	Assignment, Quiz & End Sem Exam
32	Activated Biofilters, Moving bed biological reactor (MBBR)	Lecture	CIV603.4	Assignment, Quiz & End Sem Exam
33	quential Batch reactors (SBR), Membrane Biological Reactors (MBR)	Lecture	CIV603.4	Assignment, Quiz & End Sem Exam
34	Anaerobic processes, Process fundamentals, Standard, high rate and hybrid reactors, Anaerobic filters, Expanded /fluidized bed reactors	Lecture	CIV603.4	Assignment, Quiz & End Sem Exam
35	Upflow anaerobic sludge blanket reactors, Performance and design aspects, Expanded granular bed reactors	Lecture	CIV603.4	Assignment, Quiz & End Sem Exam
36	Two stage/phase anaerobic reactors. Sludge Digestion, anaerobic digestion, aerobic digestion	Lecture	CIV603.4	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV603.1.	Know about sewerage system and its drainage.	3	3	2	3	2	**-**	**2**	**1**	1	**-**	2	3	3	3	2
CIV603.2.	Implement technology related with purification of waste water according to IS parameters and low cost sanitation systems.	3	1	2	3	2	**-**	**2**	**1**	1	**-**	3	3	1	3	2
CIV603.3.	Understand various fundamental scientific processes underlying the design and operation of waste water treatment plants.	3	2	2	3	2	**-**	**2**	**1**	1	**-**	3	3	1	2	2
CIV603.4.	Understand chemical and biological principles behind unit processes used in waste water treatment unit processes.	3	2	2	**1**	2	**-**	**2**	**3**	3	**-**	2	3	3	1	2

<u>Sample Question Paper</u>

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–VI) 2020-21						
Class: B.Tech.(CE) VI Semester						
Subject Name: CIV 603 ENVIRONMENTAL ENGINEERING - II		Time: 2 Hrs		Max.Marks:30		
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: Know about sewerage system and its drainage.

CO2: Implement technology related with purification of waste water according to IS parameters and low cost sanitation systems.

CO Map	Question No.	Question	Marks
CO1	Q.1	How will you estimate storm water flow? Explain it	3
CO1	Q.2a	Enlist different methods used for population forecast. Explain Any one in detail	3
	Q.2b	Classify the legal requirements and standards regarding treatment of sewage.	3
CO1	Q.3	Enlist the different types of pipes used for water supply. And explain cast iron Pipe in detail State the requirement of good disinfectant	6
CO2	Q.4	What is optimum dose of coagulant? How it is determined?	3
CO2	Q.5a	Define the following terms: (1) prechlorination (2) post chlorination (3) super chlorination (4) double chlorination (5) de chlorination	3
	Q.5b	Discuss the Environmental Legislation requirements while planning sewerage system	3
CO2	Q6	Write a short note on rapid sand filter	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	CIV603 ENVIRONMENTAL ENGINEERING – II							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U4G4
1	A60215818001	Mr NAMAN GOYAL	100	30	70	A	9	3	3	27
2	A60215818003	Mr SADAV KHAN	100	30	70	A-	8	3	3	24
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	A	9	3	3	27

Total No. of Students	=	3		
Total No. of Students	>60% marks	3	100.00	%
Attainment Level			Level 3	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : ESTIMATING AND COSTING
Course Code : CIV604, Crédits : 02 Session :2020-21 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name \ Dr. Ripunjoy Gogoi, Dr. P. Mahakavi

A. ***Introduction:*** This main objective is to develop in the student the art and skill whereby a monetary value can be placed on the volume of work previously measured. To develop an awareness of those factors that affect the cost of construction work and to analyze the influences that effect change in these factors. To encourage the habit of systematically recording all those statistics which are the stock in trade of the good estimator.

B. **Course Outcomes:**At the end of the course, students will be able to:

CIV604.1. Have an idea of Economics in general, Economics of India particularly for public sector agencies and private sector businesses

CIV604.2. Perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives.

CIV604.3. Quantify the worth of a structure by evaluating quantities of constituents, derive their cost rates and build up the overall cost of the structure.

CIV604.4.*U*nderstand how competitive bidding works and how to submit a competitive bid proposal.

C. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves	A	5%

	includingmedicalleaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: (5 Hours)

Basic Principles and Methodology of Economics. Demand/Supply – elasticity – Government Policies and Application. Theory of the Firm and Market Structure. Basic Macro-economic Concepts (including GDP/GNP/NI/Disposable Income) and Identities for both closed and open economies. Aggregate demand and Supply (IS/LM). Price Indices (WPI/CPI), Interest rates, Direct and Indirect Taxes

Module II: (5 Hours)

Public Sector Economics –Welfare, Externalities, Labour Market. Components of Monetary and Financial System, Central Bank –Monetary Aggregates; Commercial Banks & their functions; Capital and Debt Markets. Monetary and Fiscal Policy Tools & their impact on the economy – Inflation and Phillips Curve. Indian economy - Brief overview of post-independence period – plans. Post reform Growth, Structure of productive activity. Issues of Inclusion – Sectors, States/Regions, Groups of people (M/F), Urbanization. Employment–Informal, Organized, Unorganized, Public, Private. Challenges and Policy Debates in Monetary, Fiscal, Social, External sectors.

Module III: (10 Hours)

Estimation / Measurements for various items- Introduction to the process of Estimation; Use of relevant Indian Standard Specifications for the same, taking out quantities from the given requirements of the work, comparison of different alternatives, Bar bending schedules, Mass haul Diagrams, Estimating Earthwork and Foundations, Estimating Concrete and Masonry, Finishes, Interiors, MEP works; BIM and quantity take-offs; adding equipment costs; labour costs; rate analysis;

Module IV: (10 Hours)

Specifications-Types, requirements and importance, detailed specifications for buildings, roads, minor bridges and industrial structures. Rate analysis-Purpose, importance and necessity of the same, factors affecting, task work, daily output from different equipment/ productivity. Tender-Preparation of tender documents, importance of inviting tenders, contract types, relative merits, prequalification. general and special conditions, termination of contracts, extra work and Changes, penalty and liquidated charges, Settlement of disputes, R.A. Bill & Final Bill, Payment of advance, insurance, claims, price variation, etc. Preparing Bids- Bid Price buildup: Material, Labour, Equipment costs, Risks, Direct & Indirect Overheads, Profits; Bid conditions, alternative specifications; Alternative Bids. Bid process Management Introduction to Acts pertaining to-Minimum wages, Workman's compensation, Contracts, Arbitration, Easement rights.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Mankiw Gregory N. (2002), *Principles of Economics,* Thompson Asia
- V. Mote, S. Paul, G. Gupta(2004), *Managerial Economics,* Tata McGraw Hill
- Misra, S.K. and Puri (2009), *Indian Economy,* Himalaya
- Pareek Saroj (2003), *Textbook of Business Economics,* Sunrise Publishers
- M Chakravarty, Estimating, Costing Specifications & Valuation
- Joy P K, Handbook of Construction Management, Macmillan
- B.S. Patil, Building & Engineering Contracts
- Relevant Indian Standard Specifications.
- World Bank Approved Contract Documents.
- FIDIC Contract Conditions.
- Acts Related to Minimum Wages, Workmen's Compensation, Contract, and Arbitration
- Typical PWD Rate Analysis documents.
- UBS Publishers & Distributors, Estimating and Costing in Civil Engineering: Theory and Practice including Specification and Valuations,2016
- Dutta, B.N., Estimating and Costing in Civil Engineering (Theory & Practice), UBS Publishers, 2016

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Basic Principles and Methodology of Economics	Lecture	CIV604.1	Mid Term-1, Quiz & End Sem Exam
2	Demand/Supply – elasticity – Government Policies and Application	Lecture	CIV604.1	Mid Term-1, Quiz & End Sem Exam
3	Basic Macro-economic Concepts (including GDP/GNP/NI/Disposable Income)	Lecture	CIV604.1	Mid Term-1, Quiz & End Sem Exam
4	*Identities for both closed and open economies. Aggregate demand and Supply (IS/LM)*	Lecture	CIV604.1	Mid Term-1, Quiz & End Sem Exam
5	Price Indices (WPI/CPI), Interest rates, Direct and Indirect Taxes	Lecture	CIV604.1	Mid Term-1, Quiz & End Sem Exam
6	Public Sector Economics – Welfare, Externalities,	Lecture	CIV604.2	Mid Term-1, Quiz & End Sem Exam

	Labour Market. Components of Monetary and Financial System,			
7	Central Bank –Monetary Aggregates; Commercial Banks & their functions; Capital and Debt Markets. Monetary and Fiscal Policy Tools & their impact on the economy	Lecture	CIV604.2	Mid Term-1, Quiz & End Sem Exam
8	Inflation and Phillips Curve. Indian economy	Lecture	CIV604.2	Mid Term-1, Quiz & End Sem Exam
9	- Brief overview of post-independence period	Lecture	CIV604.2	Mid Term-1, Quiz & End Sem Exam
10	plans. Post reform Growth, Structure of productive activity. Issues of Inclusion	Lecture	CIV604.2	Mid Term-1, Quiz & End Sem Exam
11	Sectors, States/Regions, Groups of people (M/F), Urbanization. Employment	Lecture	CIV604.2	Mid Term-1, Quiz & End Sem Exam
12	Informal, Organized, Unorganized, Public, Private	Lecture	CIV604.2	Mid Term-1, Quiz & End Sem Exam
13	Challenges and Policy Debates in Monetary, Fiscal, Social, External sectors	Lecture	CIV604.2	Mid Term-1, Quiz & End Sem Exam
14	Estimation / Measurements for various items- Introduction to the process of Estimation	Lecture	CIV604.3	Mid Term-1, Quiz & End Sem Exam
15	Use of relevant Indian Standard Specifications for the same, taking out quantities from the given requirements of the work	Lecture	CIV604.3	Mid Term-1, Quiz & End Sem Exam
16	comparison of different alternatives, Bar bending schedules, Mass haul Diagrams	Lecture	CIV604.3	Mid Term-1, Quiz & End Sem Exam
17	Estimating Earthwork and Foundations	Lecture	CIV604.3	Mid Term-1, Quiz & End Sem Exam
18	Estimating Concrete and Masonry, Finishes, Interiors	Lecture	CIV604.3	Mid Term-1, Quiz & End Sem Exam
19	MEP works; BIM and quantity take-offs	Lecture	CIV604.3	Mid Term-1, Quiz & End Sem Exam
20	adding equipment costs; labour costs; rate analysis	Lecture	CIV604.3	Mid Term-1, Quiz & End Sem Exam
21	Specifications-Types,	Lecture	CIV604.4	Assignment, Quiz

	requirements and importance, detailed specifications for buildings, roads, minor bridges and industrial structures. Rate analysis-Purpose, importance and necessity of the same, factors affecting, task work, daily output from different equipment/ productivity			& End Sem Exam
22	Tender- Preparation of tender documents, importance of inviting tenders, contract types, relative merits, prequalification. general and special conditions	Lecture	CIV604.4	Assignment, Quiz & End Sem Exam
23	termination of contracts, extra work and Changes, penalty and liquidated charges, Settlement of disputes, R.A. Bill & Final Bill, Payment of advance, insurance, claims, price variation, etc. Preparing Bids- Bid Price buildup: Material, Labour, Equipment costs, Risks, Direct & Indirect Overheads	Lecture	CIV604.4	Assignment, Quiz & End Sem Exam
24	Profits; Bid conditions, alternative specifications; Alternative Bids. Bid process Management Introduction to Acts pertaining to-Minimum wages, Workman's compensation, Contracts, Arbitration, Easement rights.	Lecture	CIV604.4	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES	CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV604.1.	Have an idea of Economics in general, Economics of India particularly for public sector agencies and private sector businesses	3	2	1	3	1	**2**		**3**	2	**3**	2	3	**1**	**2**	**3**
CIV604.2.	Be able to perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives.	3	2	3	-	2	**2**	**-**	**3**	2	**3**	2	3	**3**	**1**	**1**
CIV604.3.	Quantify the worth of a structure by evaluating quantities of constituents, derive their cost rates and build up the overall cost of the structure.	3	2	1	2	-	**2**	**2**	**3**	-	**-**	2	3	**3**	**2**	**3**
CIV604.4.	*Understand how competitive bidding works and how to submit a competitive bid proposal*	3	2	1	3	1	**2**	**-**	**3**	2	**3**	2	3	**1**	**2**	**3**

<u>Sample Question Paper</u>

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–VI) 2020-21
Class: B.Tech.(CE) VI Semester

Subject Name: CIV 604 ESTIMATING AND COSTING			Time: 2 Hrs		Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: Have an idea of Economics in general, Economics of India particularly for public sector agencies and private sector businesses

CO2: Perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives.

CO Map	Question No.	Question	Marks
CO1	Q.1	State the necessity of Administrative Approval and Technical Sanction.	3
CO1	Q.2a	State the circumstances under which Revised and Supplementary Estimate is prepared.	3
	Q.2b	Mention the unit of measurement for i) Skirting up to 150 mm height ii) Partition wall 100mm thick iii)Hand Railing iv)Woodwork for door frame.	3
CO1	Q.3	Explain the role and responsibility of estimator Prepare a check list of items of work in chronological order for construction of load bearing structure.	6
CO2	Q.4	Explain the rules for deduction of opening in masonry and plastering work as per I.S.1200.	3
CO2	Q.5a	Describe the procedure of preparing approximate estimate for road project.	3
	Q.5b	Explain the data required for preparation of detailed estimate.	3
CO2	Q6	Describe the long wall and short wall method of estimating with suitable example	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	CIV604 ESTIMATING AND COSTING							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U5G5
1	A60215818001	Mr NAMAN GOYAL	100	30	70	A-	8	2	2	16
2	A60215818003	Mr SADAV KHAN	100	30	70	B+	7	2	2	14
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	A+	10	2	2	20

Total No. of Students	=	3		
Total No. of Students	>60 % marks	2	66.67	%
Attainment Level			Level 1	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : GEOMETRIC DESIGN OF HIGHWAYS LAB
Course Code : CIV622, Crédits : 01, Session :2020-21 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Ripunjoy Gogoi, Dr. P. Mahakavi

A. Introduction: *The objective of this course is to learn and practice* of computer-aided design (CAD) software in the context of highway alignments. The roadway-design software used is that favored by the Texas Department of Transportation (TxDOT) & many others is GEOPAK. This software runs through MicroStation (a common CAD package).

B. Course Outcomes: At the end of the course, students will be able to:

CIV622.1*. U*se the features of MicroStation, GEOPAK, and engineering judgment to design one side of a grade-separated, Two-Quadrant, Partial Cloverleaf A Interchange as depicted in AASHTO 2004.

CIV622.2. Learn to work on a team and make effective project presentations and recognize the value of interactions with other professional disciplines.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

- **List of experiments/demonstrations:**

- **Lab 1:** Introduction to MicroStation - Learn the basics of MicroStation required to operate GEOPAK. **(1 Hour)**
- **Lab 2:** Leg Centerline and Lanes using MicroStation - Learn the basics of MicroStation required to operate GEOPAK by drawing a simple leg centerline and lanes. **(1 Hour)**
- **Lab 3:** Areas & Dimensioning using MicroStation - Learn the concepts of points, lines, direction, distance, traverse, bearing and distance, Northing and Easting, dimensioning, and area measurement. **(1 Hour)**
- **Lab 4:** Pavement Edge Design using a Simple Arc with & without a Taper using MicroStation - Learn pavement edge design & vehicle off-tracking concepts using IGIDS-created vehicle turn template. Observe the reduction in circular arc radius and area when a taper section is added. **(1 Hour)**
- **Lab 5:** Horizontal Circular Curve using GEOPAK - Learn how to place a horizontal circular curve using GEOPAK. **(1 Hour)**
- **Lab 6:** Performing Lab 2 (Leg Centerline & Lanes) using GEOPAK - Learn horizontal alignment design using GEOPAK. **(1 Hour)**
- **Lab 7:** Define Superelevation Runoff using GEOPAK - Learn superelevation runoff design using GEOPAK. **(1 Hour)**
- **Lab 8:** Define a Spiral Curve using GEOPAK - Learn spiral curve design using GEOPAK. **(2 Hour)**
- **Lab 9:** Define a Vertical Profile using GEOPAK - Learn vertical alignment design using GEOPAK **(2 Hour)**.
- **Lab 10**: Design Project Part 1 - Define the Vertical Alignment for Road 2000 over the Freeway using GEOPAK**(2 Hour)**
- **Lab 11:** Design Project Part 2 - Design the Intersection Channelization of the Grade-Separated, Two-Quadrant, Partial Cloverleaf A Interchange using MicroStatio. **(2 Hour)**
- **Lab 12:** Design Project Part 3 - Design the Freeway Entrance Ramp of the Grade-Separated, Two-Quadrant, Partial Cloverleaf A Interchange using GEOPAK **(2 Hour)**
- **Lab 13:** Design Project Part 4 - Design the Freeway Exit Ramp of the Grade-Separated, Two-Quadrant, Partial Cloverleaf A Interchange using GEOPAK **(2 Hour)**
- **Lab 14:** Design Project Part 5 - Define the Superelevation & Complete the Grade-Separated, Two-Quadrant, Partial Cloverleaf A Interchange using MicroStation and GEOPAK **(2 Hour)**

G. Examination Scheme:

IA			EE			
A	**PR**	**Practical Based Test**	**Major Experiment**	**Minor Experimen t**	**LR**	**Viva**
5	10	15	35	15	10	10

Note: IA –InternalAssessment, EE- External Exam, A- Attendance PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Text/Reference Books:

- Khanna, S.K., Justo, C.E.G and Veeraragavan, A, 'Highway Engineering', Revised 10th Edition, Nem Chand & Bros, 2017
- Kadiyalai, L.R., ' Traffic Engineering and Transport Planning', Khanna Publishers.
- Partha Chakraborty, ' Principles Of Transportation Engineering, PHI Learning, Tomlinson

- Fred L. Mannering, Scott S. Washburn, Walter P. Kilareski,'Principles of Highway Engineering and Traffic Analysis', 4th Edition, John Wiley
- Srinivasa Kumar, R, Textbook of Highway Engineering, Universities Press, 2011.
- Paul H. Wright and Karen K. Dixon, Highway Engineering, 7th Edition, Wiley Student Edition, 2009.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	**Lab 1:** Introduction to MicroStation - Learn the basics of MicroStation required to operate GEOPAK	Lecture	CIV622.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
2	**Lab 2:** Leg Centerline and Lanes using MicroStation - Learn the basics of MicroStation required to operate GEOPAK by drawing a simple leg centerline and lanes.	Lecture	CIV622.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
3	**Lab 3:** Areas & Dimensioning using MicroStation - Learn the concepts of points, lines, direction, distance, traverse, bearing and distance, Northing and Easting, dimensioning, and area measurement	Lecture	CIV622.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
4	*Pavement Edge Design using a Simple Arc with & without a Taper using MicroStation - Learn pavement edge design & vehicle off-tracking concepts using IGIDS-created vehicle turn template. Observe the reduction in circular arc radius and area when a taper section is added.*	Lecture	CIV622.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
5	Horizontal Circular Curve using GEOPAK - Learn how to place a horizontal circular curve using GEOPAK	Lecture	CIV622.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
6	Performing Lab 2 (Leg Centerline & Lanes) using GEOPAK - Learn horizontal alignment design using	Lecture	CIV622.1	Internal Assessment, Lab Record, Quiz and End Sem Exam

	GEOPAK			
7	Define Superelevation Runoff using GEOPAK - Learn superelevation runoff design using GEOPAK	Lecture	CIV622.2	Mid Term-1, Quiz & End Sem Exam
8	Define a Spiral Curve using GEOPAK - Learn spiral curve design using GEOPAK. Define a Vertical Profile using GEOPAK - Learn vertical alignment design using GEOPAK	Lecture	CIV622.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
9	Design Project Part 1 - Define the Vertical Alignment for Road 2000 over the Freeway using GEOPAK	Lecture	CIV622.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
10	Design Project Part 2 & 3 - Design the Intersection Channelization of the Grade-Separated, Two-Quadrant, Partial Cloverleaf A Interchange using MicroStatio	Lecture	CIV622.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
11	Design Project Part 4 - Design the Freeway Exit Ramp of the Grade-Separated, Two-Quadrant, Partial Cloverleaf A Interchange using GEOPAK	Lecture	CIV622.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
12	Design Project Part 5 - Define the Superelevation & Complete the Grade-Separated, Two-Quadrant, Partial Cloverleaf A Interchange using MicroStation and GEOPAK	Lecture	CIV622.2	Internal Assessment, Lab Record, Quiz and End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		P O	P O	P O	P O	P O	P O	P O	P O	P O	P O	P O	P O	P S	P S	P S

		1	2	3	4	5	6	7	8	9	10	11	12	O1	O2	O3
CIV622.1	Use the features of MicroStation, GEOPAK, and engineering judgment to design one side of a grade-separated, Two-Quadrant, Partial Cloverleaf A Interchange as depicted in AASHTO 2004.	3	3	1	3	1	**2**			2		2	1	**1**	**1**	**3**
CIV622.2	Learn to work on a team and make effective project presentations and recognize the value of interactions with other professional disciplines.	3	2	2	3	2				2	**2**	1	3	**3**	**2**	**3**

<u>Sample Question Paper</u>

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–VI) 2020-21						
Class: B.Tech.(CE) VI Semester						
Subject Name: CIV 622 GEOMETRIC DESIGN OF HIGHWAYS LAB		Time: 2 Hrs			Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		
Student will be able to CO1: *U*se the features of MicroStation, GEOPAK, and engineering judgment to design one side of a grade-separated, Two-Quadrant, Partial Cloverleaf A Interchange as depicted in AASHTO 2004. *CO2:* Learn to work on a team and make effective project presentations and recognize the value of interactions with other professional disciplines.						

CO Map	Question No.	Question	Marks
CO1	Q.1	What do you understand by non-passing sight distance?	3
CO1	Q.2a	Write down the requirements of an ideal transition curve.	3
	Q.2b	What is mean by minimum gradient in highway? Why it is provided?	3
CO1	Q.3	What is the factor governing super elevation of a road surface? What is mean by super elevation?	6
CO2	Q.4	Define stopping sight distance.	3
CO2	Q.5a	State PIEV theory	3
	Q.5b	What is transition curve?	3
CO2	Q6	Briefly explain illumination sight distance.	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	CIV622 GEOMETRIC DESIGN OF HIGHWAYS LAB Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U8G8
1	A60215818001	Mr NAMAN GOYAL	100	30	70	A+	10	1	1	10
2	A60215818003	Mr SADAV KHAN	100	30	70	A+	10	1	1	10
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	A+	10	1	1	10
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	3	100.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : ENVIRONMENTAL ENGINEERING – II LAB
Course Code : CIV623, Crédits : 01, Session :2020-21 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia

A. Introduction: The objective of this course is to *understand various types of chemicals that contaminates water. Student will learn how the level of water contamination could be found out*.

B. Course Outcomes: At the end of the course, students will be able to:

CIV623.1. *Determine different parameters of water and waste water.*

CIV623.2. *Examine biochemical oxygen demand and chemical oxygen demand of given samples.*

CIV623.3. *Understand the technologies required for domestic and industrial wastewater treatment*

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

- Determination of solids (total, dissolved, organic, inorganic and settle able) in water **(2 hours)**
- Determination of turbidity and the optimum coagulant dose **(2 hours)**
- Determination of alkalinity and pH of water **(2 hours)**
- Determination of hardness and chlorides in water **(2 hours)**
- Determination of iron and manganese in water **(2 hours)**
- Determination of sulphates and sulphides in water **(2 hours)**
- Determination of D.O and B.O.D of waste water **(2 hours)**
- Determination of available chlorine in bleaching powder and the chlorine dose required to treat the given water sample **(2 hours)**
- Determination of coliforms in water **(2 hours)**
- Demonstration of Instrumental methods of pollutant analysis **(2 hours)**

G. Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Text/Reference Books:

- Standard method for the examination of water and waste water, 2005, APHA, AWWA, WPCF Publication

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Determination of solids (total, dissolved, organic, inorganic and settle able) in water	Lecture	CIV623.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
2	Determination of turbidity and the optimum coagulant dose	Lecture	CIV623.1	Internal Assessment, Lab Record, Quiz and End Sem Exam

3	Determination of alkalinity and pH of water	Lecture	CIV623.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
4	*Determination of hardness and chlorides in water*	Lecture	CIV623.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
5	Determination of iron and manganese in water	Lecture	CIV623.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
6	Determination of sulphates and sulphides in water	Lecture	CIV623.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
7	Determination of D.O and B.O.D of waste water	Lecture	CIV623.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
8	Determination of D.O and B.O.D of waste water	Lecture	CIV623.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
9	Determination of available chlorine in bleaching powder and the chlorine dose required to treat the given water sample	Lecture	CIV623.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
10	Determination of available chlorine in bleaching powder and the chlorine dose required to treat the given water sample	Lecture	CIV623.3	Internal Assessment, Lab Record, Quiz and End Sem Exam
11	Determination of coliforms in water	Lecture	CIV623.3	Internal Assessment, Lab Record, Quiz and End Sem Exam
12	Demonstration of Instrumental methods of pollutant analysis	Lecture	CIV623.3	Internal Assessment, Lab Record, Quiz and End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES	CORRELATION WITH PROGRAMME

														SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV623.1.	Determine different parameters of water and waste water.	3	3	1	3	1	**2**	**3**		2		**3**	1	**3**	**2**	**1**
CIV623.2.	Examine biochemical oxygen demand and chemical oxygen demand of given samples.	3	3	1	3	1	**2**			2		2	1	**1**	**1**	**3**
CIV623.3.	Understand the technologies required for domestic and industrial wastewater treatment	3	2	2	3	2				2	**2**	1	3	**3**	**2**	**3**

Sample Question Paper

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–VI) 2020-21						
Class: B.Tech.(CE) VI Semester						
Subject Name: CIV 623 ENVIRONMENTAL ENGINEERING – II LAB		Time: 2 Hrs			Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: Determine different parameters of water and waste water.

CO2: Examine biochemical oxygen demand and chemical oxygen demand of given samples.

CO Map	Question No.	Question	Marks
CO1	Q.1	How will you estimate storm water flow? Explain it	3
CO1	Q.2a	Enlist different methods used for population forecast. Explain Any one in detail	3
	Q.2b	Classify the legal requirements and standards regarding treatment of sewage.	3
CO1	Q.3	Enlist the different types of pipes used for water supply. And explain cast iron Pipe in detail State the requirement of good disinfectant	6
CO2	Q.4	What is optimum dose of coagulant? How it is determined?	3
CO2	Q.5a	Define the following terms: (1) prechlorination (2) post chlorination (3) super chlorination (4) double chlorination (5) de chlorination	3
	Q.5b	Discuss the Environmental Legislation requirements while planning sewerage system	3
CO2	Q6	Write a short note on rapid sand filter	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	CIV623 ENVIRONMENTAL ENGINEERING – II LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U9G9
1	A60215818001	Mr NAMAN GOYAL	100	30	70	A+	10	1	1	10
2	A60215818003	Mr SADAV KHAN	100	30	70	A+	10	1	1	10
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	A	9	1	1	9
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	3	100.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : ESTIMATING AND COSTING LAB
Course Code : CIV624, Crédits : 01, Session :2020-21 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Mohan Kantharia, Dr. Imran Ahmad Khan, Dr. P. Mahakavi,

A. **Introduction:** The main objective is to develop in the student the art and skill whereby a monetary value can be placed on the volume of work previously measured. To develop an awareness of those factors that affect the cost of construction work and to analyze the influences that effect change in these factors. To encourage the habit of systematically recording all those statistics which are the stock in trade of the good estimator..

B. **Course Outcomes:**At the end of the course, students will be able to:

CIV624.1. Understand the technical specifications for various works to be performed for a project and how they impact the cost of a structure.

CIV624.2. Quantify the worth of a structure by evaluating quantities of constituents, derive their cost rates and build up the overall cost of the structure.

C. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

a. Deriving an approximate estimate for a multistoried building by approximate methods.(3 hours)
b. Detailed estimate for the following with the required material survey for the same. (5 hours)
   1. Ground plus three storied RCC Framed structure building with blockwork walls
   2. bridge with minimum 2 spans
   3. factory building
   4. road work
   5. cross drainage work
   6. Ground plus three storied building with load-bearing walls
   7. Cost of finishes, MEP works for (f) above
c. Preparation of valuation report in standard Government form. (3 hours)
d. Assignments on rate analysis, specifications and simple estimates. (3 hours)
e. Detailed estimate of minor structure. (3 hours)
f. Preparation of Bar bending schedule. (3 hours)

G. Examination Scheme:

IA			EE			
A	PR	Practical Based Test	Major Experiment	Minor Experiment	LR	Viva
5	10	15	35	15	10	10

Note: IA –InternalAssessment, EE- External Exam, A- Attendance PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Text/Reference Books:

- Mankiw Gregory N. (2002), *Principles of Economics,* Thompson Asia
- V. Mote, S. Paul, G. Gupta(2004), *Managerial Economics,* Tata McGraw Hill
- Misra, S.K. and Puri (2009), *Indian Economy,* Himalaya
- Pareek Saroj (2003), *Textbook of Business Economics,* Sunrise Publishers
- M Chakravarty, Estimating, Costing Specifications & Valuation
- Joy P K, Handbook of Construction Management, Macmillan
- B.S. Patil, Building & Engineering Contracts
- Relevant Indian Standard Specifications.
- World Bank Approved Contract Documents.
- FIDIC Contract Conditions.
- Acts Related to Minimum Wages, Workmen's Compensation, Contract, and Arbitration
- Typical PWD Rate Analysis documents.
- UBS Publishers & Distributors, Estimating and Costing in Civil Engineering: Theory and Practice including Specification and Valuations, 2016
- Dutta, B.N., Estimating and Costing in Civil Engineering (Theory & Practice), UBS Publishers, 2016

I. Lecture Plan

Lecture	Topics	Mode	Correspon	Mode of

		of Delivery	ding CO	Assessing CO
1	Deriving an approximate estimate for a multistoried building by approximate methods	Lecture	CIV624.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
2	Detailed estimate for the following with the required material survey for the same.	Lecture	CIV624.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
3	Ground plus three storied RCC Framed structure building with blockwork walls	Lecture	CIV624.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
4	bridge with minimum 2 spans	Lecture	CIV624.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
5	factory building	Lecture	CIV624.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
6	road work	Lecture	CIV624.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
7	cross drainage work	Lecture	CIV624.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
8	Ground plus three storied building with load-bearing walls	Lecture	CIV624.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
9	Cost of finishes, MEP works for (f) above	Lecture	CIV624.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
10	Preparation of valuation report in standard Government form	Lecture	CIV624.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
11	Assignments on rate analysis, specifications and simple estimates	Lecture	CIV624.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
12	Detailed estimate of minor structure & Preparation of	Lecture	CIV624.2	Internal Assessment, Lab

	Bar bending schedule			Record, Quiz and End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV624.1.	Understand the technical specifications for various works to be performed for a project and how they impact the cost of a structure.	3	3	1	3	1	**2**	**3**		2	**-**	2	3	**3**	**2**	**1**
CIV624.2.	Quantify the worth of a structure by evaluating quantities of constituents, derive their cost rates and build up the overall cost of the structure.	3	2	2	3	1	**2**	**3**		2	**2**	2	3	**3**	**2**	**3**

<u>Sample Question Paper</u>

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–VI) 2020-21		
Class: B.Tech.(CE) VI Semester		
Subject Name: CIV 624 ESTIMATING AND	Time: 2 Hrs	Max.Marks:30

COSTING LAB						
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: Understand the technical specifications for various works to be performed for a project and how they impact the cost of a structure.

CO2: Quantify the worth of a structure by evaluating quantities of constituents, derive their cost rates and build up the overall cost of the structure.

CO Map	Question No.	Question	Marks
CO1	Q.1	List the types of estimate.	3
CO1	Q.2a	What is a detailed estimate?	3
	Q.2b	What are the different types of Approximate Estimate?	3
CO1	Q.3	Identify the recommendations for degree of accuracy on measurements. Determine the methods to be adopted to calculate volume.	6
CO2	Q.4	Generalize the duties of quantity surveyor.	3
CO2	Q.5a	State the unit of measurements for earth work, D.P.C and brick	3
	Q.5b	Identify various types of paneled and glazed doors.	3
CO2	Q6	Mention the units of measurement for Steel reinforcement, plastering, flooring and painting.	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	CIV624 ESTIMATING AND COSTING LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U7G7
1	A60215818001	Mr NAMAN GOYAL	100	30	70	A+	10	1	1	10
2	A60215818003	Mr SADAV KHAN	100	30	70	A+	10	1	1	10
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	A+	10	1	1	10

Total No. of Students	=	3		
Total No. of Students	>60% marks	3	100.00	%
Attainment Level			Level 3	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : Open Channel Flow
Course Code : CIV606, Crédits : 03, Session :2020-21 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. P. Mahakavi, Mr. Sachin Tiwari

A. Introduction: The main objective is to *introduce the students to various hydraulic engineering problems like open channel flows and hydraulic machines. At the completion of the course, the student should be able to relate the theory and practice of problems in hydraulic engineering*.

B. Course Outcomes: At the end of the course, students will be able to:
CIV606.1. calibrate various flow measuring devices in pipe and open channel flow.

CIV606.2. Understand their knowledge of fluid mechanics in addressing problems in open channels.
CIV606.3. classify the flow in open channel and various momentum principles in open channels

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Introduction to Open Channel Flow-Comparison between open channel flow and pipe flow, geometrical parameters of a channel, classification of open channels, classification of open channel flow, Velocity Distribution of channel section**:(5 Hours)**

Module II: Uniform Flow-Continuity Equation, Energy Equation and Momentum Equation, Characteristics of uniform flow, Chezy's formula, Manning's formula. Factors affecting Manning's Roughness Coefficient "n_.*Most economical section of ch*annel. Computation of Uniform flow, Normal depth:**(10 Hours)**

Module III: Non-Uniform Flow- Specific energy, Specific energy curve, critical flow, discharge curve Specific force Specific depth, and Critical depth. Channel Transitions. Measurement of Discharge and Velocity – Venturi Flume, Standing Wave Flume, Parshall Flume, Broad Crested Weir. Measurement of Velocity- Current meter, Floats, Hot-wire anemometer. Gradually Varied Flow- Dynamic Equation of Gradually Varied Flow, Classification of channel bottom slopes, Classification of surface profile, Characteristics of surface profile. Computation of water surface profile by graphical, numerical and analytical approaches. Direct Step method, Graphical Integration method and Direct integration method**:(10 Hours)**

Module IV: Hydraulic Jump- Theory of hydraulic jump, Elements and characteristics of hydraulic jump in a rectangular Channel, length and height of jump, location of jump, Types,applications and location of hydraulic jump. Energy dissipation and other uses, surge as a moving hydraulic jump. Positive and negative surges. Dynamics of Fluid Flow- Momentum principle, applications: Force on plates, pipe bends, moments of momentum equation**:(5 Hours)**

G. Examination Scheme:

Components	**HA**	**V/S/Q**	**CT**	**AT**	**ESE**
Weightage (%)	7	8	10	5	70

H. Suggested Text/Reference Books:

- Hydraulics and Fluid Mechanics, P.M. Modi and S.M. Seth, Standard Book House
- Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill.
- Open channel Flow, K. Subramanya, Tata McGraw Hill.
- Open Channel Hydraulics, Ven Te Chow, Tata McGraw Hill.
- Burnside, C.D., "Electromagnetic Distance Measurement," Beekman Publishers, 1971.

I. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	Introduction to Open Channel Flow-Comparison	Lecture	CIV606.1	Mid Term-1, Quiz & End Sem Exam
2	open channel flow and pipe flow, geometrical parameters of a channel	Lecture	CIV606.1	Mid Term-1, Quiz & End Sem Exam
3	classification of open channels, classification of open channel flow	Lecture	CIV606.1	Mid Term-1, Quiz & End Sem Exam

4	*Velocity Distribution of channel section*	Lecture	CIV606.1	Mid Term-1, Quiz & End Sem Exam
5	Uniform Flow-Continuity Equation, Energy Equation and Momentum Equation	Lecture	CIV606.1	Mid Term-1, Quiz & End Sem Exam
6	Characteristics of uniform flow, Chezy's formula, Manning's formula. Factors affecting Manning's Roughness Coefficient	Lecture	CIV606.1	Mid Term-1, Quiz & End Sem Exam
7	*Most economical section of ch*annel. Computation of Uniform flow, Normal depth	Lecture	CIV606.1	Mid Term-1, Quiz & End Sem Exam
8	Non-Uniform Flow- Specific energy	Lecture	CIV606.1	Mid Term-1, Quiz & End Sem Exam
9	Specific energy curve	Lecture	CIV606.1	Mid Term-1, Quiz & End Sem Exam
10	discharge curve Specific	Lecture	CIV606.1	Mid Term-1, Quiz & End Sem Exam
11	force Specific depth	Lecture	CIV606.1	Mid Term-1, Quiz & End Sem Exam
12	Critical depth. Channel Transitions	Lecture	CIV606.1	Mid Term-1, Quiz & End Sem Exam
13	Measurement of Discharge and Velocity	Lecture	CIV606.2	Mid Term-1, Quiz & End Sem Exam
14	Venturi Flume, Standing Wave Flume	Lecture	CIV606.2	Mid Term-1, Quiz & End Sem Exam
15	Parshall Flume, Broad Crested Weir	Lecture	CIV606.2	Mid Term-1, Quiz & End Sem Exam
16	Measurement of Velocity-Current meter	Lecture	CIV606.2	Mid Term-1, Quiz & End Sem Exam
17	Floats, Hot-wire anemometer	Lecture	CIV606.2	Mid Term-1, Quiz & End Sem Exam
18	Gradually Varied Flow-Dynamic Equation of Gradually Varied Flow	Lecture	CIV606.2	Mid Term-1, Quiz & End Sem Exam
19	Classification of channel bottom slopes	Lecture	CIV606.2	Mid Term-1, Quiz & End Sem Exam
20	Classification of surface profile	Lecture	CIV606.2	Mid Term-1, Quiz & End Sem Exam
21	Computation of water surface profile by graphical, numerical and analytical approaches	Lecture	CIV606.2	Assignment, Quiz & End Sem Exam
22	Direct Step method	Lecture	CIV606.2	Assignment, Quiz & End Sem Exam
23	Graphical Integration method	Lecture	CIV606.2	Assignment, Quiz & End Sem Exam

24	Direct integration method	Lecture	CIV606.2	Assignment, Quiz & End Sem Exam
25	Hydraulic Jump	Lecture	CIV606.3	Assignment, Quiz & End Sem Exam
26	Theory of hydraulic jump	Lecture	CIV606.3	Assignment, Quiz & End Sem Exam
27	Elements and characteristics of hydraulic jump	Lecture	CIV606.3	Assignment, Quiz & End Sem Exam
28	rectangular Channel, length	Lecture	CIV606.3	Assignment, Quiz & End Sem Exam
29	length and height of jump, location of jump	Lecture	CIV606.3	Assignment, Quiz & End Sem Exam
30	ypes,applications and location of hydraulic jump	Lecture	CIV606.3	Assignment, Quiz & End Sem Exam
31	surge as a moving hydraulic jump	Lecture	CIV606.3	Assignment, Quiz & End Sem Exam
32	Energy dissipation and other uses	Lecture	CIV606.3	Assignment, Quiz & End Sem Exam
33	Positive and negative surges	Lecture	CIV606.3	Assignment, Quiz & End Sem Exam
34	Dynamics of Fluid Flow	Lecture	CIV606.3	Assignment, Quiz & End Sem Exam
35	Momentum principle, applications	Lecture	CIV606.3	Assignment, Quiz & End Sem Exam
36	Force on plates, pipe bends, moments of momentum equation	Lecture	CIV606.3	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV606.1.	calibrate various flow measuring devices in pipe and open channel flow.	3	2	2	3	1	**2**	**3**		2	**2**	2	3	**3**	**2**	**3**

CIV606.2.	Understand their knowledge of fluid mechanics in addressing problems in open channels.	3	3	1	3	1	**2**	**3**		2	**-**	2	3	**3**	**2**	**1**
CIV606.3.	classify the flow in open channel and various momentum principles in open channels	3	2	2	3	1	**2**	**3**		2	**2**	2	3	**3**	**2**	**3**

S. No.	**Enrollment.No.**	**Student's Name**	**CIV606 OPEN CHANNEL FLOW**							
			Max Marks	**CE Weight Age (%)**	**ET Weight Age (%)**	**GO**	**GP**	**ACU**	**ECU**	**U14G14**
1	A60215818001	Mr NAMAN GOYAL	100	30	70	A+	10	3	3	30
2	A60215818003	Mr SADAV KHAN	100	30	70	A	9	3	3	27
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	A+	10	3	3	30
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	3	100.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : OPEN CHANNEL FLOW LAB
Course Code : CIV626, Crédits : 01, Session :2020-21 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Mr. Sachin Tiwari

A. Introduction: The main objective is to *to introduce the students to various hydraulic engineering problems like open channel flows and hydraulic machines. At the completion of the course, the student should be able to relate the theory and practice of problems in hydraulic engineering*.

B. Course Outcomes: At the end of the course, students will be able to:

CIV624.1. Understand knowledge of fluid mechanics in addressing problems in open channels.

CIV624.2. solve problems in uniform, gradually and rapidly varied flow in steady state conditions.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

a. Deriving an approximate estimate for a multistoried building by approximate methods.(3 hours)

b. Detailed estimate for the following with the required material survey for the same. (5 hours)
    1. Ground plus three storied RCC Framed structure building with blockwork walls
    2. bridge with minimum 2 spans
    3. factory building
    4. road work
    5. cross drainage work
    6. Ground plus three storied building with load-bearing walls
    7. Cost of finishes, MEP works for (f) above
c. Preparation of valuation report in standard Government form. (3 hours)
d. Assignments on rate analysis, specifications and simple estimates. (3 hours)
e. Detailed estimate of minor structure. (3 hours)
f. Preparation of Bar bending schedule. (3 hours)

G. Examination Scheme:

IA			EE			
A	**PR**	**Practical Based Test**	**Major Experiment**	**Minor Experiment**	**LR**	**Viva**
5	10	15	35	15	10	10

Note: IA –InternalAssessment, EE- External Exam, A- Attendance PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Text/Reference Books:

- Hydraulics and Fluid Mechanics, P.M. Modi and S.M. Seth, Standard Book House
- Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill.
- Open channel Flow, K. Subramanya, Tata McGraw Hill.
- Open Channel Hydraulics, Ven Te Chow, Tata McGraw Hill.
- Burnside, C.D., "Electromagnetic Distance Measurement," Beekman Publishers, 1971.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Flow Visualization	Lecture	CIV626.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
2	Uniform Flow	Lecture	CIV626.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
3	Velocity Distribution in Open channel flow	Lecture	CIV626.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
4	Venturi Flume	Lecture	CIV626.1	Internal Assessment, Lab

				Record, Quiz and End Sem Exam
5	Standing Wave Flume	Lecture	CIV626.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
6	Gradually Varied Flow	Lecture	CIV626.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
7	Hydraulic Jump	Lecture	CIV626.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
8	Flow through pipes	Lecture	CIV626.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
9	Turbulent flow through pipes	Lecture	CIV626.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
10	Laminar flow through pipes	Lecture	CIV626.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
11	Assignments on rate analysis, specifications and simple estimates	Lecture	CIV626.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
12	Detailed estimate of minor structure	Lecture	CIV626.2	Internal Assessment, Lab Record, Quiz and End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

CIV626.1.	Understand knowledge of fluid mechanics in addressing problems in open channels.	3	3	1	3	1	**2**	**3**		2	**-**	2	3	**3**	**2**	**1**
CIV626.2.	solve problems in uniform, gradually and rapidly varied flow in steady state conditions.	3	2	2	3	1	**2**	**3**		2	**2**	2	3	**3**	**2**	**3**

S. No.	Enrollment.No.	Student's Name	CIV626 OPEN CHANNEL FLOW LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U15G15
1	A60215818001	Mr NAMAN GOYAL	100	30	70	A+	10	1	1	10
2	A60215818003	Mr SADAV KHAN	100	30	70	A+	10	1	1	10
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	A+	10	1	1	10
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	3	100.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **MINOR PROJECT – I**
Course Code : NPT660, Crédits : 02, Session :2020-21 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia, Dr. Imran Ahmad Khan, Dr. Ripunjoy Gogoi, Dr. P. Mahakavi, Mr. Sachin Tiwari

A. **Introduction:** The objective of Minor project is to enable the student to take up investigative study in the broad field of Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the Department on an individual basis or two/three students in a group, under the guidance of a Supervisor.

B. **Course Outcomes:**At the end of the course, students will be able to:

NPT660.1. Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.

NPT660.2. Design, implement and test the prototype/algorithm in order to solve the conceived problem.

NPT660.3. Write comprehensive report on mini project work

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
End Semester Examination	End Semester Examination	EE	100%
Total			**100%**

F. Syllabus

Methodology:

Practical training is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

G. Examination Scheme:

Literature study/ Fabrication/ Experimentation	40
Written Report	20
Viva	15
Presentation	25
Total	**100**

H. Suggested Text/Reference Books: NA

I. Lecture Plan : NA

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO1	PO1	PSO	PSO	PSO

									0	1	2	1	2	3
NPT660.1	*Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.*	3	**2**	1	3	1	-	-	-	2		2	1	**1**	**2**	**1**
NPT660.2	*Design, implement and test the prototype/algorithm in order to solve the conceived problem.*	3	1	2	2	2	-	-	-	2		1	1	**3**	**2**	**3**
NPT660.3	*Write comprehensive report on mini project work*	2	2	2	2	2	-	-	-	3		3	1	**3**	**3**	**2**
NPT660.4	Prepare and present technical report.	1	2	1	-	-	-	-	-	-	-	-	-	**1**	**2**	**3**

S. No.	Enrollment.No.	Student's Name	NMP660 MINOR PROJECT							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U13G13
1	A60215818001	Mr NAMAN GOYAL	100	0	100	A+	10	2	2	20
2	A60215818003	Mr SADAV KHAN	100	0	100	A+	10	2	2	20
3	A60215818004	Mr SHASHWAT MOHANTY	100	0	100	A	9	2	2	18

Total No. of Students	=	3		
Total No. of Students	>60% marks	3	100.00	%
Attainment Level			Level 3	

AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : STRUCTURAL STEEL DESIGN
Course Code : BTCE 701, Crédits : 04, Session :2019-20 (Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. P. Mahakavi

EE. *Introduction:* *The objective of this course is to* to learn the behavior and design of structural steel.To gain an educational and comprehensive experience in the design of steel structures.To apply the principles, procedures and current code requirements to the design of steelstructural members.

FF. Course Outcomes: At the end of the course, students will be able to:

BTCE701.1.*Understand the behavior and design the framed steel structures*
BTCE701.2.*Identify and compute the design loads for industrial structures*
BTCE701.3.*Understand the design of steel-concrete composite structures*
BTCE701.4.*Develop complete drawings of steel structures including all details of sections and connections.*

GG. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

HH. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems
PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment
PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

II. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%

Total			100%

JJ. Syllabus

Module I: Design of steel girders

Analysis and design of laterally restrained – unrestrained – simple and compound beams – open web girders – castellated beams–deflection criteria - check for shear.

Module II: Design of compression members

Axially and eccentrically loaded compression members - built up columns - lacings and battens - design of column bases.

A project involving the design and detailing of a Mill bent is envisaged at this stage.

Module III: Roof truss

Introduction to steel roof systems - design of roof trusses – design of roofing elements and purlin – wind bracings.

A project involving the design and detailing of a roof truss is envisaged at this stage.

Module IV: Plastic Analysis

Plastic theory: introduction - plastic hinge concept - plastic modulus - shape factor - redistribution of moments - collapse mechanism - plastic analysis of beams and portal frames by equilibrium and mechanism methods

KK. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

LL. Suggested Text/Reference Books:

- Ramchandra, Design of Steel Structures Vol I and II, Standard book house, 1991
- P. Dayaratnam, Design of Steel Structures, (Wheeler), 1998
- M. Raghupathi, Design of Steel Structures, Tata McGraw Hill, 1985
- Lin & Breslar, Design of Steel Structures, John Wiley & Sons, 1963
- BIS codes (IS 800, SP: 6 – Part 1 to 6).

MM. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Analysis and design of laterally restrained	Lecture	BTCE701.1	Mid Term-1, Quiz & End Sem Exam
2	Analysis and design of laterally restrained	Lecture	BTCE701.1	Mid Term-1, Quiz & End Sem Exam
3	unrestrained	Lecture	BTCE701.1	Mid Term-1, Quiz & End Sem Exam

4	unrestrained	Lecture	BTCE701.1	Mid Term-1, Quiz & End Sem Exam
5	simple and compound beams	Lecture	BTCE701.1	Mid Term-1, Quiz & End Sem Exam
6	simple and compound beams	Lecture	BTCE701.1	Mid Term-1, Quiz & End Sem Exam
7	open web girders	Lecture	BTCE701.1	Mid Term-1, Quiz & End Sem Exam
8	open web girders	Lecture	BTCE701.1	Mid Term-1, Quiz & End Sem Exam
9	castellated beams	Lecture	BTCE701.1	Mid Term-1, Quiz & End Sem Exam
10	castellated beams	Lecture	BTCE701.1	Mid Term-1, Quiz & End Sem Exam
11	deflection criteria	Lecture	BTCE701.1	Mid Term-1, Quiz & End Sem Exam
12	check for shear	Lecture	BTCE701.1	Mid Term-1, Quiz & End Sem Exam
13	Axially and eccentrically loaded compression members	Lecture	BTCE701.2	Mid Term-1, Quiz & End Sem Exam
14	Axially and eccentrically loaded compression members	Lecture	BTCE701.2	Mid Term-1, Quiz & End Sem Exam
15	Axially and eccentrically loaded compression members	Lecture	BTCE701.2	Mid Term-1, Quiz & End Sem Exam
16	built up columns	Lecture	BTCE701.2	Mid Term-1, Quiz & End Sem Exam
17	built up columns	Lecture	BTCE701.2	Mid Term-1, Quiz & End Sem Exam
18	built up columns	Lecture	BTCE701.2	Mid Term-1, Quiz & End Sem Exam
19	lacings and battens	Lecture	BTCE701.2	Mid Term-1, Quiz & End Sem Exam
20	lacings and battens	Lecture	BTCE701.2	Mid Term-1, Quiz & End Sem Exam
21	lacings and battens	Lecture	BTCE701.2	Assignment, Quiz & End Sem Exam
22	design of column bases	Lecture	BTCE701.2	Assignment, Quiz & End Sem Exam
23	design of column bases	Lecture	BTCE701.2	Assignment, Quiz & End Sem Exam
24	design of column bases	Lecture	BTCE701.2	Assignment, Quiz & End Sem Exam
25	Introduction to steel roof systems	Lecture	BTCE701.3	Assignment, Quiz & End Sem Exam
26	Introduction to steel roof systems	Lecture	BTCE701.3	Assignment, Quiz & End Sem Exam
27	Introduction to steel roof systems	Lecture	BTCE701.3	Assignment, Quiz & End Sem Exam
28	design of roof trusses	Lecture	BTCE701.3	Assignment, Quiz

				& End Sem Exam
29	design of roof trusses	Lecture	BTCE701.3	Assignment, Quiz & End Sem Exam
30	design of roof trusses	Lecture	BTCE701.3	Assignment, Quiz & End Sem Exam
31	design of roofing elements and purlin	Lecture	BTCE701.3	Assignment, Quiz & End Sem Exam
32	design of roofing elements and purlin	Lecture	BTCE701.3	Assignment, Quiz & End Sem Exam
33	design of roofing elements and purlin	Lecture	BTCE701.3	Assignment, Quiz & End Sem Exam
34	wind bracings	Lecture	BTCE701.3	Assignment, Quiz & End Sem Exam
35	wind bracings	Lecture	BTCE701.3	Assignment, Quiz & End Sem Exam
36	wind bracings	Lecture	BTCE701.3	Mid Term-1, Quiz & End Sem Exam
37	Plastic theory	Lecture	BTCE701.4	Mid Term-1, Quiz & End Sem Exam
38	introduction	Lecture	BTCE701.4	Mid Term-1, Quiz & End Sem Exam
39	plastic hinge concept	Lecture	BTCE701.4	Mid Term-1, Quiz & End Sem Exam
40	plastic modulus	Lecture	BTCE701.4	Mid Term-1, Quiz & End Sem Exam
41	shape factor	Lecture	BTCE701.4	Mid Term-1, Quiz & End Sem Exam
42	redistribution of moments	Lecture	BTCE701.4	Mid Term-1, Quiz & End Sem Exam
43	collapse mechanism	Lecture	BTCE701.4	Mid Term-1, Quiz & End Sem Exam
44	plastic analysis of beams	Lecture	BTCE701.4	Mid Term-1, Quiz & End Sem Exam
45	portal frames by equilibrium	Lecture	BTCE701.4	Mid Term-1, Quiz & End Sem Exam
46	portal frames by equilibrium	Lecture	BTCE701.4	Mid Term-1, Quiz & End Sem Exam
47	mechanism methods	Lecture	BTCE701.4	Mid Term-1, Quiz & End Sem Exam
48	mechanism methods	Lecture	BTCE701.4	Mid Term-1, Quiz & End Sem Exam

NN. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES	CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE701.1.	Understand the behavior and design the framed steel structures	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
BTCE701.2.	Identify and compute the design loads for industrial structures	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE701.3.	Understand the design of steel-concrete composite structures	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
BTCE701.4.	Develop complete drawings of steel structures including all details of sections and connections.	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**

S. No.	Enrollment.No.	Student's Name	BTCE701 STRUCTURAL STEEL DESIGN Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U1G1
1	A60215817001	Mr UDDESHYA UPADHYAY	100	30	70	B+	7	4	4	28
2	A60215817003	Ms NEHA KARAIYA	100	30	70	A	9	4	4	36
3	A60215817005	Mr RAHUL PINGLE	100	30	70	B+	7	4	4	28
4	A60515817001	Mr KARAN SINGH SIKARWAR	100	30	70	B+	7	4	4	28
5	A60515817003	Mr DHANANJAY CHAUHAN	100	30	70	B+	7	4	4	28
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	1	20.00	%	
			Attainment Level					-		

AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : ENVIRONMENTAL ENGINEERING - II
Course Code : BTCE702, Crédits : 03, Session :2019-20 (Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Imran Ahmad Khan

K. ***Introduction:*** *The objective of this course is to* teach students the basic principles and concepts of unit operations and processes involvedin water and wastewater treatment. To develop a student's skill in the basic design of unit operations and processesinvolved in water and wastewater treatment. To develop a student's skill in evaluating the performance of water and wastewater treatmentplants. To teach students the various methods of sludge management

L. Course Outcomes: At the end of the course, students will be able to:

BTCE702.1. Able to design individual unit operation or process appropriate to the situation by applying physical, chemical, biological and engineering principles.

BTCE702.2. Able to identify the type of unit operations and processes involved in water and wastewater treatment plants based on the water quality

BTCE702.3. Investigate the performance of various unit operations and processes to meet the desired health and environment related goals.

BTCE702.4. Understand sludge management and disposal

M. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

N. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

O. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be	A	5%

	qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

P. Syllabus

Module I

Sanitary plumbing – sanitary fixtures – systems of piping – house drainage– connection of house drains and street sewers. Systems of sewerage– Dry weather flow and wet weather flow– sewers and sewer appurtenances – sewage pumping – maintenance of sewers.

Module II

Waste water- Characteristics– sampling – population equivalent — preliminary treatment of waste water – screens – grit chamber – detritus tank – Sedimentation tank.
Biological treatment (process details and design considerations) - Aerobic- Activated Sludge Process- Trickling Filter- Oxidation Ponds

Module III

Anaerobic treatment- Anaerobic digesters- Septic Tanks- Soak pits
Waste water disposal – disposal into stream –fundamentals of stream sanitation- disposal by irrigation – sludge treatment and disposal

Module IV

Solid waste management: Generation- on site handling and storage- transfer and transportprocessing- resource recovery- treatment and disposal.
Air pollution and control – sources –pollutants and their health effects– particulate and gaseous pollution control devices (fundamentals)-Settling chambers- Electrostatic precipitators- Cyclones- Wet Collectors-Gas absorption by tray and packed towers

Module V: Industrial Visit

At least one visit to industry with in India in the field of Civil Engineering maximum three working days duration.

Q. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

R. Suggested Text/Reference Books:

- Birdie G. S and Birdie J.S, Water Supply and Sanitary Engineering, Dhanpat Rai and Sons (1998), New Delhi
- Duggal K.N., Elements of Environmental Engineering, S. Chand and Co. Ltd. (2000), New Delhi
- Garg S.K, Environmental Engineering Vol. II¸ Khanna Publications (2001) New Delhi
- Ehlers VM & Steel EW, Municipal & Rural Sanitation, 6th Edn.(1965)McGraw Hill.
- Sawyer and McCarte, Chemistry for Environmental Engineering, Tata McGraw-Hill, (2003) New Delhi,.
- Fair, Geyer & Okun, Water and Waste water Engineering, John Wiley & sons, Inc (1966)
- Metcalf & Eddy, Waste Water Engineering Treatment, Disposal & Reuse, Tata McGraw Hill (1979)

S. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Sanitary plumbing	Lecture	BTCE702.1	Mid Term-1, Quiz & End Sem Exam
2	sanitary fixtures	Lecture	BTCE702.1	Mid Term-1, Quiz & End Sem Exam
3	systems of piping	Lecture	BTCE702.1	Mid Term-1, Quiz & End Sem Exam
4	house drainage	Lecture	BTCE702.1	Mid Term-1, Quiz & End Sem Exam
5	connection of house drains and street sewers	Lecture	BTCE702.1	Mid Term-1, Quiz & End Sem Exam
6	Systems of sewerage	Lecture	BTCE702.1	Mid Term-1, Quiz & End Sem Exam
7	Dry weather flow and wet weather flow	Lecture	BTCE702.1	Mid Term-1, Quiz & End Sem Exam
8	sewers and sewer appurtenances	Lecture	BTCE702.1	Mid Term-1, Quiz & End Sem Exam
9	sewage pumping – maintenance of sewers	Lecture	BTCE702.1	Mid Term-1, Quiz & End Sem Exam
10	Waste water- Characteristics– sampling	Lecture	BTCE702.2	Mid Term-1, Quiz & End Sem Exam
11	population equivalent	Lecture	BTCE702.2	Mid Term-1, Quiz & End Sem Exam
12	preliminary treatment of waste water	Lecture	BTCE702.2	Mid Term-1, Quiz & End Sem Exam
13	screens – grit chamber	Lecture	BTCE702.2	Mid Term-1, Quiz & End Sem Exam
14	detritus tank – Sedimentation tank	Lecture	BTCE702.2	Mid Term-1, Quiz & End Sem Exam
15	Biological treatment (process details and design considerations)	Lecture	BTCE702.2	Mid Term-1, Quiz & End Sem Exam
16	Aerobic- Activated Sludge Process	Lecture	BTCE702.2	Mid Term-1, Quiz & End Sem Exam
17	Trickling Filter	Lecture	BTCE702.2	Mid Term-1, Quiz & End Sem Exam
18	Oxidation Ponds	Lecture	BTCE702.2	Mid Term-1, Quiz & End Sem Exam
19	Anaerobic treatment	Lecture	BTCE702.3	Mid Term-1, Quiz & End Sem Exam
20	Anaerobic digesters	Lecture	BTCE702.3	Mid Term-1, Quiz & End Sem Exam
21	Septic Tanks- Soak pits	Lecture	BTCE702.3	Assignment, Quiz & End Sem Exam
22	Waste water disposal	Lecture	BTCE702.3	Assignment, Quiz & End Sem Exam
23	disposal into stream	Lecture	BTCE702.3	Assignment, Quiz & End Sem Exam

24	fundamentals of stream l	Lecture	BTCE702.3	Assignment, Quiz & End Sem Exam
25	disposal by irrigation	Lecture	BTCE702.3	Assignment, Quiz & End Sem Exam
26	sludge treatment	Lecture	BTCE702.3	Assignment, Quiz & End Sem Exam
27	disposal	Lecture	BTCE702.3	Assignment, Quiz & End Sem Exam
28	Solid waste management:	Lecture	BTCE702.4	Assignment, Quiz & End Sem Exam
29	Generation- on site handling	Lecture	BTCE702.4	Assignment, Quiz & End Sem Exam
30	storage- transfer	Lecture	BTCE702.4	Assignment, Quiz & End Sem Exam
31	Transportprocessing	Lecture	BTCE702.4	Assignment, Quiz & End Sem Exam
32	resource recovery- treatment and disposal.	Lecture	BTCE702.4	Assignment, Quiz & End Sem Exam
33	Air pollution and control – sources –pollutants and their health effects	Lecture	BTCE702.4	Assignment, Quiz & End Sem Exam
34	particulate and gaseous pollution control devices (fundamentals)-	Lecture	BTCE702.4	Assignment, Quiz & End Sem Exam
35	Settling chambers- Electrostatic precipitators- Cyclones	Lecture	BTCE702.4	Assignment, Quiz & End Sem Exam
36	Wet Collectors-Gas absorption by tray and packed towers	Lecture	BTCE702.4	Mid Term-1, Quiz & End Sem Exam

T. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE702.1 .	Able to design individual unit operation or process appropriate to the situation by applying physical, chemical, biological and engineering principles.	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**

BTCE702.2 .	Able to identify the type of unit operations and processes involved in water and wastewater treatment plants based on the water quality	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE702.3.	Investigate the performance of various unit operations and processes to meet the desired health and environment related goals.	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
BTCE702.4.	Understand sludge management and disposal	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**

S. No.	Enrollment.No.	Student's Name	BTCE702 ENVIRONMENTAL ENGINEERING - II							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U2G2
1	A60215817001	Mr UDDESHYA UPADHYAY	100	30	70	A	9	3	3	27
2	A60215817003	Ms NEHA KARAIYA	100	30	70	A+	10	3	3	30
3	A60215817005	Mr RAHUL PINGLE	100	30	70	A+	10	3	3	30
4	A60515817001	Mr KARAN SINGH SIKARWAR	100	30	70	A	9	3	3	27
5	A60515817003	Mr DHANANJAY CHAUHAN	100	30	70	A+	10	3	3	30
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	5	100.00	%	
			Attainment Level				Level 3			

AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : DESIGN OF HYDRAULIC STRUCTURES
Course Code : BTCE703, Crédits : 03, Session :2019-20 (Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia, Dr. Imran Ahmad Khan, Dr. Ripunjoy Gogoi, Dr. P. Mahakavi, Mr. Sachin Tiwari

K. **Introduction:** The objective of this course is to understand the various concepts of water resources engineering. The course introduces the concept of hydrology, ground water and then deals with irrigation engineering. It also deals with design of dam.

L. **Course Outcomes:** At the end of the course, students will be able to:

BTCE703.1. Identify different component in an head work and its use

BTCE703.2 Design the head work of an irrigation system

BTCE703.3 Design the drops, escapes and outlet for the canal system

BTCE703.4 Describe various storage zones in an reservoir

BTCE703.5 Calculate different types of forces acting on a dam and design it

M. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

N. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

O. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%

End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

P. Syllabus

Moduls I : Diversion head work

Diversion head works-Location – Essential components of Weir and Barrage – Weirs on permeable foundations- Blighs and khoslas seepage theories – Design procedure.

Moduls II : Earthen Dams and Rock fill Dams

Dams – Types of dams and their selection

Types, causes of failure and design criteria, soils suitable for earth dam construction, construction methods, foundation requirements, typical earth dam sections, estimation of seepage through and below the dam, seepage control, stability of slopes by slip circle method of analysis, pore pressure, sudden draw down, steady seepage and construction pore pressure condition. Rock fill dams: Types, merits and demerits, conditions favourable for their adoption.

Moduls III : Gravity dams

Gravity dam- Analysis and design.

Gravity dams: Design Criteria, forces acting on gravity dams, elementary profile, low and high gravity dams, stability analysis, evaluation of profile by method of zoning, practical profile, foundation treatment, construction joints, galleries in gravity dam

Moduls IV : Spillways

Different types and suitability

Ogee spill way and its design, details of syphon, shaft, chute and side channel spillways, emergency spillways.

Energy dissipatiors and gates: Principles of energy dissipation Energy dissiptors based on tail water rating curve and jump height curves Spillway crest gates- vertical lift and radial gates, their design principles and details. Design of canal regulating structures, Detailed design of Sarda Falls, design of cross drainage works,sphypon aquaduct.

Moduls V : Regulation and control of canal system

Purpose, Types of canal regulation works and their function aspects. Irrigation Outlets- Requirements, Types, non-moular, semi- module and rigid module, selection criterion. River Training – Objective and need, classification of rivers and rivers, and river training works, meandering, stages, methods of river training, bank protection,Methods for measurement of discharge.

Q. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

R. Suggested Text/Reference Books:

- Irrigation Engg and Hydraulic Structures by S.K.Garg, Khanna Publishers.
- Irrigation. Water Resources, and water power Engineering By Dr.P.N.Modi, Standard Book House 1990
- Engineering Hydrology by K. Subramanya, TMH.
- Irrigation Water Power and Water Resource Engg. By K.R. Arora.
- Water Resources Engg. By Larry W. Mays, John Wiley India
- Water Resources Engg. By Wurbs and James, John wiley India
- Water Resources Engg. By R.K.Linsely, McGraw Hill
- Irrigation and water Resources Engg.By G L Asawa, New age International Publishers
- Irrigation Theory and practices by A.M.Michel.

- Irrigation and water Power engineering by B.C.Punmia, Laxmi Publishers.

S. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Diversion head works	Lecture	BTCE703.1	Mid Term-1, Quiz & End Sem Exam
2	Location	Lecture	BTCE703.1	Mid Term-1, Quiz & End Sem Exam
3	Essential components of Weir and Barrage	Lecture	BTCE703.1	Mid Term-1, Quiz & End Sem Exam
4	Weirs on permeable foundations	Lecture	BTCE703.1	Mid Term-1, Quiz & End Sem Exam
5	Blighs and khoslas seepage theories	Lecture	BTCE703.1	Mid Term-1, Quiz & End Sem Exam
6	Design procedure	Lecture	BTCE703.1	Mid Term-1, Quiz & End Sem Exam
7	Design procedure	Lecture	BTCE703.1	Mid Term-1, Quiz & End Sem Exam
8	Dams – Types of dams and their selection	Lecture	BTCE703.2	Mid Term-1, Quiz & End Sem Exam
9	Types, causes of failure and design criteria, soils suitable for earth dam construction	Lecture	BTCE703.2	Mid Term-1, Quiz & End Sem Exam
10	construction methods, foundation requirements.	Lecture	BTCE703.2	Mid Term-1, Quiz & End Sem Exam
11	typical earth dam sections, estimation of seepage through and below the dam	Lecture	BTCE703.2	Mid Term-1, Quiz & End Sem Exam
12	seepage control, stability of slopes by slip circle method of analysis, pore pressure	Lecture	BTCE703.2	Mid Term-1, Quiz & End Sem Exam
13	sudden draw down, steady seepage and construction pore pressure condition	Lecture	BTCE703.2	Mid Term-1, Quiz & End Sem Exam
14	Rock fill dams: Types, merits and demerits, conditions favourable for their adoption.	Lecture	BTCE703.2	Mid Term-1, Quiz & End Sem Exam
15	Gravity dam- Analysis and design.	Lecture	BTCE703.3	Mid Term-1, Quiz & End Sem Exam
16	Gravity dams: Design Criteria	Lecture	BTCE703.3	Mid Term-1, Quiz & End Sem Exam
17	forces acting on gravity dams	Lecture	BTCE703.3	Mid Term-1, Quiz & End Sem Exam
18	elementary profile, low and high gravity dams	Lecture	BTCE703.3	Mid Term-1, Quiz & End Sem Exam
19	stability analysis, evaluation of profile by method of zoning,	Lecture	BTCE703.3	Mid Term-1, Quiz & End Sem Exam
20	practical profile, foundation treatment,	Lecture	BTCE703.3	Mid Term-1, Quiz & End Sem Exam
21	construction joints, galleries in	Lecture	BTCE703.3	Assignment, Quiz

	gravity dam			& End Sem Exam
22	Different types and suitability	Lecture	BTCE703.4	Assignment, Quiz & End Sem Exam
23	Ogee spill way and its design, details of syphon	Lecture	BTCE703.4	Assignment, Quiz & End Sem Exam
24	shaft, chute and side channel spillways,	Lecture	BTCE703.4	Assignment, Quiz & End Sem Exam
25	emergency spillways. Energy dissipatiors and gates: Principles of energy dissipation	Lecture	BTCE703.4	Assignment, Quiz & End Sem Exam
26	Energy dissiptors based on tail water rating curve and jump height curves Spillway crest gates- vertical lift and radial gates, their design principles and details.	Lecture	BTCE703.4	Assignment, Quiz & End Sem Exam
27	Design of canal regulating structures, Detailed design of Sarda Falls, design of cross drainage works,sphypon aquaduct.	Lecture	BTCE703.4	Assignment, Quiz & End Sem Exam
28	Purpose, Types of canal regulation works and their function aspects.	Lecture	BTCE703.4	Assignment, Quiz & End Sem Exam
29	Irrigation Outlets- Requirements,	Lecture	BTCE703.5	Assignment, Quiz & End Sem Exam
30	Types, non-moular, semi- module and rigid module,	Lecture	BTCE703.5	Assignment, Quiz & End Sem Exam
31	selection criterion. River Training – Objective and need	Lecture	BTCE703.5	Assignment, Quiz & End Sem Exam
32	classification of rivers and rivers	Lecture	BTCE703.5	Assignment, Quiz & End Sem Exam
33	river training works, meandering, stages	Lecture	BTCE703.5	Assignment, Quiz & End Sem Exam
34	methods of river training	Lecture	BTCE703.5	Assignment, Quiz & End Sem Exam
35	bank protection	Lecture	BTCE703.5	Assignment, Quiz & End Sem Exam
36	Methods for measurement of discharge.	Lecture	BTCE703.5	Assignment, Quiz & End Sem Exam

T. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

BTCE703.1	Identify different component in an head work and its use	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
BTCE703.2	Design the head work of an irrigation system	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE703.3	Design the drops, escapes and outlet for the canal system	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
BTCE703.4	Describe various storage zones in an reservoir	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**
BTCE703.5	Calculate different types of forces acting on a dam and design it	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**

S. No.	Enrollment.No.	Student's Name	BTCE703 DESIGN OF HYDRAULIC STRUCTURES							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U3G3
1	A60215817001	Mr UDDESHYA UPADHYAY	100	30	70	A	9	3	3	27
2	A60215817003	Ms NEHA KARAIYA	100	30	70	A+	10	3	3	30
3	A60215817005	Mr RAHUL PINGLE	100	30	70	A+	10	3	3	30
4	A60515817001	Mr KARAN SINGH SIKARWAR	100	30	70	A+	10	3	3	30
5	A60515817003	Mr DHANANJAY CHAUHAN	100	30	70	A+	10	3	3	30

Total No. of Students	=	5		
Total No. of Students	>60% marks	5	100.00	%
Attainment Level			Level 3	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : ENVIRONMENTAL ENGINEERING LAB
Course Code : BTCE720 Crédits : 01, Session :2019-20 (Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia, Dr. Imran Ahmad Khan, Dr. Ripunjoy Gogoi, Dr. P. Mahakavi, Mr. Sachin Tiwari

A. ***Introduction:*** *The objective of this course is to* teach students the basic principles and concepts of unit operations and processes involvedin water and wastewater treatment. To develop a student's skill in the basic design of unit operations and processesinvolved in water and wastewater treatment. To develop a student's skill in evaluating the performance of water and wastewater treatmentplants. To teach students the various methods of sludge management

B. **Course Outcomes:** At the end of the course, students will be able to:
BTCE720.1. Able to design individual unit operation or process appropriate to the situation by applying physical, chemical, biological and engineering principles.
BTCE720.2. Able to identify the type of unit operations and processes involved in water and wastewater treatment plants based on the water quality
BTCE720.3. Investigate the performance of various unit operations and processes to meet the desired health and environment related goals.
BTCE720.4. Understand sludge management and disposal

K. **Programme Outcomes:**
PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

L. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

M. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

N. Syllabus

1. Determination of solids (total, dissolved, organic, inorganic and settleable) in water

2. Determination of turbidity and the optimum coagulant dose

3. Determination of alkalinity and pH of water

4. Determination of hardness and chlorides in water

5. Determination of iron and manganese in water

6. Determination of sulphates and sulphides in water

7. Determination of D.O and B.O.D of waste water

8. Determination of available chlorine in bleaching powder and the chlorine dose required to treat the given water sample

9. Determination of coliforms in water

10. Demonstration of Instrumental methods of pollutant analysis

O. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

P. Suggested Text/Reference Books:

- Standard method for the examination of water and waste water, 2005, APHA, AWWA, WPCF Publication

Q. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Determination of solids (total, dissolved, organic, inorganic and settleable) in water	Practical	BTCE720.1	Mid Term-1, Quiz & End Sem Exam
2	Determination of turbidity and the optimum coagulant dose	Practical	BTCE720.1	Mid Term-1, Quiz & End Sem Exam
3	Determination of alkalinity and pH of water	Practical	BTCE720.1	Mid Term-1, Quiz & End Sem Exam
4	Determination of hardness and chlorides in water	Practical	BTCE720.2	Mid Term-1, Quiz & End Sem Exam
5	Determination of iron and manganese in water	Practical	BTCE720.2	Mid Term-1, Quiz & End Sem Exam
6	Determination of sulphates and sulphides in water	Practical	BTCE720.2	Mid Term-1, Quiz & End Sem Exam
7	Determination of D.O and B.O.D of waste water	Practical	BTCE720.3	Mid Term-1, Quiz & End Sem Exam

8	Determination of available chlorine in bleaching powder and the chlorine dose required to treat the given water sample	Practical	BTCE720.3	Mid Term-1, Quiz & End Sem Exam
9	Determination of coliforms in water	Practical	BTCE720.3	Mid Term-1, Quiz & End Sem Exam
10	Determination of coliforms in water	Practical	BTCE720.4	Mid Term-1, Quiz & End Sem Exam
11	Demonstration of Instrumental methods of pollutant analysis	Practical	BTCE720.4	Mid Term-1, Quiz & End Sem Exam
12	Demonstration of Instrumental methods of pollutant analysis	Practical	BTCE720.4	Mid Term-1, Quiz & End Sem Exam

R. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE720.1	Able to design individual unit operation or process appropriate to the situation by applying physical, chemical, biological and engineering principles.	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
BTCE720.2	Able to identify the type of unit operations and processes involved in water and wastewater treatment plants based on the water quality	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE720.3	Investigate the performance of various unit operations and processes to meet the desired health and environment	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**

	related goals.															
BTCE720.4	Understand sludge management and disposal	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**

S. No.	Enrollment.No.	Student's Name	BTCE720 ENVIRONMENTAL ENGINEERING LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U4G4
1	A60215817001	Mr UDDESHYA UPADHYAY	100	30	70	A	9	1	1	9
2	A60215817003	Ms NEHA KARAIYA	100	30	70	A+	10	1	1	10
3	A60215817005	Mr RAHUL PINGLE	100	30	70	A+	10	1	1	10
4	A60515817001	Mr KARAN SINGH SIKARWAR	100	30	70	A+	10	1	1	10
5	A60515817003	Mr DHANANJAY CHAUHAN	100	30	70	A+	10	1	1	10

Total No. of Students	=	5		
Total No. of Students	>60% marks	5	100.00	%
Attainment Level			Level 3	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : STRUCTURAL DETAILING LAB
Course Code : BTCE721 Crédits : 01, Session :2019-20 (Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia, Dr. Imran Ahmad Khan, Dr. Ripunjoy Gogoi, Dr. P. Mahakavi, Mr. Sachin Tiwari

C. ***Introduction:*** *The objective of this course is to* understand the design of columns. To understand the design of beams. To know the importance of the beams and its applications. To apply the numerical techniques for different structural elements. To study the different numerical procedures for calculating the response of structures. To learn the design of frames, slabs.

D. **Course Outcomes:** At the end of the course, students will be able to:
BTCE721.1. Understand the designand theories of slabs.
BTCE721.2. Understand the design and theories of columns.
BTCE721.3. Understand the design and theories of beams.
BTCE721.4. Understand the design and theories of foundations.

S. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

T. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

U. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

V. Syllabus

Preparation of working drawings for the following using any drafting software:

RC Beams- Simply supported, Continuous, Cantilever

T – beam / L-beam floor

Slabs – Simply supported, Continuous, One way and two way slabs.

Columns – Tied Columns and Spirally reinforced columns.

Isolated footings for RC Columns.

Combined rectangular and trapezoidal footings.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

W. Suggested Text/Reference Books:

- SPurushothaman. P, Reinforced Concrete Structural Elements-, Tata McGraw Hill, 1986
- G.S. Ramaswamy, Design and Construction of Concrete Shell Roofs-CBS publishers, 1986
- Ashok K Jain, Reinforced Concrete –Nem Chand Bros. Roorkee, 1998
- Jain & Jaikrishna, Plain and Reinforced Concrete – Vol I & II, Nem Chand Bros., Roorkee, 2000.
- Taylor C Pere, Reinforced Concrete Chimneys, Concrete publications, 1960
- Design of deep girders, Concrete Association of India, 1960
- Mallick & Gupta, Reinforced Concrete, - Oxford & IBH, 1982
- BIS codes (IS 456, IS 2210, IS 4998, IS 3370, SP 16, SP 24, SP 34).
- IRC Codes (IRC 5, IRC 6, IRC 21)

X. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	RC Beams- Simply supported, Continuous, Cantileve	Practical	BTCE721.1	Mid Term-1, Quiz & End Sem Exam
2	RC Beams- Simply supported, Continuous, Cantileve	Practical	BTCE721.1	Mid Term-1, Quiz & End Sem Exam
3	T – beam / L-beam floor	Practical	BTCE721.1	Mid Term-1, Quiz & End Sem Exam
4	T – beam / L-beam floor	Practical	BTCE721.2	Mid Term-1, Quiz & End Sem Exam
5	Slabs – Simply supported, Continuous, One way and two way slabs.	Practical	BTCE721.2	Mid Term-1, Quiz & End Sem Exam
6	Slabs – Simply supported, Continuous, One way and two way slabs.	Practical	BTCE721.2	Mid Term-1, Quiz & End Sem Exam

7	Columns – Tied Columns and Spirally reinforced columns.	Practical	BTCE721.3	Mid Term-1, Quiz & End Sem Exam
8	Columns – Tied Columns and Spirally reinforced columns.	Practical	BTCE721.3	Mid Term-1, Quiz & End Sem Exam
9	Isolated footings for RC Column	Practical	BTCE721.3	Mid Term-1, Quiz & End Sem Exam
10	Isolated footings for RC Column	Practical	BTCE721.4	Mid Term-1, Quiz & End Sem Exam
11	Combined rectangular and trapezoidal footings	Practical	BTCE721.4	Mid Term-1, Quiz & End Sem Exam
12	Combined rectangular and trapezoidal footings	Practical	BTCE721.4	Mid Term-1, Quiz & End Sem Exam

Y. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE721.1	Understand the design and theories of slabs.	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
BTCE721.2	Understand the design and theories of columns.	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
BTCE721.3	Understand the design and theories of beams.	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
BTCE721.4	Understand the design and theories of foundations.	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**

S. No.	Enrollment.No.	Student's Name	BTCE721 STRUCTURAL DETAILING LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U5G5
1	A60215817001	Mr UDDESHYA UPADHYAY	100	30	70	A-	8	1	1	8
2	A60215817003	Ms NEHA KARAIYA	100	30	70	A	9	1	1	9
3	A60215817005	Mr RAHUL PINGLE	100	30	70	A	9	1	1	9
4	A60515817001	Mr KARAN SINGH SIKARWAR	100	30	70	A	9	1	1	9
5	A60515817003	Mr DHANANJAY CHAUHAN	100	30	70	A+	10	1	1	10
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	5	100.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **PROJECT**
Course Code : BTCE760, Crédits : 06, Session :2019-20 (Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia, Dr. Imran Ahmad Khan, Dr. Ripunjoy Gogoi, Dr. P. Mahakavi, Mr. Sachin Tiwari

K. **Introduction:** The objective of project is to enable the student to take up investigative study in the broad field of Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the Department on an individual basis or two/three students in a group, under the guidance of a Supervisor.

L. **Course Outcomes:**At the end of the course, students will be able to:

BTCE760.1. Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.

BTCE760.2. Design, implement and test the prototype/algorithm in order to solve the conceived problem.

BTCE760.3. Write comprehensive report on project work.

M. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

N. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

O. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
End Semester Examination	End Semester Examination	EE	100%
Total			**100%**

P. Syllabus

Methodology:

Practical training is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

Q. Examination Scheme:

Literature study/ Fabrication/ Experimentation	40
Written Report	20
Viva	15
Presentation	25
Total	**100**

R. Suggested Text/Reference Books: NA

S. Lecture Plan : NA

T. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

BTCE760. 1	*Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.*	3	**2**	1	3	1	**-**	**-**	**-**	2		2	1	**1**	**2**	**1**
BTCE760. 2	*Design, implement and test the prototype/algorithm in order to solve the conceived problem.*	3	1	2	2	2	**-**	**-**	**-**	2		1	1	**3**	**2**	**3**
BTCE760. 3	*Write comprehensive report on project work*	2	2	2	2	2	**-**	**-**	**-**	3		3	1	**3**	**3**	**2**

S. No.	Enrollment.No.	Student's Name	BTCE760 PROJECT Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U10G10
1	A60215817001	Mr UDDESHYA UPADHYAY	100	0	100	A	9	6	6	54
2	A60215817003	Ms NEHA KARAIYA	100	0	100	A	9	6	6	54
3	A60215817005	Mr RAHUL PINGLE	100	0	100	A-	8	6	6	48
4	A60515817001	Mr KARAN SINGH SIKARWAR	100	0	100	A-	8	6	6	48
5	A60515817003	Mr DHANANJAY CHAUHAN	100	0	100	A+	10	6	6	60
			Total No. of Students			=	5			
			Total No. of Students			>60 % marks	5	100.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **INDUSTRIAL TRAINING**
Course Code : BTCE750, Crédits : 06, Session :2019-20 (Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia, Dr. Imran Ahmad Khan, Dr. Ripunjoy Gogoi, Dr. P. Mahakavi, Mr. Sachin Tiwari

K. Introduction: The objective of this course is to enable the students to explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills. It will help them to manage the technical content and work. It will also help them to prepare and present technical report..

L. Course Outcomes: At the end of the course, students will be able to:

BTCE750.1. Explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills.

BTCE750.2. Manage the technical content and work.

BTCE750.3. Learn the various administrative process followed in industry and prepare and present technical report.

M. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

N. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

O. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
End Semester Examination	End Semester Examination	EE	100%
Total			**100%**

P. Syllabus

Methodology:

Industrial training is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the practical

training the students are to present a report covering various aspects learnt by them and give a presentation on same.

Q. Examination Scheme:

Feedback from industry/work place	20
Training Report	40
Viva	15
Presentation	25
Total	**100**

R. Suggested Text/Reference Books: NA

S. Lecture Plan : NA

T. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE750.1	Explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills.	3	**2**	1	3	1	-	-	-	2		2	1	**1**	**2**	**1**
BTCE750.2	Manage the technical content and work.	3	1	2	2	2	-	-	-	2		1	1	**3**	**2**	**3**
BTCE750.3	Learn the various administrative process followed in industry and prepare and present technical report.	2	2	2	2	2	-	-	-	3		3	1	**3**	**3**	**2**

AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

PROGRAMME ARTICULATION MATRIX

4th Year		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
VIII SEM	BTCE-801	3	2	2	-	2	-	-	3	2	-	-	2	3	-	2
	BTCE-802	3	2	2	-	-	-	1	-	-	-	-	2	3	-	2
	BTCE-804	3	2	2	-	2	-	1	-	-	-	-	2	3	-	2
	BTCE-86 0	3	2	2	-	2	-	1	-	-	-	-	2	3	-	2

S. No.	Enrollment. No.	Student's Name	BTCE750 INDUSTRIAL TRAINING (EVALUATION) Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U11G11
1	A60215817001	Mr UDDESHYA UPADHYAY	100	0	100	A	9	6	6	54
2	A60215817003	Ms NEHA KARAIYA	100	0	100	A	9	6	6	54
3	A60215817005	Mr RAHUL PINGLE	100	0	100	A-	8	6	6	48
4	A60515817001	Mr KARAN SINGH SIKARWAR	100	0	100	A-	8	6	6	48
5	A60515817003	Mr DHANANJAY CHAUHAN	100	0	100	A+	10	6	6	60

Total No. of Students	=	5	
Total No. of Students	>60 % marks	5	100.00 %
Attainment Level			Level 3

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **ADVANCED CONCRETE DESIGN**
Course Code : BTCE 801, Crédits : 04, Session : 2019-20 (Even Sem.), Class : B.Tech. 4th Year
Faculty Name : Mr. Sachin Tiwari

A. Introduction

Design is a plan or drawing produced to show the look and function or workings of a building before it is built. It is also the process of selecting the proper materials and proportioning the different elements of the structure according to state-of-the art engineering science and technology.

B. Course Outcomes: At the end of the course, students will be able to:

- **BTCE 801.1**.Estimate the crack width and deflection with regard to the serviceability. .
- **BTCE 801.2**. Analyse and design a grid floor system. Analyse and design a flat slab system. Discuss fire and seismic resistance of concrete structures

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentt	A	5%

	o be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			100%

F. Course Content

Module I Large span concrete roofs: Introduction– classification- behaviour of flat slabs - direct design and equivalent frame method- codal provisions - waffle slabs.

Module II: Deep beams Analysis of deep beams- design as per BIS - design using strut and tie method.

Chimneys Analysis of stresses in concrete chimneys - uncracked and cracked sections- codal provisions- design of chimney. A project involving the design of a deep beam and concrete chimney is envisaged at this stage.

Module III: Water tanks /Bunkers/Silos: Introduction- rectangular and circular with flat bottom- spherical and conical tank roofs- staging- design as per BIS. A project involving the design and detailing of a water tank is envisaged at this stage.

Module IV: Bridges : Design of slab culvert – R.C box culverts –T-beam bridges – Concept on design of continuous bridges, balanced cantilever bridges, arch bridges and rigid frame bridges. A project involving the design and detailing of a slab culvert/ T-beam bridge is envisaged at this stage.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- Purushothaman. P, Reinforced Concrete Structural Elements-, Tata McGraw Hill, 1986
- G.S. Ramaswamy, Design and Construction of Concrete Shell Roofs-CBS publishers, 1986
- Ashok K Jain, Reinforced Concrete –Nem Chand Bros. Roorkee, 1998
- Jain & Jaikrishna, Plain and Reinforced Concrete – Vol I & II, Nem Chand Bros., Roorkee, 2000.
- Taylor C Pere, Reinforced Concrete Chimneys, Concrete publications, 1960

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Introduction	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
2	classification- behaviour of flat slabs.	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
3	classification- behaviour of flat slabs.	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
4	Design and classification- behaviour of flat slabs.	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
5	direct design and equivalent frame method	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
6	direct design and equivalent frame method	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
7	direct design and equivalent frame method	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
8	direct design and equivalent frame method	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
9	codal provisions for design of flat slab	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
10	codal provisions for design of flat slab	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
11	Analysis of deep beams- design as per BIS - design using strut and tie method.	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
12	Analysis of deep beams design as per BIS - design using strut and tie method.	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
13	Analysis of deep beams design as per BIS - design using strut and tie method.	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
14	**Chimneys** Analysis of stresses in concrete chimneys	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
15	**Chimneys** Analysis of stresses in concrete chimneys	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam

16	**Chimneys** Analysis of stresses in concrete chimneys	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
17	uncracked and cracked sections	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
18	uncracked and cracked sections	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
19	codal provisions- design of chimney. A project involving the design of a deep beam and concrete chimney is envisaged at this stage.	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
20	codal provisions- design of chimney. A project involving the design of a deep beam and concrete chimney is envisaged at this stage.	Lecture	BTCE 801.1	Mid Term-1, Quiz & End Sem Exam
21	codal provisions- design of chimney. A project involving the design of a deep beam and concrete chimney is envisaged at this stage.	Lecture	BTCE 801.1	Mid Term-2, Quiz & End Sem Exam
22	Introduction	Lecture	BTCE 801.1	Mid Term-2, Quiz & End Sem Exam
23	Rectangular and circular with flat bottom- spherical and conical tank roofs- staging- design as per BIS.	Lecture	BTCE 801.1	Mid Term-2, Quiz & End Sem Exam
24	Rectangular and circular with flat bottom- spherical and conical tank roofs- staging- design as per BIS.	Lecture	BTCE 801.1	Mid Term-2, Quiz & End Sem Exam
25	Rectangular and circular with flat bottom- spherical and conical tank roofs- staging- design as per BIS.	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
26	Rectangular and circular with flat bottom- spherical and conical tank roofs- staging- design as per BIS.	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
27	A project involving the design and detailing of a water tank is envisaged at this stage.	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
28	A project involving the design and detailing of a water tank is envisaged at this stage.	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
29	A project involving the design and detailing of a water tank is	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam

	envisaged at this stage.			
30	A project involving the design and detailing of a water tank is envisaged at this stage.	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
31	Design of slab culvert – R.C box culverts –T, balanced cantilever bridges, arch bridges and rigid frame bridges.	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
32	Beam bridges – Concept on design of continuous bridges	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
33	Beam bridges – Concept on design of continuous bridges	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
34	Beam bridges – Concept on design of continuous bridges	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
35	balanced cantilever bridges, arch bridges and rigid frame bridges.	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
36	balanced cantilever bridges, arch bridges and rigid frame bridges	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
37	A project involving the design and detailing of a slab culvert/ T-beam bridge is envisaged at this stage	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
38	A project involving the design and detailing of a slab culvert/ T-beam bridge is envisaged at this stage	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
39	A project involving the design and detailing of a slab culvert/ T-beam bridge is envisaged at this stage	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
40	A project involving the design and detailing of a slab culvert/ T-beam bridge is envisaged at this stage	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
41	Beam bridges – Concept on design of continuous bridges	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
42	Beam bridges – Concept on design of continuous bridges	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
43	balanced cantilever bridges, arch bridges and rigid frame bridges.	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
44	balanced cantilever bridges, arch bridges and rigid frame bridges	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
45	A project involving the design and detailing of a slab culvert/ T-beam bridge is envisaged at this stage	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam

46	A project involving the design and detailing of a slab culvert/ T-beam bridge is envisaged at this stage	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
47	A project involving the design and detailing of a slab culvert/ T-beam bridge is envisaged at this stage	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam
48	A project involving the design and detailing of a slab culvert/ T-beam bridge is envisaged at this stage	Lecture	BTCE 801.2	Mid Term-2, Quiz & End Sem Exam

E. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE 801.1	Estimate the crack width and deflection with regard to the serviceability. .	3	3	1	3	1				2		2	1			
BTCE 801.2	Analyse and design a grid floor system. Analyse and design a flat slab system. Discuss fire and seismic resistance of concrete structures	3	2	2	2	2				2		1	1			

S. No.	Enrollment.No.	Student's Name	BTCE801 ADVANCED CONCRETE DESIGN							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U1G1
1	A60215817001	Mr UDDESHYA UPADHYAY	100	30	70	A-	8	4	4	32
2	A60215817003	Ms NEHA KARAIYA	100	30	70	A	9	4	4	36
3	A60215817005	Mr RAHUL PINGLE	100	30	70	A	9	4	4	36
4	A60515817001	Mr KARAN SINGH SIKARWAR	100	30	70	A	9	4	4	36
5	A60515817003	Mr DHANANJAY CHAUHAN	100	30	70	A+	10	4	4	40

Total No. of Students	=	5		
Total No. of Students	>60% marks	5	100.00	%
Attainment Level			Level 3	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **ENGINEERING ECONOMICS AND MANAGEMENT**
Course Code : BTCE 802, Crédits : 03, Session : 2019-20 (Even Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Ripunjoy Gogoi

A. Introduction

This course aims to enables the Civil Engineering student to become an entrepreneur by understanding the law of economics. To ensure the students to apply different Methods of appraisal of projects and pricing techniques apart from knowing about various Macroeconomics Model.

Course Outcomes: At the end of the course, students will be able to:

- **BTCE 802.1.**Know the Scope and Method of Managerial economics along with Fundamental Economics and help them to develop a thorough understanding on engineering decision making.
- **BTCE 802.2**. Analyse the demand and supply adopting market strategy
- **BTCE 802.3.** Understand the production function and factors affecting it with various economy conditions of the firm.

- **BTCE 802.4.** Study the different types of market structure and strategies

- **Programme Outcomes:**

  PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

  PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

  PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

  PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

  PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

  PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

  PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

  PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

  PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

  PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

B. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentt o be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			100%

C. Course Content

Module I: Organisations and their Economic Environment: Definition of Economics and Managerial Economics – Nature and Scope – Definition and Concept of Good, Want, Value, Wealth, Utility – Utility and Demand – Law of Diminishing Marginal Utility – Assumptions and Importance. Demand and Supply – Law of Demand and Law of Supply. Market price and natural price. Standard market forms- Monopoly, Perfect competition. Organisational forms- Proprietorship, partnership, Joint Stock Company – Cooperative organisation.

Module II: Macroeconomics: Money- nature and functions – Inflation and Deflation – Kinds of Banking – commercial banks – Central banking – Credit instrument - Monetary Policy – International trade Balance of trade and Balance of Payments – taxation – Direct and Indirect taxes – Impact and Incidence of tax- Concept of National Income – Features with reference to developing countries.

Module III: Introduction to Management: Management Theory- Characteristics of management – Systems Approach to management –Concepts of goal, objective, strategies, programmes. Decision making under certainty, uncertainty and risk – Introduction to functional areas of management – Operations management, Human resources management, marketing management.

Module IV: Financial and Inventory Management: Need for Financial Management – Types of financing – Short term and long term Borrowing– Equity financing – Analysis of Financial Statement – balance sheet – Profit and Loss account – Fund flow statement – Ratio Analysis . Investment and Financial decision –Financial control and Job control. Functions and objectives of Inventory management – Decision models – Economic Order Quantity (EOQ) model – sensitivity analysis of EOQ model, Economic production lot size model – inventory model with planned shortages – Periodic order quantity – single period Inventory models – Simulation model for inventory analysis.

Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

D. Suggested Books

- Konni, Donnel C.O. and Weighnrich. H., Management, Eight Edition, McGraw Hill International Book Company, 1997.
- Philip Kotler, Marketing Management, Prentice-Hall of India, Edition 1998.
- G.W. Plossl, Production and inventory control by, Prentice Hall.
- Paul A Samuelson and William D Nardhaus, Economics, McGraw Hill International Edition.
- Barthwal R R, Industrial Economics – An Introductory Text Book, New Age International Pvt Ltd, 2000.
- Aninnya Sen, Microeconomics – Theory and Applications, OUP.
- Sharma J.L., Construction management and accounts, Sathya Prakashan, New Delhi, 1994.
- Srinath,L.S. An Introduction to Project Management, Tata McGraw Hill publications, 1995.

E. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	Definition of Economics and–– Assumptions and. Market price and natural price. Standard market forms-	Lecture	BTCE 802.1	Mid Term-1, Quiz & End Sem Exam

2	Managerial Economics – Nature and Scope	Lecture	BTCE 802.1	Mid Term-1, Quiz & End Sem Exam
3	Managerial Economics – Nature and Scope	Lecture	BTCE 802.1	Mid Term-1, Quiz & End Sem Exam
4	Definition and Concept of Good, Want, Value, Wealth, Utility – Utility and Demand	Lecture	BTCE 802.1	Mid Term-1, Quiz & End Sem Exam
5	Definition and Concept of Good, Want, Value, Wealth, Utility – Utility and Demand	Lecture	BTCE 802.1	Mid Term-1, Quiz & End Sem Exam
6	Law of Diminishing Marginal Utility	Lecture	BTCE 802.1	Mid Term-1, Quiz & End Sem Exam
7	Law of Diminishing Marginal Utility	Lecture	BTCE 802.1	Mid Term-1, Quiz & End Sem Exam
8	Importance. Demand and Supply – Law of Demand and Law of Supply	Lecture	BTCE 802.1	Mid Term-1, Quiz & End Sem Exam
9	Importance. Demand and Supply – Law of Demand and Law of Supply	Lecture	BTCE 802.1	Mid Term-1, Quiz & End Sem Exam
10	Monopoly, Perfect competition. Organisational forms-Proprietorship, partnership, Joint	Lecture	BTCE 802.2	Mid Term-1, Quiz & End Sem Exam
11	Stock Company – Cooperative organisation.	Lecture	BTCE 802.2	Mid Term-1, Quiz & End Sem Exam
12	Stock Company – Cooperative organisation.	Lecture	BTCE 802.2	Mid Term-1, Quiz & End Sem Exam
13	Money- nature and functions —— taxation	Lecture	BTCE 802.2	Mid Term-1, Quiz & End Sem Exam
14	Kinds of Banking – commercial banks – Central banking – Credit instrument.	Lecture	BTCE 802.2	Mid Term-1, Quiz & End Sem Exam
15	Kinds of Banking – commercial banks – Central banking – Credit instrument.	Lecture	BTCE 802.2	Mid Term-1, Quiz & End Sem Exam
16	Inflation and Deflation - Monetary Policy	Lecture	BTCE 802.2	Mid Term-1, Quiz & End Sem Exam
17	Inflation and Deflation - Monetary Policy	Lecture	BTCE 802.2	Mid Term-1, Quiz & End Sem Exam
18	International trade Balance of trade and Balance of Payments	Lecture	BTCE 802.2	Mid Term-1, Quiz & End Sem Exam
19	International trade Balance of trade and Balance of Payments	Lecture	BTCE 802.3	Mid Term-1, Quiz & End Sem Exam
20	Direct and Indirect taxes –	Lecture	BTCE 802.3	Mid Term-1, Quiz

	Impact and Incidence of tax			& End Sem Exam
21	Direct and Indirect taxes – Impact and Incidence of tax	Lecture	BTCE 802.3	Mid Term-2, Quiz & End Sem Exam
22	Concept of National Income – Features with reference to developing countries.	Lecture	BTCE 802.3	Mid Term-2, Quiz & End Sem Exam
23	Concept of National Income – Features with reference to developing countries.	Lecture	BTCE 802.3	Mid Term-2, Quiz & End Sem Exam
24	Management Theory-–, programmes. Operations management.	Lecture	BTCE 802.3	Mid Term-2, Quiz & End Sem Exam
25	Characteristics of management – Systems Approach to management	Lecture	BTCE 802.3	Mid Term-2, Quiz & End Sem Exam
26	Characteristics of management – Systems Approach to management	Lecture	BTCE 802.3	Mid Term-2, Quiz & End Sem Exam
27	Concepts of goal, objective, strategies	Lecture	BTCE 802.3	Mid Term-2, Quiz & End Sem Exam
28	Concepts of goal, objective, strategies	Lecture	BTCE 802.4	Mid Term-2, Quiz & End Sem Exam
29	Decision making under certainty, uncertainty and risk – Introduction to functional areas of management	Lecture	BTCE 802.4	Mid Term-2, Quiz & End Sem Exam
30	Decision making under certainty, uncertainty and risk – Introduction to functional areas of management	Lecture	BTCE 802.4	Mid Term-2, Quiz & End Sem Exam
31	Human resources management, marketing management.	Lecture	BTCE 802.4	Mid Term-2, Quiz & End Sem Exam
32	Need for Financial Management – Types of financing – Short term and long term Borrowing– Equity financing .	Lecture	BTCE 802.4	Mid Term-2, Quiz & End Sem Exam
33	Analysis of Financial Statement – balance sheet – Profit and Loss account – Fund flow statement – Ratio Analysis	Lecture	BTCE 802.4	Mid Term-2, Quiz & End Sem Exam
34	Investment and Financial decision –– Economic Order Quantity (EOQ) model – sensitivity analysis of EOQ model, Economic production lot	Lecture	BTCE 802.4	Mid Term-2, Quiz & End Sem Exam

35	Financial control and Job control. Functions and objectives of Inventory management – Decision models	Lecture	BTCE 802.4	Mid Term-2, Quiz & End Sem Exam
36	size model – inventory model with planned shortages – Periodic order quantity – single period Inventory models – Simulation model for inventory analysis.	Lecture	BTCE 802.4	Mid Term-2, Quiz & End Sem Exam

F. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE802.1	Know the Scope and Method of Managerial economics along with Fundamental Economics and help them to develop a thorough understanding on engineering decision making.	3	3	1	3	1				2		2	1			
BTCE802.2	Analyse the demand and supply adopting market strategy	3	2	2	2	2				2		1	1			
BTCE802.3	Understand the production function and factors affecting it with various economy conditions	3	3	1	3	1				2		2	1			

	of the firm.															
BTCE802.4	Study the different types of market structure and strategies	3	2	2	2	2				2		1	1			

S. No.	Enrollment.No.	Student's Name	BTCE802 ENGINEERING ECONOMICS & MANAGEMENT							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U2G2
1	A60215817001	Mr UDDESHYA UPADHYAY	100	30	70	A	9	3	3	27
2	A60215817003	Ms NEHA KARAIYA	100	30	70	A+	10	3	3	30
3	A60215817005	Mr RAHUL PINGLE	100	30	70	A	9	3	3	27
4	A60515817001	Mr KARAN SINGH SIKARWAR	100	30	70	A	9	3	3	27
5	A60515817003	Mr DHANANJAY CHAUHAN	100	30	70	A+	10	3	3	30

Total No. of Students	=	5		
Total No. of Students	>60% marks	5	100.00	%
Attainment Level			Level 3	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : TRAFFIC ENGINEERING AND MANAGEMENT
Course Code : BTCE804, Crédits : 04, Session : 2019-20 (Even Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Ripunjoy Gogoi

A. Introduction

To provide understanding on basic traffic characteristics and various models describing the relationship among traffic stream parameters. To train students to collect and analyze traffic data. To prepare students to perform capacity and level of service analysis of a highway. To teach students to perform traffic signal design using IRC guidelines. To make students aware of traffic regulations and measures to manage traffic. To enable students to understand the importance of roadway safety and accident analysis

B. Course Outcomes: At the end of the course, students will be able to:

- **BTCE 804.1**.Describe traffic stream parameters and their relationship
- **BTCE 804.2**.Identify various traffic stream models and their application
- **BTCE 804.3.**Collect the traffic data and analyse it using statistical tools.
- **BTCE 804.4.**Evaluate capacity and level of service for a given highway
- **BTCE 804.5**.Design traffic signal using IRC guidelines

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightag e**

Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentt o be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			100%

E. Course Content

F. **Module I: Introduction:** Significance and scope, Characteristics of Vehicles and Road Users, Skid Resistance and Braking Efficiency (Problems), Components of Traffic Engineering- Road, Traffic and Land Use Characteristics

Module II: Traffic Surveys and Analysis: Surveys and Analysis - Volume, Capacity, Speed and Delays, Origin and Destination, Parking, Pedestrian Studies, Accident Studies and Safety Level of Services- Basic principles of Traffic Flow.

Module III: Traffic Control: Traffic signs, Road markings, Design of Traffic signals and Signal co-ordination (Problems),Traffic control aids and Street furniture, Street Lighting, Computer applications in Signal design

Module IV: Geometric Design of Intersections: Conflicts at Intersections, Classification of 'At Grade Intersections, - Channallised Intersections- Principles of Intersection Design, Elements of Intersection Design, Rotary design, GradeSeparation and interchanges - Design principles.

Module V: Traffic Management: Traffic Management- Transportation System Management (TSM) - Travel DemandManagement (TDM), Traffic Forecasting techniques, Restrictions on turning movements, OnewayStreets, Traffic Segregation, Traffic Calming, Tidal flow operations, Exclusive Bus Lanes,Introduction to Intelligent Transportation System (ITS).

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva. V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Kadiyali L R, Traffic Engineering and Transport Planning, Khanna Technical Publications,Delhi, 2000.
- Khanna K and Justo C E G, Highway Engineering, Khanna Publishers, Roorkee, 2001.
- Indian Roads Congress (IRC) specifications: Guidelines and special publications on TrafficPlanning and Management
- Guidelines of Ministry of Road Transport and Highways, Government of India.
- Subhash C.Saxena, A Course in Traffic Planning and Design, Dhanpat Rai Publications,New Delhi, 1989.
- Transportation Engineering – An Introduction, C.Jotin Khisty, B.Kent Lall, Prentice Hall ofIndia Pvt Ltd, 2006.
- **Lecture Plan**

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	**Introduction:**, Skid Resistance and	Lecture	BTCE 804.1	Mid Term-1, Quiz & End Sem Exam
2	Significance and scope, Characteristics of Vehicles and Road Users	Lecture	BTCE 804.1	Mid Term-1, Quiz & End Sem Exam
3	Significance and scope, Characteristics of Vehicles and Road Users	Lecture	BTCE 804.1	Mid Term-1, Quiz & End Sem Exam
4	Significance and scope, Characteristics of Vehicles and Road Users	Lecture	BTCE 804.1	Mid Term-1, Quiz & End Sem Exam
5	Braking Efficiency (Problems), Components of Traffic Engineering- Road, Traffic and Land Use Characteristics	Lecture	BTCE 804.1	Mid Term-1, Quiz & End Sem Exam
6	Braking Efficiency (Problems), Components of Traffic Engineering- Road, Traffic and Land Use Characteristics	Lecture	BTCE 804.1	Mid Term-1, Quiz & End Sem Exam
7	Braking Efficiency (Problems), Components of Traffic Engineering- Road, Traffic and Land Use Characteristics	Lecture	BTCE 804.1	Mid Term-1, Quiz & End Sem Exam
8	Braking Efficiency (Problems), Components of Traffic Engineering- Road, Traffic and Land Use Characteristics	Lecture	BTCE 804.1	Mid Term-1, Quiz & End Sem Exam
9	Braking Efficiency (Problems), Components of Traffic Engineering- Road, Traffic and Land Use Characteristics	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam
10	**Traffic Surveys and Analysis:**, Origin and Destination,	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam
11	Surveys and Analysis - Volume, Capacity, Speed and	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam

	Delays			
12	Surveys and Analysis - Volume, Capacity, Speed and Delays	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam
13	Surveys and Analysis - Volume, Capacity, Speed and Delays	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam
14	Parking, Pedestrian Studies, Accident Studies	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam
15	Safety Level of Services- Basic principles of Traffic Flow	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam
16	Safety Level of Services- Basic principles of Traffic Flow	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam
17	Safety Level of Services- Basic principles of Traffic Flow	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam
18	Traffic signs, Road markings	Lecture	BTCE 804.2	Mid Term-1, Quiz & End Sem Exam
19	Design of Traffic signals and Signal co-ordination	Lecture	BTCE 804.3	Mid Term-1, Quiz & End Sem Exam
20	Design of Traffic signals and Signal co-ordination	Lecture	BTCE 804.3	Mid Term-1, Quiz & End Sem Exam
21	*Design of Traffic signals and Signal co-ordination*	Lecture	BTCE 804.3	Mid Term-2, Quiz & End Sem Exam
22	*Traffic control aids and Street furniture, Street Lighting*	Lecture	BTCE 804.3	Mid Term-2, Quiz & End Sem Exam
23	*Traffic control aids and Street furniture, Street Lighting*	Lecture	BTCE 804.3	Mid Term-2, Quiz & End Sem Exam
24	(Problems, Computer applications in Signal design	Lecture	BTCE 804.3	Mid Term-2, Quiz & End Sem Exam
25	*(Problems, Computer applications in Signal design*	Lecture	BTCE 804.3	Mid Term-2, Quiz & End Sem Exam
26	**Geometric Design of Intersections:** - Channallised Intersections-, Rotary design,.	Lecture	BTCE 804.3	Mid Term-2, Quiz & End Sem Exam
27	*Conflicts at Intersections, Classification of 'At Grade Intersections,*	Lecture	BTCE 804.3	Mid Term-2, Quiz & End Sem Exam
28	*Conflicts at Intersections, Classification of 'At Grade Intersections,*	Lecture	BTCE 804.3	Mid Term-2, Quiz & End Sem Exam
29	*Conflicts at Intersections, Classification of 'At Grade Intersections,*	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam
30	*Principles of Intersection Design, Elements of Intersection Design*	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam

31	Principles of Intersection Design, Elements of Intersection Design	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam
32	Grade Separation and interchanges - Design principles	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam
33	Traffic Management- Transportation System Management (TSM)	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam
34	*Travel Demand Management (TDM), Traffic Forecasting techniques*	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam
35	*Restrictions on turning movements, One way Streets, Traffic Segregation*	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam
36	Traffic Calming, Tidal flow operations, Exclusive Bus Lanes, Introduction to Intelligent Transportation System (ITS).	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam
37	*(Problems, Computer applications in Signal design*	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam
38	**Geometric Design of Intersections:** - Channallised Intersections-, Rotary design,.	Lecture	BTCE 804.4	Mid Term-2, Quiz & End Sem Exam
39	*Conflicts at Intersections, Classification of 'At Grade Intersections,*	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam
40	*Conflicts at Intersections, Classification of 'At Grade Intersections,*	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam
41	*Conflicts at Intersections, Classification of 'At Grade Intersections,*	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam
42	*Principles of Intersection Design, Elements of Intersection Design*	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam
43	Principles of Intersection Design, Elements of Intersection Design	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam
44	Grade Separation and interchanges - Design principles	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam
45	Traffic Management- Transportation System Management (TSM)	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam
46	*Travel Demand Management (TDM), Traffic Forecasting techniques*	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam
47	*Restrictions on turning movements, One way Streets, Traffic Segregation*	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam
48	Traffic Calming, Tidal flow operations, Exclusive Bus Lanes, Introduction to Intelligent Transportation System	Lecture	BTCE 804.5	Mid Term-2, Quiz & End Sem Exam

	(ITS).			

- **Course Articulation Matrix (Mapping of COs with POs)**

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE 804.1	Describe traffic stream parameters and their relationship	3	3	1	3	1				2		2	1			
BTCE 804.2	Identify various traffic stream models and their application	3	2	2	2	2				2		1	1			
BTCE 804.3	Collect the traffic data and analyse it using statistical tools.	3	3	1	3	1				2		2	1			
BTCE 804.4	Evaluate capacity and level of service for a given highway	3	2	2	2	2				2		1	1			
BTCE 804.5	Design traffic signal using IRC guidelines	3	3	1	3	1				2		2	1			

S. No.	Enrollment.No.	Student's Name	BTCE804 TRAFFIC ENGINEERING & MANAGEMENT							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U7G7
1	A60215817001	Mr UDDESHYA UPADHYAY	100	30	70	A+	10	4	4	40
2	A60215817003	Ms NEHA KARAIYA	100	30	70	A+	10	4	4	40
3	A60215817005	Mr RAHUL PINGLE	100	30	70	A+	10	4	4	40
4	A60515817001	Mr KARAN SINGH SIKARWAR	100	30	70	A+	10	4	4	40
5	A60515817003	Mr DHANANJAY CHAUHAN	100	30	70	A+	10	4	4	40

Total No. of Students	=	5		
Total No. of Students	>60 % marks	5	100.00	%
Attainment Level			Level 3	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : Project
Course Code : BTCE860, Crédits : 09, Session : 2019-20 (Even Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Imran Ahmad Khan, Dr. Mohan Kantharia, Dr. P. Mahakavi

A. Introduction

The objective of project is to enable the student to take up investigative study in the broad field of Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the Department on an individual basis or two/three students in a group, under the guidance of a Supervisor.

Course Outcomes: At the end of the course, students will be able to:

BTCE860.1. Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.
BTCE860.2. Design, implement and test the prototype/algorithm in order to solve the conceived problem.
BTCE860.3. Write comprehensive report on project work

B. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

C. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
End Semester Examination	End Semester Examination	EE	100%
Total			**100%**

A. **Syllabus**
Methodology:

Project is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the project the students are to present a report covering various aspects learnt by them and give a presentation on same.

D. **Examination Scheme:**

Literature study/ Fabrication/ Experimentation	**40**
Written Report	**20**
Viva	**15**
Presentation	**25**
Total	**100**

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva. V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

A. **Suggested Text/Reference Books: NA**
B. **Lecture Plan : NA**
C. **Course Articulation Matrix (Mapping of COs with POs)**

E. **Course Articulation Matrix (Mapping of COs with POs)**

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCE860.1	*Conceive a problem statement either from rigorous*	3	**2**	1	3	1	**-**	**-**	**-**	2		2	1	**1**	**2**	**1**

	literature survey or from the requirements raised from need analysis.															
BTCE860.2	*Design, implement and test the prototype/algorithm in order to solve the conceived problem.*	3	1	2	2	2	-	-	-	2		1	1	**3**	**2**	**3**
BTCE860.3	*Write comprehensive report on project work*	2	2	2	2	2	-	-	-	3		3	1	**3**	**3**	**2**

S. No.	Enrollment.No.	Student's Name	BTCE860 PROJECT (DISSERTATION)							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U6G6
1	A60215817001	Mr UDDESHYA UPADHYAY	100	0	100	A	9	9	9	81
2	A60215817003	Ms NEHA KARAIYA	100	0	100	A+	10	9	9	90
3	A60215817005	Mr RAHUL PINGLE	100	0	100	A	9	9	9	81
4	A60515817001	Mr KARAN SINGH SIKARWAR	100	0	100	A	9	9	9	81
5	A60515817003	Mr DHANANJAY CHAUHAN	100	0	100	A+	10	9	9	90
			Total No. of Students			=	5			
			Total No. of Students			>60 % marks	5	100.00	%	
			Attainment Level					Level 3		

AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR
AMITY SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF CIVIL ENGINEERING

Programme Educational Objectives

B. Tech (Civil Engineering)

Graduates of the programme B Tech (Civil Engineering) will

PEO 1: Gain knowledge and skills in Civil engineering which will enable them to have a career and professional accomplishment in the public or private sector organizations

PEO 2: Become consultants on complex real life Civil Engineering problems related to Infrastructure development especially housing, construction, water supply, sewerage, transport, spatial planning.

PEO 3: Become entrepreneurs and develop processes and technologies to meet desired infrastructure needs of society and formulate solutions that are technically sound, Economically feasible, and socially acceptable.

PEO 4: Perform investigation for solving Civil Engineering problems by conducting research using modern equipment and software tools.

PEO 5: Function in multi-disciplinary teams and advocate policies, systems, processes and equipment to support civil engineering

AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR
AMITY SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF CIVIL ENGINEERING

PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Bachelor of Technology (B. Tech.) CE

Academic Year – 2021-22

Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

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PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

PROGRAMMEARTICULATIONM ATRIX																
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ISEM	MAT101	3	2	3	3	3	-	-	-	2	-	2	3	-	-	-
	CHE101	3	3	3	3	-	3	3	3	3	3	3	3	-	-	-
	CSE104	3	3	3	2	-	-	-	-	-	-	-	3	3	3	3
	BME101	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2
	CIV101	3	2	2	2	-		-	-	1	1	1	2	2	-	-
	CHE121	3	3	2	-	-	-	-	-	-	-	-	2	3	-	2
	CSE124	3	3	3	2	-	-	-	-	-	-	-	3	3	3	3
	BME121	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2

	BCU141	3	2	2	2	-		-	-	1	1	1	2	2	-	-
	EVS142	3	3	2	-	-	-	-	-	-	-	-	2	3	-	2
	BSU143	3	3	2	-	-	-	-	-	-	-	-	2	3	-	2
	FLU144	3	3	3	2	-	-	-	-	-	-	-	3	3	3	3
IISEM	MAT201	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2
	PHY101	3	2	2	2	-		-	-	1	1	1	2	2	-	-
	ECE101	3	3	2	-	-	-	-	-	-	-	-	2	3	-	2
	CSE204	3	3	3	2	-	-	-	-	-	-	-	3	3	3	3
	BME102	3	2	2	-	2	-	-	3	2	-	-	2	3	-	2
	PHY121	3	2	2	-	2	-	-	3	2	-	-	2	3	-	2
	ECE121	3	2	2	-	-	-	1	-	-	-	-	2	3	-	2
	CSE224	3	2	2	-	2	-	1	-	-	-	-	2	3	-	2
	BME122	3	2	2	-	2	-	-	3	2	-	-	2	3	-	2
	BCU241	3	2	2	-	2	-	1	3	2	-	1	2	3	-	2
	EVS242	3	2	2	1	2	-	-	3	2	-	2	2	3	-	2
	BSU243	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2
	FLU244	3	2	2	-	2	-	1	-	-	-	-	2	3	-	2

PROGRAMME ARTICULATION MATRIX

2nd Year		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
III SEM	MAT 301	3	2	1	-	-	-	-	-	-	-	-	2	1	1	1
	CIV 302	3	3	3	2	-	-	-	-	-	-	-	3	3	3	3
	CIV 303	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2
	CIV 308	3	2	2	2	-		-	-	1	1	1	2	2	-	-
	CIV 309	3	3	2	-	-	-	-	-	-	-	-	2	3	-	2
	BME 104	1	2	2	1	1	-	-	-	-	-	-	-	2	-	-
	ECE 307	3	3	2	-	-	-	-	-	-	-	-	2	3	-	2
	CIV 322	1	2	2	1	1	-	-	-	-	-	-	-	2	-	-
	ECE 327	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2
IV SEM	CIV 401	3	2	2	-	2	-	-	3	2	-	-	2	3	-	2
	CIV 402	3	2	2	-	-	-	1	-	-	-	-	2	3	-	2
	CIV 403	3	2	2	-	2	-	1	-	-	-	-	2	3	-	2
	CIV 404	3	2	2	-	2	-	-	3	2	-	-	2	3	-	2
	CIV 405	3	2	2	-	2	-	1	3	2	-	1	2	3	-	2
	CIV 407	3	2	2	1	2	-	-	3	2	-	2	2	3	-	2
	ECE 407	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2

	CIV 421	3	2	2	1	2	-	-	3	2	-	2	2	3	-	2
	CIV 422	3	2	2	1	2	-	-	3	2	-	2	2	3	-	2
	CIV 423	3	2	2	1	2	-	-	3	2	-	2	2	3	-	2
	CIV 424	3	2	2	1	2	-	-	3	2	-	2	2	3	-	2
	ECE 427	3	2	2	1	2	-	-	3	2	-	2	2	3	-	2

PROGRAMME ARTICULATION MATRIX

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
VSEM	CIV 501	3	3	2	3	3	2	2	-	3	2	3	3	3	3	3
	CIV 502	2	2	2	-	3	-	3	2	-	3	-	3	1	2	1
	CIV 503	3	3	1	2	3	3	3	3	3	-	1	3	3	2	2
	CIV 504	2	-	2	-	3	-	3	2	-	3	-	3	3	2	2
	CIV 505	3	3	3	2	2	1	1	-	-	-	-	3	3	3	3
	CIV 506	2	2	2	-	3	-	3	2	-	3	-	3	1	2	1
	CIV 507	3	3	1	2	3	3	3	3	3	-	1	3	3	2	2
	CIV 522	3	3	2	3	3	2	2	-	3	2	3	3	3	3	3
	CIV 524	2	2	2	-	3	-	3	2	-	3	-	3	1	2	1
	CIV 527	3	3	1	2	3	3	3	3	3	-	1	3	3	2	2
	NPT550	3	2	1		1	2	1	-	2	-	1	3	3	3	3
VISEM	CIV 601	3	3	2	3	3	2	2	-	3	2	3	3	1	2	1
	CIV 602	2	2	2	-	3	-	3	2	-	3	-	3	3	2	2
	CIV 603	3	3	1	2	3	3	3	3	3	-	1	3	3	2	2
	CIV 604	2	2	2	-	3	-	3	2	-	3	-	3	3	3	3
	CIV 622	3	3	1	2	3	3	3	3	3	-	1	3	1	2	1
	CIV 623	2	-	2	-	3	-	3	2	-	3	-	3	3	2	2
	CIV 624	3	3	1	2	3	3	3	3	3	-	1	3	3	3	3
	CIV 605	2	2	2	-	3	-	3	2	-	3	-	3	1	2	1
	CIV 606	3	3	1	2	3	3	3	3	3	-	1	3	3	2	2
	CIV 607	3	3	1	2	3	3	3	3	3	-	1	3	3	2	2
	CIV 625	2	2	2	-	3	-	3	2	-	3	-	3	3	3	3
	CIV 626	3	3	1	2	3	3	3	3	3	-	1	3	1	2	1
	CIV 627	2	2	2	-	3	-	3	2	-	3	-	3	3	2	2
	NMP660	3	1	2	3	3	1	1	-	-	3	3	3	3	3	2

PROGRAMME ARTICULATION MATRIX

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
VII SEM	CIV 701	3	3	2	3	3	2	2	-	3	2	3	3	3	3	3
	CIV 702	2	2	2	-	3	-	3	2	-	3	-	3	1	2	1
	CIV 706	2	2	2	-	3	-	3	2	-	3	-	3	1	2	1
	CIV 722	3	3	2	3	3	2	2	-	3	2	3	3	3	3	3
	NPT 750	3	2	1		1	2	1	-	2	-	1	3	3	3	3
	NMP760	3	2	1		1	2	1	-	2	-	1	3	3	3	3
VIII SEM	CIV 801	3	3	2	3	3	2	2	-	3	2	3	3	1	2	1
	CIV 802	2	2	2	-	3	-	3	2	-	3	-	3	3	2	2
	CIV 803	3	3	1	2	3	3	3	3	3	-	1	3	3	2	2
	CIV 823	2	-	2	-	3	-	3	2	-	3	-	3	3	2	2
	NMP860	3	1	2	3	3	1	1	-	-	3	3	3	3	3	2

AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENTOF CIVIL ENGINEERING
Course Handout
Course : APPLIED MATHEMATICS – I (CALCULUS AND LINEAR ALGEBRA)
Course Code : MAT101, Crédits : 04, Session :2021-22(Odd Sem.), Class : B.Tech. 1st Year
Faculty Name : Dr. Santosh Kumar Sharma, Dr. Alok Jain, Dr. Girraj Kumar Verma, Dr. RajatVaish, Dr. Ram Kumar

A. Introduction: The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis, and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

B. Course Outcomes: At the end of the course, students will be able to:

MAT101.1. Solvetheproblemsofdifferentiationoffunctionsoftwovariablesandknow about the maximization and minimization of functions of severalvariables.

MAT101.2. Cometoknowtheapplicationsofdoubleandtripleintegrationinfindingtheareaandvolume Apart from various applications, they will have a basic understanding of Beta and Gamma functions.

MAT101.3. KnowaboutqualitativeapplicationsofGauss's,Stoke'sandGreen'stheorem

MAT101.4. Able to solve qualitative problems based on vector analysis and matrixanalysissuchasrank, eigen values, diagonalizationetc.

MAT101.5. Use the tools of linear algebra includinglinearindependenceanddependenceofvectors, linear transformations, eigen values, matrix of a linear transformation.

C. Programme Outcomes:

[PO.1].**Engineeringknowledge**:Applytheknowledgeofmathematics,science,engineeringfundamentals,andanengineeringspecializationtothesolutionofcomplexengineeringproblems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineeringproblems reaching substantiated conclusions using first principles of mathematics, natural sciences,andengineeringsciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and designsystem components or processes that meet the specified needs with appropriate consideration for thepublichealthandsafety,andthecultural,societal,andenvironmentalconsiderations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of theinformationtoprovidevalidconclusions

[PO.5].**Moderntoolusage**:Create,select,andapplyappropriatetechniques,resources,andmodernengineering and IT tools including prediction and modeling to complex engineering activities with anunderstandingofthelimitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to theprofessionalengineeringpractice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societalandenvironmentalcontexts,anddemonstratetheknowledgeof,andneedforsustainabledevelopment

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities andnorms oftheengineeringpractices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverseteams,andinmultidisciplinarysettings

[PO.10].**Communication**:Communicateeffectivelyoncomplexengineeringactivitieswiththeengineeringcommunity and with society at large, such as, being able to comprehend and write effective reports anddesigndocumentation,makeeffectivepresentations,andgiveandreceiveclearinstructions

[PO.11].**Projectmanagementandfinance**:Demonstrateknowledgeandunderstandingoftheengineeringandmanagementprinciplesandapplythesetoone'sownwork,asamemberandleaderinateam,tomanageprojectsandinmultidisciplinaryenvironments

[PO.12].**Life-longlearning**:Recognizetheneedfor,andhavethepreparationandabilityto engageinindependent andlife-longlearninginthebroadestcontextoftechnologicalchange

D. **Programme Specific Outcomes:**

PSO1: Will beabletodesign,developandimplementefficientsoftwareforagivenreallifeproblem.

PSO 2: Will be able to apply knowledge of AI, Machine Learning and Data Mining in analyzing big data forextractingusefulinformationfromitandforperformingpredictiveanalysis.

PSO 3: Will be able to design, manage and secure wired/ wireless computer networks for transfer and sharing ofinformation.

E. **Assessment Plan:**

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term	CT	15%
	Seminar/Viva-Voce/Quiz/Home	S/V/Q/HA	10%

	Assignment		
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. **Syllabus**

Module I: Differential Calculus:

Successive differentiation, Leibnitz Theorem, Rolle's theorem, Mean value theorem, Taylor's and Maclaurin's theorems with remainders, Partial Differentiation, Total derivative; Maxima and minima for two variables.

Module II: Integral Calculus:

Evaluation of definite and improper integrals: Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface, areas and volumes of revolutions, Multiple Integration: Double integrals (Cartesian and polar), Triple integrals (Cartesian).

Module III: Vector Calculus:

Scalar and vector field, Gradient, Divergence and Curl, Directional Derivative, Evaluation of a Line Integral, Green's theorem in plane (without proof), Stoke's theorem (without proof) and Gauss Divergence theorem (without proof).

Module IV: Matrices:

Inverse and Rank of a matrix, Linear systems of equations, Consistency of Linear Simultaneous Equations, linear Independence, Gauss elimination and Gauss-Jordan elimination, Eigen values, eigenvectors, Caley-Hamilton theorem, Diagonalization.

Module V: Linear algebra & Vector spaces:

Linear algebra: Group, ring, field (Definition), Vector Space, linear dependence of vectors, basis, dimension; Linear transformations (maps), range and kernel of a linear map, Inverse of a linear transformation, rank-nullity theorem (without proof), composition of linear maps, Matrix associated with a linear map.

G. **Examination Scheme:**

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
- G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
- V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–West press, Reprint 2005.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Differentiation	Lecture	MAT101.1	Mid Term, Quiz & End Sem Exam
2	Successive Differentiation	Lecture	MAT101.1	Mid Term, Quiz & End Sem Exam
3	Leibnitz Theorem	Lecture	MAT101.1	Mid Term, Quiz & End Sem Exam
4	Rolle's theorem	Lecture	MAT101.1	Mid Term, Quiz & End Sem Exam
5	Mean value theorem	Lecture	MAT101.1	Mid Term, Quiz & End Sem Exam
6	Taylor's theorem	Lecture	MAT101.1	Mid Term, Quiz & End Sem Exam
7	Maclaurin's theorems withremainders	Lecture	MAT101.1	Mid Term, Quiz & End Sem Exam
8	Partial Differentiation	Lecture	MAT101.1	Mid Term, Quiz & End Sem Exam
9	Total derivative	Lecture	MAT101.1	Mid Term, Quiz & End Sem Exam
10	Maxima and minima for two variables	Lecture	MAT101.1	Mid Term, Quiz & End Sem Exam
11	Evaluation of definite and improper integrals	Lecture	MAT101.2	Mid Term, Quiz & End Sem Exam
12	Beta and Gamma functions and their properties I	Lecture	MAT101.2	Mid Term, Quiz & End Sem Exam
13	Beta and Gamma functions and their properties-II	Lecture	MAT101.2	Mid Term, Quiz & End Sem Exam
14	Applications of definite integrals to evaluate surface of revolutions	Lecture	MAT101.2	Mid Term, Quiz & End Sem Exam
15	Applications of definite integrals to evaluate areas of revolutions	Lecture	MAT101.2	Mid Term, Quiz & End Sem Exam
16	Applications of definite integrals to evaluate volumes of revolutions	Lecture	MAT101.2	Mid Term, Quiz & End Sem Exam

17	Multiple Integration	Lecture	MAT101.2	Mid Term, Quiz & End Sem Exam
18	Double integrals (Cartesian)	Lecture	MAT101.2	Mid Term, Quiz & End Sem Exam
19	Double integrals (Polar)	Lecture	MAT101.2	Mid Term, Quiz & End Sem Exam
20	Triple integrals (Cartesian)	Lecture	MAT101.2	Mid Term, Quiz & End Sem Exam
21	Scalar and vector field	Lecture	MAT101.3	Home Assignment, Quiz & End Sem Exam
22	Gradient	Lecture	MAT101.3	Home Assignment, Quiz & End Sem Exam
23	Divergence and Curl	Lecture	MAT101.3	Home Assignment, Quiz & End Sem Exam
24	Directional Derivative	Lecture	MAT101.3	Home Assignment, Quiz & End Sem Exam
25	Evaluation of a Line Integral	Lecture	MAT101.3	Home Assignment, Quiz & End Sem Exam
26	Green's theorem in plane (without proof)	Lecture	MAT101.3	Home Assignment, Quiz & End Sem Exam
27	Stoke's theorem (without proof)	Lecture	MAT101.3	Home Assignment, Quiz & End Sem Exam
28	Gauss Divergence theorem (without proof)	Lecture	MAT101.3	Home Assignment, Quiz & End Sem Exam
29	Inverse and Rank of a matrix	Lecture	MAT101.4	Home Assignment, Quiz & End Sem Exam
30	Linear systems of equations	Lecture	MAT101.4	Home Assignment, Quiz & End Sem Exam
31	Consistency of Linear Simultaneous Equations	Lecture	MAT101.4	Home Assignment, Quiz & End Sem Exam
32	Linear Independence	Lecture	MAT101.4	Home Assignment, Quiz & End Sem Exam
33	Gauss elimination and Gauss-Jordan elimination	Lecture	MAT101.4	Home Assignment, Quiz & End Sem Exam
34	Eigen values, eigenvectors	Lecture	MAT101.4	Home Assignment, Quiz

				& End Sem Exam
35	Caley-Hamilton theorem	Lecture	MAT101.4	Home Assignment, Quiz & End Sem Exam
36	Diagonalization	Lecture	MAT101.4	Home Assignment, Quiz & End Sem Exam
37	Group	Lecture	MAT101.5	Home Assignment,Quiz & End Sem Exam
38	Ring, field (Definition)	Lecture	MAT101.5	Home Assignment, Quiz & End Sem Exam
39	Vector Space	Lecture	MAT101.5	Home Assignment, Quiz & End Sem Exam
40	Linear dependence of vectors	Lecture	MAT101.5	Home Assignment, Quiz & End Sem Exam
41	Basis	Lecture	MAT101.5	Home Assignment, Quiz & End Sem Exam
42	Dimension	Lecture	MAT101.5	Home Assignment, Quiz & End Sem Exam
43	Linear transformations (maps)	Lecture	MAT101.5	Home Assignment, Quiz & End Sem Exam
44	Range and kernel of a linear map	Lecture	MAT101.5	Home Assignment, Quiz & End Sem Exam
45	Inverse of a linear transformation	Lecture	MAT101.5	Home Assignment, Quiz & End Sem Exam
46	Rank- nullity theorem (without proof)	Lecture	MAT101.5	Home Assignment, Quiz & End Sem Exam
47	Composition of linear maps	Lecture	MAT101.5	Home Assignment, Quiz & End Sem Exam
48	Matrix associated with a linear map	Lecture	MAT101.5	Home Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
MAT 101.1	Solvetheproblemsofdifferentiationoffunctionsoftwo variablesandknow about the maximization and minimization of functions of severalvariables	3	3	1	3	1				2		2	1			
MAT 101.2	Cometoknowtheapplicationsofdoubleandtripleintegrationinfindingthe areaandvolume. Apart from various applications, they will have a basic understanding of Beta and Gamma functions.	3	2	2	2	2				2		1	1			
MAT 101.3	KnowaboutqualitativeapplicationsofGauss's,Stoke'sandGreen'stheorem	3	2	2	2	2				3		3	1			
MAT 101.4	Able to solve qualitative problems based on vector analysis and matrixanalysissuchasrank, eigen values, diagonalizationetc.	3	3	2	3	2				1		2	1			
MAT 101.5	Use the tools of linear algebra including linearindependenceanddependenceofvectors, linear transformations, eigen values, matrix of a linear transformation.	2	2	1	2	3				2		2	1			

S. No.	Enrollment.No.	Student's Name	MAT101 APPLIED MATHEMATICS - I (CALCULUS AND LINEAR ALGEBRA)								
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U2G2
1	A60215821003	Mr SHAD KHAN	100	30	70	B+	7	4	4	28
2	A60215821004	Mr SOHAM UPADHYAY	100	30	70	A	9	4	4	36

Total No. of Students	=	2		
Total No. of Students	>60% marks	1	50	%
Attainment Level			Level 1	

AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENTOF CIVIL ENGINEERING
Course Handout
Course : APPLIED CHEMISTRYTHEORY
Course Code : CHE 101, Crédits : 04, Session :2021-22(Odd Sem.), Class : B.Tech. 1stYear
Faculty Name : RachanaKathal, Dr. Shivendra Singh, Dr. Kuldeep Singh, Dr. Pooja Sharma, Dr. ShivaniBansal, Dr. ReenaShrivastava

A. **Introduction***: The course aims to train the students in basic and applied principles of Chemistry. Chemistry is essential to develop analytical capabilities of students, so that they can characterize, transform and use materials in engineering and apply the knowledge in their field. All engineering fields have unique bonds with chemistry whether it is Aerospace, Mechanical, Environmental and other fields. The makeup of substances is always a key factor, which must be known. The upcoming field of technology like Nanotechnology and Biotechnology depends fully on the knowledge of basic chemistry. With this versatile need in view, course has been designed in such a way so that the student should get an overview of the whole subject starting from the very basic bonding mechanism to the application of materials.*

B. Course Outcomes: After successful completion of the course students will have the knowledge and skill to:

CHE 101.1. Apply the principles of chemical sciences to understand the very basic bonding mechanism, thermodynamic requisites and energetic consideration of reactions. Application of engineering materials in different situations such as boiler corrosion, polymer science etc.

CHE 101.2. Apply the principles of chemical sciences to understand the very basic thermodynamic requisites and energetic consideration of reactions.

CHE 101.3. Apply the principles of chemical sciences to understand the very basic principles of stereochemistry and optical activity.

CHE 101.4. Apply the principles of chemical sciences to understand the very basic polymer science and applications of the principles to daily life.

CHE 101.5.Apply the principles of chemical sciences to understand the very basic water corrosion in special reference to water chemistry, hardness, alkalinity, caustic embrittlement, boiler corrosion, industrial boiler feed water etc.

CHE101.6. Apply the principles of chemical sciences to understand the very basic principles of spectroscopy and characterization techniques

C. Programme Outcomes:

[PO.1].**Engineeringknowledge**:Applytheknowledgeofmathematics,science,engineeringfundamentals,andanengineeringspecializationtothesolutionofcomplexengineeringproblems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineeringproblems reaching substantiated conclusions using first principles of mathematics, natural sciences,andengineeringsciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and designsystem components or processes that meet the specified needs with appropriate consideration for thepublichealthandsafety,andthecultural,societal,andenvironmentalconsiderations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of theinformationtoprovidevalidconclusions

[PO.5].**Moderntoolusage**:Create,select,andapplyappropriatetechniques,resources,andmodernengineering and IT tools including prediction and modeling to complex engineering activities with anunderstandingofthelimitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to theprofessionalengineeringpractice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societalandenvironmentalcontexts,anddemonstratetheknowledgeof,andneedforsustainabledevelopment

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities andnorms oftheengineeringpractices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverseteams,andinmultidisciplinarysettings

[PO.10].**Communication**:Communicateeffectivelyoncomplexengineeringactivitieswiththeengineeringcommunity and with society at large, such as, being able to comprehend and write effective reports anddesigndocumentation,makeeffectivepresentations,andgiveandreceiveclearinstructions

[PO.11].**Projectmanagementandfinance**:Demonstrateknowledgeandunderstandingoftheengineeringandmanagementprinciplesandapplythesetoone'sownwork,asamemberandleaderinateam,tomanageprojectsandinmultidisciplinaryenvironments

[PO.12].**Life-longlearning**:Recognizetheneedfor,andhavethepreparationandabilityto engageinindependent andlife-longlearninginthebroadestcontextoftechnologicalchange

D. **Programme Specific Outcomes:**

PSO1: Will beabletodesign,developandimplementefficientsoftwareforagivenreallifeproblem.

PSO 2: Will be able to apply knowledge of AI, Machine Learning and Data Mining in analyzing big data forextractingusefulinformationfromitandforperformingpredictiveanalysis.

PSO 3: Will be able to design, manage and secure wired/ wireless computer networks for transfer and sharing ofinformation.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Chemical Bonding (6 Hours)

Fajan's rule; Hybridization. Valence bond and Molecular orbital theory for diatomic molecule (H_2, N_2& O_2); Bond order & magnetic characters of these molecules.

Module II: Thermodynamics & Chemical Equilibrium (Use of free energy in chemical equilibria) (8 Hours)

Le Chatelier's Principle; Equilibrium constant from Thermodynamic Constants; pH and pOH, Buffer Solution, Buffer Action

Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Corrosion: Prevention and corrosion control.

Module III: Stereochemistry (6 Hours)

Symmetry and chirality, Isomerism; diastereomers, enantiomers, optical activity, absolute configurations of one chiral carbons and conformational analysis of ethane.

Module IV: Polymers (6 Hours)

Introduction; Polymerization; Addition and Condensation Polymerization. Thermosetting and Thermoplastic Polymers. Molecular Weight of Polymer; Rubber, Plastic and Fiber; Preparation, Properties and uses of PMMA, Polyester, Epoxy Resins and Bakelite, Silicone Polymers.

Module V: Water Chemistry (6 Hours)

Introduction and specifications of water, Hardness and its determination (EDTA method only), Alkalinity, Caustic embrittlement, Boiler feed water, boiler problems; scale, sludge, Carbonate & phosphate conditioning, colloidal conditioning &calgon treatment, Water softening processes; Lime – soda process, Ion exchange method. Water for domestic use.

Module VI: Instrumental Methods of analysis (8 Hours)

Introduction; Principles of spectroscopy; Laws of absorbance,
IR: Principle, Instrumentation and Application
UV: Principle, Instrumentation and Application
NMR: Principle, Instrumentation and Application

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

1. Keeler, J., De Paula, J., Atkins, P. W. (2018). Atkins' Physical Chemistry. United Kingdom: Oxford University Press. ISBN 9780198814740
2. Rattan, S. Engineering Chemistry, Arihant Publication. ISBN: 8190691910
3. Plane, R. A., Sienko, M. J. (1979). Chemistry: Principles and Applications. Japan: McGraw-Hill. ISBN 9780070573215
4. Mohan, J. (2004). Organic Spectroscopy: Principles and Applications. United Kingdom: Alpha Science. ISBN 9780849339523
5. Jain, P.; Jain. Engineering Chemistry. (2020). India: Dhanpat Rai Publishing Company (P) Limited. ISBN 978-9352165728
6. Vollhardt, P., Schore, N., Vollhardt, K. P. C. (2018). Organic Chemistry: Structure and Function. United Kingdom: Macmillan Learning. ISBN 9781319187712

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Fajan's rules for partial ionic character of covalent bonds	Lecture	CHE101.1	Mid Term-1, Quiz & End Sem Exam
2	Hybridization	Lecture	CHE 101.1	Mid Term-1, Quiz & End Sem Exam
3	Valence bond theory	Lecture	CHE 101.1	Mid Term-1, Quiz & End Sem Exam
4	Molecular orbital theory for diatomic molecule (H_2, N_2& O_2)	Lecture	CHE 101.1	Mid Term-1, Quiz & End Sem Exam
5	Molecular orbital theory for diatomic molecule (H_2, N_2& O_2)	Lecture	CHE 101.1	Mid Term-1, Quiz & End Sem Exam
6	Bond order & magnetic characters of H_2, N_2& O_2 molecules.	Lecture	CHE 101.1	Mid Term-1, Quiz & End Sem Exam
7	Le Chatelier's Principle	Lecture	CHE 101.2	Mid Term-1, Quiz

				& End Sem Exam
8	Le Chatelier's Principle; Equilibrium constant from Thermodynamic Constants	Lecture	CHE 101.2	Mid Term-1, Quiz & End Sem Exam
9	pH and pOH	Lecture	CHE 101.2	Mid Term-1, Quiz & End Sem Exam
10	Buffer Solution, Buffer Action	Lecture	CHE 101.2	Mid Term-1, Quiz & End Sem Exam
11	Thermodynamic functions: energy, entropy and free energy.	Lecture	CHE 101.2	Mid Term-1, Quiz & End Sem Exam
12	Estimations of entropy and free energies.	Lecture	CHE 101.2	Mid Term-1, Quiz & End Sem Exam
13	Free energy and emf. Cell potentials, the Nernst equation and applications.	Lecture	CHE 101.2	Mid Term-1, Quiz & End Sem Exam
14	Corrosion: Prevention and corrosion control.	Lecture	CHE 101.2	Mid Term-1, Quiz & End Sem Exam
15	Symmetry and chirality	Lecture	CHE 101.3	Mid Term-1, Quiz & End Sem Exam
16	Isomerism; diastereomers, enantiomers	Lecture	CHE 101.3	Mid Term-1, Quiz & End Sem Exam
17	optical activity	Lecture	CHE 101.3	Mid Term-1, Quiz & End Sem Exam
18	optical activity	Lecture	CHE 101.3	Mid Term-1, Quiz & End Sem Exam
19	absolute configurations of one chiral carbon	Lecture	CHE 101.3	Mid Term-1, Quiz & End Sem Exam
20	conformational analysis of ethane.	Lecture	CHE 101.3	Mid Term-1, Quiz & End Sem Exam
21	Introduction to Polymerization; Addition and Condensation Polymerization.	Lecture	CHE 101.4	Mid Term-2, Quiz & End Sem Exam
22	Thermosetting and Thermoplastic Polymers.	Lecture	CHE 101.4	Mid Term-2, Quiz & End Sem Exam
23	Molecular Weight of Polymer; Rubber, Plastic and Fiber	Lecture	CHE 101.4	Mid Term-2, Quiz & End Sem Exam
24	Preparation, Properties and uses of PMMA	Lecture	CHE 101.4	Mid Term-2, Quiz & End Sem Exam
25	Polyester, Epoxy Resins and Bakelite	Lecture	CHE 101.4	Mid Term-2, Quiz & End Sem Exam
26	Silicone Polymers	Lecture	CHE 101.4	Mid Term-2, Quiz & End Sem Exam
27	Introduction and specifications of water, Hardness and its determination (EDTA method only),	Lecture	CHE 101.5	Mid Term-2, Quiz & End Sem Exam

28	Hardness and its determination (EDTA method only),	Lecture	CHE 101.5	Mid Term-2, Quiz & End Sem Exam
29	Alkalinity, numericals on alkalinity	Lecture	CHE 101.5	Mid Term-2, Quiz & End Sem Exam
30	Alkalinity, numericals on alkalinity	Lecture	CHE 101.5	Mid Term-2, Quiz & End Sem Exam
31	Determination of alkalinity	Lecture	CHE 101.5	Mid Term-2, Quiz & End Sem Exam
32	, Caustic embrittlement	Lecture	CHE 101.5	Mid Term-2, Quiz & End Sem Exam
33	Boiler feed water, boiler problems; scale, sludge,	Lecture	CHE 101.5	Mid Term-2, Quiz & End Sem Exam
34	Carbonate & phosphate conditioning, colloidal conditioning &calgon treatment	Lecture	CHE 101.5	Mid Term-2, Quiz & End Sem Exam
35	Carbonate & phosphate conditioning, colloidal conditioning &calgon treatment	Lecture	CHE 101.5	Mid Term-2, Quiz & End Sem Exam
36	Lime – soda process	Lecture	CHE 101.5	Mid Term-2, Quiz & End Sem Exam
37	Lime – soda process	Lecture	CHE 101.5	Quiz & End Sem Exam
38	Introduction; Principles of spectroscopy	Lecture	CHE 101.6	Quiz & End Sem Exam
39	Introduction; Principles of spectroscopy	Lecture	CHE 101.6	Quiz & End Sem Exam
40	Principles of spectroscopy; Laws of absorbance	Lecture	CHE 101.6	Quiz & End Sem Exam
41	IR: Principle, Instrumentation and Application	Lecture	CHE 101.6	Quiz & End Sem Exam
42	IR: Principle, Instrumentation and Application	Lecture	CHE 101.6	Quiz & End Sem Exam
43	IR: Principle, Instrumentation and Application	Lecture	CHE 101.5	Quiz & End Sem Exam
44	UV: Principle, Instrumentation and Application	Lecture	CHE 101.5	Quiz & End Sem Exam
45	UV: Principle, Instrumentation and Application	Lecture	CHE 101.5	Quiz & End Sem Exam
46	NMR: Principle, Instrumentation and Application	Lecture	MAT101.6	Quiz & End Sem Exam
47	NMR: Principle,	Lecture	MAT101.6	Quiz & End Sem

	Instrumentation and Application			Exam
48	NMR: Principle, Instrumentation and Application	Lecture	MAT101.6	Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CHE 101.1	Fajan's rule; Hybridization. Valence bond and Molecular orbital theory for diatomic molecule (H_2, N_2& O_2); Bond order & magnetic characters of these molecules.	3	3	3	3	1	3	3	3	3	3	3	3			
CHE 101.2	Le Chatelier's Principle; Equilibrium constant from Thermodynamic Constants; pH and pOH, Buffer Solution, Buffer Action Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Corrosion:	3	3	3	3	1	3	3	2	3	3	3	3			

	Prevention and corrosion control.															
CHE 101.3	Symmetry and chirality, Isomerism; diastereomers, enantiomers, optical activity, absolute configurations of one chiral carbons and conformational analysis of ethane.	3	3	3	3	1	3	3	3	3	3	3	3			
CHE 101.4	Introduction; Polymerization ; Addition and Condensation Polymerization . Thermosetting and Thermoplastic Polymers. Molecular Weight of Polymer; Rubber, Plastic and Fiber; Preparation, Properties and uses of PMMA, Polyester, Epoxy Resins and Bakelite, Silicone Polymers	3	3	3	3	1	3	3	3	3	3	3	3			
CHE 101.5	Introduction and specifications of water, Hardness and its determination (EDTA method only), Alkalinity, Caustic embrittlement, Boiler feed water, boiler problems;	3	3	3	3	1	3	3	3	3	2	3	3			

	scale, sludge, Carbonate & phosphate conditioning, colloidal conditioning &calgon treatment, Water softening processes; Lime – soda process, Ion exchange method. Water for domestic use.															
CHE 101.6	Introduction; Principles of spectroscopy; Laws of absorbance, IR: Principle, Instrumentation and Application UV: Principle, Instrumentation and Application NMR: Principle, Instrumentation and Application	3	3	3	3	1	3	3	3	3	2	3	3			

SampleQuestionPaper

<table>
<tr><td colspan="7">Amity School of Engineering and Technology
DepartmentofCivil Engineering
IMID-SEMESTER(SEM–I)2021-22</td></tr>
<tr><td colspan="7">Class:B.Tech.(CSE) ISemester</td></tr>
<tr><td colspan="2">SubjectName:
CHE101APPLIED CHEMISTRY THEORY</td><td colspan="3">Time:2 Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of thequestions as perBloomsTaxo nomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>QuestionM apping</td><td></td><td>Q.1-6</td><td>Q.1-6</td><td>Q.1-6</td><td>Q.1-6</td><td></td></tr>
<tr><td colspan="7">Student willbeableto
CO1:Listthebroadperceptiveof cloudarchitectureand model.CO2:
Applydifferentcloud programming modelsasper need.</td></tr>
</table>

COMap	QuestionNo.	Question	Marks
CO1	Q.1	Compare the magnetic properties of N_2 and O_2	3
CO2, CO 3	Q.2a	Derive expressions for G and A.	3
	Q.2b	Explain chiral carbon. Explain circular dichroism with example.	3
CO4	Q.3	Explain the preparation, properties and uses of Nylon 66.	6
CO4	Q.4	Calculate the type and extent of alkalinity when 10 mL of water sample was analyzed against N/50 HCl. The volume of acid used upto the Phenolphthalein end point was 9.2 mL, whereas, volume of acid used upto the methyl orange end point was 13.6 mL. Calculate the type and extent of alkalinity in the given water sample.	3
CO5, CO4	Q.5a	Why phosphate conditioning is better than carbonate conditioning of boiler feed water?	3
	Q.5b	Explain the preparation, properties and uses of Bakelite	3
CO6	Q6	Explain the NMR spectrum of ethanol.	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	CHE101 APPLIED CHEMISTRY Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U3G3
1	A60215821003	Mr SHAD KHAN	100	30	70	A+	10	4	4	40
2	A60215821004	Mr SOHAM UPADHYAY	100	30	70	A	9	4	4	36

Total No. of Students	=	2		
Total No. of Students	>60% marks	2	100	%
Attainment Level			Level 3	

AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : BASIC CIVIL ENGINEERING AND APPLIED MECHANICS
Course Code : CIV101, Crédits : 02, Session :2021-22(Odd Semester), Class : B.Tech. 1st Year
Faculty name : Dr. Mohan Kantharia, Mr. Sachin Tiwari

K. **Introduction:**The objective of this course is to understand the utility of various types of building materials and understand the location, construction detail and suitability of various building elements. It aims to determine the location of object on ground surface and to understand the effects of system of forces on rigid body in static conditions.

L. **Course Outcomes:**At the end of the course, students will be able to:

CIV101.1. Explain concepts and terminologies of building materials, surveying and mechanics.

CIV101.2. Apply various methods for surveying and mechanics.

CIV101.3. Determine the location, area and volume of objects on ground surface.

CIV101.4. Solve the problems of surveying and mechanics by using various methods.

CIV101.5. Analyse the effects of system of forces on rigid bodies in static conditions.

M. **Programme Outcomes:**

[PO.1].**Engineeringknowledge**:Applytheknowledgeofmathematics,science,engineeringfundamentals,andanengineeringspecializationtothesolutionofcomplexengineeringproblems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineeringproblems reaching substantiated conclusions using first principles of mathematics, natural sciences,andengineeringsciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and designsystem components or processes that meet the specified needs with appropriate consideration for thepublichealthandsafety,andthecultural,societal,andenvironmentalconsiderations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of theinformationtoprovidevalidconclusions

[PO.5].**Moderntoolusage**:Create,select,andapplyappropriatetechniques,resources,andmodernengineering and IT tools including prediction and modeling to complex engineering activities with anunderstandingofthelimitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to theprofessionalengineeringpractice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societalandenvironmentalcontexts,anddemonstratetheknowledgeof,andneedforsustainabledevelopment

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities andnorms oftheengineeringpractices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverseteams,andinmultidisciplinarysettings

[PO.10].**Communication**:Communicateeffectivelyoncomplexengineeringactivitieswiththeengineeringcommunity and with society at large, such as, being able to comprehend and write effective reports anddesigndocumentation,makeeffectivepresentations,andgiveandreceiveclearinstructions

[PO.11].**Projectmanagementandfinance**:Demonstrateknowledgeandunderstandingoftheengineeringandmanagementprinciplesandapplythesetoone'sownwork,asamemberandleaderinateam,tomanageprojectsandinmultidisciplinaryenvironments

[PO.12].**Life-longlearning**:Recognizetheneedfor,andhavethepreparationandabilityto engageinindependent andlife-longlearninginthebroadestcontextoftechnologicalchange

N. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

O. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves	A	5%

	includingmedicalleaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

P. Syllabus

Module I: Building Materials:
Stones, bricks, cement, timber - types, properties, test & uses, Introduction of concrete properties & laboratory tests on concrete, curing of concrete and mortar materials.
Module II: Surveying & Positioning:
Introduction to surveying, survey stations, measurement of distances; conventional and EDM methods. Measurement of directions by different methods, measurement of elevations by different methods, reciprocal levelling.
Module III: Smart City:
Elements of smart city, role of experts of various discipline of engineering in the development of smart city. Concept of green buildings, including rainwater harvesting, non-conventional sources of energy. Smart transportation and drainage system.
Module IV: Forces and Equilibrium:
Graphical and analytical treatment of concurrent and non-concurrent coplanar forces, free body diagram. Force diagram and Bow's notations. Application of equilibrium concepts. Analysis of plane trusses, method of joints, method of Sections.
Module V: Centre of Gravity and moment of Inertia:
Centroid and centre of gravity, moment of inertia of composite section. Support reactions, shear force and bending moment diagram for cantilever & simply supported beam with concentrated, distributed load and Couple.

Q. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

R. Suggested Text/Reference Books:

- Surveying, Vol. – 1, Punmia B.C., Laxmi Publications, 17th edition, 2016
- Building Material, B. C. Punmia, Laxmi Publications,2016
- A textbook of Engineering Mechanics, D. S. Kumar, Katsons Publications, 2013
- Basic Civil Engineering, S. Ramamrutam & R. Narayan, Dhanpat Rai Pub., 3rd edition, 2013
- Applied Mechanics, Prasad I.B., Khanna Publication 17th edition, 1996
- Surveying, Duggal, Tata McGraw Hill New Delhi, 4th edition, 2013
- Engineering Mechanics - Statics & Dynamics, R.C. Hibbler, Pearson Publications, 14th edition, 2015
- Engineering Mechanics - statics dynamics, A. Boresi & Schmidt, Cengage learning,1st edition, 2008.
- Applied Mechanics, R.K. Rajput, Laxmi Publications, 3rd edition, 2016

S. Lecture Plan

Lecture	**Topics**	**Mode**	**Correspon**	**Mode of**

		of Delivery	ding CO	Assessing CO
1	STONES AND BRICKS	Lecture	CIV101.1	Mid Term-1, Quiz & End Sem Exam
2	WOOD AND CEMENT	Lecture	CIV101.1	Mid Term-1, Quiz & End Sem Exam
3	MORTAR AND CONCRETE AGGREGATE	Lecture	CIV101.1	Mid Term-1, Quiz & End Sem Exam
4	TESTING AND PROPERTIES CEMENT	Lecture	CIV101.1	Mid Term-1, Quiz & End Sem Exam
5	USES AND TYPES CONCRETE	Lecture	CIV101.1	Mid Term-1, Quiz & End Sem Exam
6	SURVEY TYPES AND CHAIN	Lecture	CIV101.2	Mid Term-1, Quiz & End Sem Exam
7	COMPASS SURVEY	Lecture	CIV101.2	Mid Term-1, Quiz & End Sem Exam
8	LEVELLING	Lecture	CIV101.2	Mid Term-1, Quiz & End Sem Exam
9	EDM, GPS AND TOTAL STATION	Lecture	CIV101.2	Mid Term-1, Quiz & End Sem Exam
10	SMART CITIES INDICATORS	Lecture	CIV101.3	Mid Term-1, Quiz & End Sem Exam
11	RAINWATER HARVESTING	Lecture	CIV101.3	Mid Term-1, Quiz & End Sem Exam
12	NON-CONVENTIONAL ENERGY SOURCES	Lecture	CIV101.3	Mid Term-1, Quiz & End Sem Exam
13	GREEN BUILDINGS	Lecture	CIV101.3	Mid Term-1, Quiz & End Sem Exam
14	FORCES AND MOMENTS	Lecture	CIV101.4	Mid Term-1, Quiz & End Sem Exam
15	LAMI’S THEOREM AND VARIGNON THEOREM	Lecture	CIV101.4	Mid Term-1, Quiz & End Sem Exam
16	COMPOSITION AND RESOLUTION OF FORCES	Lecture	CIV101.4	Mid Term-1, Quiz & End Sem Exam
17	SUPPORT REACTIONS	Lecture	CIV101.4	Mid Term-1, Quiz & End Sem Exam
18	TRUSSES	Lecture	CIV101.4	Mid Term-1, Quiz & End Sem Exam
19	CENTRE OF GRAVITY AND MOMENTS OF INERTIA	Lecture	CIV101.5	Mid Term-1, Quiz & End Sem Exam
20	PERPENDICULAR AXIS AND PARALLEL AXIS THEOREM	Lecture	CIV101.5	Mid Term-1, Quiz & End Sem Exam
21	TYPES OF LOADS, SUPPORTS, AND BEAM	Lecture	CIV101.5	Mid Term-2, Quiz & End Sem Exam
22	SHEAR FORCE AND BENDIND MOMENT DIAGRAM	Lecture	CIV101.5	Mid Term-2, Quiz & End Sem Exam
23	POINT LOADS SF AND BM	Lecture	CIV101.5	Mid Term-2, Quiz & End Sem Exam
24	UDL SF AND BM	Lecture	CIV101.5	Mid Term-2, Quiz

				& End Sem Exam

T. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV101.1	Explain concepts and terminologies of building materials, surveying and mechanics.	3	3	1	3	1	-	-	-	2		2	1			
CIV101.2	Apply various methods for surveying and mechanics.	3	2	2	2	2	-	-	-	2		1	1			
CIV101.3	Determine the location, area and volume of objects on ground surface.	3	2	2	2	2				3		3	1			
CIV101.4	Solve the problems of surveying and mechanics by using various methods.	3	3	2	3	2				1		2	1			
CIV101.5	Analyse the effects of system of forces on rigid bodies in static conditions.	2	2	1	2	3				2		2	1			

SampleQuestionPaper

Amity School of Engineering and Technology DepartmentofCivilEngineering IMID-SEMESTER(SEM– I)2021-22		
Class:B.Tech.(Civil) ISemester		
SubjectName: CIV101 Basic Civil Engineering and Applied Mechanics	Time:2 Hrs	Max.Marks:30

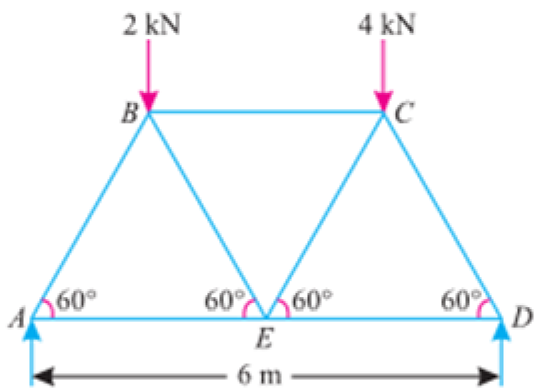
Levels of thequestions as perBloomsTaxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
QuestionMapping	Q.1,2	Q.3,4,5	Q.6			

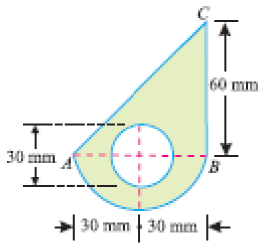
Student willbeableto

CO1. Explain concepts and terminologies of building materials, surveying and mechanics.

CO2. Apply various methods for surveying and mechanics.

CO3. Determine the location, area and volume of objects on ground surface.

COMap	QuestionNo.	Question	Marks
CO1	Q.1	Describe Green buildings as futuristic buildings.	3
CO1	Q.2a	State law of parallelogram law of forces and prove it .	3
	Q.2b	What is the meaning of resultant and equilibrant, show in examples.	3
CO2	Q.3	Each member of the truss is 3meter length. The truss is freely supported at its end points. At points B and C forces 2kN and 4kN are applied respectively. Find the forces in all the members of the truss. Also indicate whether the forces compressive or tensile in nature. 	6

CO2	Q.4	What do you understand by composition and resolution of forces?	3
CO3	Q.5a	What are the characteristics of good building stone?	3
	Q.5b	Convert the following whole circle bearings to quadrantal bearings. (a) 350^0 10' (b) 225^0 30' (c) 120°30' (d) 50° 15'	3
CO3	Q6	Find the moment of inertia of the lamina with a circular hole of 30 mm diameter about the axis AB as shown in the figure.  	6

Attainments		Rubric
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	CIV101 BASIC CIVIL ENGINEERING & APPLIED MECHANICS Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U13G13
1	A60215821003	Mr SHAD KHAN	100	30	70	A	9	2	2	18
2	A60215821004	Mr SOHAM UPADHYAY	100	30	70	A	9	2	2	18
			Total No. of Students			=	2			
			Total No. of Students			>60% marks	2	100	%	
			Attainment Level					Level 3		

AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : APPLIED CHEMISTRY LAB
Course Code : CHE 121, Crédits : 01, Session :2021-22(Odd Sem.), Class : B.Tech. 1st Year
Faculty Name : Rachana Kathal, Dr. Shivendra Singh, Dr. Kuldeep Singh, Dr. Pooja Sharma, Dr. Shivani Bansal, Dr. Reena Shrivastava

Introduction: Principles of chemistry relevant to the study of science and engineering have clarity of understanding through experiments. Learning process and learning outcomes get enhanced through experiments relevant to and commensurate with theoretical knowledge. The lab course is designed to teach the students the basics and advanced chemical principles through experiments.

Four basic sciences, Physics, Chemistry, Mathematics and Biology are the building blocks in engineering and technology. Chemistry is essential to develop analytical capabilities of students, so that they can characterize, transform and use materials in engineering and apply knowledge in their field. All engineering fields have unique bonds with chemistry whether it is Aerospace, Mechanical, Environmental and other fields; the makeup of substances is always a key factor, which must be known. For electronics and computer science engineering, apart from the material, computer modeling and simulation knowledge can be inherited from the molecule designing. The upcoming field of technology like Nanotechnology and Biotechnology depends fully on the knowledge of basic chemistry. With this versatile need in view, course has been designed in such a way so that the student should get an overview of the whole subject starting from the very basic application of principles.

U. **Course Outcomes:**After successful completion of the course students will have the knowledge and skill to:

CHE 121.1. Apply the principles of chemical sciences to understand the importance of boiler feed water quality management in different situations such as scale and sludge management – Determination of hardness of water.

CHE 121.2.Apply the principles of chemical sciences to understand the importance of boiler feed water quality management in different situations such as boiler corrosion and caustic embrittlement – Determination of Alkalinity.

CHE 121.3.Apply the principles of chemical sciences to understand the importance of water quality management in different situations such as dissolved chlorine management in domestic water quality management – Determination of residual Chlorine.

CHE 121.4.Apply the principles of chemical sciences to understand the very basic polymer science and applications of the principles to daily life – preparation of urea formaldehyde resin.

CHE 121.5.Apply the principles of chemical sciences to understand the importance of water quality management in different situations such as dissolved oxygen management in water bodies for sustaining aquatic flora and fauna.

CHE 121.6.Apply the principles of chemical sciences to understand the surface tension and relatedproperties of liquids.

CHE 121.7.Apply the principles of chemical sciences to understand the very basic principles of chromatographic separation techniques as primary analytical technique.

CHE 121.8.Apply the principles of chemical sciences to understand the very basic principles of conductometric titration techniques as primary analytical technique.

CHE 121.9.Apply the principles of chemical sciences to understand the basic principles of titrimetric analysis techniques as primary chemicalanalytical method.

CHE 121.10.Apply the principles of chemical sciences to understand the very basic principles of liquid- liquid separation techniques as primary analytical technique.

CHE 121.11.Apply the principles of chemical sciences to understand the very basic principles of double titration techniques

CHE 121.12.Apply the principles of chemical sciences to understand the very basic principles of pHmetric titration techniques as primary analytical technique.

V. **Programme Outcomes:**

[PO.1].**Engineeringknowledge**:Applytheknowledgeofmathematics,science,engineeringfundamentals,andanengineeringspecializationtothesolutionofcomplexengineeringproblems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineeringproblems reaching substantiated conclusions using first principles of mathematics, natural sciences,andengineeringsciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and designsystem components or processes that meet the specified needs with appropriate consideration for thepublichealthandsafety,andthecultural,societal,andenvironmentalconsiderations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of theinformationtoprovidevalidconclusions

[PO.5].**Moderntoolusage**:Create,select,andapplyappropriatetechniques,resources,andmodernengineering and IT tools including prediction and modeling to complex engineering activities with anunderstandingofthelimitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to theprofessionalengineeringpractice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societalandenvironmentalcontexts,anddemonstratetheknowledgeof,andneedforsustainabledevelopment

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities andnorms oftheengineeringpractices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverseteams,andinmultidisciplinarysettings

[PO.10].**Communication**:Communicateeffectivelyoncomplexengineeringactivitieswiththeengineeringcommunity and with society at large, such as, being able to comprehend and write effective reports anddesigndocumentation,makeeffectivepresentations,andgiveandreceiveclearinstructions

[PO.11].**Projectmanagementandfinance**:Demonstrateknowledgeandunderstandingoftheengineeringandmanagementprinciplesandapplythesetoone'sownwork,asamemberandleaderinateam,tomanageprojectsandinmultidisciplinaryenvironments

[PO.12].**Life-longlearning**:Recognizetheneedfor,andhavethepreparationandabilityto engageinindependent andlife-longlearninginthebroadestcontextoftechnologicalchange

W. Programme Specific Outcomes:

PSO1: Will beabletodesign,developandimplementefficientsoftwareforagivenreal-lifeproblem.

PSO 2: Will be able to apply knowledge of AI, Machine Learning and Data Mining in analyzing big data forextractingusefulinformationfromitandforperformingpredictiveanalysis.

PSO 3: Will be able to design, manage and secure wired/ wireless computer networks for transfer and sharing ofinformation.

X. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

Y. Syllabus

List of experiments: [Any 10]

1. Chemical analysis of water for determination of hardness. (2 Hrs)
2. Chemical analysis of water for determination of Alkalinity. (2 Hrs)
3. Chemical analysis of water for determination of residual Chlorine. (2 Hrs)
4. Synthesis of urea - formaldehyde resin. (2 Hrs)
5. Determination of dissolved oxygen in water. (2 Hrs)
6. Determination of surface tension of a given liquid. (2 Hrs)
7. Plant pigments separation by paper chromatography. (2 Hrs)
8. Conductometric titration. (2 Hrs)

9. Determination of water modules of crystallization in Mohr’s salt. (2 Hrs)
10. Application of distribution law in the determination of equilibrium constant. (2 Hrs)
11. Determination of amount of Oxalic acid and Sulphuric acid in one litre of solution. (2 Hrs)
12. pH metric titration. (2 Hrs)

Z. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

AA.Suggested Text/Reference Books:

- Pandey O.P. & et Al. Practical Chemistry (2010), S. Chand New Delhi. ISBN:978-8121908122.
- Das, Subash Chandra. Advanced practical chemistry, 3/e rev. / Kolkata Quality Printing 2003
- Vogel's Quantitative Chemical Analysis. (2009). India: Pearson Education. ISBN 9788131723258
- S K Bhasin & Sudha Rani. Laboratory Manual on Engineering Chemistry.(2019); Dhanpat Rai Publishing Company. ISBN: 978-8187433132
- Experiments in Applied Chemistry, Dr. Sunitta Rattan; CATSON Book Publishers.

BB. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	Chemical analysis of water for determination of hardness	Practical	CHE121.1	Mid Term-1, Quiz & End Sem Exam
2	Chemical analysis of water for determination of Alkalinity.	Practical	CHE121.2	Mid Term-1, Quiz & End Sem Exam
3	Chemical analysis of water for determination of residual Chlorine	Practical	CHE121.3	Mid Term-1, Quiz & End Sem Exam
4	Synthesis of urea - formaldehyde resin	Practical	CHE121.4	Mid Term-1, Quiz & End Sem Exam
5	Determination of dissolved oxygen in water	Practical	CHE121.5	Mid Term-1, Quiz & End Sem Exam
6	Determination of surface tension of a given liquid.	Practical	CHE121.6	Mid Term-1, Quiz & End Sem Exam
7	Plant pigments separation by paper chromatography	Practical	CHE121.7	Mid Term-1, Quiz & End Sem Exam
8	Conductometric titration	Practical	CHE121.8	Mid Term-1, Quiz & End Sem Exam
9	Determination of water modules of crystallization in Mohr’s salt.	Practical	CHE121.9	Mid Term-1, Quiz & End Sem Exam
10	Application of distribution law in the determination of equilibrium constant.	Practical	CHE121.10	Mid Term-1, Quiz & End Sem Exam
11	Determination of amount of Oxalic acid and Sulphuric acid in one litre of solution	Practical	CHE121.11	Mid Term-1, Quiz & End Sem Exam
12	pH metric titration	Practical	CHE121.12	Mid Term-1, Quiz

				& End Sem Exam

CC. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CHE 121.1	Chemical analysis of water for determination of hardness	3	3	3	3	1	3	3	3	3	3	3	3			
CHE 121.2	Chemical analysis of water for determination of Alkalinity.	3	3	3	3	1	3	3	2	3	3	3	3			
CHE 121.3	Chemical analysis of water for determination of residual Chlorine	3	3	3	3	1	3	3	3	3	3	3	3			
CHE 121.4	Synthesis of urea - formaldehyde resin	3	3	3	3	1	3	3	3	3	3	3	3			
CHE 121.5	Determination of dissolved oxygen in water	3	3	3	3	1	3	3	3	3	2	3	3			
CHE 121.6	Determination of surface tension of a given liquid.	3	3	3	3	1	3	3	3	3	2	3	3			
CHE 121.7	Plant pigments separation by paper chromatography	3	3	3	3	1	3	3	3	3	2	3	3			
CHE 121.8	Conductometric titration	3	3	3	3	1	3	3	3	3	2	3	3			
CHE 121.9	Determination of water modules of crystallization in Mohr's salt.	3	3	3	3	1	3	3	3	3	2	3	3			

CHE101.10	Application of distribution law in the determination of equilibrium constant.	3	3	3	3	1	3	3	3	3	2	3	3			
CHE 121.11	Determination of amount of Oxalic acid and Sulphuric acid in one litre of solution	3	3	3	3	1	3	3	3	3	2	3	3			
CHE 121.12	pH metric titration	3	3	3	3	1	3	3	3	3	2	3	3			

SampleQuestionPaper

Amity School of Engineering and Technology Departmentof Civil Engineering IMID-SEMESTER(SEM–I)2021-22						
Class:B.Tech.(CSE) ISemester						
SubjectName: CHE101APPLIED CHEMISTRY		Time:2 Hrs			Max.Marks:30	
Levels of thequestions as perBloomsTaxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
QuestionMapping		Q.1, 2	Q.1, 2	Q.1, 2	Q.1, 2	Q.1, 2
Student willbeableto attain CO1 to 12						

COMap	QuestionNo.	Question	Marks
CO1-12	Q.1	Calculate the type and extent of alkalinity when 50 mL of water sample was analyzed against N/50 HCl. The volume of acid used upto the Phenolphthalein end point was 18.2 mL, whereas, volume of acid used upto the methyl orange end point was 11.6 mL. Calculate the type and extent of alkalinity in the given water sample.	15
CO1-12	Q2	Plant pigment separation by thin layer chromatography.	35

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	**Enrollment.No.**	**Student's Name**	**CHE121 APPLIED CHEMISTRY LAB**							
			Max Marks	**CE Weight Age (%)**	**ET Weight Age (%)**	**GO**	**GP**	**ACU**	**ECU**	**U7G7**
1	A60215821003	Mr SHAD KHAN	100	30	70	A	9	1	1	9
2	A60215821004	Mr SOHAM UPADHYAY	100	30	70	A	9	1	1	9

Total No. of Students	=	2		
Total No. of Students >60% marks		2	100	%
Attainment Level			Level 3	

AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

ENVIRONMENTAL STUDIES
Course Handout
Course : **ENVIRONMENTAL STUDIES - I**
Course Code : EVS 142, Crédits : 02, Session :2021-22(Odd Sem.), Class : UG 1st Year
Faculty Name : Prof. Kuldip Dwivedi, Prof. Swapnil Rai, Dr. Rwitabrata Mallick, Dr. NidhiShukla, Dr. AbhishekBhardwaj

A. Introduction: Objective of the course:

'The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behavior and the growth, development and maturity of living organisms. At present a great number of environmental issues, have grown in size and complexity day by day, threatening the survival of mankind on earth.Environment study is quite essential in all streams of studies including environmental engineering and industrial management. The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

B. Course Outcomes: At the end of the course, students will be able tolearn about:

- **EVS142.1**. The multidisciplinary nature of environmental studies, including its definition, scope and need for public awareness**.**
- **EVS142.2**. Our natural resources including renewable and non-renewable resources comprising of forest, water, mineral, food, energy, and land resources.
- **EVS142.3**. The ecosystem, their structure and function, energy flow, bio-geochemical cycles, community ecology, ecological succession, ecological pyramids, forest, grassland, aquatic and tundra ecosystem.

  EVS142.4. Biodiversity and its types; Value of Biodiversity & Biodiversity Hot Spots; Biodiversity at Global, National and Local Levels & Threats to Biodiversity and Conservation of Biodiversity

C. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

D. Syllabus

Module I: The Multidisciplinary Nature of Environmental studies and Environment

Environmental Education: Definition, scope, and importance, Need for public awareness, Environmental Agencies, Organisation and NGOs, Environment: Definition, importance, Segments. Case Studies related to environmental protection and role of teachers and students.

Module II: Natural Resources

Renewable and non-renewable resources:

Natural resources and associated problems

Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits, and problems.

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.

Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

Role of an individual in conservation of natural resources.

Equitable use of resources for sustainable lifestyles.

Module III: Ecosystems

Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession

Food chains, food webs and ecological pyramids

Introduction, types, characteristic features, structure, and function of the following ecosystem:

a. Forest ecosystem

b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

Module IV: Biodiversity and its conservation

Introduction – Definition: genetic, species and ecosystem diversity
Biogeographical classification of India
Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values Biodiversity at global, national and local levels
India as a mega-diversity nation, Hot spots of biodiversity
Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts, Endangered and endemic species of India
Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

E. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

F. Suggested Text/Reference Books:

- Chauhan B. S. 2009: Environmental Studies, University Science Press New Delhi.
- Dhameja S.K., 2010; Environmental Studies, Katson Publisher, New Delhi.
- Smriti Srivastava, 2011: Energy Environment Ecology and Society, Katson Publisher, New Delhi.
- Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
- BharuchaErach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380 013, India.
- Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
- Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopaedia, Jaico Publ. House, Mumbai, 1196p
- De A.K., Environmental Chemistry, Wiley Eastern Ltd. Down to Earth, Centre for Science and Environment (R)
- Gleick, H.P. 1993. Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p
- Hawkins R.E., Encyclopaedia of Indian Natural History, Bombay Natural History Society, Bombay (R) Heywood, V.H &Waston, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
- Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p. Mckinney, M.L. & School, R.M. 1996. Environmental Science Systems & Solutions, Web enhanced edition. 639p.
- Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB) Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
- Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p
- Rao M N. & Datta, A.K. 1987. Wastewater treatment. Oxford & IBH Publ. Co. Pvt. Ltd. 345p. Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut
- Survey of the Environment, The Hindu (M)

- Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science
- Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II, Enviro Media (R)
- Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (TB) Wanger K.D., 1998 Environmental Management. W.B. Saunders Co. Philadelphia, USA 499p

G. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Environmental Studies & Education	Lecture	EVS142.1	Mid Term, Assignment, Quiz & End Sem Exam
2	Environmental Organizations & Environmentalists	Lecture	EVS142.1	Mid Term, Assignment, Quiz & End Sem Exam
3	Environment & Its Segments-I	Lecture	EVS142.1	Mid Term, Assignment, Quiz & End Sem Exam
4	Environment & Its Segments-II	Lecture	EVS142.1	Mid Term, Assignment, Quiz & End Sem Exam
5	Case Studies	Lecture	EVS142.1	Mid Term, Assignment, Quiz & End Sem Exam
6	Role of Teachers and Students in Environmental Protection	Lecture	EVS142.1	Mid Term, Assignment, Quiz & End Sem Exam
7	Introduction to Natural Resources	Lecture	EVS142.2	Mid Term, Assignment, Quiz & End Sem Exam
8	Forest Resources	Lecture	EVS142.2	Mid Term, Assignment, Quiz & End Sem Exam
9	Water Resources	Lecture	EVS142.2	Mid Term, Assignment, Quiz & End Sem Exam
10	Mineral Resources	Lecture	EVS142.2	Mid Term, Assignment, Quiz & End Sem Exam
11	Food Resources	Lecture	EVS142.2	Mid Term, Assignment, Quiz & End Sem Exam
12	Energy Resources	Lecture	EVS142.2	Mid Term, Assignment, Quiz & End Sem Exam
13	Energy Resources	Lecture	EVS142.2	Mid Term, Assignment, Quiz & End Sem Exam
14	Energy Resources	Lecture	EVS142.2	Mid Term, Assignment, Quiz & End Sem Exam
15	Land Resources	Lecture	EVS142.2	Mid Term, Assignment, Quiz

				& End Sem Exam
16	Sustainable Lifestyle	Lecture	EVS142.2	Mid Term, Assignment, Quiz & End Sem Exam
17	Concept, Structure and Function of Ecosystem	Lecture	EVS142.3	Mid Term, Assignment, Quiz & End Sem Exam
18	Food Chains & Food Webs	Lecture	EVS142.3	Mid Term, Assignment, Quiz & End Sem Exam
19	Energy Flow in Ecosystem & Biogeochemical Cycles	Lecture	EVS142.3	Mid Term, Assignment, Quiz & End Sem Exam
20	Community Ecology & Ecological Succession	Lecture	EVS142.3	Mid Term, Assignment, Quiz & End Sem Exam
21	Ecological Pyramids	Lecture	EVS142.3	Mid Term, Assignment, Quiz & End Sem Exam
22	Types of Ecosystems	Lecture	EVS142.3	Mid Term, Assignment, Quiz & End Sem Exam
23	Introduction and Types of Biodiversity	Lecture	EVS142.4	Mid Term, Assignment, Quiz & End Sem Exam
24	Value of Biodiversity & Biodiversity at Global, National and Local Levels	Lecture	EVS142.4	Mid Term, Assignment, Quiz & End Sem Exam
25	Biodiversity Hot Spots &Threats to Biodiversity	Lecture	EVS142.4	Mid Term, Assignment, Quiz & End Sem Exam
26	Conservation of Biodiversity	Lecture	EVS142.4	Mid Term, Assignment, Quiz & End Sem Exam

SampleQuestionPaper

Amity School of Life Science Department of Environmental Science MID-SEMESTER(SEM–1)2021-22						
Class: UG, ISemester						
SubjectName: EVS142 **Environmental Studies - I**		Time: 1.5 Hrs.			Max.Marks:30	
Levels of thequestions as perBloomsTaxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
QuestionMapping	Q.1-10	Q.11	Q.12-13	Q.14-15	Q.16-18	

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	EVS142 ENVIRONMENTAL STUDIES - I								
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U6G6
1	A60215821003	Mr SHAD KHAN	100	30	70	A	9	2	2	18
2	A60215821004	Mr SOHAM UPADHYAY	100	30	70	A+	10	2	2	20

Total No. of Students	=	2		
Total No. of Students	>60% marks	2	100	%
Attainment Level			Level 3	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : APPLIEDPHYSICS – I
Course Code : PHY101, Crédits : 04, Session :2021-22(Even Sem.), Class : B.Tech. 1st Year
Faculty Name : Dr. Manisha Singh, Dr. PankajMishra, Dr. SnehalC.Jani

DD. **Introduction:**The objective of this course is to familiarize the prospective engineers with fundamentals and applications ofElectromagnetics,Relativity,and Modern Physics. It aims to equip the students with standard concepts at an intermediate to advanced level that that will equip them with requisite skills to apply in solving real life problems.

EE. **Course Outcomes:**At the end of the course, students will be able to:

PHY101.1. Solvetheproblems related to time varying electric and magnetic field, and apply its concept in day to day applications.

PHY101.2. Students will develop understanding of relativistic motion and its applications.

PHY101.3. Students will acquire understanding of mechanics involved at microscopic levels

PHY101.4. Students willdevelop understanding of fundamental components of any electronic devices and its applications.

FF. **Programme Outcomes:**

[PO.1].**Engineeringknowledge**:Applytheknowledgeofmathematics,science,engineeringfundamentals,andanengineeringspecializationtothesolutionofcomplexengineeringproblems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyzecomplex engineeringproblems reaching substantiated conclusions using first principles of mathematics, natural sciences,andengineeringsciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and designsystem components or processes that meet the specified needs with appropriate consideration for thepublichealthandsafety,andthecultural,societal,andenvironmentalconsiderations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of theinformationtoprovidevalidconclusions

[PO.5].**Moderntoolusage**:Create,select,andapplyappropriatetechniques,resources,andmodernengineering and IT tools including prediction and modeling to complex engineering activities with anunderstandingofthelimitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to theprofessionalengineeringpractice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societalandenvironmentalcontexts,anddemonstratetheknowledgeof,andneedforsustainabledevelopment

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities andnorms oftheengineeringpractices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverseteams,andinmultidisciplinarysettings

[PO.10].**Communication**:Communicateeffectivelyoncomplexengineeringactivitieswiththeengineeringcommunity and with society at large, such as, being able to comprehend and write effective reports anddesigndocumentation,makeeffectivepresentations,andgiveandreceiveclearinstructions

[PO.11].**Projectmanagementandfinance**:Demonstrateknowledgeandunderstandingoftheengineeringandmanagementprinciplesandapplythesetoone'sownwork,asamemberandleaderinateam,tomanageprojectsandinmultidisciplinaryenvironments

[PO.12].**Life-longlearning**:Recognizetheneedfor,andhavethepreparationandabilityto engageinindependent andlife-longlearninginthebroadestcontextoftechnologicalchange

GG. Programme Specific Outcomes:

A graduate of Civil Engineering Program will demonstrate:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds**.**

HH. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves	A	5%

	includingmedicalleaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

II. **Syllabus**

Module I: Electromagnetics:

Scalar and vector fields, gradient of a scalar field, physical significance of gradient, equipotential surface. Line, surface and volume integrals, Divergence and curl of vector field and mathematical analysis physical significance, Electric flux, Gauss' law, Proof and Applications, Gauss divergence and Stokes theorems. Differential form of Gauss' Law, Amperes' Law, Displacement current, Faradays Law, Maxwell equations in free space & isotropic media (Integral form & differential form), EM wave propagation in free space, Poynting vector..

Module II: Special Theory of Relativity:

Michelson-Morley experiment, Importance of negative result, Inertial & non-inertial frames of reference, Einstein's postulates of Special theory of Relativity, Space-time coordinate system, Relativistic Space Time transformation (Lorentz transformation equation), Transformation of velocity, Addition of velocities, Length contraction and Time dilation, Mass-energy equivalence (Einstein's energy mass relation) & Derivation of Variation of mass with velocity .

Module III: Wave Mechanics:

Wave particle duality, De-Broglie matter waves, phase and group velocity, Heisenberg uncertainty principle, wave function and its physical interpretation, Operators, expectation values. Time dependent & time independent Schrödinger wave equation for free & bound states, square well potential (rigid wall), Step potential.

Module IV: Semiconductor and Electronic Materials:

Band Theory of Solids, Semi-conductors: Intrinsic and Extrinsic,carrIer concentration, Direct and indirect band- gaps, Types of Electronic materials, p-n Junction Diode,Diode Equation, Breakdown in p-n Junction Diode: Avalanche and Zener, Zener Diode and its applications photoconductivity and photovoltaics. Superconductivity, Meissner Effect, Type I and Type II Superconductors.

JJ. **Examination Scheme:**

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

KK. **Suggested Text/Reference Books:**

- Physics of waves, W. C. Elmore & M. A. Heald
- Introduction to Electrodynamics, D. J. Griffith
- Engineering Physics, Satya Prakash
- Concept of Modern Physics, A. Beiser

- Solid State Physics, S. O. Pallai

LL. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Scalar and vector fields	Lecture	PHY101.1	Mid Term-1, Quiz & End Sem Exam
2	Gradient of a scalar field,physical significance of gradient	Lecture	PHY101.1	Mid Term-1, Quiz & End Sem Exam
3	Equipotential surface.Line, surface and volume integrals,	Lecture	PHY101.1	Mid Term-1, Quiz & End Sem Exam
4	Divergence of vector field(mathematical analysis),physical significance	Lecture/ Tutorial s	PHY101.1	Mid Term-1, Quiz & End Sem Exam
5	Curl of vector field(mathematical analysis),physical significance	Lecture/ Tutorial s	PHY101.1	Mid Term-1, Quiz & End Sem Exam
6	Electric flux, Gauss' law, Proof and Applications	Lecture	PHY101.1	Mid Term-1, Quiz & End Sem Exam
7	Gauss divergence and Stokes theorems	Lecture	PHY101.1	Mid Term-1, Quiz & End Sem Exam
8	Differential form of Gauss' Law, Amperes' Law	Lecture	PHY101.1	Mid Term-1, Quiz & End Sem Exam
9	Displacement current, Faradays Law	Lecture	PHY101.1	Mid Term-1, Quiz & End Sem Exam
10	Displacement current, Faradays Law	Lecture	PHY101.1	Mid Term-1, Quiz & End Sem Exam
11	EM wave propagation in free space	Lecture	PHY101.1	Mid Term-1, Quiz & End Sem Exam
12	Poynting vector	Lecture	PHY101.1	Mid Term-1, Quiz & End Sem Exam
13	Electromagnetics	Tutorial s	PHY101.1	Mid Term-1, Quiz & End Sem Exam
14	Michelson-Morley experiment	Lecture	PHY101.2	Mid Term-1, Quiz & End Sem Exam
15	Michelson-Morley experimentImportance of negative result	Lecture	PHY101.2	Mid Term-1, Quiz & End Sem Exam
16	Inertial & non-inertial frames of reference	Lecture	PHY101.2	Mid Term-1, Quiz & End Sem Exam
17	Einstein's postulates of Special theory of Relativity	Lecture/ Tutorial	PHY101.2	Mid Term-1, Quiz & End Sem Exam

		s		
18	Space-time coordinate system	Lecture	PHY101.2	Mid Term-1, Quiz & End Sem Exam
19	Relativistic Space Time transformation (Lorentz transformation equation	Lecture	PHY101.2	Mid Term-1, Quiz & End Sem Exam
20	Transformation of velocity	Lecture	PHY101.2	Mid Term-1, Quiz & End Sem Exam
21	Addition of velocities,	Lecture/ Tutorial s	PHY101.2	Mid Term-2, Quiz & End Sem Exam
22	Length contraction and Time dilation	Lecture/ Tutorial s	PHY101.2	Mid Term-2, Quiz & End Sem Exam
23	Mass-energy equivalence (Einstein's energy mass relation)	Lecture	PHY101.2	Mid Term-2, Quiz & End Sem Exam
24	Mass-energy equivalence (Einstein's energy mass relation)	Lecture/ Tutorial s	PHY101.2	Mid Term-2, Quiz & End Sem Exam
25	Derivation of Variation of mass with velocity,	Lecture	PHY101.2	Mid Term-2, Quiz & End Sem Exam
26	Special Theory of Relativity	Tutorial s/Revisi on	PHY101.2	Mid Term-2, Quiz & End Sem Exam
27	Wave particle duality	Lecture	PHY101.3	Mid Term-2, Quiz & End Sem Exam
28	, De-Broglie matter waves	Lecture	PHY101.3	Mid Term-2, Quiz & End Sem Exam
29	phase and group velocity	Lecture	PHY101.3	Mid Term-2, Quiz & End Sem Exam
30	Heisenberg uncertainty principle	Lecture	PHY101.3	Mid Term-2, Quiz & End Sem Exam
31	wave function and its physical interpretation	Lecture	PHY101.3	Mid Term-2, Quiz & End Sem Exam
32	Operators, expectation values	Lecture/ Tutorial s	PHY101.3	Mid Term-2, Quiz & End Sem Exam
33	Time dependent & time independent Schrödinger wave equation for free	Lecture	PHY101.3	Mid Term-2, Quiz & End Sem Exam
34	Time dependent & time independent Schrödinger wave equation for bound states	Lecture	PHY101.3	Mid Term-2, Quiz & End Sem Exam
35	Schrödinger wave equation for free & bound states, square well potential (rigid wall),	Lecture	PHY101.3	Mid Term-2, Quiz & End Sem Exam
36	Schrödinger wave equation	Lecture	PHY101.3	Mid Term-2, Quiz

	for free & bound states, Step potential.			& End Sem Exam
37	Band Theory of Solids	Lecture	PHY101.4	Quiz & End Sem Exam
38	Semi-conductors: Intrinsic and Extrinsic	Lecture	PHY101.4	Quiz & End Sem Exam
39	Carrier concentration	Lecture/ Tutorials	PHY101.4	Quiz & End Sem Exam
40	Direct and indirect band-gaps	Lecture	PHY101.4	Quiz & End Sem Exam
41	Types of Electronic materials	Lecture	PHY101.4	Quiz & End Sem Exam
42	P-N Junction Diode,Diode Equation	Lecture	PHY101.4	Quiz & End Sem Exam
43	Breakdown in p-n Junction Diode: Avalanche and Zener	Lecture	PHY101.4	Quiz & End Sem Exam
44	Zener Diode and its applications	Lecture/ Tutorials	PHY101.4	Quiz & End Sem Exam
45	photoconductivity and photovoltaics	Lecture	PHY101.4	Quiz & End Sem Exam
46	Superconductivity, Meissner Effect	Lecture	PHY101.4	Quiz & End Sem Exam
47	Type I and Type II Superconductors	Lecture	PHY101.4	Quiz & End Sem Exam
48	Semiconductor and Electronic Materials	Revision	PHY101.4	Quiz & End Sem Exam

MM. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
PHY101.1	Solvetheproblemsofdifferentiationoffunctions oftwovariables andknow about the maximization and	3	3	1	2	3	3	2	1	2	1	-	3	-	-	-

	minimization of functions of severalvariable s															
PHY101.2	Cometoknowtheap plicationsofdoublea ndtripleintegrationi nfindingthe areaandvolume. Apart from various applications, they will have a basic understanding of Beta and Gamma functions.	3	3	1	2	3	3	2	1	2	1	-	3	-	-	-
PHY101.3	Knowaboutqualitati veapplicationsofGa uss's,Stoke'sandGre en'stheorem	3	3	1	2	3	3	2	1	2	1	-	3	-	-	-
PHY101.4	Able to solve qualitative problems based on vector analysis and matrixanalysiss uchasrank, eigen values, diagonalization etc.	3	3	1	2	3	3	2	1	2	1	-	3	-	-	-

S. No.	Enrollment.No.	Student's Name	PHY101 APPLIED PHYSICS – I							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U3G3
1	A60215821003	Mr SHAD KHAN	100	30	70	C+	4	4	4	16
2	A60215821004	Mr SOHAM UPADHYAY	100	30	70	C+	4	4	4	16
			Total No. of Students			=	2			
			Total No. of Students			>60% marks	0	0.00	%	
			Attainment Level					-		

AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : APPLIEDPHYSICS LAB-1
Course Code : PHY121, Crédits : 01, Session :2021-22(Even Sem.), Class : B.Tech. 1stYear
Faculty Name : Dr.ManishaSingh,Dr.PankajMishra,Dr.SnehalC.Jani

Introduction: Principles of Physics relevant to the study of science and engineering have clarity of understanding through experiments. Learning process and learning outcomes get enhanced through experiments relevant to and commensurate with theoretical knowledge. The lab course is designed to teach the students the basics and advanced chemical principles through experiments.

Physics is the building blocks in engineering and technology and is essential to develop analytical capabilities of students, so that they can transform and apply the fundamental knowledge in their field. All engineering fields have unique applicationsof laws of Physics, insights of matter and space is a key factor in understanding of nature and laws governing it. For electronics and computer science engineering, knowledge of semiconductors and its devices is essentially needed. With this versatile need in view, course has been designed in such a way so that the student should get an insight of the subject starting from the very basic application of principles.

NN. Course Outcomes: After successful completion of the course students will have the knowledge and skill to:

PHY 121.1.Apply the fundamentals of semiconductors to understand the conceptEnergy band gap.

PHY 121.2.Apply the fundamentals of physical sciences to understand the importance resonance,and its applications in day to day life.

PHY 121.3.Apply the understanding of varying fieldand determine parameters of significance.

PHY 121.4.Apply the fundaments of semiconductors to understand working of basic electronic devices

PHY 121.5 Apply the fundaments understandings of different types of semiconductors to understand working of basic electronic devices .

PHY 121.6.Apply the fundaments of semiconductors to understand working of basic electronic devices

PHY 121.7.Apply the working principles of electronic components to different types of cct arrangements involved in day to day life.

PHY 121.8.Apply the principles of semiconductor devices as a voltage regulator

PHY 121.9.Apply the principles of semiconductor devices in designing solar cells.

PHY 121.10.Apply the principles of varying electric and magnetic field in day to day life.

OO. Programme Outcomes:

[PO.1].**Engineeringknowledge**:Applytheknowledgeofmathematics,science,engineeringfundamentals,andanengineeringspecializationtothesolutionofcomplexengineeringproblems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineeringproblems reaching substantiated conclusions using first principles of mathematics, natural sciences,andengineeringsciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and designsystem components or processes that meet the specified needs with appropriate consideration for thepublichealthandsafety,andthecultural,societal,andenvironmentalconsiderations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of theinformationtoprovidevalidconclusions

[PO.5].**Moderntoolusage**:Create,select,andapplyappropriatetechniques,resources,andmodernengineering and IT tools including prediction and modeling to complex engineering activities with anunderstandingofthelimitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to theprofessionalengineeringpractice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societalandenvironmentalcontexts,anddemonstratetheknowledgeof,andneedforsustainabledevelopment

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities andnorms oftheengineeringpractices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverseteams,andinmultidisciplinarysettings

[PO.10].**Communication**:Communicateeffectivelyoncomplexengineeringactivitieswiththeengineeringcommunity and with society at large, such as, being able to comprehend and write effective reports anddesigndocumentation,makeeffectivepresentations,andgiveandreceiveclearinstructions

[PO.11].**Projectmanagementandfinance**:Demonstrateknowledgeandunderstandingoftheengineeringandmanagementprinciplesandapplythesetoone'sownwork,asamemberandleaderinateam,tomanageprojectsandinmultidisciplinaryenvironments

[PO.12].**Life-longlearning**:Recognizetheneedfor,andhavethepreparationandabilityto engageinindependent andlife-longlearninginthebroadestcontextoftechnologicalchange

PP. Programme Specific Outcomes:

PSO1: Will beabletodesign,developandimplementefficientsoftwareforagivenreal-lifeproblem.

PSO 2: Will be able to apply knowledge of AI, Machine Learning and Data Mining in analyzing big data forextractingusefulinformationfromitandforperformingpredictiveanalysis.

PSO 3: Will be able to design, manage and secure wired/ wireless computer networks for transfer and sharing ofinformation.

QQ. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

RR. Syllabus

List of experiments: [Any 10]

1. To determine the forbidden band gap energy of a semiconductor.
2. To determine the frequency of AC mains using sonometer.
3. To determine the value of specific charge (ratio of e/m) of an electron by Thomson method.
4. To study the common base characteristics of a PNP junction transistor, by drawinginput characteristic curves andoutput characteristic curves.
5. To study the common emitter characteristics of a NPN junction transistor, by drawinginput characteristic curves andoutput characteristic curves.
6. To study a series /parallel resonant LCR circuit, its resonate frequency and quality factor
7. To study the voltage regulation characteristics of a zener diode.
8. To study the characteristics of a solar cell.
9. To draw V – I characteristics of a photocell and to verify the inverse square law of radiation.
10. To plot graph showing the variation of magnetic field with distance along the axis of a circular coil carrying current, and hence estimate the radius of the coil.

SS. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

TT. Suggested Text/Reference Books:

- Physics Practical, Gupta and Kumar

UU. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	To determine the forbidden band gap energy of a semiconductor	Practical	PHY121.1	Mid Term-1, Quiz & End Sem Exam
2	To determine the frequency of AC mains using sonometer	Practical	PHY121.2	Mid Term-1, Quiz & End Sem Exam
3	To determine the value of specific charge (ratio of e/m) of an electron by Thomson method.	Practical	PHY121.3	Mid Term-1, Quiz & End Sem Exam
4	To study the common base characteristics of a PNP junction transistor, by drawinginput characteristic curves andoutput characteristic curves	Practical	PHY121.4	Mid Term-1, Quiz & End Sem Exam
5	To study the common emitter characteristics of a NPN junction transistor, by drawinginput characteristic curves andoutput characteristic curves.	Practical	PHY21.5	Mid Term-1, Quiz & End Sem Exam
6	To study a series /parallel resonant LCR circuit, its resonate frequency and quality factor	Practical	PHY121.6	Mid Term-1, Quiz & End Sem Exam
7	To study the voltage regulation characteristics of a zener diode.	Practical	PHY121.7	Mid Term-1, Quiz & End Sem Exam
8	To study the characteristics of a solar cell	Practical	PHY121.8	Mid Term-1, Quiz & End Sem Exam
9	To draw V – I characteristics of a photocell and to verify the inverse square law of radiation	Practical	PHY121.9	Mid Term-1, Quiz & End Sem Exam
10	To plot graph showing the variation of magnetic field with distance along the axis of a circular coil carrying current, and hence estimate the radius of the coil.	Practical	PHY121.10	Mid Term-1, Quiz & End Sem Exam

VV. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES	CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
PHY 121.1	Determination the forbidden band gap energy of a semiconductor	3	3	3	2	2	1	1	1	1	3	3	3	-	-	-
PHY 121.2	To determine the frequency of AC mains using sonometer	3	3	3	2	2	1	1	1	1	3	3	3	-	-	-
PHY 121.3	To determine the value of specific charge (ratio of e/m) of an electron by Thomson method.	3	3	3	2	2	1	1	1	1	3	3	3	-	-	-
PHY 121.4	To study the common base characteristics of a PNP junction transistor, by drawinginput characteristic curves andoutput characteristic curves	3	3	3	2	2	1	1	1	1	3	3	3	-	-	-
PHY 121.5	To study the common emitter characteristics of a NPN junction transistor, by drawinginput characteristic curves andoutput characteristic curves.	3	3	3	2	2	1	1	1	1	3	3	3	-	-	-
PHY 121.6	To study a series /parallel resonant LCR circuit, its resonate frequency and quality factor	3	3	3	2	2	1	1	1	1	3	3	3	-	-	-
PHY 121.7	To study the voltage regulation characteristics of a zener diode.	3	3	3	2	2	1	1	1	1	3	3	3	-	-	-
PHY 121.8	To study the characteristics of a solar cell	3	3	3	2	2	1	1	1	1	3	3	3	-	-	-

PHY 121.9	To draw V – I characteristics of a photocell and to verify the inverse square law of radiation	3	3	3	2	2	1	1	1	1	3	3	3	-	-	-
PHY 121.10	To plot graph showing the variation of magnetic field with distance along the axis of a circular coil carrying current, and hence estimate the radius of the coil.	3	3	3	2	2	1	1	1	1	3	3	3	-	-	-

SampleQuestionPaper

Amity School of Engineering and Technology Departmentof Civil Engineering IMID-SEMESTER(SEM–I)2021-22						
Class:B.Tech.(CSE) ISemester						
SubjectName: CHE101APPLIED CHEMISTRY		Time:2 Hrs			Max.Marks:30	
Levels of thequestions as perBloomsTaxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
QuestionMapping		Q.1, 2	Q.1, 2	Q.1, 2	Q.1, 2	Q.1, 2
Student willbeableto attain CO1 to 12						

COMap	QuestionNo.	Question	Marks
CO1-12	Q.1	Calculate the type and extent of alkalinity when 50 mL of water sample was analyzed against N/50 HCl. The volume of acid used upto the Phenolphthalein end point was 18.2 mL, whereas, volume of acid used upto the methyl orange end point was 11.6 mL. Calculate the type and extent of alkalinity in the given water sample.	15
CO1-12	Q2	Plant pigment separation by thin layer chromatography.	35

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	PHY121 APPLIED PHYSICS LAB – I							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U7G7
1	A60215821003	Mr SHAD KHAN	100	30	70	A	9	1	1	9
2	A60215821004	Mr SOHAM UPADHYAY	100	30	70	A+	10	1	1	10
			Total No. of Students			=	2			
			Total No. of Students			>60% marks	2	100.00	%	
			Attainment Level					Level 3		

ENVIRONMENTAL STUDIES
Course Handout
Course : **ENVIRONMENTAL STUDIES – II**
Course Code : EVS 242, Crédits : 02, Session :2021-22(Even Sem.), Class : UG 1st Year
Faculty Name : Prof. Kuldip Dwivedi, Prof. Swapnil Rai, Dr. Rwitabrata Mallick, Dr. NidhiShukla, Dr. AbhishekBhardwaj

A. Introduction: Objective of the course:

- To understand various types of environmental pollution.
- To educate masses, in general and students, about the issues related to degradation of environment and also social issues related to environment.
- To understand sustainable development.
- To understand environmental assets, local flora, and fauna through field surveys

B. Course Outcomes: At the end of the course, students will be able to know about:

EVS242.1 Explain various types of environmental pollutions.
EVS242.2 Understand role of individual in abatement of environmental pollution.
EVS242.3 Explain methods to mitigate disasters.
EVS242.4 Learn various environmental protection laws.
EVS242.5 Learn role of IT in environment and human health.

C. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

D. Syllabus

Module I: Environmental Pollution

Definition, causes, effects and control measures of:

a. Air pollution

b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear pollution

Solid waste management: Causes, effects, and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster management: floods, earthquake, cyclone and landslides.

Module II: Social Issues and the Environment

From unsustainable to sustainable development, Urban problems and related to energy, Water conservation, rainwater harvesting, watershed management

Resettlement and rehabilitation of people; its problems and concerns Case studies.
Environmental ethics: Issues and possible solutions

Climate change, Global warming, Acid rain, Ozone layer depletion, Nuclear Accidents and Holocaust case studies.
Fireworks/Crackers – Introduction, ill effects on environment and humans.
Wasteland reclamation, Consumerism and waste products, Environmental Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act

Issues involved in enforcement of environmental legislation public awareness

Module III: Human Population and the Environment

Population growth, variation among nations
Population explosion – Family Welfare Programmes
Environment and human health
Human Rights
Value Education
HIV / AIDS
Women and Child Welfare
Role of Information Technology in Environment and Human Health
Case Studies

Module IV: Field Work

Visit to a local area to document environmental assets-river / forest/ grassland/ hill/ mountain. Visit to a local polluted site – Urban / Rural / Industrial / Agricultural. Study of common plants, insects, birds. Study of simple ecosystems-pond, river, hill slopes, etc (Field work equal to 5 lecture hours)

E. Examination Scheme:

Components	A	CT	P/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, P/V/Q: Project/Viva/Quiz, EE: End Semester Examination; A: Attendance

F. Suggested Text/Reference Books:

- Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
- BharuchaErach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380 013, India
- Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
- Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopaedia, Jaico Publ. House, Mumbai, 1196p
- De A.K., Environmental Chemistry, Wiley Eastern Ltd. Down to Earth, Centre for Science and Environment (R)
- Gleick, H.P. 1993. Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p

- Hawkins R.E., Encyclopaedia of Indian Natural History, Bombay Natural History Society, Bombay (R) Heywood, V.H &Waston, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
- Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p. Mckinney, M.L. & School, R.M. 1996. Environmental Science Systems & Solutions, Web enhanced edition. 639p.
- Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB) Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
- Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p
- Rao M N. & Datta, A.K. 1987. Wastewater treatment. Oxford & IBH Publ. Co. Pvt. Ltd. 345p. Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut
- Survey of the Environment, The Hindu (M)
- Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science
- Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II, Enviro Media (R)
- Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (TB) Wanger K.D., 1998 Environmental Management. W.B. Saunders Co. Philadelphia, USA 499p

G. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction to Environmental Pollution	Lecture	EVS242.1	Mid Term, Assignment, Quiz & End Sem Exam
2	Air Pollution: Causes, effects, and control measures	Lecture	EVS242.1	Mid Term, Assignment, Quiz & End Sem Exam
3	Water Pollution: Causes, effects and control measures	Lecture	EVS242.1	Mid Term, Assignment, Quiz & End Sem Exam
4	Wastewater Treatment	Lecture	EVS242.1	Mid Term, Assignment, Quiz & End Sem Exam
5	Marine Pollution: Causes, effects and control measures	Lecture	EVS242.1	Mid Term, Assignment, Quiz & End Sem Exam
6	Causes, effects and control measures of Soil and Noise Pollution	Lecture	EVS242.1	Mid Term, Assignment, Quiz & End Sem Exam
7	Causes, effects and control measures of Thermal and Radioactive pollution	Lecture	EVS242.1	Mid Term, Assignment, Quiz & End Sem Exam
8	Solid Waste Management	Lecture	EVS242.1	Mid Term, Assignment, Quiz & End Sem Exam
9	Role of Individual in prevention of Pollution	Lecture	EVS242.1	Mid Term, Assignment, Quiz & End Sem Exam
10	Disaster Management	Lecture	EVS242.1	Mid Term, Assignment, Quiz & End Sem Exam
11	Sustainable development and Agenda 21	Lecture	EVS242.2	Mid Term, Assignment, Quiz & End Sem Exam
12	Urban problems related to	Lecture	EVS242.2	Mid Term,

	Energy			Assignment, Quiz & End Sem Exam
13	Water conservation and Management, Rainwater Harvesting, Watershed Management	Lecture	EVS242.2	Mid Term, Assignment, Quiz & End Sem Exam
14	Resettlement & Rehabilitation of People, Environmental Ethics	Lecture	EVS242.2	Mid Term, Assignment, Quiz & End Sem Exam
15	Climate Changes	Lecture	EVS242.2	Mid Term, Assignment, Quiz & End Sem Exam
16	Fireworks / Crackers – Effectson environment and humans	Lecture	EVS242.2	Mid Term, Assignment, Quiz & End Sem Exam
17	Wasteland Reclamation	Lecture	EVS242.2	Mid Term, Assignment, Quiz & End Sem Exam
18	Environmental Protection Laws in India	Lecture	EVS242.2	Mid Term, Assignment, Quiz & End Sem Exam
19	Population growth & Population Explosion	Lecture	EVS242.3	Mid Term, Assignment, Quiz & End Sem Exam
20	Environment and human health	Lecture	EVS242.3	Mid Term, Assignment, Quiz & End Sem Exam
21	Human Rights	Lecture	EVS242.3	Mid Term, Assignment, Quiz & End Sem Exam
22	HIV/AIDS	Lecture	EVS242.3	Mid Term, Assignment, Quiz & End Sem Exam
23	Women and Child Welfare	Lecture	EVS242.3	Mid Term, Assignment, Quiz & End Sem Exam
24	Role of Information Technology in Environment &Human Health	Lecture	EVS242.3	Mid Term, Assignment, Quiz & End Sem Exam
25	Field Work & Report	Project Work (Field Based Activity)	EVS242.4	Evaluation, Presentation, Viva
26	Field Work & Report	Project Work (Field Based Activity)	EVS242.4	Evaluation, Presentation, Viva

SampleQuestionPaper

Amity School of Life Science DepartmentofEnvironmental Science MID-SEMESTER(SEM–2)2021-22						
Class:UG,IISemester						
SubjectName: EVS242 **Environmental Studies - II**		Time:1.5 Hrs.			Max.Marks:30	
Levels of thequestions as perBloomsTaxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
QuestionMapping	Q.1-10	Q.11	Q.12-13	Q.14-15	Q.16-18	

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	EVS242 ENVIRONMENTAL STUDIES - II							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U6G6
1	A60215821003	Mr SHAD KHAN	100	30	70	C+	4	2	2	8
2	A60215821004	Mr SOHAM UPADHYAY	100	30	70	C+	4	2	2	8
			Total No. of Students			=	2			
			Total No. of Students			>60% marks	0	0.00	%	
			Attainment Level					-		

DEPARTMENTOF CIVIL ENGINEERING
Course Handout
Course : APPLIED MATHEMATICS – III (PROBABILITY, STATISTICS AND NUMERICAL METHODS)
Course Code : MAT301, Crédits : 03, Session :2021-22(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Santosh Kumar Sharma, Dr. Alok Jain, Dr. Girraj Kumar Verma, Dr. Rajat Vaish, Dr. Ram Kumar

WW. **Introduction:** The objective of this course is to familiarize the prospective engineers with techniques in basic statistics, probability, testing of significance, and numerical methods for differentiation, integration, equations and ordinary differential equations. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

XX. Course Outcomes: At the end of the course, students will be able to:

MAT301.1. Solve the problems of real life applications using measures of central tendency and to find out the correlation between various factors.

MAT301.2. Come to know the applications of probability and probability distribution functions in various sampling methods.

MAT301.3. Solve problems of sampling for large and small sampling using test of significance based on normal and chi-square statistics.

MAT301.4. Find the interpolated values of dependent variable, derivative at certain point, solution of equations and solution of simultaneous equations.

MAT301.5. Use the tools of numerical methods to solve definite integration and ordinary differential equations.

YY. Programme Outcomes:

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

ZZ. Programme Specific Outcomes:

PSO 1: Will be able to design, develop and implement efficient software for a given real life problem.

PSO 2: Will be able to apply knowledge of AI, Machine Learning and Data Mining in analyzing big data forextracting useful information from it and for performing predictive analysis.

PSO 3: Will be able to design, manage and secure wired/ wireless computer networks for transfer and sharing ofinformation.

AAA. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home	S/V/Q/HA	10%

	Assignment		
Attendance	A minimum of 75% Attendance is required to be maintained by a studentto be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

BBB. Syllabus

Module I : Basic Statistics

Measures of Central tendency: Moments, skewness and Kurtosis, Correlation and regression – Rank correlation.

Applied Statistics : Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves.

Module II : Basic Probability and expectation

Discrete and Continuous random variables and their properties, Dependent and Independent random variables. Probability spaces, conditional probability, sums of independent random variables. Expectation of Discrete Random Variables.

Probability distributions and probability density function for discrete and continuous variable: Binomial, Poisson's and Normal distribution and evaluation of its statistical parameters.

Module III: Test of significance for Small and large samples

est of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.

Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

Module IV : Numerical Methods

Solution of simultaneous linear equations by numerical techniques; Jacobi's and Gauss-Seidel method. Solution of algebraic and transcendental equations – Bi-section method, Newton-Raphson method and Regula-Falsi method.

Interpolation : Finite differences, Relation between operators, Interpolation using Newton's forward and backward difference formula.

Interpolation for unequal intervals: Newton's divided difference and Lagrange's formulae.

Module V : Numerical Methods

Numerical differentiation and integration: Picard's method, Trapezoidal rule and Simpson's 1/3rd and 3/8 rules.

Solution of Ordinary differential equation : Taylor's series, Euler's and modified Euler's methods, Runge-

Kutta method of fourth order, Milne's and Adam's predicator-corrector methods.

CCC. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

DDD. Suggested Text/Reference Books:

- Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- P.G. Hoel, S.C. Port and C.J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003(Reprint).
- S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
- W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968.
- N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
- T. Veerarajan, Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi, 2010.

EEE. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Measures of Central tendency	Lecture	MAT301.1	Mid Term-1, Quiz & End Sem Exam
2	Moments, skewness and Kurtosis	Lecture	MAT301.1	Mid Term-1, Quiz & End Sem Exam
3	Correlation and regression	Lecture	MAT301.1	Mid Term-1, Quiz & End Sem Exam
4	Rank Correlation	Lecture	MAT301.1	Mid Term-1, Quiz & End Sem Exam
5	Curve fitting by the method of least squares	Lecture	MAT301.1	Mid Term-1, Quiz & End Sem Exam
6	Straight Line	Lecture	MAT301.1	Mid Term-1, Quiz & End Sem Exam
7	Parabola and More curves	Lecture	MAT301.1	Mid Term-1, Quiz & End Sem Exam
8	Discrete and Continuous random variables	Lecture	MAT301.2	Mid Term-1, Quiz & End Sem Exam
9	Dependent and Independent random variables	Lecture	MAT301.2	Mid Term-1, Quiz & End Sem Exam
10	Probability spaces, conditional probability	Lecture	MAT301.2	Mid Term-1, Quiz & End Sem Exam

11	Sums of independent random variables, Expectation of Discrete Random Variables	Lecture	MAT301.2	Mid Term-1, Quiz & End Sem Exam
12	Probability distributions and probability density function	Lecture	MAT301.2	Mid Term-1, Quiz & End Sem Exam
13	Binomial and Poisson's distribution	Lecture	MAT301.2	Mid Term-1, Quiz & End Sem Exam
14	Normal distribution	Lecture	MAT301.2	Mid Term-1, Quiz & End Sem Exam
15	Large sample test for single proportion	Lecture	MAT301.3	Quiz & End Sem Exam
16	difference of proportions, single mean	Lecture	MAT301.3	Quiz & End Sem Exam
17	difference of means and standard deviations	Lecture	MAT301.3	Quiz & End Sem Exam
18	Test for single mean, difference of means	Lecture	MAT301.3	Quiz & End Sem Exam
19	Test for ratio of variances	Lecture	MAT301.3	Quiz & End Sem Exam
20	Chi-square test for goodness of fit	Lecture	MAT301.3	Quiz & End Sem Exam
21	Independence of attributes	Lecture	MAT301.3	Quiz & End Sem Exam
22	Jacobi's and Gauss-Seidel method	Lecture	MAT301.4	Quiz & End Sem Exam
23	Bi-section method, Newton-Raphson method	Lecture	MAT301.4	Quiz & End Sem Exam
24	Regula-Falsi method	Lecture	MAT301.4	Quiz & End Sem Exam
25	Finite differences, Relation between operators	Lecture	MAT301.4	Quiz & End Sem Exam
26	Interpolation using Newton's forward and backward difference formula	Lecture	MAT301.4	Quiz & End Sem Exam
27	Newton's divided difference	Lecture	MAT301.4	Quiz & End Sem Exam
28	Lagrange's formulae	Lecture	MAT301.4	Quiz & End Sem Exam
29	Picard's method	Lecture	MAT301.5	Quiz & End Sem Exam
30	Trapezoidal rule	Lecture	MAT301.5	Quiz & End Sem Exam
31	Simpson's 1/3rd and 3/8 rules	Lecture	MAT301.5	Quiz & End Sem Exam
32	Taylor's series and Euler's method	Lecture	MAT301.5	Quiz & End Sem Exam
33	modified Euler's methods	Lecture	MAT301.5	Quiz & End Sem Exam
34	Runge-Kutta method of fourth order	Lecture	MAT301.5	Quiz & End Sem Exam

35	Milne's predicator-corrector methods	Lecture	MAT301.5	Quiz & End Sem Exam
36	Adam's predicator-corrector methods	Lecture	MAT301.5	Quiz & End Sem Exam

FFF. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
MAT301.1	Solve the problems of real life applications using measures of central tendency and to find out the correlation between various factors.	3	3	2	3	2						2		**3**	**2**	**1**
MAT301.2	Come to know the applications of probability and probability distribution functions in various sampling methods.	3	2	2	3	3						2		**3**	**2**	**1**
MAT301.3	Solve problems of sampling for large and small sampling using test of significance based on normal and chi-square statistics.	3	2	2	3	3						2		**3**	**2**	**1**
MAT301.4	Find the interpolated values of dependent variable, derivative at certain point,	3	2	2	3	3						2		**3**	**2**	**1**

	solution of equations and solution of simultaneous equations.															
MAT301.5	Use the tools of numerical methods to solve definite integration and ordinary differential equations.	3	2	2	3	2						2		**3**	**2**	**1**

S. No.	Enrollment.No.	Student's Name	MAT301 APPLIED MATHEMATICS-III (PROBABILITY, STATISTICS AND NUMERICAL METHODS) Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U2G2
1	A60215820001	Mr ABHI PRATAP	100	30	70	A	9	3	3	27
2	A60215820002	Mr AMRENDRA SINGH CHAUHAN	100	30	70	A	9	3	3	27
3	A60215820003	Mr SHYAM VEER SINGH	100	30	70	A	9	3	3	27
4	A60215820004	Mr SAHIL SHARMA	100	30	70	A+	10	3	3	30
			Total No. of Students			=	4			
			Total No. of Students			>60% marks	4	100.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **COMPUTER-AIDED CIVIL ENGINEERING DRAWING**
Course Code : CIV 302, Crédits : 03, Session : 2021-22 (Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Mohan Khantharia

A. Introduction

The objective of the course is to develop the capability for carrying out independent design. Information in the form of sketch and images to be illustrated as a part of discussion.

B. Course Outcomes: At the end of the course, students will be able to:

- **CIV302.1**. Applying software's in design and drawings of Civil Engineering structures.
- **CIV302.2**. Able to proficiency, including the ability to use industry-standard computer software to generate 2D and 3D drawings.
- **CIV302.3**. Understanding of the theory of orthographic projection and the conventions associated with Civil engineering drawings.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

E. Course Content

F. **Module I: Basics of Auto Cad (2-D) and Auto Cad (3-D):** Two-dimensional drafting work to be handled in detail on Auto Cad. Complete Drafting, Editing and modification work to be done and presentations be made.Basic commands and usage of 3d Auto Cad drawing. Drafting basic geometrical forms and combinations of the same in three dimensions and their editing.

Module II: Elements of Building Drawing: Symbols and sing Conventions used for materials, plumbing, rebar drawing, electrical fittings. Masonry Bonds details, one brick wall and one and half brick wall, wall connections, . RCC beam, column, footings, foundation plan, load wearing wall.

Module III:Building Drawing: Detail drawing of single story building Plan, Elevation, Sectional Elevation. Standard fittings, drawings of different types of buildings. .

Module IV: Building Bye-laws: Building Planning – Provisions of National Building Code, open area,setbacks, FAR terminology, principles of planning, orientation. site selection, types of drawings. Types of buildings. Classification of structure, Load bearing structure, Framed structure, Composite structure.

Module V: Perspective Drawing: Elements of perspective drawing involving simple problems, one point and two point perspectives.

G. Examination Scheme:

Components	A	CT	S/V/Q/ HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- Building Drawing Shah M. G. Kale C. M, Tata McGraw-Hill Education
- Planning & Designing of Building Sane Y. S, Allies Book Stall
- Architectural Design Ernest Pickering, J. Wiley & Sons
- National Building Code-2005

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Two-dimensional drafting work to be handled in detail on Auto Cad.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
2	Complete Drafting.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
3	Basic commands and usage of 3d Auto Cad drawing	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
4	Drafting basic geometrical forms	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
5	combinations of the same in three dimensions and their editing.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
6	Editing and modification work to be done and presentations be made.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
7	Symbols and sing Conventions used for materials,., , .	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
8	plumbing, rebar drawing, electrical fittings.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
9	plumbing, rebar drawing, electrical fittings.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
10	Masonry Bonds details, one brick wall and one and half brick wall.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
11	Masonry Bonds details, one	Lecture	CIV 302.1	Mid Term-1, Quiz

	brick wall and one and half brick wall.			& End Sem Exam
12	wall connections.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
13	RCC beam.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
14	Rcc column, footings.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
15	Foundation plan, load Bearing wall.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
16	Detail drawing of single story building Plan,	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
17	Elevation, of buildings	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
18	Sectional Elevation.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
19	Standard fittings.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
20	Drawings of different types of buildings	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
21	Building Planning Types of buildings.	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
22	Provisions of National Building Code.	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
23	Provisions of National Building Code.	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
24	Open area,setbacks	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
25	FAR terminology	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
26	Principles of planning, orientation	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
27	Site selection, types of drawings.	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
28	*Classification of structure, Load bearing structure,*	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
29	Framed structure, Composite structure.	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
30	Elements of perspective drawing involving simple problems, one point and two point perspectives.	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
31	Elements of perspective drawing involving simple problems, one point and two point perspectives.	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam

32	Elements of perspective drawing involving simple problems, one point and two point perspectives. Elements of perspective drawing involving simple problems, one point and two point perspectives.	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
33	Elements of perspective drawing involving simple problems, one point and two point perspectives.	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
34	Elements of perspective drawing involving simple problems, one point and two point perspectives.	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
35	Elements of perspective drawing involving simple problems, one point and two point perspectives.	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam
36	Elements of perspective drawing involving simple problems, one point and two point perspectives.	Lecture	CIV 302.1	Mid Term-2, Quiz & End Sem Exam

J.

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV302.1	Application of software's in design and drawings of Civil Engineering structures.	3	3	1	3	1				2		2	1			
CIV302.2	Able to proficiency, including the ability to use industry-standard computer software to generate 2D and 3D drawings	3	2	2	2	2				2		1	1			

CIV302.3	Understanding of the theory of orthographic projection and the conventions associated with Civil engineering drawings.	3	2	2	2	2				3		3	1			

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–III)2021-22		
Class: B.Tech (CE) 3rd Semester		
Subjec tName: CIV 302 Computer Aided Civil Engg drawing	Time:1.5Hrs	Max.Marks:30

Levels of thequestions as perBloomsTaxo nomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		

Student will be able to
CO1: Using the software for the design of buildings, making plans.
CO2: Applying the basic concept of drawing
CO3: Understanding the various projections.

COMap	QuestionNo.	Question	Marks
CO1	Q.1	Use Auto CADD to make 2-D plan of building	3
CO1	Q.2a	What are various software used for the design of building.	3
	Q.2b	Write down various commands in Auto-CADD	3
CO1	Q.3	What is use of line command ?	6
CO2	Q.4	Discuss various types of projections.	3
CO2	Q.5a	Draw orthographic projections.	3
	Q.5b	Discuss various types of elements of building drawing.	3
CO3	Q6	What do you mean by 2-d and 3-d projections.	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1

Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	CIV302 COMPUTER-AIDED CIVIL ENGINEERING DRAWING							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U11G11
1	A60215820001	Mr ABHI PRATAP	100	30	70	B+	7	3	3	21
2	A60215820002	Mr AMRENDRA SINGH CHAUHAN	100	30	70	B	6	3	3	18
3	A60215820003	Mr SHYAM VEER SINGH	100	30	70	B+	7	3	3	21
4	A60215820004	Mr SAHIL SHARMA	100	30	70	B+	7	3	3	21
			Total No. of Students			=	4			
			Total No. of Students			>60% marks	0	0.00	%	
			Attainment Level					-		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **ENGINEERING MECHANICS**
Course Code : CIV 303, Credits : 04, Session : 2021-22(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Mohan Khantharia, Dr. Imran Ahmad Khan

A. Introduction

The course also covers the simple and compound stresses due to forces, stresses and deflection in beams due to bending, torsion in circular section, strain energy, different theories of failure, stress in thin cylinder thick cylinder and spheres due to external and internal pressure.

B. Course Outcomes: At the end of the course, students will be able to:

- **CIV303.1** Able to know the importance of seismic activity consideration in terrain.
- **CIV303.2** Able to understand various techniques to determine engineering properties of rocks and distinguish different types of rocks and minerals.

C. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects.

D.

Component of Evaluation	**Description**	**Code**	**Weightag e %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		

	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

E. **Module I: Introduction to Engineering Mechanics Covering:** Introduction to Engineering Mechanics covering, Force Systems Basic concepts, Particle equilibrium in 2-D & 3-D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces, Components in Space – Resultant- Moment of Forces and its Application; Couples and Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems; Static Indeterminacy.

Module II:Centroid and Centre of Gravity Covering: Centroid and Centre of Gravity covering, Centroid of simple figures from first principle, centroid of composite sections; Centre of Gravity and its implications; Area moment of inertia- Definition, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections; Mass moment inertia of circular plate, Cylinder, Cone, Sphere, Hook.

Module III: Basic Structural Analysis: Basic Structural Analysis covering, Equilibrium in three dimensions; Method of Sections; Method of Joints; How to determine if a member is in tension or compression; Simple Trusses; Zero force members; Beams & types of beams; Frames & Machines, Friction covering, Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, wedge friction, screw jack & differential screw jack;

Module IV: Virtual Work and Energy Method: Virtual Work and Energy Method- Virtual displacements, principle of virtual work for particle and ideal system of rigid bodies, degrees of freedom. Active force diagram, systems with friction, mechanical efficiency. Conservative forces and potential energy (elastic and gravitational), energy equation for equilibrium. Applications of energy method.

Module V: Review of Particle Kinematics, Dynamics and **Mechanical Vibrations:**Introduction to Kinematics of Rigid Bodies covering, Basic terms, general principles in dynamics; Types of motion, Instantaneous centre of rotation in plane motion and simple problems; D'Alembert's principle and its applications in plane motion and connected bodies; Work energy principle and its application in plane motion of connected bodies; Kinetics of rigid body rotation; Review of particle dynamics- Rectilinear motion; Plane curvilinear motion (rectangular, path, and polar coordinates). 3-D curvilinear motion; Relative and constrained motion; Newton's 2nd law (rectangular, path, and polar coordinates). Work-kinetic energy, power, potential energy. Impulse-momentum (linear, angular); Impact (Direct and oblique), Mechanical Vibrations covering, Basic terminology, free and forced vibrations, resonance and its effects; Degree of freedom; Derivation for frequency and amplitude of free vibrations without damping and single degree of freedom system, simple problems, types of pendulum, use of simple, compound and torsion pendulums.

F. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/ HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

G. Text Books

- Jindal U.C., “Strength of Materials”, Galgotia Publication, New Delhi, 1998.
- Ryder G.H., “Strength of Materials”, Macmillan, Delhi, 2003.
- R.K. Bansal, “Strength of Materials”, Laxmi Publication, New Delhi, 2001.
- Sadhu Singh, “Strength of Materials”, Khanna Publishers, New Delhi, 2000.
- Timoshenko S.P., “Elements of Strength of Materials”, East-West affiliated, New Delhi, 2000.
- Hibbler R.C., “Mechanics of Materials”, Prentice Hall, New Delhi, 1994.

H.

Lecture	**Topics**	**Mode of Delivery**	**Corresponding CO**	**Mode of Assessing CO**
1	Introduction to Engineering Mechanics covering.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
2	Force Systems Basic concepts	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
3	Particle equilibrium in 2-D & 3-D.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
4	Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
5	Components in Space – Resultant- Moment of Forces and its Application.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
6	Couples and Resultant of Force System, Equilibrium of System of Forces	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
7	Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
8	Static Indeterminacy.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
9	Centroid and Centre of Gravity covering.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
10	Centroid of simple figures.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
11	from first principle, centroid of composite sections.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
12	Centre of Gravity and its implications.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
13	Area moment of inertia- Definition.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
14	Moment of inertia of plane sections from first principles.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
15	Theorems of moment of inertia.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam

16	Moment of inertia of standard sections and composite sections	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
17	Mass moment inertia of circular plate, Cylinder,	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
18	Mass moment inertia Cone, Sphere, Hook.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
19	Basic Structural Analysis covering.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
20	Equilibrium in three dimensions.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
21	Method of Sections.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
22	Method of Joints; How to determine if a member is in tension or compression	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
23	Simple Trusses; Zero force members.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
24	Beams & types of beams; Frames & Machines	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
25	Friction covering, Types of friction, Limiting friction.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
26	Friction, Static and Dynamic Friction	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
27	Laws of; Motion of Bodies, wedge friction.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
28	screw jack & differential screw jack	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
29	Method of Joints; How to determine if a member is in tension.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
30	Virtual Work and Energy Method-for. (	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
31	Virtual displacements, principle of virtual work.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
32	particle and ideal system of rigid bodies.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
33	degrees of freedom.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
34	Active force diagram, systems with friction.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
35	Mechanical efficiency. Conservative forces and potential energy.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
36	Elastic and gravitational), energy equation for equilibrium. Applications of energy method.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
37	Introduction to Kinematics of Rigid Bodies covering, Basic terms, general principles in dynamics.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
38	Mechanical Vibrations covering, Basic terminology, free and forced vibrations.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam

39	Resonance and its effects; Degree of freedom.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam
40	Derivation for frequency and amplitude of free vibrations without damping and single degree of freedom system.	Lecture	CIV303.1	Mid Term-2, Quiz & End Sem Exam

I.

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV303.1	Able to know the importance of seismic activity consideration in terrain.	3	3	1	3	1				2		2	1			
CIV303.2	Able to understand various techniques to determine engineering properties of rocks and distinguish different types of rocks and minerals	3	2	2	2	2				2		1	1			

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–III)2021-22						
Class: B.Tech (CE) 3rd Semester						
Subject t Name: CIV 303 Engineering Mechanics		Time:1.5Hrs		Max.Marks:30		
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		
Student will be able to CO1: Understand the basic concept of stress and strain CO2: Analyze the basic properties of different materials.						

CO Map	Question No.	Question	Marks
CO1	Q.1	What is force and it system?	3
CO1	Q.2a	What is concurrent and coplanar forces?	3
	Q.2b	What do you mean by free body diagram?	3
CO1	Q.3	What is stress and strain?	6
CO2	Q.4	What is Kinetics of rigid body and also Review of particle dynamics.	3
CO2	Q.5a	What is centre of gravity.	3
	Q.5b	What is curvilinear motion, Relative and constrained motion.	3
CO2	Q6	What is Newton’s 2nd law (rectangular, path, and polar coordinates).	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	CIV303 ENGINEERING MECHANICS Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U4G4
1	A60215820001	Mr ABHI PRATAP	100	30	70	B+	7	4	4	28
2	A60215820002	Mr AMRENDRA SINGH CHAUHAN	100	30	70	B	6	4	4	24
3	A60215820003	Mr SHYAM VEER SINGH	100	30	70	A-	8	4	4	32
4	A60215820004	Mr SAHIL SHARMA	100	30	70	B+	7	4	4	28
			Total No. of Students			=	4			
			Total No. of Students			>60% marks	1	25.00	%	
			Attainment Level					-		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **CIVIL ENGINEERING & ENERGY SCIENCE**
Course Code : CIV 308, Credits : 04, Session : 2021-22 (Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Mohan Khantharia, Mr. Sachin Tiwari

A. Introduction

Energy-efficient construction implies the development of energy-efficient technological and other measures that are aimed at streamlining the processes of using energy resources at all stages of construction. One of their effective directions is the construction of "green" buildings with zero energy consumption.

B. Course Outcomes: At the end of the course students will be able to learn

- **CIV 308.1** Understand the basics of ancient and modern architecture, modern construction and materials.
- **CIV 308.2** Analyze the difference between different types of energy sources their origin and usage.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects.

D. Programme Specific Outcomes:

PSO1: Students will be able to understand the different types of construction ancient and modern in recent trends.

PSO2: Students will able to apply all the concepts to develop green construction and to use energy efficiently.

PSO3: It will help student to understand the different types of construction.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/ HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25%includesalltypesofleaves Including medical leaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F.

Module I: Introduction: What is Civil Engineering/ Infrastructure? Basics of Engineering and Civil Engineering; Broad disciplines of Civil Engineering; Importance of Civil Engineering, Possible scopes for a career. Early constructions and developments over time; Ancient monuments & Modern marvels; Development of various materials of construction and methods of construction; Works of Eminent civil engineers. Introduction to Energy Science: Scientific principles and historical interpretation to place energy use in the context of pressing societal, environmental and climate issues.

Module II: Energy Sources: Overview of energy systems, sources, transformations, efficiency, and storage. Fossil fuels (coal, oil, oil-bearing shale and sands, coal gasification) - past, present & future, Remedies & alternatives for fossil fuels - biomass, wind, solar, nuclear, wave, tidal and hydrogen; Sustainability and environmental trade-offs of different energy systems; possibilities for energy storage or regeneration (Ex. Pumped storage hydro power projects, superconductor-based energy storages, high efficiency batteries)

Module III: Energy & Environment: Energy efficiency and conservation; introduction to clean energy technologies and its importance in sustainable development; Carbon footprint, energy consumption and sustainability; introduction to the economics of energy;; How future energy use can be influenced by economic, environmental, trade, and research policy.

Module IV: Civil Engineering Projects connected with the Energy Sources: Coal mining technologies, Oil exploration offshore platforms, Underground and under-sea oil pipelines, solar chimney project, wave energy caissons, coastal installations for tidal power, wind mill towers; hydro power stations above-ground and underground along with associated dams, tunnels, penstocks, etc.; Nuclear reactor; Spent Nuclear fuel storage and disposal systems.

Module V: Engineering for Energy Conservation: Concept of Green Building and Green Architecture; Green building concepts; LEED ratings. Energy Audit of Facilities and optimization of energy consumption**:** Aesthetics in Civil Engineering, Examples of great architecture, fundamentals of architectural design & town planning; Building Systems (HVAC, Acoustics, Lighting, etc.); LEED ratings; Development of Smart cities.

G.Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- Patil, B.S.(1974), Legal Aspects of Building and Engineering Contract
- The National Building Code, BIS, (2017)
- RERA Act, (2017)
- Meena Rao (2006), Fundamental concepts in Law of Contract, 3rd Edn. Professional Offset
- Chandiramani, Neelima (2000), The Law of Contract: An Outline, 2nd Edn. Avinash Publications Mumbai
- Boyle, Godfrey (2004), Renewable Energy (2nd edition). Oxford UniversityPress

I. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Corresponding CO**	**Mode of Assessing CO**
1	What is Civil Engineering/ and Civil Engineering;	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
2	Infrastructure? Basics of Engineering	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
3	Broad disciplines of Civil Engineering.	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
4	Importance of Civil Engineering,	Lecture	CIV308.1	Mid Term-1, Quiz

				& End Sem Exam
5	Early constructions and developments over time	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
6	Ancient monuments & Modern marvels	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
7	Development of various materials of construction and methods of construction	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
8	Works of Eminent civil engineers. Introduction to Energy Science	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
9	Scientific principles and historical interpretation to place energy use in the context of pressing societal	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
10	Environmental and climate issues.	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
11	Possible scopes for a career.	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
12	Overview of energy systems, and storage., coal gasification)	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
13	Overview of energy systems, sources, transformations, efficiency	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
14	Fossil fuels (coal, oil, oil-bearing shale and sands.	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
15	past, present & future, remedies & alternatives for fossil fuels	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
16	Biomass, wind, solar, nuclear, wave, tidal and hydrogen.	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
17	Sustainability and environmental trade-offs of different energy systems	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
18	possibilities for energy storage or regeneration (Ex. Pumped storage hydro power project	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
19	superconductor-based energy storages, high efficiency batteries)	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
20	Energy efficiency and conservation;, environmental,	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
21	introduction to clean energy technologies	Lecture	CIV308.1	Mid Term-2, Quiz & End Sem Exam
22	introduction to clean energy technologies and its importance in sustainable development	Lecture	CIV308.1	Mid Term-2, Quiz & End Sem Exam
23	Carbon footprint, energy consumption and sustainability	Lecture	CIV308.1	Mid Term-2, Quiz & End Sem Exam
24	introduction to the economics of energy	Lecture	CIV308.1	Mid Term-2, Quiz & End Sem Exam
25	How future energy use can be influenced by economic	Lecture	CIV308.1	Mid Term-2, Quiz & End Sem Exam
26	Trade, and research policy.	Lecture	CIV308.1	Mid Term-2, Quiz

				& End Sem Exam
27	Coal mining technologies, Oil exploration offshore platforms, , solar,; tunnels, penstocks, etc.;	Lecture	CIV308.1	Mid Term-2, Quiz & End Sem Exam
28	Underground and under-sea oil pipelines	Lecture	CIV308.1	Mid Term-2, Quiz & End Sem Exam
29	chimney project, wave energy caissons	Lecture	CIV308.1	Mid Term-2, Quiz & End Sem Exam
30	coastal installations for tidal power, wind mill towers	Lecture	CIV308.1	Mid Term-2, Quiz & End Sem Exam
31	hydro power stations above-ground and underground along with associated dams,	Lecture	CIV308.1	Mid Term-2, Quiz & End Sem Exam
32	Nuclear reactor; Spent Nuclear fuel storage and disposal systems.	Lecture	CIV308.1	Mid Term-2, Quiz & End Sem Exam
33	Nuclear reactor; Spent Nuclear fuel storage and disposal systems.	Lecture	CIV308.1	Mid Term-2, Quiz & End Sem Exam
34	Concept of Green Building and Green Architecture.:,	Lecture	CIV308.1	Mid Term-2, Quiz & End Sem Exam
35	Green building concepts	Lecture	CIV308.1	Mid Term-2, Quiz & End Sem Exam
36	LEED ratings	Lecture	CIV308.1	Mid Term-2, Quiz & End Sem Exam
37	Energy Audit of Facilities and optimization of energy consumption	Lecture	CIV308.1	Mid Term-2, Quiz & End Sem Exam
38	Aesthetics in Civil Engineering, Examples of great architecture	Lecture	CIV308.1	Mid Term-2, Quiz & End Sem Exam
39	fundamentals of architectural design & town planning; Building Systems	Lecture	CIV308.1	Mid Term-2, Quiz & End Sem Exam
40	(HVAC, Acoustics, Lighting, etc.); LEED ratings; Development of Smart cities.	Lecture	CIV308.1	Mid Term-2, Quiz & End Sem Exam

J. **Course Articulation Matrix (Mapping of COs with POs)**

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV308.1	Understand the basic concept of sustainable construction with different materials.	3	3	1	3	1				2		2	1		1	1
CIV308.2	Students will able to visualize the difference between ancient and modern construction.	3	2	2	2	2				2		1	1		2	1
CIV308.3	Understanding the basic of different structural components and their usage.	3	2	2	2	2				2		1	1		1	2

Sample Question Paper

Amity School of Engineering and Technology
Department of CIVIL Engineering
MID-SEMESTER(SEM–III)2021-22

Class: B.Tech (CE) 3rd Semester

Subjec tName: CIV 308 Civil Engg and Energy Sciences	Time:1.5Hrs	Max.Marks:30

Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		

Student will be able to
CO1: Understand the basic difference between modern and ancient constructions
CO2: Understand basic of different energy sources and their origin

CO Map	Question No.	Question	Marks
CO1	Q.1	What do you understand by modern construction materials?	3
CO1	Q.2a	What do you understand by cement?	3
	Q.2b	What are different types of construction materials?	3
CO1	Q.3	What do you mean by concrete?	6
CO2	Q.4	What are different conventional energy sources?	3
CO2	Q.5a	Discuss origin of fossil fuels and its use.	3
	Q.5b	Discuss tidal energy, solar energy and wind energy.	3
CO2	Q6	Discuss conventional and non conventional energy sources.	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	CIV308 CIVIL ENGINEERING AND ENERGY SCIENCE Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U13G13
1	A60215820001	Mr ABHI PRATAP	100	30	70	A-	8	4	4	32
2	A60215820002	Mr AMRENDRA SINGH CHAUHAN	100	30	70	A	9	4	4	36
3	A60215820003	Mr SHYAM VEER SINGH	100	30	70	A	9	4	4	36
4	A60215820004	Mr SAHIL SHARMA	100	30	70	A	9	4	4	36
			Total No. of Students			=	4			
			Total No. of Students			>60 % marks	4	100.00	%	
			Attainment Level					Level 3		

AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : LIFE SCIENCE/BIOLOGY FOR ENGINEERS
Course Code : CIV309, Crédits : 03, Session :2021-22(OddSemester), Class : B.Tech. 2ndYear
Facultyname : Dr. Nidhi Shukla

A. **Introduction:**The objective of this course is to understand thebiosystems engineering, Ergonomics, Biomedical engineering, etc. Biosystems Engineering focused on the application of engineering principles to biological systems like plants, animals, micro-organisms, or humans. It is very much important for engineering students to understand the basic principles of engineering and the introduction of biological concepts so that they can effectively interact to concern for providing solutions to the problems related to biosystems.

B. **Course Outcomes:**At the end of the course, students will be able to:

CIV 309.1. Understand basic biological principles and organizational structure of living systems at molecular level.

CIV 309.2. Comprehend basic biological principles and organizational structure of living systems at Cellular level.

CIV 309.3. To provide the students an appreciation of how biological systems can be re-designed as substitute products for natural systems.

CIV309.4. Appreciate biological process with engineering perspective.

CIV309.5. Impart knowledge about the common corridors of biology and engineering and Biologically inspired technologies.

C. **Programme Outcomes:**

[PO.1].**Engineeringknowledge**:Applytheknowledgeofmathematics,science,engineeringfundamentals,andanengineeringspecializationtothesolutionofcomplexengineeringproblems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineeringproblems reaching substantiated conclusions using first principles of mathematics, natural sciences,andengineeringsciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and designsystem components or processes that meet the specified needs with appropriate consideration for thepublichealthandsafety,andthecultural,societal,andenvironmentalconsiderations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of theinformationtoprovidevalidconclusions

[PO.5].**Moderntoolusage**:Create,select,andapplyappropriatetechniques,resources,andmodernengineering and IT tools including prediction and modeling to complex engineering activities with anunderstandingofthelimitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to theprofessionalengineeringpractice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societalandenvironmentalcontexts,anddemonstratetheknowledgeof,andneedforsustainabledevelopment

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities andnorms oftheengineeringpractices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverseteams,andinmultidisciplinarysettings

[PO.10].**Communication**:Communicateeffectivelyoncomplexengineeringactivitieswiththeengineeringcommunity and with society at large, such as, being able to comprehend and write effective reports anddesigndocumentation,makeeffectivepresentations,andgiveandreceiveclearinstructions

[PO.11].**Projectmanagementandfinance**:Demonstrateknowledgeandunderstandingoftheengineeringandmanagementprinciplesandapplythesetoone’sownwork,asamemberandleaderinateam,tomanageprojectsandinmultidisciplinaryenvironments

[PO.12].Life-longlearning:Recognizetheneedfor,andhavethepreparationandabilityto engageinindependent andlife-longlearninginthebroadestcontextoftechnologicalchange

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I:Uni-cellularity and Multi-cellularity:(6 Hours)

What is Life sciences/Biology? Classification per se is not what biology is all about (Theunderlying criterion, such as morphological, biochemical or ecological be highlighted). Hierarchy of life forms at phenomenological level. Classification based on (a) cellularity- Unicellular or multicellular (b) ultrastructure- prokaryotes or eucaryotes. (c) energy and Carbon utilization - Autotrophs, heterotrophs, lithotropes (d) Ammonia excretion – aminotelic, uricoteliec, ureotelic (e) Habitats- acquatic or terrestrial.

Module II: Why We Need to Study Biology: (6 Hours)

Introduction to surveying, survey stations, measurement of distances; conventional and EDM methods.Measurement of directions by different methods, measurement of elevations by different methods, reciprocal levelling.

Module III: Molecules of Life & Molecular Genetics: (6 Hours)

Molecules of life, Discuss monomeric units and polymeric structures. Discuss about sugars, starch and cellulose. Amino acids and proteins, Lipids.Nucleotides and DNA/RNA structure & concept of gene.

Module IV: Plant Diversity: (6 Hours)
Unicellular and multicellular organisms, prokaryotes and eukaryotes, Autotrophs, heterotrophs, Hierarchy of life forms, Classification, General account and importance of Virus, Bacteria, Fungi, Lichens, Bryophytes, pteridophytes, Gymnosperms, Angiosperms.

Module V: Concepts of Recessiveness and Dominance: (6 Hours)
Principles of Genetics in biology are like Newton's laws to Physical Sciences. Mendel's laws, Meiosis and Mitosis (be taught as a part of genetics. Emphasis to be give not to the mechanics of cell division nor the phases but how genetic material passes from parent to offspring).

Module VI:Ecology, Ecosystems & Population Ecology:(6 Hours)
Components, types, flow of matter and energy in an ecosystem; Ecosystem structure- Biotic and a-biotic factors, food chain, food web, ecological pyramids.
Population characteristics, ecotypes; Population genetics- Environmental Management, Policies and legal aspects- Environment Protection Acts, International Treaties; Environmental Impact Assessment

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd.
- Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
- Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T.2001, Environmental Encyclopedia,JaicoPubl.House,Mumabai, 1196p
- Jadhav, H &Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House,Delhi 284 p. Mckinney, M.L. &School, R.M. 1996.Environmental Science Systems &Solutions, Web enhanced edn. 639p
- Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H. John Wiley and Sons
- Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freeman andCompany
- Molecular Genetics (Second edition), Stent, G. S.; and Calender, R. W.H. Freeman and company, Distributed by Satish Kumar Jain for CBSPublisher
- Microbiology, Prescott, L.M J.P. Harley and C.A. Klein 1995. 2nd edition Wm, C. BrownPublishers

I. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Corresponding CO**	**Mode of Assessing CO**
1	What is Life sciences/Biology? Classification based on (a). (c) energy and Carbon utilization - Autotrophs, ureotelic.	Lecture	CIV309.1	Mid Term-1, Quiz & End Sem Exam
2	what biology is all about (The underlying criterion	Lecture	CIV309.1	Mid Term-1, Quiz & End Sem Exam
3	Classification per se is not, such as morphological, biochemical or ecological be highlighted).	Lecture	CIV309.1	Mid Term-1, Quiz & End Sem Exam

4	Hierarchy of life forms at phenomenological level.	Lecture	CIV309.1	Mid Term-1, Quiz & End Sem Exam
5	Hierarchy of life forms at phenomenological level.	Lecture	CIV309.1	Mid Term-1, Quiz & End Sem Exam
6	cellularity- Unicellular or multicellular (b) ultrastructure- prokaryotes or eucaryotes	Lecture	CIV309.1	Mid Term-1, Quiz & End Sem Exam
7	heterotrophs, lithotropes (d) Ammonia excretion – aminotelic, uricoteliec	Lecture	CIV309.1	Mid Term-1, Quiz & End Sem Exam
8	(e) Habitats- acquatic or terrestrial.	Lecture	CIV309.1	Mid Term-1, Quiz & End Sem Exam
9	To convey that Biology is as important a scientific discipline as Mathematics, Physics and Chemistry.	Lecture	CIV309.1	Mid Term-1, Quiz & End Sem Exam
10	Bring out the fundamental differences between science and engineering.	Lecture	CIV309.1	Mid Term-1, Quiz & End Sem Exam
11	Mention the most exciting aspect of biology as an independent scientific discipline.	Lecture	CIV309.1	Mid Term-1, Quiz & End Sem Exam
12	Mention the most exciting aspect of biology as an independent scientific discipline.	Lecture	CIV309.1	Mid Term-1, Quiz & End Sem Exam
13	Discuss how biological observations of 18th Century that lead to major discoveries.	Lecture	CIV309.1	Mid Term-1, Quiz & End Sem Exam
14	Discuss how biological observations of 18th Century that lead to major discoveries.	Lecture	CIV309.1	Mid Term-1, Quiz & End Sem Exam
15	Molecules of life.	Lecture	CIV309.1	Mid Term-1, Quiz & End Sem Exam
16	Discuss monomeric units and polymeric structures.	Lecture	CIV309.1	Mid Term-1, Quiz & End Sem Exam
17	Discuss about sugars, starch and cellulose.	Lecture	CIV309.1	Mid Term-1, Quiz & End Sem Exam
18	Amino acids and proteins, Lipids.	Lecture	CIV309.1	Mid Term-1, Quiz & End Sem Exam
19	Nucleotides and DNA/RNA structure & concept of gene.	Lecture	CIV309.1	Mid Term-1, Quiz & End Sem Exam
20	Nucleotides and DNA/RNA	Lecture	CIV309.1	Mid Term-1,

	structure & concept of gene. Unicellular and multicellular organisms.			Quiz & End Sem Exam
21	prokaryotes and eukaryotes, Autotrophs.	Lecture	CIV309.1	Mid Term-2, Quiz & End Sem Exam
22	heterotrophs, Hierarchy of life forms	Lecture	CIV309.1	Mid Term-2, Quiz & End Sem Exam
23	Classification, General account and importance of Virus	Lecture	CIV309.1	Mid Term-2, Quiz & End Sem Exam
24	Bacteria, Fungi, Lichens, Bryophytes	Lecture	CIV309.1	Mid Term-2, Quiz & End Sem Exam
25	pteridophytes, Gymnosperms,Angiosperms	Lecture	CIV309.1	Mid Term-2, Quiz & End Sem Exam
26	Principles of Genetics in biology are like Newton's laws to Physical Sciences.	Lecture	CIV309.1	Mid Term-2, Quiz & End Sem Exam
27	Mendel's laws, Meiosis and Mitosis (be taught as a part of genetics.	Lecture	CIV309.1	Mid Term-2, Quiz & End Sem Exam
28	Emphasis to be give not to the mechanics of cell division nor the phases.	Lecture	CIV309.1	Mid Term-2, Quiz & End Sem Exam
29	how genetic material passes from parent to offspring).	Lecture	CIV309.1	Mid Term-2, Quiz & End Sem Exam
30	Components.Population characteristics Environment Protection Acts,	Lecture	CIV309.1	Mid Term-2, Quiz & End Sem Exam
31	types, flow of matter and energy in an ecosystem	Lecture	CIV309.1	Mid Term-2, Quiz & End Sem Exam
32	types, flow of matter and energy in an ecosystem	Lecture	CIV309.1	Mid Term-2, Quiz & End Sem Exam
33	Ecosystem structure- Biotic and a-biotic factors, food chain, food web, ecological pyramids	Lecture	CIV309.1	Mid Term-2, Quiz & End Sem Exam
34	ecotypes; Population genetics- EnvironmentalManagement, Policies and legal aspects-	Lecture	CIV309.1	Mid Term-2, Quiz & End Sem Exam
35	International Treaties; Environmental Impact Assessment	Lecture	CIV309.1	Mid Term-2, Quiz & End Sem Exam
36	InternationalTreaties; Environmental Impact Assessment	Lecture	CIV309.1	Mid Term-2, Quiz & End Sem

				Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV309.1	Understand basic biological principles and organizational structure of living systems at molecular level.	2	1	1	0	3	2	2	1	1	0	2	2			
CIV309.2	Comprehend basic biological principles and organizational structure of living systems at cellular level.	2	1	1	0	0	3	1	2	1	0	2	2			
CIV309.3	Know Energy transformations and information processing in biological systems	2	1	3	0	0	2	1	1	2	2	1	1			
CIV309.4	Appreciate biological process with engineering perspective.	2	0	1	1	2	2	2	1	1	1	0	2			
CIV309.5	Impart knowledge about the common corridors of biology and engineering and biologically inspired technologies.	2	1	2	0	1	2	2	1	1	1	0	2			

SampleQuestionPaper

<table>
<tr><td colspan="7">Amity School of Engineering and Technology
DepartmentofCivilEngineering
IMID-SEMESTER(SEM– III)2021-22</td></tr>
<tr><td colspan="7">Class:B.Tech.(Civil) IIISemester</td></tr>
<tr><td colspan="2">SubjectName:
CIV309LIFE SCIENCE/BIOLOGY FOR ENGINEERS</td><td colspan="3">Time:2 Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of thequestions as perBloomsTaxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>QuestionMapping</td><td>Q.1,2</td><td>Q.3,4,5</td><td>Q.6</td><td></td><td></td><td></td></tr>
<tr><td colspan="7">Student willbeableto
CO1. • Develop an understanding of the different life forms from microbes to higher plants and their importance in human life.
CO2. • Develop an understanding of the ecosystems, community ecology, ecosystem structure etc.
CO3.• Develop an insight into the various environmental management covering principles environment protection Acts. Environmental Impact Assessment</td></tr>
</table>

<table>
<tr><th>COMap</th><th>QuestionNo.</th><th>Question</th><th>Marks</th></tr>
<tr><td>CO1</td><td>Q.1</td><td>Describe Lipids in detail.</td><td>3</td></tr>
<tr><td rowspan="2">CO1</td><td>Q.2</td><td>What are Carbohydrates? Classify them by giving one Example.</td><td>3</td></tr>
<tr><td>Q.3</td><td>Draw a Well Labeled diagram of Nucleus</td><td></td></tr>
<tr><td>CO2</td><td>Q.4</td><td>Explain the function of plasma membrane of cell</td><td>3</td></tr>
<tr><td>CO2</td><td>Q.5</td><td>Explain the Difference Between prokaryotes and eukaryotes</td><td>3</td></tr>
<tr><td rowspan="2">CO3</td><td>Q6</td><td>What is the Structure and Function of Chloroplast</td><td>10</td></tr>
<tr><td>Q7</td><td>What is the difference between
a) Animal Cell and Plant Cell
b) DNA and RNA</td><td>10</td></tr>
<tr><td>CO3</td><td>Q8</td><td>Define ammonotelic, ureotelic and uricotelic animals? Give example of each</td><td>10</td></tr>
</table>

Attainments		Rubric
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment. No.	Student's Name	CIV309 LIFE SCIENCE/BIOLOGY FOR ENGINEERING							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U14G14
1	A60215820001	Mr ABHI PRATAP	100	30	70	B+	7	3	3	21
2	A60215820002	Mr AMRENDRA SINGH CHAUHAN	100	30	70	A-	8	3	3	24
3	A60215820003	Mr SHYAM VEER SINGH	100	30	70	A	9	3	3	27
4	A60215820004	Mr SAHIL SHARMA	100	30	70	A	9	3	3	27
			Total No. of Students			=	4			
			Total No. of Students			>60 % marks	3	75.00	%	
			Attainment Level					Level 2		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **MECHANICAL ENGINEERING**
Course Code : BME 104, Credits : 02, Session : 2021-22(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Nagendra Kumar Sharma

A. Introduction

Mechanical engineering is **one of the broadest engineering disciplines**. Mechanical engineers design, develop, build, and test. They deal with anything that moves, from components to machines to the human body.

B. Course Outcomes: At the end of the course students will be able to learn

- **BME 104.1** Ability to design and conduct experiments, as well as to analyze and interpret data.
- **BME 104.2** Ability to apply modern engineering tools, techniques and resources to solve complex mechanical engineering activities with an understanding of the limitations.
- **BME 104.3** Ability to comprehend the thermodynamics and their corresponding processes that influence the behaviour and response of structural components.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects.

D. Programme Specific Outcomes:

PSO1: Apply basic knowledge of mathematics, science and engineering principles to solve technical problems.

PSO2: Design and analyze a system component, or process to meet desired needs in Mechanical Engineering. Design a system and conduct experiments to find suitable solution in the field of mechanical engineering.

PSO3: Identify, visualize, formulate and solve engineering problems in the field of mechanical Engineering

E.

<table>
<tr><th>Component of Evaluation</th><th>Description</th><th>Code</th><th>Weightage %</th></tr>
<tr><td rowspan="3">Continuous Internal Evaluation</td><td>Mid Term 1</td><td rowspan="2">CT</td><td rowspan="2">15%</td></tr>
<tr><td>Mid Term 2</td></tr>
<tr><td>Seminar/Viva-Voce/Quiz/Home Assignment</td><td>S/V/Q/ HA</td><td>10%</td></tr>
<tr><td>Attendance</td><td>A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End</td><td>A</td><td>5%</td></tr>
</table>

	Semester examination. The allowance of 25%includesalltypesofleaves Including medical leaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F.Course Content

Module I: Basic Concepts- Basic concepts: concept of continuum, macroscopic approach, Thermodynamic systems - closed, open and isolated. Property, state, path and process, quasistatic process, work, modes of work. Zeroth law of thermodynamics, concept of temperature and heat. Concept of ideal and real gases.

Module II: First Law of Thermodynamics: Concepts of Internal Energy, Specific Heat Capacities, Enthalpy. Energy Balance for Closed and Open Systems, Energy Balance for Steady-Flow Systems. Steady-Flow Engineering Devices. Energy Balance for Unsteady- Flow

Module III: Second Law of Thermodynamics: Thermal energy reservoirs, heat engines energy conversion, Kelvin's and Clausius statements of second law, the Carnot cycle, the Carnot Theorem, Carnot heat engine, efficiency, the Carnot refrigerator and heat pump, COP. Clausius inequality, concept of entropy, reversible and irreversible processes, Entropy change of pure substances, isentropic processes.

Module IV: Properties of Pure Substance: Properties of pure substances. Thermodynamic properties of pure substances in solid, liquid and vapour phases. Phase rule, P-V, P-T, T-V, T-S, H-S diagrams, PVT surfaces. Thermodynamic properties of steam. Calculations of work done and heat transfer in non- flow and flow processes

Module V: Power Cycles: Vapour and combined power cycles, including the Carnot vapor cycle, Rankine cycle, Gas power cycles, Otto cycle, diesel engine cycle, gas-turbine Brayton cycle.

G.Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att Attendance

H.Suggested Books:

- Nag.P.K., "Engineering Thermodynamics", Tata McGraw-Hill, NewDelhi.
- Cengel, Thermodynamics - AnEngineeringApproach*Tata McGraw Hill, New*Delhi.
- Sonntag, R. E., Borgnakke, C., &Wylen, G. J. V. Fundamentals of thermodynamics: Wiley.
- Moran, M. J., Shapiro, H. N., Boettner, D. D., & Bailey, M. Fundamentals of Engineering
- Thermodynamics: John Wiley & Sons.

I.lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	concept of continuum, macroscopic approach concept of	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam

	temperature and heat.			
2	Thermodynamic systems - closed, open and isolated. Property, state,	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
3	Path and process, quasistatic process, work, modes of work.	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
4	Zeroth law of thermodynamics.	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
5	Concept of ideal and real gases.	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
6	Concepts of Internal Energy, Specific Heat Capacities, Enthalpy,	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
7	Energy Balance for Closed and Open Systems	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
8	Energy Balance for Steady-Flow Systems	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
9	Steady-Flow Engineering Devices	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
10	Energy Balance for Unsteady-Flow.	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
11	Thermal energy reservoirs, the Carnot Theorem,. Clausius inequality, concept of entropy,.	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
12	Kelvin's and Clausius statements of second law.	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
13	heat engines energy conversion, , the Carnot cycle,	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
14	Carnot heat engine, efficiency, the Carnot refrigerator and heat pump, COP.	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
15	reversible and irreversible processes, Entropy change of pure substances, isentropic processes	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
16	Properties of pure substances. Thermodynamic properties of pure substances in solid, liquid and vapour phases.	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
17	Phase rule, P-V, P-T, T-V, T-S, H-S diagrams, PVT surfaces. Thermodynamic properties of steam	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
18	Calculations of work done and heat transfer in non- flow and flow processes.	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
19	Vapour and combined power cycles, including the Carnot vapor cycle,	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam
20	Rankine cycle, Gas power cycles, Otto cycle, diesel engine cycle, gas-turbine Brayton cycle.	Lecture	BME 104.1	Mid Term-1, Quiz & End Sem Exam

A. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BME104.1	Explain the basic concepts and laws of thermodynamics. Distinguish the properties of ideal and real gases.	3	3	1	3	1				2		2	1	1	2	1
BME104.2	Apply the concept of enthalpy and entropy in thermal systems, Calculate the properties of pure substance and explain the working of steam cycles.	3	2	2	2	2				2		1	1	2	2	1
BME104.3	Problems in psychrometric processes and gas mixtures. Apply thermodynamic laws for real time applications	2	1	1	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–III)2021-22						
Class: B.Tech (CE) 3rd Semester						
Subject t Name: BME 104 Mechanical Engineering		Time:1.5Hrs		Max.Marks:30		
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		
Student will be able to CO1: Understand the basic of mechanical engineering CO2: Analyze the basic mechanical engineering problems CO3: Analyze the basic of thermodynamics						

CO Map	Question No.	Question	Marks
CO1	Q.1	What is concept of Continum?	3
CO1	Q.2a	Discuss Zeroth law of thermodynamics.	3
	Q.2b	Discuss quasi static process in detail.	3
CO1	Q.3	Discuss concept of real and ideal gases.	6
CO2	Q.4	Discuss Thermal energy reservoirs and its concept in detail.	3
CO2	Q.5a	Discuss statements of second law Carnot cycle.	3
	Q.5b	Discuss Carnot cycle and theorem.	3
CO3	Q6	Discuss various thermodynamics properties of various substances in liquid and vapour phase.	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment. No.	Student's Name	BME104 MECHANICAL ENGINEERING Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U3G3
1	A60215820001	Mr ABHI PRATAP	100	30	70	A	9	2	2	18
2	A60215820002	Mr AMRENDRA SINGH CHAUHAN	100	30	70	A	9	2	2	18
3	A60215820003	Mr SHYAM VEER SINGH	100	30	70	A	9	2	2	18
4	A60215820004	Mr SAHIL SHARMA	100	30	70	A+	10	2	2	20

Total No. of Students	=	4		
Total No. of Students	>60 % marks	4	100.00	%
Attainment Level			Level 3	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **BASIC ELECTRONICS**
Course Code : ECE 307, Credits : 02, Session : 2021-22(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Narendra Kumar Garg, Mrs.Shally Goyal, Dr. Ajay Dadoria

A. Introduction

Electronics is about **manipulating electricity to accomplish a particular task** and is very much a hands-on endeavor. Since the result of building electronic circuits is usually a device that performs a task, this hands-on aspect should be self-evident.

B. Course Outcomes: At the end of the course students will be able to learn

- **ECE307.1** Understand and Know broadly the concepts and functionalities of the electronic devices, tools and instruments.
- **ECE307.2** Understand use, general specifications and deploy abilities of the electronic devices, and assemblies.
- **ECE307.3** Analyse usage of electronic devices, tools and instruments in engineering applications.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects.

D. Programme Specific Outcomes:

PSO1: Apply principles of Engineering Mathematics, Physics and core engineering including applications appropriate to the Electronics & Communication Engineering.

PSO2: Apply basic knowledge related to Electronic Devices & Circuits, Electromagnetics, Digital Signal Processing, Communication Engineering and Embedded Systems to solve engineering problems.

PSO3: Demonstrate proficiency in use of software and hardware required in reallife applications.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/ HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25%includesalltypesofleaves Including medical leaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module 1: Diodes and Applications: Semiconductor Diode - Ideal versus Practical, Diode Equivalent Circuits, Load Line Analysis; Diode as a Switch, Diode as a Rectifier, Half Wave and Full Wave Rectifiers; Breakdown Mechanisms, Zener Diode – Operation and Applications; Opto-Electronic Devices – LEDs, Clipper and clampers.

Module 2: Transistor Characteristics: Bipolar Junction Transistor (BJT) –Construction, Operation, Amplifying Action, Common Base, Common Emitter and Common Collector Configurations, Operating Point, Introduction to FET, Feedback Amplifiers – Principle, Advantages of Negative Feedback.

Module 3: Operational Amplifiers and Applications: Introduction to Op-Amp, Differential Amplifier Configurations, CMRR, PSRR, Slew Rate; Block Diagram, Pin Configuration of 741 Op-Amp, Characteristics of Ideal Op-Amp, Concept of Virtual Ground; inverting and non-inverting amplifier applications: summing and difference amplifier, unity gain buffer, comparator.

Module 4: Digital Electronics Fundamentals: Difference between analog and digital signals, Boolean algebra, Basic and Universal Gates, Symbols, Truth tables, logic expressions, Logic simplification using K- map, half and full adder/subtractor, multiplexers, de- multiplexer.

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Books

- David. A. Bell (2003), Laboratory Manual for Electronic Devices and Circuits, Prentice Hall, India
- SantiramKal (2002), Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India
- Thomas L. Floyd and R. P. Jain (2009), Digital Fundamentals by Pearson Education,
- Paul B. Zbar, A.P. Malvino and M.A. Miller (2009), Basic Electronics – A Text-Lab. Manual, TMH
- R. T. Paynter (2009), Introductory Electronic Devices & Circuits, Conventional Flow Version, Pearson

I. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	Semiconductor Diode - Ideal versus Practical,;; Breakdown Mechanisms.	Lecture	ECE 307.1	Mid Term-1, Quiz & End Sem Exam

2	Diode Equivalent Circuits, Load Line Analysis.	Lecture	ECE 307.1	Mid Term-1, Quiz & End Sem Exam
3	Diode as a Switch, Diode as a Rectifier, Half Wave and Full Wave Rectifiers.	Lecture	ECE 307.1	Mid Term-1, Quiz & End Sem Exam
4	Zener Diode – Operation and Applications.	Lecture	ECE 307.1	Mid Term-1, Quiz & End Sem Exam
5	Opto-Electronic Devices – LEDs.	Lecture	ECE 307.1	Mid Term-1, Quiz & End Sem Exam
6	Clipper and clampers.	Lecture	ECE 307.1	Mid Term-1, Quiz & End Sem Exam
7	Bipolar Junction Transistor (BJT)	Lecture	ECE 307.1	Mid Term-1, Quiz & End Sem Exam
8	Construction, Operation, Amplifying Action.	Lecture	ECE 307.1	Mid Term-1, Quiz & End Sem Exam
9	Common Base, Common Emitter and Common Collector Configurations.	Lecture	ECE 307.1	Mid Term-1, Quiz & End Sem Exam
10	Operating Point, Introduction to FET.	Lecture	ECE 307.1	Mid Term-1, Quiz & End Sem Exam
11	Feedback Amplifiers – Principle.	Lecture	ECE 307.1	Mid Term-1, Quiz & End Sem Exam
12	Advantages of Negative Feedback.			Mid Term-2, Quiz & End Sem Exam
13	Introduction to Op-Amp, Differential Amplifier Configurations.	Lecture	ECE 307.1	Mid Term-2, Quiz & End Sem Exam
14	CMRR, PSRR, Slew Rate; Block Diagram, Pin Configuration of 741 Op-Amp	Lecture	ECE 307.1	Mid Term-2, Quiz & End Sem Exam
15	Characteristics of Ideal Op-Amp, Concept of Virtual Ground.	Lecture	ECE 307.1	Mid Term-2, Quiz & End Sem Exam
16	inverting and non-inverting amplifier applications	Lecture	ECE 307.1	Mid Term-2, Quiz & End Sem Exam
17	summing and difference amplifier, unity gain buffer, comparator.	Lecture	ECE 307.1	Mid Term-2, Quiz & End Sem Exam
18	Difference between analog and digital signals, Boolean algebra,	Lecture	ECE 307.1	Mid Term-2, Quiz & End Sem Exam
19	Logic simplification using K-map, half and full adder/subtractor, multiplexers, de- multiplexer	Lecture	ECE 307.1	Mid Term-2, Quiz & End Sem Exam
20	Basic and Universal Gates, Symbols, Truth tables, logic expressions	Lecture	ECE 307.1	Mid Term-2, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ECE307.1	Apply the knowledge of mathematics, science, engineering Know broadly the concepts and functionalities of the electronic devices, tools and instruments.	3	3	1	3	1				2		2	1	1	2	1
ECE307.2	Understand use, general specifications and deploy abilities of the electronic devices, and assemblies.	3	2	2	2	2				2		1	1	2	2	1
ECE307.3	Confidence in handling and usage of electronic devices, tools and instruments in engineering applications.	2	1	1	2	2				2		1	1	2	2	1

S. No.	Enrollment. No.	Student's Name	ECE307 BASIC ELECTRONICS							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U5G5
1	A60215820001	Mr ABHI PRATAP	100	30	70	B	6	2	2	12
2	A60215820002	Mr AMRENDRA SINGH CHAUHAN	100	30	70	B-	5	2	2	10
3	A60215820003	Mr SHYAM VEER SINGH	100	30	70	A-	8	2	2	16
4	A60215820004	Mr SAHIL SHARMA	100	30	70	B+	7	2	2	14
			Total No. of Students			=	4			
			Total No. of Students			>60 % marks	1	25.00	%	
			Attainment Level					-		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **COMPUTER-AIDED CIVIL ENGINEERING DRAWING LAB**
Course Code : CIV 322, Credits : 01, Session : 2021-22(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Sachin Tiwari, Mr. Mohan Kantharia

A. Introduction

Engineering drawing, most commonly referred to as engineering graphics, is the art of manipulation of designs of a variety of components, especially those related to engineering.

B. Course Outcomes: At the end of the course, students will be able to:

- **CIV322.1**. Application of software's in design and drawings of Civil Engineering structures.
- **CIV322.2**. Able to proficiency, including the ability to use industry-standard computer software to generate 2D and 3D drawings
- **CIV322.3**. Understanding of the theory of orthographic projection and the conventions associated with Civil engineering drawings.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Function as design consultants in construction industry for the design of civil engineering structures.

PSO2: Provide sustainable solutions to the Civil Engineering Problems

PSO3: It. will help students to analyze and Provide concrete solution to environmental problem

E.

Component of Evaluation	**Description**	**Code**	**Weightag e %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/H A	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastu dentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%

Total			**100%**

F. Course Content

- Basic of 2-D Auto CAD **(2 Hours)**
- Drawing of Elements of Buildings, column, beam, footings by 2-D Auto CAD**. (2 Hours)**
- Drawing of RCC Details by Auto CAD **(2 Hours)**
- Drawing of Residential Building, and school Building by Auto CAD. **(2 Hours**)
- Types of stair, RCC stair case, septic tank, Soak pit. **(2 Hours)**
- Paneled, doors, windows and ventilators in wood, Glazed paneled, wooden doors: **(2 Hours)**
- Residential building- with load wearing walls, including details of doors and windows: **(2 Hours)**
- Preparation of site plans and service plans as per Building Rules: **(2 Hours**)
- Roof trusses. Industrial buildings:**(2 Hours)**
- Perspective view of single story buildings.**(2 Hours)**

G. Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Books

- National Building Code of India
- Local Building Bye-laws
- Callender, John Hancock, Time Saver Standards for Architectural design Data, Tata McGraw Hill.
- Chiara, Callender, John Hancock, Time Saver Standards for Building Type, McGraw Hill

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Basic of 2-D Auto CAD	Practical	CIV322.1	Mid Term-1, Quiz & End Sem Exam
2	Drawing of Elements of Buildings, column, beam, footings by 2-D Auto CAD.	Practical	CIV322.1	Mid Term-1, Quiz & End Sem Exam
3	Drawing of RCC Details by Auto CAD.	Practical	CIV322.1	Mid Term-1, Quiz & End Sem Exam
4	Drawing of Residential Building, and school Building by Auto CAD.	Practical	CIV322.1	Mid Term-1, Quiz & End Sem Exam
5	Types of stair, RCC stair case, septic tank, Soak pit.	Practical	CIV322.1	Mid Term-1, Quiz & End Sem Exam
6	Paneled, doors, windows and ventilators in wood, Glazed paneled, wooden doors:	Practical	CIV322.1	Mid Term-1, Quiz & End Sem Exam
7	Residential building- with load wearing walls, including details of doors and windows.	Practical	CIV322.1	Mid Term-1, Quiz & End Sem Exam
8	Preparation of site plans and service plans as per Building Rules	Practical	CIV322.1	Mid Term-1, Quiz & End Sem Exam
9	Roof trusses. Industrial buildings	Practical	CIV322.1	Mid Term-1, Quiz

				& End Sem Exam
10	Perspective view of single story buildings.			

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV322.1	Function as design consultants in construction industry for the design of civil engineering structures.	3	3	1	3	1				2		2	1	1	2	1
CIV322.2	Provide sustainable solutions to the Civil Engineering Problems	3	2	2	2	2				2		1	1	2	2	1

Sample Question Paper

<table>
<tr><td colspan="7">Amity School of Engineering and Technology
Department of CIVIL Engineering
MID-SEMESTER(SEM–III)2021-22</td></tr>
<tr><td colspan="7">Class: B.Tech (CE) 3rd Semester</td></tr>
<tr><td colspan="2">Subject Name:
CIV 321 Computer Aided Civil Engg drawing Lab</td><td colspan="3">Time:1.5Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of thequestions as perBloomsTaxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3,6</td><td>Q.4</td><td>Q.2,5</td><td></td><td></td></tr>
<tr><td colspan="7">Student will be able to
CO1: Using the software for the design of buildings, making plans.
CO2: Applying the basic concept of drawing
CO3: Understanding the various projections.</td></tr>
</table>

CO Map	Question No.	Question	Marks
CO1	Q.1	Use Auto CADD to make 2-D plan of building	3
CO1	Q.2a	Discuss various key elements for building design.	3
	Q.2b	Write down various commands in Auto-CADD	3
CO1	Q.3	Discuss different building bye law in detail.	6
CO2	Q.4	Discuss drawing detail of single storey R.C.C building.	3
CO2	Q.5a	Draw orthographic projections.	3
	Q.5b	Discuss drawing detail of different types of paneled doors.	3
CO3	Q6	What do you mean by 2-d and 3-d projections. Discuss orthographic projection.	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment. No.	Student's Name	CIV322 COMPUTER-AIDED CIVIL ENGINEERING DRAWING LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U12G12
1	A60215820001	Mr ABHI PRATAP	100	30	70	A-	8	1	1	8
2	A60215820002	Mr AMRENDRA SINGH CHAUHAN	100	30	70	A-	8	1	1	8
3	A60215820003	Mr SHYAM VEER SINGH	100	30	70	A+	10	1	1	10
4	A60215820004	Mr SAHIL SHARMA	100	30	70	A+	10	1	1	10
			Total No. of Students			=	4			
			Total No. of Students			>60 % marks	4	100.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **BASIC ELECTRONICS LAB**
Course Code : ECE 327, Credits : 01, Session : 2021-22(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Narendra Kumar Garg, Dr. Ajay Dadoria

A. Introduction

The objective of the job is to train students of making drawings using computer. The drawings are to be prepared as per specifications.

B. Course Outcomes: At the end of the course, students will be able to:

- **ECE327.1** Understand the concepts and functionalities of the electronic devices, tools and instruments.
- **ECE327.2** Understand use, general specifications and deploy abilities of the electronic devices, and assemblies.
- **ECE327.3** Confidence in handling and usage of electronic devices, tools and instruments in engineering applications

C. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Function as design consultants in construction industry for the design of civil engineering structures.

PSO2: Provide sustainable solutions to the Civil Engineering Problems

PSO3: It. will help students to analyze and Provide concrete solution to environmental problem.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

- To study and verify the VI characteristic of a diode. **(2 Hours)**
- To study the Zener diode in breakdown region. **(2 Hours)**
- To study diode as a half wave rectifier. **(2 Hours)**
- To study diode as a full wave rectifier. **(2 Hours)**
- To study the characteristics of a CE Transistor. **(2 Hours)**
- To study the VI characteristic of CB &CC Transistor **(2 Hours)**
- To study transistor as an a amplifiers **(2 Hours)**
- To study the JFET operation. **(2 Hours)**
- To study OP Amp. As inverting and non-inverting Amp. **(2 Hours)**

- To study OP Amp in open loop and close loop. **(2 Hours)**

G. Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

H. Suggested Books

- David. A. Bell (2003), Laboratory Manual for Electronic Devices and Circuits, Prentice Hall, India
- SantiramKal (2002), Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India
- Thomas L. Floyd and R. P. Jain (2009), Digital Fundamentals by Pearson Education,

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	To study and verify the VI characteristic of a diode.	Practical	ECE327.1	Mid Term-1, Quiz & End Sem Exam
2	To study the Zener diode in breakdown region.	Practical	ECE327.1	Mid Term-1, Quiz & End Sem Exam
3	To study diode as a half wave rectifier.	Practical	ECE327.1	Mid Term-1, Quiz & End Sem Exam
4	To study diode as a full wave rectifier.	Practical	ECE327.1	Mid Term-1, Quiz & End Sem Exam
5	To study the characteristics of a CE Transistor.	Practical	ECE327.1	Mid Term-1, Quiz & End Sem Exam
6	To study the VI characteristic of CB &CC Transistor	Practical	ECE327.1	Mid Term-1, Quiz & End Sem Exam
7	To study transistor as an a amplifiers	Practical	ECE327.1	Mid Term-1, Quiz & End Sem Exam
8	To study the JFET operation	Practical	ECE327.1	Mid Term-1, Quiz & End Sem Exam
9	To study OP Amp. As inverting and non-inverting Amp	Practical	ECE327.1	Mid Term-1, Quiz & End Sem Exam
10	To study OP Amp in open loop and close loop	Practical	ECE327.1	Mid Term-1, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ECE327.1	An ability to design, implement and evaluate Electronics and Communication systems for public health and safety, cultural, societal and environmental considerations.	3	3	1	3	1				2		2	1	1	2	1
ECE327.2	An ability to design electronic circuits and conduct investigations, as well as to analyze and interpret data.	3	2	2	2	2				2		1	1	2	2	1

S. No.	Enrollment.No.	Student's Name	ECE327 BASIC ELECTRONICS LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U10G10
1	A60215820001	Mr ABHI PRATAP	100	30	70	A-	8	1	1	8
2	A60215820002	Mr AMRENDRA SINGH CHAUHAN	100	30	70	B+	7	1	1	7
3	A60215820003	Mr SHYAM VEER SINGH	100	30	70	A-	8	1	1	8
4	A60215820004	Mr SAHIL SHARMA	100	30	70	A	9	1	1	9
			Total No. of Students		=	4				
			Total No. of Students		>60% marks	3	75.00	%		
			Attainment Level				Level 2			

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **MATERIALS, TESTING & EVALUATION**
Course Code : CIV 401, Credits : 02, Session : 2021-22(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Mohan Kantharia, Dr. Vimal Kumar Gupta

A. Introduction

Materials testing helps us to understand and quantify whether a specific material or treatment is suitable for a particular application. With the wide variety of materials and treatments available in the marketplace, testing can help narrow down the choices to the most appropriate selection for the intended use.

B. At the end of the course students will able to learn:

- **CIV 401.1** Understand the electronic sensors, Operate a data acquisition system.
- **CIV 401.2** Analyse various types of testing machines, Configure a testing machine to measure tension or compression behaviour.
- **CIV 401.3** Apply and Compute engineering values (e.g. stress or strain) from laboratory measures, Analyze a stress versus strain curve for modulus, yield strength and other related attributes

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Identify the properties of engineering materials like cement, sand, concrete, ceramics, bitumen, structural steel etc.

PSO2: Explain the classification of engineering materials and uses of materials

PSO3: Understand the manufacturing process of cement, concrete, bitumen, glass, plastics, metals, paints and other engineering materials.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module I: **Introduction to Engineering Materials Covering:** Cements, M-Sand, Concrete (plain, reinforced and steel fibre/ glass fibre-reinforced, light-weight concrete, High Performance Concrete, Polymer Concrete) Ceramics, and Refractories, Bitumen and asphaltic materials, Timbers, Glass and Plastics, Structural Steel and other Metals, Paints and Varnishes, Acoustical material and geo-textiles, rubber and asbestos, laminates and adhesives, Graphene, Carbon composites and other engineering materials including properties and uses of these.

Module II: **Introduction to Material Testing Covering**: What is the " Material Engineering" ?; Mechanical behavior and mechanical characteristics; Elasticity – principle and characteristics; Plastic deformation of metals; Tensile test – standards for different material (brittle, quasi-brittle, elastic and so on) True stress – strain interpretation of tensile test; hardness tests; Bending and torsion test; strength of ceramic.

Module III: **Introduction to Material Testing Covering**: Internal friction, creep – fundaments and characteristics; Brittle fracture of steel – temperature transition approach; Background of fracture mechanics; Discussion of fracture toughness testing – different materials; concept of fatigue of materials; Structural integrity assessment procedure and fracture mechanics

Module IV: **Standard Testing & Evaluation Procedures Covering:** Laboratory for mechanical testing; Discussion about mechanical testing; Naming systems for various irons, steels and nonferrous metals; Discussion about elastic deformation; Plastic deformation; Impact test and transition temperatures; Fracture mechanics – background; Fracture toughness – different materials; Fatigue of material; Creep.

Module V: Testing*:* from the above modules covering, Understanding i) Tests & testing of bricks, ii) Tests & testing of sand, iii) Tests & testing of concrete, iv) Tests & testing of soils, v) Tests & testing of bitumen & bituminous mixes, vi) Tests & testing of polymers and polymer based materials, vii) Tests & testing of metals & viii) Tests & testing of other special materials, composites and cementitious materials. Explanation of mechanical behavior of these materials.

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- Chudley, R., Greeno (2006), 'Building Construction Handbook' (6th ed.),R. Butterworth- Heinemann
- Khanna, S.K., Justo, C.E.G and Veeraragavan, A, ' Highway Materials and Pavement Testing', Nem Chand& Bros, FifthEdition
- Various related updated & recent standards of BIS, IRC, ASTM, RILEM, AASHTO, etc. corresponding to materialsused for Civil Engineeringapplications
- Kyriakos Komvopoulos (2011), Mechanical Testing of Engineering Materials,Cognella
- E.N. Dowling (1993), Mechanical Behaviour of Materials,Prentice Hall International Edition
- AmericanSocietyforTestingandMaterials(ASTM),*AnnualBookofASTMStandards* (post 2000)
- Related papers published in international journals

I. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	Cements, M-Sand, Concrete (plain, reinforced and steel fibre/ glass fibre-reinforced, Paints and Varnishes, Graphene.	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
2	light-weight concrete, High Performance Concrete, Polymer Concrete) Ceramics, and Refractories	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
3	Bitumen and asphaltic materials, Timbers.	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
4	Glass and Plastics, Structural Steel and other Metals	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
5	Acoustical material and geo-	Lecture	CIV401.1	Mid Term-1, Quiz

	textiles, rubber and asbestos, laminates and adhesives			& End Sem Exam
6	Carbon composites and other engineering materials including properties and uses of these.	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
7	What is the " Material Engineering" ?;; Elasticity –;and so on);	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
8	Mechanical behavior and mechanical characteristics	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
9	principle and characteristics.	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
10	Plastic deformation of metals; Tensile test – standards for different material (brittle, quasi-brittle, elastic.	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
11	True stress – strain interpretation of tensile test	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
12	hardness tests; Bending and torsion test; strength of ceramic.	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
13	Internal friction, creep – fundaments and characteristics;;;; concept of fatigue of materials;	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
14	Brittle fracture of steel – temperature transition approach.	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
15	Background of fracture mechanics.	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
16	Discussion of fracture toughness testing – different materials.	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
17	Structural integrity assessment procedure and fracture mechanics	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
18	For mechanical testing; Discussion about mechanical testing; Naming systems for various irons.	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
19	steels and nonferrous metals; Discussion about elastic deformation; Plastic deformation.	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
20	Impact test and transition temperatures; Fracture mechanics – background; Fracture toughness – different materials; Fatigue of material; Creep.	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
21	Tests & testing of bitumen & bituminous mixes, vi) Tests & testing of polymers and polymer based materials, vii)	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam
22	Tests & testing of metals & viii) Tests & testing of other special materials, composites and cementitious materials.	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam
23	Explanation of mechanical	Lecture	BTCE401.1	Mid Term-2, Quiz

	behavior of these materials.			& End Sem Exam
24	Tests & testing of bricks, ii) Tests & testing of sand, iii) Tests & testing of concrete, iv) Tests & testing of soils, v)	Lecture	BTCE401.1	Mid Term-2, Quiz & End Sem Exam

J.Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV401.1	Explain standards for different materials, stress-strain interpretation. Describe the fundamentals of internal friction, creep, brittle fracture of steel. Describe the testing procedures of fresh and hardened concrete	3	3	1	3	1				2		2	1	1	2	1
CIV401.2	Understand the concept of fatigue of materials, structural integrity assessment procedure. Perform the mechanical testing of various metals like iron, steel and non-ferrous metals.	3	2	2	2	2				2		1	1	2	2	1
CIV401.3	Explain elastic deformation and plastic deformation of metals. Understand the impact testing, fatigue and creep of materials. Explain fracture toughness of different materials like steel and non-ferrous metals. Explain the testing procedures of bricks and sand.	2	1	1	2	2				2		1	1	2	2	1

Sample Question Paper

<table>
<tr><td colspan="7">Amity School of Engineering and Technology
Department of CIVIL Engineering
MID-SEMESTER(SEM–IV)2021-22</td></tr>
<tr><td colspan="7">Class: B.Tech (CE) 4th Semester</td></tr>
<tr><td colspan="2">Subject t Name:
CIV 401 MATERIALS, TESTING & EVALUATION</td><td colspan="3">Time:1.5Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3,6</td><td>Q.4</td><td>Q.2,5</td><td></td><td></td></tr>
<tr><td colspan="7">Student will be able to
CO1: Understand the basic concept of stress and strain
CO2: Analysis of various types of materials properties and machines.
CO3: Calculation of various parameters Young's Modulus, Yield strength</td></tr>
</table>

<table>
<tr><th>CO Map</th><th>Question No.</th><th>Question</th><th>Marks</th></tr>
<tr><td>CO1</td><td>Q.1</td><td>What is stress and different types of stress?</td><td>3</td></tr>
<tr><td rowspan="2">CO1</td><td>Q.2a</td><td>Discuss relation between stress and strain.</td><td>3</td></tr>
<tr><td>Q.2b</td><td>What do you understand by fracture modes of steel?</td><td>3</td></tr>
<tr><td>CO1</td><td>Q.3</td><td>What do you understand by fracture toughness?</td><td>6</td></tr>
<tr><td>CO2</td><td>Q.4</td><td>Calculate the stress and strain value for different grades of steel.</td><td>3</td></tr>
<tr><td rowspan="2">CO2</td><td>Q.5a</td><td>Calculate fracture toughness value for given steel specimen.</td><td>3</td></tr>
<tr><td>Q.5b</td><td>Discuss various tests used to find the strength of steel.</td><td>3</td></tr>
<tr><td>CO3</td><td>Q6</td><td>Calculate the Yield and Young's modulus value for different grades of steel.</td><td>6</td></tr>
</table>

<table>
<tr><th colspan="2">Attainments</th><th>Rubric</th></tr>
<tr><td>Level</td><td>1</td><td>IF60%ofstudentssecuremorethan60%marksthenlevel1</td></tr>
<tr><td>Level</td><td>2</td><td>IF70%ofstudentssecuremorethan60%marksthenlevel2</td></tr>
<tr><td>Level</td><td>3</td><td>IF80%ofstudentssecuremorethan60%marksthenlevel3</td></tr>
</table>

S. No.	Enrollment.No.	Student's Name	CIV401 MATERIALS, TESTING & EVALUATION							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U2G2
1	A60215820001	Mr ABHI PRATAP	100	30	70	C+	4	2	2	8
2	A60215820002	Mr AMRENDRA SINGH CHAUHAN	100	30	70	C+	4	2	2	8
3	A60215820003	Mr SHYAM VEER SINGH	100	30	70	C+	4	2	2	8
4	A60215820004	Mr SAHIL SHARMA	100	30	70	C+	4	2	2	8

Total No. of Students	=	4		
Total No. of Students	>60% marks	0	0.00	%
Attainment Level		-		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **ENGINEERING GEOLOGY**
Course Code : CIV 402, Credits : 02, Session : 2021-22(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Mohan Kantharia, Mr. Sachin Tiwari

A. Introduction

Engineering Geology is the application of the geologic sciences to engineering practice to **assure the safe location, design, construction, operation and maintenance of engineering works**, which may not be adversely affected by potential geological problems.

B. At the end of the course students will able to learn:

- **CIV 402.1** Understand the Site characterization and how to collect, analyze, and report geologic data using standards in engineering practice,The fundamentals of the engineering properties of earth materials.
  The mechanics of soils and fluids and their influence on settlement, liquefaction, and soil slope stability.
- **CIV 402.2** Analyse Rock mass characterization and the mechanics of planar rock slide sand topples.
- **CIV 402.3** Apply Soil characterization and the Unified Soil Classification System.

C. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate

consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Function as design consultants in construction industry for the design of civil engineering structures.

PSO2: Provide sustainable solutions to the Civil Engineering Problems

PSO3: It. will help students to analyze and Provide concrete solution to environmental problem.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance	A	5%

	isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module I: Branches and scope of geology, Physical Geology: Structure of the earth, Geological agents and their action, physical and chemical weathering, geological work done by wind, river, river meandering, glacial formation, coastal formation, underground water.

Module II: Mineralogy and Elements of Crystallography: Study of properties of minerals, formation, various groups of minerals, silicate, Felspar, pyroxene, mica. Various important minerals hornblende, Muscovite, Quartz, Corundum, calcite, Anthophyllite etc. Elements of a crystal, Cristallographique Axis, Crystal classes and system, Isométric, Tétragonal, Hexagonal, Orthorhombic, Monoclinic, Triclinic, System.

Module III: Petrology: Study of Igneous, Sedimentary, and metamorphic Rocks. Their texture, classification structure, forms, and engineering Use, Important rocks Granite, Gabbro, Dolerite, Pegmatite, Breccia, Sandstone, Shale, Limestone, Coals, Gypsum, Slate, Gneiss, Quartzite,

Module IV: Structural Geology and Ground Water: Types of folds, faults and joints, their classification and causes. Earthquake, volcanism and plate tectonics,Slope failures and landslides, elements of rock Mechanics.HydrogeologyGroundwater and occurrence, investigations, quality, artificial recharge

Module V: Geology in Civil Engineering, Stratigraphy and Geology of India: Tunnels, dams, reservoirs, Tunnels, Roads. Types of structures and classification and their effect on civil Engineering projects. Types, age and occurrence of rock formations and economic importance, study of Cuddapah, Vindhyan Dharwar, Deccan, and Gondwana group. Indian mineral deposits Coal, Petroleum, metallic and nonmetallic ores.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- R. Vaidyanathan, P. Perumal, Comprehensive Structural Analysis Vol. I & II, Laxmi Publications, New Delhi
- Reddy C.S., Basic Structural Analysis, 2nd ed., Tata McGraw Hill, New Delhi (2004).

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Structure of the earth, geological	Lecture	CIV402.1	Mid Term-1, Quiz

	work done by wind, river,			& End Sem Exam
2	Geological agents and their action	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
3	physical and chemical weathering	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
4	River meandering, glacial formation.	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
5	coastal formation, underground water	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
6	Study of properties of minerals, mica.	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
7	various groups of minerals.	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
8	formation, silicate, Felspar, pyroxene	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
9	Various important minerals hornblende, Muscovite, Quartz	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
10	Elements of a crystal, Cristallographique Axis, Crystal classes and system.	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
11	Anthophyllite etc. , Isométric, Tétragonal, Hexagonal, Orthorhombic	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
12	Corundum, calcite, Monoclinic, Triclinic, System.	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
13	Study of Igneous, Sedimentary, and metamorphic Rocks.	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
14	Important rocks Granite, Gabbro, Dolerite, Pegmatite, Breccia, Sandstone.	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
15	classification structure, forms, and engineering Use, Shale, Limestone	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
16	Coals, Gypsum, Slate, Gneiss, Quartzite	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
17	Rocks and Their texture.	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
18	Structural Geology and Ground Water:	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
19	Earthquake, volcanism and plate tectonics,Slope failures and landslides, elements of rock Mechanics.	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
20	Hydrogeology Groundwater and occurrence, investigations, quality, artificial recharge	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
21	Types of folds, faults and joints, their classification and causes.	Lecture	CIV402.1	Mid Term-2, Quiz & End Sem Exam
22	Tunnels, dams, reservoirs, Tunnels, Roads. Types of structures and classification and their effect on	Lecture	CIV402.1	Mid Term-2, Quiz & End Sem Exam

	civil Engineering projects..			
23	Types, age and occurrence of rock formations and economic importance, study of Cuddapah, Vindhyan Dharwar, Deccan, and Gondwana group	Lecture	CIV402.1	Mid Term-2, Quiz & End Sem Exam
24	Indian mineral deposits Coal, Petroleum, metallic and nonmetallic ores.	Lecture	CIV402.1	Mid Term-2, Quiz & End Sem Exam

J.Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV402.1	Students will able to understand the presence of different types of rocks and their classification.	3	3	1	3	1				2		2	1	1	2	1
CIV402.2	To get a understanding of different types of geological formation and have knowledge of different types of minerals.	3	2	2	2	2				2		1	1	2	2	1
CIV402.3	To have a clears idea about the different geomorphic process.	2	1	1	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–IV)2021-22						
Class: B.Tech (CE) 4th Semester						
Subject t Name: CIV 402 Engineering Geology		Time:1.5Hrs		Max.Marks:30		
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		

Student will be able to
CO1: Understand the basic concept and different properties of rocks
CO2: Analyze different types of materials and rocks.
CO3: Understand the soil formation and characterization.

CO Map	Question No.	Question	Marks
CO1	Q.1	What do you understand by geology?	3
CO1	Q.2a	What is rock? Discuss different types of rocks.	3
	Q.2b	Discuss different classification of rocks and its properties.	3
CO1	Q.3	Discuss Types of folds, faults and joints, their classification and causes.	6
CO2	Q.4	Discuss various types of geological formation in detail.	3
CO2	Q.5a	Discuss Earthquake, volcanism and plate tectonic in details.	3
	Q.5b	Discuss Slope failures and landslides with neat sketch.	3
CO3	Q6	Discuss Hydrogeology Groundwater and artificial recharge.	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	CIV402 ENGINEERING GEOLOGY Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U3G3
1	A60215820001	Mr ABHI PRATAP	100	30	70	C+	4	2	2	8
2	A60215820002	Mr AMRENDRA SINGH CHAUHAN	100	30	70	B	6	2	2	12
3	A60215820003	Mr SHYAM VEER SINGH	100	30	70	C+	4	2	2	8
4	A60215820004	Mr SAHIL SHARMA	100	30	70	B-	5	2	2	10

Total No. of Students	=	4	
Total No. of Students	>60% marks	0	0.00 %
Attainment Level		-	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **SURVEYING**
Course Code : CIV 403, Credits : 03, Session : 2021-22(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Mohan Kantharia, Mr. Sachin Tiwari, Dr. Ripunjoy Gogoi

A. Introduction

Surveying is **the process of determining the relative position of natural and man- made features on or under the earth's surface**, the presentation of this information either graphically in the form of plans or numerically in the form of tables, and the setting out of measurements on the earth's surface.

B. At the end of the course students will able to learn:

CIV403.1 Apply the knowledge, techniques, skills, and applicable tools of the discipline to engineering and surveying activities.

CIV403.2 Relate the knowledge on Surveying to the new frontiers of science like Hydrographic surveying, Electronic Distance Measurement, Global Positioning System, Photo grammetry and Remote Sensing.

C. P**rogramme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: apply the knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve well-defined surveying problems appropriate to the discipline.

PSO2: design solutions for well-defined technical problems and assist with engineering design of systems, components, or processes appropriate to the discipline

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module I: Introduction to Surveying: Principles, Linear, angular and graphical methods, Survey stations, Survey lines- ranging, bearing of survey lines, Levelling: Plane table surveying, Principles of levelling- booking and reducing levels; differential, reciprocal leveling, profile levelling and cross sectioning. Digital and Auto Level, Errors in levelling; contouring: Characteristics, methods, uses; areas and volumes. Theodolite survey: Instruments, Measurement of horizontal and vertical angle; Horizontal and vertical control - methods - triangulation - network- Signals. Baseline - choices - instruments and accessories - extension of base lines - corrections - Satellite station - reduction to centre - Intervisibility of height and distances - Trigonometric leveling - Axis single corrections.

Module II: **Curves:** Elements of simple and compound curves – Method of setting out– Elements of Reverse curve - Transition curve – length of curve – Elements of transition curve - Vertical curve.

Module III: **Modern Field Survey Systems:** Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments, Distomat, Total Station – Parts of a Total Station – Accessories –Advantages and Applications, Field Procedure for total station survey, Errors in Total Station Survey; Global Positioning Systems- Segments, GPS measurements, errors and biases, Surveying with GPS, Co-ordinate transformation, accuracy considerations.

Module IV: Photogrammetry Surveying: Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; Stereoscopy, ground control extension for photographic mapping- aerial triangulation, radial triangulation, methods; photographic mapping- mapping using paper prints, mapping using stereoplotting instruments, mosaics, map substitutes.

Module V: **Remote Sensing:** Introduction –Electromagnetic Spectrum, interaction of electromagnetic radiation with the atmosphere and earth surface, remote sensing data acquisition: platforms and sensors; visual image interpretation; digital image processing.

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/ HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- Madhu, N, Sathikumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson India,2006.
- Manoj, K. Arora and Badjatia, Geomatics Engineering, Nem Chand & Bros,2011
- Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International,2010
- Chandra, A.M., Higher Surveying, Third Edition, New Age International (P) Limited, 2002.
- Anji Reddy, M., Remote sensing and Geographical information system, B.S. Publications,2001.
- Arora, K.R., Surveying, Vol-I, II and III, Standard Book House,2015.

I. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	Principles, Linear, angular and graphical methods, Survey stations, Survey lines- ranging,; differential.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
2	bearing of survey lines, Levelling: Plane table surveying, Principles of levelling- booking and reducing levels	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
3	contouring: Characteristics, methods, uses; areas and	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam

	volumes. Theodolite survey.			
4	Reciprocal leveling, profile levelling and cross sectioning. Digital and Auto Level, Errors in levelling	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
5	Instruments, Measurement of horizontal and vertical angle; Horizontal and vertical control - methods -triangulation - network- Signals.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
6	Baseline - choices - instruments and accessories - extension of base lines - corrections	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
7	Satellite station - reduction to centre - Intervisibility of height and distances - Trigonometric leveling - Axis single corrections.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
8	Elements of simple and compound curves. Elements of transition curve - Vertical curve.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
9	Method of setting out	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
10	Elements of Reverse curve	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
11	Transition curve – length of curve.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
12	Principle of Electronic Distance Measurement.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
13	Types of EDM instruments.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
14	Modulation, Distomat, Total Station – Parts of a Total Station.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
15	Accessories –Advantages and Applications, Field Procedure for total station survey.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
16	Co-ordinate transformation, accuracy considerations	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
17	Global Positioning Systems- Segments, GPS measurements	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
18	Errors in Total Station Survey.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
19	Errors and biases, Surveying with GPS.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
20	Introduction, Basic concepts, perspective geometry of aerial photograph.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
21	Basic concepts, perspective geometry of aerial photograph	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
22	relief and tilt displacements	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
23	terrestrial photogrammetry, flight	Lecture	CIV 403.1	Mid Term-2, Quiz

	planning.			& End Sem Exam
24	Stereoscopy, ground control extension for photographic mapping.	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
25	Aerial triangulation, radial triangulation, methods.	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
26	photographic mapping- mapping using paper prints	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
27	Mapping using stereoplotting instruments, mosaics, map substitutes	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
28	mapping using stereoplotting instruments, mosaics, map substitutes	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
29	Introduction, –Electromagnetic Spectrum.	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
30	Electromagnetic Spectrum	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
31	Interaction of electromagnetic radiation with the atmosphere and earth surface.	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
32	Interaction of electromagnetic radiation with the atmosphere and earth surface.	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
33	Remote sensing data acquisition.	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
34	Platforms and sensors; visual image.	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
35	Interpretation; digital image processing.	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam
36	Interpretation; digital image processing.	Lecture	CIV 403.1	Mid Term-2, Quiz & End Sem Exam

J.Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV403.1	Student will able to learn about different process of angle measurement in vertical	3	3	1	3	1				2		2	1	1	2	1

	and horizontal plane with manually and by using various devices.															
CIV403.2	Setting out the correct orientation of any structural components and different distances measurement techniques.	3	2	2	2	2				2		1	1	2	2	1

Sample Question Paper

<table>
<tr><td colspan="7">Amity School of Engineering and Technology
Department of CIVIL Engineering
MID-SEMESTER(SEM–IV)2021-22</td></tr>
<tr><td colspan="7">Class: B.Tech (CE) 4th Semester</td></tr>
<tr><td colspan="2">Subject t Name:
CIV 403 SURVEYING</td><td colspan="2">Time:1.5Hrs</td><td colspan="3">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3,6</td><td>Q.4</td><td>Q.2,5</td><td></td><td></td></tr>
<tr><td colspan="7">Student will be able to
CO1: Understand basic principles of surveying and tools.
CO2: Analyze different forms of science with new technique and instruments.</td></tr>
</table>

CO Map	Question No.	Question	Marks
CO1	Q.1	What is principle of surveying?	3
CO1	Q.2a	What do you understand by theodlite survey?	3
	Q.2b	Elements of simple and compound curves – Method of setting out curves.	3
CO1	Q.3	Discuss Elements of Reverse curve.	6
CO2	Q.4	Discuss Transition curve – length of curve Elements of transition curve.	3
CO2	Q.5a	Discuss Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments.	3
	Q.5b	Discuss principle of aerial survey and its importance.	3
CO2	Q6	Discuss remote sensing data acquisition, platforms and	6

		sensors.	

Attainments		Rubric
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No .	Enrollment.No .	Student's Name	CIV403 SURVEYING							
			Max Marks	CE Weigh t Age (%)	ET Weigh t Age (%)	GO	GP	ACU	EC U	U4G 4
1	A60215820001	Mr ABHI PRATAP	100	30	70	A	9	2	2	18
2	A60215820002	Mr AMRENDRA SINGH CHAUHAN	100	30	70	A+	10	2	2	20
3	A60215820003	Mr SHYAM VEER SINGH	100	30	70	A+	10	2	2	20
4	A60215820004	Mr SAHIL SHARMA	100	30	70	A+	10	2	2	20
			Total No. of Students			=	4			
			Total No. of Students			>60 % marks	4	100.00	%	
			Attainment Level					Level 3		

Course Handout
Course : **FLUID MECHANICS**
Course Code : CIV 404, Credits : 03, Session : 2021-22(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Sachin Tiwari

A. Introduction

Fluid mechanics is **the study of fluids either in motion (fluid dynamics) or at rest (fluid statics)**. Both liquids and gases are classified as fluids. There is a theory available for fluid flow problems, but in all cases it should be backed up by experiment. It is a highly visual subject with good instrumentation.

B. Students will be able to learn after completion of this course

- **CIV404.1** Understand the properties of fluids, pressure measurement devices, hydraulic forces on surfaces, bouncy and flotation in fluids.
- **CIV404.2** Analyse kinematics and static behavior of fluids, dimension and model analysis, laminar and turbulent flow.
- **CIV404.3** Understand low through pipes and orifices, boundary layer theory.

C. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write

effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Calculate Hydrostatic Force and its Location for a given geometry and orientation of plane surface. Examine the possibility of a flow using continuity equation.

PSO2: Employ Archimedes principle to solve numerical examples on Buoyancy, Identify and interpret different flows with relevant equations

PSO3: Distinguish velocity potential function and stream function and solve for velocity and acceleration of a fluid at a given location in a fluid flow, Examine stability of a floating body by determining its metacentric height.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module I: Basic Concepts and Definitions: Distinction between a fluid and a solid; Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; variation of viscosity with temperature, Newton law of viscosity; vapour pressure, boiling point, cavitation; surface tension, capillarity, Bulk modulus of elasticity, compressibility.

Module II: Fluid Statics: Fluid Pressure: Pressure at a point, Pascals law, pressure variation with temperature, density and altitude. Piezometer, U-Tube Manometer, Single Column Manometer, U-Tube Differential Manometer, Micromanometers. pressure gauges, Hydrostatic pressure and force: horizontal, vertical and inclined surfaces. Buoyancy and stability of floating bodies.

Module III: Fluid Kinematics: Classification of fluid flow: steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one, two and three dimensional flows; Stream line, path line, streak line and stream tube; stream function, velocity potential function. One-, two- and three -dimensional continuity equations in Cartesian coordinate.

Module III: Fluid Dynamics: Surface and body forces; Equations of motion - Euler's equation; Bernoulli's equation – derivation; Energy Principle; Practical applications of Bernoulli's equation: venturimeter, orifice meter and pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend; Vortex Flow – Free and Forced; Dimensional Analysis and Dynamic Similitude - Definitions of Reynolds Number, Froude Number, Mach Number, Weber *Number and Euler Number; Buckingham's* π-Theorem. Notches and Weirs.

Module IV: Fluid Dynamics: Boundary layer theory, drag and lift force, drag on a sphere, rough and smoothboundaries, concept of mixinglength, boundary layer distribution for various shapes and for variousReynold'snumber.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- R.K. Bansal, "Fluid Mechanics & Hydraulic Machines", Laxmi Publications (P) Ltd., 2002.
- Gupta, S. C., Fluid Mechanics and Hydraulic Machines, Pearson Education, 2007
- D.S. Kumar, "Fluid Mechanics and Fluid Power Engineering", S.K. Kataria& Sons, 2000.
- F. M. White, Introduction to Fluid Mechanics, McGraw Hill

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Distinction between a fluid and a solid.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
2	Density, Specific weight, Specific gravity	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
3	Kinematic and dynamic viscosity.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
4	variation of viscosity with temperature.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
5	Newton law of viscosity; vapour pressure.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
6	boiling point, cavitation; surface tension.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
7	capillarity, Bulk modulus of elasticity, compressibility.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
8	Fluid Pressure . pressure gauges..	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
9	Pressure at a point	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
10	Pascals law, pressure variation with temperature.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam

11	Piezometer, U-Tube Manometer.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
12	Single Column Manometer.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
13	U-Tube Differential Manometer.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
14	Density and altitude. Micromanometers.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
15	Hydrostatic pressure and force	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
16	Hydrostatic pressure and force horizontal, vertical and inclined surfaces	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
17	Buoyancy and stability of floating bodies.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
18	Buoyancy and stability of floating bodies.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
19	Classification of fluid flow: steady and unsteady flow.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
20	Uniform and non-uniform flow.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
21	laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow.	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
22	Ideal and real fluid flow; one, two and three dimensional flows.	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
23	Stream line, path line, streak line and stream tube; stream function, velocity potential function.	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
24	One-, two- and three -dimensional continuity equations in Cartesian coordinate	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
25	Surface and body forces;; Momentum principle; Forces exerted by fluid flow on pipe bend; Vortex Flow -.	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
26	Equations of motion - Euler's equation; Bernoulli's equation – derivation	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
27	Energy Principle; Practical applications of Bernoulli's equation: venture-meter, orifice meter and pitot tube.	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
28	Free and Forced; Dimensional Analysis and Dynamic Similitude	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
29	Definitions of Reynolds Number, Froude Number, Mach Number, Weber Number and Euler Number; Buckingham's π-Theorem. Notches	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam

	and Weirs.			
30	**Fluid Dynamics:**	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
31	Boundary layer theory, drag and lift force.	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
32	drag on a sphere, rough and smooth boundaries.	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
33	concept of mixing length,	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
34	boundary layer distribution for various shapes and for various Reynold's number.	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
35	boundary layer distribution for various shapes and for various Reynold's number.	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam
36	boundary layer distribution for various for various Reynold's number.	Lecture	CIV 404.1	Mid Term-2, Quiz & End Sem Exam

J.Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV404.1	Examine Bernoulli's equation for ideal and real fluids and evaluate the direction of flow. Distinguish between major loss and minor loss. Employ Darcy-Weichbach and Chezy's equation to calculate friction losses.	3	3	1	3	1				2		2	1	1	2	1
CIV404.2	Interpret different pipe fittings and evaluate the fluid velocity considering major and minor losses. Sketch HGL and TEL for a given pipe setting	3	2	2	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–IV)2021-22						
Class: B.Tech (CE) IV Semester						
SubjectName: CIV 404 Fluid Mechanics		Time:1.5Hrs			Max.Marks:30	
Levels of thequestions as perBloomsTaxo nomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
QuestionM apping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		
Student willbeableto CO1:Understand the different types of fluid and their nature CO2: Use of different types of pressure measuring devices						

COMap	QuestionNo.	Question	Marks
CO1	Q.1	Discuss different types of fluid	3
CO1	Q.2a	What are different types of flow	3
	Q.2b	Discuss Newton’s law of viscosity	3
CO1	Q.3	What is Rehology?	6
CO2	Q.4	What do you mean by Barometer?	3
CO2	Q.5a	What is kinematic and dynamic viscosity	3
	Q.5b	Write different flow conditions.	3
CO2	Q6	Different types of manometers	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

. No.	Enrollment.No.	Student's Name	CIV404 FLUID MECHANICS							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U5G5
1	A60215820001	Mr ABHI PRATAP	100	30	70	C+	4	3	3	12
2	A60215820002	Mr AMRENDRA SINGH CHAUHAN	100	30	70	C+	4	3	3	12
3	A60215820003	Mr SHYAM VEER SINGH	100	30	70	B-	5	3	3	15
4	A60215820004	Mr SAHIL SHARMA	100	30	70	C+	4	3	3	12
			Total No. of Students			=	4			
			Total No. of Students			>60% marks	0	0.00	%	
			Attainment Level					-		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **SOLID MECHANICS**
Course Code : CIV 405, Credits : 02, Session : 2020-21(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Ripunjoy Gogoi, Dr. Imran Ahmad Khan

A. Introduction

The course also covers the simple and compound stresses due to forces, stresses and deflection in beams due to bending, torsion in circular section, strain energy, different theories of failure, stress in thin cylinder thick cylinder and spheres due to external and internal pressure.

B. Course Outcomes: At the end of the course, students will be able to:

- **CIV405.1** Understand basic concept of stress and strain and their use to derive the other material properties.
- **CIV405.2** Able to understand various techniques to determine engineering properties of materials and distinguish different types of steels and its properties.
- **CIV405.3** Apply basic concept to calculate stress in various elements and calculate torsional strength of various elements.

C. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate

consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects.

D.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home	S/V/Q/HA	10%

	Assignment		
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

E.

Module I: Simple stresses and strains Concept of stress and strain; Hooke's law, Young's modulus, Poisson ratio, stress at a point, stress and strains in bars subjected to axial loading. Modulus of elasticity, stress produced in compound bars subject to axial loading. Temperature stress and strain calculations due to applications of axial loads and variation of temperature in single and compound walls. Impact loading.

Module II: Compound stress and strains The two dimensional system; stress at a point on a plane, principal stresses and principal planes; Mohr's circle of stress. Graphical and Analytical methods for stresses on oblique section of body. Shear force and bending moment diagrams for cantilever, simply supported and overhanging beams.

Module III Theory of bending stresses in beams due to bending, assumptions in the simple bending theory, derivation of formula: its application to beams of rectangular, circular and channel sections, composite / flitched beams, bending and shear stresses in composite beams.

Module IV: Torsion Derivation of torsion equation and its assumptions. Applications of the equation of the hollow and solid circular shafts torsional rigidity, combined torsion and bending of circular shafts principal stress and maximum shear stresses under combined loading of bending and torsion, analysis of close-coiled-helical springs.

Module V: Thin cylinders and spheres Derivation of formulae and calculation of hoop stress, longitudinal stress in a cylinder and sphere subjected to internal pressure.

Module VI: Columns and struts Columns and failure of columns, Euler's formulas; Rankine-Gordon's formula, Johnson's empirical formula for axially loaded columns and their applications.

Module VII: Slope and deflection Relationship between moment, slope and deflection, Mohr's theorem; Moment area method; method of integration; Macaulay's method: Use of all these methods to calculate slope and deflection for the following:

- Cantilevers
- Simply supported beams with or without overhang
- Under concentrated loads, uniformly distributed loads or combination of concentrated and uniformly distributed loads.

F. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/ HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

G.

- Jindal U.C., “Strength of Materials”, Galgotia Publication, New Delhi, 1998.
- Ryder G.H., “Strength of Materials”, Macmillan, Delhi, 2003.
- R.K. Bansal, “Strength of Materials”, Laxmi Publication, New Delhi, 2001.
- Sadhu Singh, “Strength of Materials”, Khanna Publishers, New Delhi, 2000.
- Timoshenko S.P., “Elements of Strength of Materials”, East-West affiliated, New Delhi, 2000.
- Hibbler R.C., “Mechanics of Materials”, Prentice Hall, New Delhi, 1994.

H.

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Concept of stress and strain	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
2	Hooke’s law, Young’s modulus, Poisson ratio, stress at a point	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
3	stress and strains in bars subjected to axial loading	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
4	Modulus of elasticity, stress produced in compound bars subject to axial loading.	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
5	Temperature stress and strain calculations due to applications of axial loads	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
6	variation of temperature in single and compound walls	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
7	Impact loading.	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
8	The two dimensional system., simply supported and overhanging beams	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
9	stress at a point on a plane	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
10	Principal stresses and principal planes	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
11	Mohr’s circle of stress.	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
12	Graphical and Analytical methods for stresses on oblique section of body	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
13	Shear force and bending moment diagrams for cantilever	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
14	Shear force and bending moment diagrams overhanging beams	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
15	Theory of bending stresses in	Lecture	CIV 405.1	Mid Term-1, Quiz

	beams due to bending,			& End Sem Exam
16	Theory of bending stresses in beams assumption	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
17	In the simple bending theory	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
18	Derivation of formula: its application to beams of rectangular	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
19	circular and channel sections, composite / flitched	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
20	Beams, bending and shear stresses in composite beams.	Lecture	CIV 405.1	Mid Term-1, Quiz & End Sem Exam
21	Derivation of torsion equation . torsional and torsion.	Lecture	CIV 405.1	Mid Term-2, Quiz & End Sem Exam
22	Derivation of torsion assumptions	Lecture	CIV 405.1	Mid Term-2, Quiz & End Sem Exam
23	Applications of the equation of the hollow and solid circular shafts	Lecture	CIV 405.1	Mid Term-2, Quiz & End Sem Exam
24	Rigidity, combined torsion and bending of circular shafts	Lecture	CIV 405.1	Mid Term-2, Quiz & End Sem Exam
25	Principal stress	Lecture	CIV 405.1	Mid Term-2, Quiz & End Sem Exam
26	Maximum shear stresses under combined loading of bending	Lecture	CIV 405.1	Mid Term-2, Quiz & End Sem Exam
27	Analysis of close-coiled-helical springs	Lecture	CIV 405.1	Mid Term-2, Quiz & End Sem Exam
28	Derivation of formulae and calculation of hoop stress.	Lecture	CIV 405.1	Mid Term-2, Quiz & End Sem Exam
29	Longitudinal stress in a cylinder	Lecture	CIV 405.1	Mid Term-2, Quiz & End Sem Exam
30	Sphere subjected to internal pressure.	Lecture	CIV 405.1	Mid Term-2, Quiz & End Sem Exam
31	Columns and failure of columns.	Lecture	CIV 405.1	Mid Term-2, Quiz & End Sem Exam
32	Euler’s formulas	Lecture	CIV 405.1	Mid Term-2, Quiz & End Sem Exam
33	Rankine-Gordon’s formula.	Lecture	CIV 405.1	Mid Term-2, Quiz & End Sem Exam
34	Johnson’s empirical formula	Lecture	CIV 405.1	Mid Term-2, Quiz & End Sem Exam
35	For axially loaded columns and their applications	Lecture	CIV 405.1	Mid Term-2, Quiz & End Sem Exam
36	For axially loaded columns and their applications	Lecture	CIV 405.1	Mid Term-2, Quiz & End Sem Exam

I.

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV405.1	Able to know the importance of seismic activity consideration in terrain.	3	3	1	3	1				2		2	1			
CIV405.2	Able to understand various techniques to determine engineering properties of rocks and distinguish different types of rocks and minerals	3	2	2	2	2				2		1	1			

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–IV)2021-22						
Class: B.Tech (CE) 4th Semester						
Subject t Name: CIV 405 Solid Mechanics		Time:1.5Hrs			Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		

Student will be able to
CO1: Understand the basic of stress and strain for different materials.
CO2: Apply basic concept to find engineering properties of materials.
CO3: Calculate different stress and strength parameters.

CO Map	Question No.	Question	Marks
CO1	Q.1	Calculate Poission's ratio for steel and concrete.	3
	Q.2a	What is volumetric stress and strain? Discuss.	3

CO1	Q.2b	What do you mean by free body diagram?	3
CO1	Q.3	What is stress and strain?	6
CO2	Q.4	What is shear force and bending moment?	3
CO2	Q.5a	What is thin and thick shell calculate hoop stress value?	3
	Q.5b	Discuss bending moment diagram for simply supported beam with Point load.	3
CO3	Q6	Calculate torsional strength for circular shaft.	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	CIV405 SOLID MECHANICS Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U6G6
1	A60215820001	Mr ABHI PRATAP	100	30	70	C+	4	3	3	12
2	A60215820002	Mr AMRENDRA SINGH CHAUHAN	100	30	70	C+	4	3	3	12
3	A60215820003	Mr SHYAM VEER SINGH	100	30	70	C+	4	3	3	12
4	A60215820004	Mr SAHIL SHARMA	100	30	70	C+	4	3	3	12

Total No. of Students	=	4		
Total No. of Students	>60% marks	0	0.00	%
Attainment Level			-	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **CIVIL ENGINEERING – SOCIETAL & GLOBAL IMPACT**
Course Code : CIV407, Credits : 02, Session : 2021-22(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Mohan Kantharia, Dr. Ripunjoy Gogoi

A. Introduction

The course is designed to provide a better understanding of the impact which Civil Engineering has on the Society at large and on the global arena. Civil Engineering projects have an impact on the Infrastructure, Energy consumption and generation, Sustainability of the Environment, Aesthetics of the environment, Employment creation, Contribution to the GDP, and on a more perceptible level, the Quality of Life.

B. After completion of this course students will able to learn

- **CIV407.1** Understand the impact which Civil Engineering projects have on the Society at large and on the global arena and using resources efficiently and effectively.
- **CIV407.2** Understand extent of Infrastructure, its requirements for energy and how they are met: past, present and future, the Sustainability of the Environment, including its Aesthetics.
- **CIV407.3** Analyse potentials of Civil Engineering for Employment creation and its Contribution to the GDP,the Built Environment and factors impacting the Quality of Life.

C. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1 Associate various measures for enhancing the build environment, thereby improving quality of life of the occupants.

PSO2: Evaluate the potential of Civil Engineering for employment creation and its contribution to the GDP.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module I:Introduction to Course and Overview: Understanding the past to look into the future: Pre-industrial revolution days, Agricultural revolution, first and second industrial revolutions, IT revolution; Recent major Civil Engineering breakthroughs and innovations; Present day world and future projections, Evaluating future requirements for various resources; GIS and applications for monitoring systems; Human Development Index and Ecological Footprint of India Vs other countries and analysis.

Module II: Understanding the importance of Civil Engineering in Shaping and Impacting the World: The ancient and modern Marvels and Wonders in the field of Civil Engineering; Future Vision for Civil Engineering

Module III: Infrastructure - Habitats, Megacities, Smart Cities, Futuristic Visions: Transportation (Roads, Railways & Metros, Airports, Seaports, River ways, Sea canals, Tunnels (below ground, under water); Futuristic systems (ex, Hyper Loop)); Energy generation (Hydro, Solar (Photovoltaic, Solar Chimney), Wind, Wave, Tidal, Geothermal, Thermal energy); Water provisioning; Telecommunication needs (towers, above-ground and underground cabling).

Module IV: Environment: Traditional & futuristic methods; Solid waste management, Water purification, Wastewater treatment & Recycling, Hazardous waste treatment; Flood control (Dams, Canals, River interlinking), Multi-purpose water projects, Atmospheric pollution;

Module V: Built Environment: Recycling, Temperature/ Sound control in built environment, Conservation, Repairs & Rehabilitation of Structures & Heritage structures; Innovations and methodologies for ensuring Sustainability

Module VI: Civil Engineering Projects: Environmental Impact Analysis procedures; Waste (materials, manpower, equipment) avoidance/ Efficiency increase; Advanced construction techniques for better sustainability; Techniques for reduction of Green House Gas emissions in various aspects of Civil Engineering Projects; contribution of Civil Engineering to GDP.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

Brito, Ciampi, Vasconcelos, Amarol, Barros (2013) Engineering impacting Social, Economic and Working Environment, 120th ASEE Annual Conference and Exposition.

NAE Grand Challenges for Engineering (2006), Engineering for the Developing World, The Bridge, Vol 34, No.2, Summer2004.

Allen M. (2008) Cleansing the city. Ohio University Press. Athens Ohio.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Understanding the past to look into the future: Pre-industrial revolution days, Agricultural revolution, first and second industrial revolutions;	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
2	IT revolution; Recent major Civil Engineering breakthroughs and innovations	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
3	Present day world and future projections	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
4	GIS and applications for monitoring systems; Human Development Index and Ecological Footprint of India Vs other countries and analysis.	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
5	Evaluating future requirements for various resources.	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
6	The ancient and modern Marvels and Wonders in the field of Civil Engineering.	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
7	Future Vision for Civil Engineering	Lecture	CIV 407.1	Mid Term-1, Quiz

				& End Sem Exam
8	*Human Development Index and Ecological Footprint of India*	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
9	Transportation (Roads, Railways & Metros.);, Tidal, Geothermal, Thermal energy);	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
10	Airports, Seaports, River ways, Sea canals.	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
11	Tunnels (below ground, under water.	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
12	Futuristic systems (ex, Hyper Loop)	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
13	Energy generation (Hydro, Solar (Photovoltaic, Solar Chimney), Wind, Wave	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
14	Water provisioning; Telecommunication needs (towers, above-ground and underground cabling).	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
15	Traditional & futuristic methods; Solid waste management, Water purification.	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
16	Wastewater treatment & Recycling, Hazardous waste treatment	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
17	Recycling, Temperature/ Sound control in built environment, Conservation,;	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
18	Innovations and methodologies for ensuring Sustainability	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
19	Innovatins and methodologies for ensuring Sustainability Flood control (Dams, Canals, River interlinking), Multi-purpose water projects, Atmospheric pollution	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
20	Repairs & Rhabilitation of Structures & Heritage structures	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
21	Repairs & Rehabilitation of Structures & Heritage structures	Lecture	CIV 407.1	Mid Term-2, Quiz & End Sem Exam
22	Environmental Impact Analysis procedures; Waste (materials, manpower, equipment) avoidance/	Lecture	CIV 407.1	Mid Term-2, Quiz & End Sem Exam
23	emissions in various aspects of Civil Engineering Projects; contribution of Civil Engineering to GDP	Lecture	CIV 407.1	Mid Term-2, Quiz & End Sem Exam
24	Efficiency increase; Advanced construction techniques for better sustainability; Techniques for reduction of Green House Gas	Lecture	CIV 407.1	Mid Term-2, Quiz & End Sem Exam

J.Course Articulation Matrix (Mapping of COs with POs

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV407.1	Students will be able to develop new idea about civil engineering and its impact on social life.	3	3	1	3	1				2		2	1	1	2	1
CIV407.2	Different types of energy sources linked to the development of society	3	2	2	2	2				2		1	1	2	2	1
CIV407.3	A new methods to reduce the effects of green house gases on the environment and its impact on human life.		2	1	3	2				2		1	1	2	1	

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–IV)2021-22						
Class: B.Tech (CE) 4th Semester						
Subject t Name: CIV 407 Civil Engg societal and global Impact		Time:1.5Hrs		Max.Marks:30		
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		
Student will be able to CO1: Understand the impact of society on global arena. CO2: Analyze the needs of resource and energy for the society. CO3: Understand the potentials of civil engineering projects and						

its impact on social life.

CO Map	Question No.	Question	Marks
CO1	Q.1	What do you understand by innovations in civil engineering?	3
CO1	Q.2a	Discuss ancient and modern civil engineering construction.	3
	Q.2b	Discuss application of GIS and GPS on global society.	3
CO1	Q.3	Discuss waste water treatment process in detail.	6
CO2	Q.4	Discuss water handling and purification scheme.	3
CO2	Q.5a	Discuss techniques of reduction for green house gases.	3
	Q.5b	What do you understand by solid waste management?	3
CO3	Q6	What do you mean by sustainable sonstruction?	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	**Enrollment.No.**	**Student's Name**	**CIV407 CIVIL ENGINEERING - SOCIETAL & GLOBAL IMPACT**							
			Max Marks	**CE Weight Age (%)**	**ET Weight Age (%)**	**GO**	**GP**	**ACU**	**ECU**	**U13G13**
1	A60215820001	Mr ABHI PRATAP	100	30	70	A	9	2	2	18
2	A60215820002	Mr AMRENDRA SINGH CHAUHAN	100	30	70	A	9	2	2	18
3	A60215820003	Mr SHYAM VEER SINGH	100	30	70	A+	10	2	2	20
4	A60215820004	Mr SAHIL SHARMA	100	30	70	A	9	2	2	18

Total No. of Students	=	4		
Total No. of Students	>60 % marks	4	100.00	%
Attainment Level			Level 3	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **INSTRUMENTATION & SENSOR TECHNOLOGIES FOR CIVIL ENGINEERING APPLICATIONS**
Course Code : ECE 407, Credits : 02, Session : 2021-22(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Ajay Dadoria, Ms. Shally Goyal

A. Introduction

Sensors and Instrumentation research area encompasses the development and optimisation of new or existing devices that detect and measure changes in temperature, pressure, vibration and light. It also includes the integration and optimisation of these devices into a new system or instrument.

B. After completion of this course students will able to learn

- **ECE 407.1** Apply the concepts and functionalities of the electronic devices, tools and instruments.
- **ECE 407.2** Understand use, general specifications and deploy abilities of the electronic devices, and assemblies.
- **ECE 407.3** Understand handling and usage of electronic devices, tools and instruments in engineering applications.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Students will able to learn about the different types of sensors present to detect different natural phenomenon.

PSO2: Students will able to utilize the knowledge to detect natural and artificial calamities and to reduce the risk of their impact.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

E. Course Content

Module 1: Diodes and Applications: (5 Hours)

Semiconductor Diode - Ideal versus Practical, Diode Equivalent Circuits, Load Line Analysis; Diode as a Switch, Diode as a Rectifier, Half Wave and Full Wave Rectifiers; Breakdown Mechanisms, Zener Diode – Operation and Applications; Opto-Electronic Devices – LEDs, Clipper and clampers.

Module 2: Transistor Characteristics: (5 Hours)

Bipolar Junction Transistor (BJT) –Construction, Operation, Amplifying Action, Common Base, Common Emitter and Common Collector Configurations, Operating Point,

Introduction to FET, Feedback Amplifiers – Principle, Advantages of Negative Feedback,

Module 3: Operational Amplifiers and Applications: (5 Hours)

Introduction to Op-Amp, Differential Amplifier Configurations, CMRR, PSRR, Slew Rate; Block Diagram, Pin Configuration of 741 Op-Amp, Characteristics of Ideal Op-Amp, Concept of Virtual Ground; inverting and non-inverting amplifier applications: summing and difference amplifier, unity gain buffer, comparator,

Module 4: Digital Electronics Fundamentals: (5 Hours)

Difference between analog and digital signals, Boolean algebra, Basic and Universal Gates, Symbols, Truth tables, logic expressions, Logic simplification using K- map, half and full adder/subtractor, multiplexers, de- multiplexers

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- David. A. Bell (2003), Laboratory Manual for Electronic Devices and Circuits, Prentice Hall, India
- SantiramKal (2002), Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India
- Thomas L. Floyd and R. P. Jain (2009), Digital Fundamentals by Pearson Education,
- Paul B. Zbar, A.P. Malvino and M.A. Miller (2009), Basic Electronics – A Text-Lab. Manual, TMH.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Semiconductor Diode - Ideal versus Practical,Breakdown Mechanisms	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
2	Diode Equivalent Circuits, Load Line Analysis	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
3	Diode as a Switch, Diode as a Rectifier, Half Wave and Full Wave Rectifiers.	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
4	*Zener Diode – Operation and Applications*	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
5	Opto-Electronic Devices – LEDs,	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
6	Clipper and clampers.	Lecture	ECE 407.1	Mid Term-1, Quiz

				& End Sem Exam
7	Bipolar Junction Transistor (BJT)	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
8	Bipolar Junction Transistor (BJT) - Operation, Amplifying Action.	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
9	Common Base, Common Emitter and Common Collector	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
10	Construction, , Configurations, Operating Point	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
11	Introduction to FET, Feedback Amplifiers	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
12	Principle, Advantages of Negative Feedback.	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
13	Introduction to Op-Amp, Block inverting and non-inverting gain buffer, comparator	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
14	Configurations, CMRR, PSRR	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
15	Differential Amplifier, Slew Rate.	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
16	Diagram, Pin Configuration of 741 Op-Amp.	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
17	Characteristics of Ideal Op-Amp, Concept of Virtual Ground.	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
18	amplifier applications: summing and difference amplifier, unity	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
19	amplifier applications: summing and difference amplifier, unity	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
20	Difference between analog and digital signals,	Lecture	ECE 407.1	Mid Term-1, Quiz & End Sem Exam
21	Boolean algebra, Basic and Universal Gates.	Lecture	ECE 407.1	Mid Term-2, Quiz & End Sem Exam
22	Symbols, Truth tables, logic expressions.	Lecture	ECE 407.1	Mid Term-2, Quiz & End Sem Exam
23	Logic simplification using K-map, half and full adder/subtractor.	Lecture	ECE 407.1	Mid Term-2, Quiz & End Sem Exam
24	multiplexers, de- multiplexers	Lecture	ECE 407.1	Mid Term-2, Quiz & End Sem Exam

J.Course Articulation Matrix (Mapping of COs with POs

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES	CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ECE 407.1	To enable students to acquire in-depth knowledge in the field of Instrumentation Engineering with an ability to integrate existing and new knowledge with the advancement of the technology.	3	3	1	3	1				2		2	1	1	2	1
ECE 407.2	To train students to conduct research and experiments by applying appropriate techniques and tools with an understanding of the limitations for sustainable development of society.	3	2	2	2	2				2		1	1	2	2	1
ECE 407.3	To prepare students to act as a member and leader of the team to contribute positively to manage projects efficiently in the field of Instrumentation Engineering		2	1	3	2				2		1	1	2	1	

Sample Question Paper

<table>
<tr><td colspan="7">Amity School of Engineering and Technology
Department of Electronics & Communication Engineering
IMID-SEMESTER(SEM–IV)2021-22</td></tr>
<tr><td colspan="7">Class: B.Tech.(CE) IV Semester</td></tr>
<tr><td colspan="2">ECE 407 :INSTRUMENTATION & SENSOR TECHNOLOGIES FOR CIVIL ENGINEERING APPLICATIONS</td><td colspan="3">Time:1.30 Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of thequestions as perBloomsTaxo</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
</table>

nomy						
QuestionM apping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student willbeableto
CO1:To analyze the errors during measurements
CO2:To specify the requirements in the calibration of sensors and instruments
CO5:To describe the requirements during the transmission of measured signals
CO7:To suggest proper sensor technologies for specific applications
CO8:To design and set up measurement systems and do the studies

COMap	QuestionNo.	Question	Marks
CO1	Q.1	What is difference between accuracy and precision of a measuring instruments.	3
CO2,CO8	Q.2a	What is IR Sensors? Explain active and passive IR sensors.	3
	Q.2b	What are the factors to be taken into account while performing measurement?	3
CO7	Q.3	Explain the basic working principles of temperature sensors. List types of temperature sensors. Explain any one in detail.	6
CO5	Q.4	What is the approach used for sensor installation explain it	3
CO2,CO8	Q.5a	Describe the order and methodology used for sensors installation.	3
	Q.5b	What are the factors to be taken into account while performing measurement?	3
CO7	Q6	Draw the classification of error in measurements and discuss in detail.	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	ECE407 INSTRUMENTATION & SENSOR TECHNOLOGIES FOR CIVIL ENGINEERING APPLICATIONS							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U14G14
1	A60215820001	Mr ABHI PRATAP	100	30	70	B-	5	2	2	10
2	A60215820002	Mr AMRENDRA SINGH CHAUHAN	100	30	70	B+	7	2	2	14
3	A60215820003	Mr SHYAM VEER SINGH	100	30	70	B+	7	2	2	14
4	A60215820004	Mr SAHIL SHARMA	100	30	70	B-	5	2	2	10

Total No. of Students	=	4		
Total No. of Students	>60 % marks	0	0.00	%
Attainment Level			-	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **MATERIAL TESTING AND EVALUATION LAB**
Course Code : CIV 421, Credits : 01, Session : 2021-22(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Mohan Kantharia, Dr. Imran Ahmad Khan

A. Introduction

Materials testing **helps us to understand and quantify whether a specific material or treatment is suitable for a particular application**. With the wide variety of materials and treatments available in the marketplace, testing can help narrow down the choices to the most appropriate selection for the intended use.

B. Course Outcomes: At the end of the course, students will be able to:

- **CIV421.1**. Understand the Gradation of coarse and fine aggregates ,Different corresponding tests and need/application of these tests in design and quality control.
- **CIV421.2**. Apply Tensile Strength of materials &concrete composites.
- **CIV421.3**. Analyse Compressive strength test on aggregates.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Function as design consultants in construction industry for the design of civil engineering structures.

PSO2: Provide sustainable solutions to the Civil Engineering Problems

PSO3: It. will help students to analyze and Provide concrete solution to environmental problem

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

- Gradation of course and fineaggregates. Different corresponding tests and need/ application of these tests in design and quality control**. (2 Hours)**
- Concrete permeability test, and tiles abrasion test **(1 Hour)**
- Tensile Strength of materials & concrete composites. Compressive strength test onaggregates**(1 Hour)**
- Tension I-Elastic Behaviour of metals & materials. Tension II-Failure of CommonMaterials: **(2 Hours)**
- Direct Shear-Frictional Behaviour. Concrete I-Early Age Properties: **(2 Hours)**
- Concrete II-Compression and Indirect Tension. Compression-Directionality: **(2 Hours)**
- Soil Classification. Consolidation and Strength Tests: **(2 Hours)**
- Tension III-Heat Treatment. Torsion test: **(2 Hours)**
- Hardness tests (Brinnel's and Rockwell). Tests on closely coiled and open coiled springs: **(2 Hours)**
- Theories of Failure and Corroboration with Experiments. Tests on unmodified bitumen and modified binders with polymers: **(2 Hours)**
- Bituminous Mix Design and Tests on bituminous mixes – Marshall method. Concrete Mix Design as per BIS: **(2 Hours)**

G. Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Books

- National Building Code of India
- Local Building Bye-laws
- Callender, John Hancock, Time Saver Standards for Architectural design Data, Tata McGraw Hill.
- Chiara, Callender, John Hancock, Time Saver Standards for Building Type, McGraw Hill

I. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	Gradation of course and fineaggregates. Different corresponding tests and need/ application of these tests in design and quality control**.**	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam
2	Concrete permeability test, and tiles abrasion	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam
3	Tensile Strength of materials & concrete composites. Compressive strength test on aggregates	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam
4	Tension I-Elastic Behaviour of metals & materials. Tension II-Failure of Common Materials	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam
5	Direct Shear-Frictional Behaviour. Concrete I-Early Age Properties	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam
6	Concrete II-Compression and	Practical	CIV421.1	Mid Term-1, Quiz

	Indirect Tension. Compression-Directionality.			& End Sem Exam
7	Soil Classification. Consolidation and Strength Tests: Tension III-Heat Treatment. Torsion test	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam
8	Hardness tests (Brinnel's and Rockwell). Tests on closely coiled and open coiled springs	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam
9	Theories of Failure and Corroboration with Experiments. Tests on unmodified bitumen and modified binders with polymers	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam
10	Bituminous Mix Design and Tests on bituminous mixes – Marshall method. Concrete Mix Design as per BIS	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV421.1	Function as design consultants in construction industry for the design of civil engineering structures.	3	3	1	3	1				2		2	1	1	2	1
CIV421.2	Provide sustainable solutions to the Civil Engineering Problems related with materials and their strength.	3	2	2	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of Electronics and Communication Engineering MID-SEMESTER(SEM–IV)2021-22
Class: B.Tech.(CE) IV Semester

Subject Name: CIV 421 Material Testing and Evaluation Lab		Time:2 Hrs			Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1, 2,3	Q.1, 2,3	Q. 1,2,3	Q.1,2,3	Q.1,2,3	Q.1,2,3
Student will be able to attain CO1 to 3						

CO Map	Question No.	Question	Marks
CO1-3	Q.1	Tensile Strength of materials & concrete composites. Compressive strength test on aggregates	10
CO1-3	Q2	Tension I-Elastic Behaviour of metals & materials. Tension II-Failure of Common Materials.	10
CO1-3	Q3	Theories of Failure and Corroboration with Experiments. Tests on unmodified bitumen and modified binders with polymers.	10

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	CIV421 MATERIALS TESTING AND EVALUATION LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U8G8
1	A60215820001	Mr ABHI PRATAP	100	30	70	A	9	1	1	9
2	A60215820002	Mr AMRENDRA SINGH CHAUHAN	100	30	70	A+	10	1	1	10
3	A60215820003	Mr SHYAM VEER SINGH	100	30	70	A	9	1	1	9
4	A60215820004	Mr SAHIL SHARMA	100	30	70	A+	10	1	1	10
			Total No. of Students			=	4			
			Total No. of Students			>60 % marks	4	100.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **ENGINEERING GEOLOGY LAB**
Course Code : CIV 422, Credits : 01, Session : 2021-22(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Mohan Kantharia, Dr. Ripunjoy Gogoi

A. Introduction

The study of various types of rock formation and its physical properties. Topics such as rocks and minerals, soils, and earthquake activities are discussed with special reference to local geological problems. This lab course also focuses on physical properties of minerals.

B. Course Outcomes: At the end of the course, students will be able to:

- **CIV422.1**. To understand the various types of rocks (Igneous Petrology), Identification of rocks (Sedimentary Petrology)
- **CIV422.2**. Analyze the difference of rocks (Metamorphic Petrolody), Minerals and crystallography

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Students will able to understand the basic of rocks and various geological formations.

PSO2: Differentiate between different types of rocks and their origin and properties.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

- Study of physical properties ofminerals: **(2 Hours)**
- Study of spgravity of minerals and rocks **(2 Hours)**
- Study of different group ofminerals:**(2 Hours)**
- Study of Crystal and Crystalsystem:**(2 Hours)**
- Identification of minerals: Silica group: Quartz, Amethyst, Opal; Feldspar group: Orthoclase, Plagioclase; Cryptocrystalline group: Jasper; Carbonate group: Calcite; Element group: Graphite; Pyroxene group: Talc; Mica group: Muscovite; Amphibole group: Asbestos, Olivine, Hornblende, Magnetite, Hematite, Corundum, Kyanite, Garnet, Galena,Gypsum:**(2 Hours)**
- Identification of rocks (Igneous Petrology): Acidic Igneous rock: Granite and its varieties, Syenite, Rhyolite, Pumice, Obsidian, Scoria, Pegmatite, Volcanic Tuff. Basic rock: Gabbro, Dolerite, Basalt and its varieties,Trachyte.**(2 Hours)**
- Identification of rocks (Sedimentary Petrology): Conglomerate, Breccia, Sandstone and its varieties, Laterite, Limestone and its varieties, Shales and itsvarieties: **(2 Hours)**
- Identification of rocks (Metamorphic Petrolody): Marble, slate, Gneiss and its varieties, Schist and its varieties. Quartzite,Phyllite: **(2 Hours)**
- Study of topographical features from Geological maps. Identification of symbols inmaps: **(2 Hours)**
- Field study of foulds and faults:**(2 Hours)**

G. Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Books

- Parbin Singh, Engineering & General Geology, S.K. Kataria& Sons, New Delhi (2008)
- Bangar, K.M., Principles of Engineering Geology, Standard Publishers Distributors, Delhi (2009)
- Billings, Marland P., Structural Geology, 3rd ed., Prentice-Hall India, New Delhi.
- Todd, D.K., Ground Water Hydrology, 2nd ed., Wiley India, New Delhi (2008)

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Study of physical properties of minerals, Study of sp gravity of minerals and rocks	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam
2	Study of different group of minerals.	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam
3	Study of Crystal and Crystal system	Practical	CIV422.1	Mid Term-1, Quiz

				& End Sem Exam
4	Identification of minerals: Silica group: Quartz, Amethyst, Opal; Feldspar group: Orthoclase, Plagioclase; Cryptocrystalline group: Jasper; Carbonate group: Calcite; Element group: Graphite; Pyroxene group: Talc; Mica group: Muscovite.	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam
5	Identification of rocks (Igneous Petrology): Acidic Igneous rock: Granite and its varieties, Syenite, Rhyolite, Pumice, Obsidian, Scoria, Pegmatite, Volcanic Tuff. Basic rock: Gabbro, Dolerite, Basalt and its varieties.	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam
6	Identification of rocks (Sedimentary Petrology): Conglomerate, Breccia, Sandstone and its varieties, Laterite, Limestone and its varieties, Shales and itsvarieties	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam
7	Study of topographical features from Geological maps.	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam
8	Identification of rocks (Metamorphic Petrolody): Marble, slate, Gneiss and its varieties, Schist and its varieties. Quartzite.	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam
9	Identification of symbols in maps	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam
10	Field study of foulds and faults	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV422.1	To understand the difference of rocks (Igneous Petrology), Identification of rocks (Sedimentary Petrology)	3	3	1	3	1				2		2	1	1	2	1

CIV422.2	Analyze the various types of rocks (Metamorphic Petrolody), Minerals and crystallography.	3	2	2	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of Electronics and Communication Engineering MID-SEMESTER(SEM–IV)2021-22						
Class: B.Tech.(CE) IV Semester						
Subject Name: CIV 422 Engineering Geology Lab		Time:2 Hrs			Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1, 2	Q.1, 2	Q. 1,2	Q.1,2	Q.1,2	Q.1,2
Student will be able to attain CO1 to 3						

CO Map	Question No.	Question	Marks
CO1-2	Q.1	Identification of rocks (Sedimentary Petrology): Conglomerate, Breccia, Sandstone and its varieties, Laterite, Limestone and its varieties, Shales and itsvarieties:	15
CO1-2	Q2	Study of topographical features from Geological maps. Identification of symbols inmaps: Field study of foulds and faults	15

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

‘

S. No .	Enrollment.No .	Student's Name	CIV422 ENGINEERING GEOLOGY LAB							
			Max Marks	CE Weigh t Age (%)	ET Weigh t Age (%)	GO	GP	ACU	EC U	U7G 7
1	A60215820001	Mr ABHI PRATAP	100	30	70	A-	8	1	1	8
2	A60215820002	Mr AMRENDRA SINGH CHAUHAN	100	30	70	A+	10	1	1	10
3	A60215820003	Mr SHYAM VEER SINGH	100	30	70	A+	10	1	1	10
4	A60215820004	Mr SAHIL SHARMA	100	30	70	A+	10	1	1	10
			Total No. of Students			=	4			
			Total No. of Students			>60 % marks	4	100.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **SURVEYING LAB**
Course Code : CIV 423, Credits : 01, Session : 2021-22(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Mohan Kantharia, Dr. Ripunjoy Gogoi

A. Introduction

Surveying Lab offers additional experience in fundamental land surveying measurement methods for surveying courses, including precision steel taping methods to perform horizontal measurements, digital theodolites to perform angular measurements and traditional and automatic levels for elevation measurements.

B. At the end of the course students will able to learn following idea's

Course Outcomes: At the end of the course, students will be able to:

- **CIV423.1** Understand the Chain survey - Traversing and plotting of details. Chain survey – Measurement of Area by offsetting.
- **CIV423.2**. Analyze the Compass survey - Traversing with compass and calculation of Interior angles. The use of advance survey instrument, Total station, theodolite etc.

C. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Students will able to understand the basic of different types of methods for measuring the distances and elevations of different points.

PSO2: Student will apply practical knowledge for determining the various control points.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-	S/V/Q/H	10%

	Voce/Quiz/Home Assignment	A	
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastu dentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

- Chain survey-Traversing and plotting of details: **(2 Hours)**
- Chain survey-Measurement of Area by offsetting: **(2 Hours)**
- Compass survey - Traversing with compass and calculation of Interior angles: **(2 Hours)**
- Plane table survey-Method of Radiation: **(2 Hours)**
- Plane table survey-Method of Intersection: **(2 Hours)**
- Leveling Fly Leveling-Plane of collimation method: **(2 Hours)**
- Leveling Fly leveling-Rise and Fall method: **(2 Hours)**
- Total station uses in angles and sop distance measurement.: **(2 Hours)**
- Total station leveling and Contour surveying, Topographical maps.: **(2 Hours)**
- Theodolite surveying-Measurement of horizontal angle by method of repetition and reiteration:**(2 Hours)**

G. Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Books

- Madhu, N, Sathikumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson India,2006.
- Manoj, K. Arora and Badjatia, Geomatics Engineering, Nem Chand & Bros,2011
- Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International,2010
- Chandra, A.M., Higher Surveying, Third Edition, New Age International (P) Limited, 2002.
- Anji Reddy, M., Remotesensing and Geographical information system, B.S. Publications,2001.
- Arora, K.R., Surveying, Vol-I, II and III, Standard Book House,2015.

I. Lecture Plan

Lectu re	**Topics**	**Mode of**	**Correspon ding CO**	**Mode of Assessing CO**

		Delivery		
1	Chain survey-Traversing and plotting of details.	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam
2	Chain survey-Measurement of Area by offsetting.	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam
3	Compass survey - Traversing with compass and calculation of Interior angles.	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam
4	Plane table survey-Method of Radiation.	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam
5	Plane table survey-Method of Intersection.	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam
6	Leveling Fly Leveling-Plane of collimation method	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam
7	Leveling Fly leveling-Rise and Fall method.	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam
8	*Total station uses in angles and sop distance measurement.*	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam
9	Total station leveling and Contour surveying, Topographical maps	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam
10	Theodolite surveying-Measurement of horizontal angle by method of repetition and reiteration.	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV423.1	Understand the Chain survey - Traversing and plotting of details. Chain survey – Measurement of Area by offsetting.	3	3	1	3	1				2		2	1	1	2	1
CIV423.2	Analyze the Compass survey - Traversing with compass and calculation of Interior angles. The use of advance survey instrument, Total station, theodolite etc.	3	2	2	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology
Department of Electronics and Communication Engineering
MID-SEMESTER(SEM–IV)2021-22

<table>
<tr><td colspan="7">Class: B.Tech.(CE) IV Semester</td></tr>
<tr><td colspan="2">Subject Name:
CIV 423 Surveying Lab</td><td colspan="3">Time:2 Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1, 2</td><td>Q.1, 2</td><td>Q. 1,2</td><td>Q.1,2</td><td>Q.1,2</td><td>Q.1,2</td></tr>
<tr><td colspan="7">Student will be able to attain CO1 to 3</td></tr>
</table>

CO Map	Question No.	Question	Marks
CO1-2	Q.1	• Chain survey-Traversing and plotting of details • Chain survey-Measurement of Area by offsetting	15
CO1-2	Q2	• Compass survey - Traversing with compass and calculation of Interior angles • Plane table survey-Method of Radiation • Plane table survey-Method of Intersection	15

<table>
<tr><th colspan="2">Attainments</th><th>Rubric</th></tr>
<tr><td>Level</td><td>1</td><td>IF60%ofstudentssecuremorethan60%marksthenlevel1</td></tr>
<tr><td>Level</td><td>2</td><td>IF70%ofstudentssecuremorethan60%marksthenlevel2</td></tr>
<tr><td>Level</td><td>3</td><td>IF80%ofstudentssecuremorethan60%marksthenlevel3</td></tr>
</table>

S. No.	Enrollment.No.	Student's Name	CIV423 SURVEYING LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U9G9
1	A60215820001	Mr ABHI PRATAP	100	30	70	A	9	1	1	9
2	A60215820002	Mr AMRENDRA SINGH CHAUHAN	100	30	70	A+	10	1	1	10
3	A60215820003	Mr SHYAM VEER SINGH	100	30	70	A+	10	1	1	10
4	A60215820004	Mr SAHIL SHARMA	100	30	70	A+	10	1	1	10

Total No. of Students	=	4		
Total No. of Students	>60 % marks	4	100.00	%
Attainment Level			Level 3	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **FLUID MECHANICS LAB**
Course Code : CIV 424, Credits : 01, Session : 2021-22(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Sachin Tiwari

A. Introduction

The Fluid Mechanics laboratory is designed to examine the properties of fluids and to conduct experiments involving both incompressible and compressible flow.

B. At the end of the course students will able to learn following idea's

Course Outcomes: At the end of the course, students will be able to:

- **CIV424.1** Understand the different types of fluid exists in nature their behaviour and characteristics.
- **CIV424.2**. Analyze the various types of losses and different types of flow conditions, calculate different types of forces observed by moving bodies in different flow conditions.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Students will able to understand the basic of different types of methods for measuring the pressure with the help of different devices.
PSO2: Student will apply practical knowledge for determining the discharge from various sections and pipes.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

- Measurement of viscosity: **(2 Hours)**
- Study of Pressure MeasuringDevices: **(2 Hours)**
- Stability of FloatingBody: (2 **Hours**)
- Hydrostatics Force on Flat Surfaces/ CurvedSurfaces: (2 **Hours**)
- Verification of Bernoulli'sTheorem: (2 **Hours)**
- Venturimeter: (2 **Hours**)
- Orificemeter: (2 **Hours**)
- Impacts ofjets: (2 **Hours**)
- Flow Visualisation–IdealFlow: (2 **Hours**)
- Length of establishment offlow, velocity distribution inpipes, LaminarFlow: (2 **Hours**)

G. Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Books

- R.K. Bansal, "Fluid Mechanics & Hydraulic Machines", Laxmi Publications (P) Ltd., 2002.

- Gupta, S. C., Fluid Mechanics and Hydraulic Machines, Pearson Education, 2007
- D.S. Kumar, “Fluid Mechanics and Fluid Power Engineering”, S.K. Kataria& Sons, 2000.
- F. M. White, Introduction to Fluid Mechanics, McGraw Hill

I. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Corresponding CO**	**Mode of Assessing CO**
1	Measurement of viscosity	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam
2	Study of Pressure Measuring Devices	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam
3	Stability of Floating Body:	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam
4	Hydrostatics Force on Flat Surfaces/ Curved Surfaces	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam
5	Verification of Bernoulli’sTheorem:	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam
6	Venturimeter	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam
7	Orificemeter	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam
8	Impacts of jets:	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam
9	Flow Visualisation–Ideal Flow:	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam
10	Length of establishment off low, velocity distribution in pipes, Laminar Flow	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV424.1	Understand the different types of fluid exists in nature their behaviour and characteristics.	3	3	1	3	1				2		2	1	1	2	1
CIV424.2	Analyze the various types of losses and different types of flow conditions, calculate different types of forces observed by	3	2	2	2	2				2		1	1	2	2	1

	moving bodies in different flow conditions.														

Sample Question Paper

Amity School of Engineering and Technology Department of Electronics and Communication Engineering MID-SEMESTER(SEM–IV)2021-22						
Class: B.Tech.(CE) IV Semester						
Subject Name: CIV 424 Fluid Mechanics Lab		Time:2 Hrs		Max.Marks:30		
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1, 2	Q.1, 2	Q. 1,2	Q.1,2	Q.1,2	Q.1,2
Student will be able to attain CO1 to 3						

CO Map	Question No.	Question	Marks
CO1-2	Q.1	• Measurement of viscosity • Study of Pressure Measuring Devices • Stability of Floating Body	15
CO1-2	Q2	• Hydrostatics Force on Flat Surfaces/ Curved Surfaces • Verification of Bernoulli's Theorem	15

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No .	Enrollment. No.	Student's Name	CIV424 FLUID MECHANICS LAB								
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U15G 15

1	A60215820001	Mr ABHI PRATAP	100	30	70	B+	7	1	1	7
2	A60215820002	Mr AMRENDRA SINGH CHAUHAN	100	30	70	B+	7	1	1	7
3	A60215820003	Mr SHYAM VEER SINGH	100	30	70	B+	7	1	1	7
4	A60215820004	Mr SAHIL SHARMA	100	30	70	A-	8	1	1	8
			Total No. of Students			=	4			
			Total No. of Students			>60 % marks	1	25.00	%	
			Attainment Level					-		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **INSTRUMENTATION & SENSOR TECHNOLOGIES FOR CIVIL ENGINEERING APPLICATIONS LABORATORY**
Course Code : ECE 427, Credits : 01, Session : 2021-22(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Ajay Dadoria, Dr. Shally Goyal

A. Introduction

Sensors and Instrumentation research area encompasses the development and optimisation of new or existing devices that detect and measure changes in temperature, pressure, vibration and light. It also includes the integration and optimisation of these devices into a new system or instrument.

B. At the end of the course students will able to learn following idea's

Course Outcomes: At the end of the course, students will be able to:

- **CIV422.1** Understand the different types of sensors exist and their use in advanced technology. To analyze the errors during measurements
- **CIV422.2**. Analyze the various types of losses and Measure the resolution and sensitivity of thermocouple, thermistor and LVDT To specify the requirements in the calibration of sensors and instruments. To describe the measurement of electrical variables.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Students will able to understand the basic of different types of sensors and methods for measuring the losses from sensors

PSO2: Student will apply practical knowledge to find out the various new advancement in the field of sensors.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance	A	5%

	isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

- Measurement of resolution and sensitivity of thermocouple: **(2 Hours)**
- Measurement of resolution, sensitivity and non-linearity of thermistor: **(2 Hours)**
- Measurement of thickness of LVDT: **(2 Hours)**
- Measurement of resolution of LVDT (and displacement measurement): **(2 Hours)**
- Vibration measurement by stroboscope: **(2 Hours)**
- Angular frequency (speed of rotating objects) measurement by stroboscope: **(2 Hours)**
- Pressure transducer study and calibration: **(2 Hours)**
- Proving ring (force measurement): **(2 Hours)**
- Study of Torque cell: **(2 Hours)**
- Closed loop study of an electric circuit: **(2 Hours)**

G. Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Books

- David. A. Bell (2003), Laboratory Manual for Electronic Devices and Circuits, Prentice Hall, India
- SantiramKal (2002), Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India
- Thomas L. Floyd and R. P. Jain (2009), Digital Fundamentals by Pearson Education,
- Paul B. Zbar, A.P. Malvino and M.A. Miller (2009), Basic Electronics – A Text-Lab. Manual, TMH
- R. T. Paynter (2009), Introductory Electronic Devices & Circuits, Conventional Flow Version, Pearson

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Measurement of resolution and sensitivity of thermocouple:	Practical	ECE 427.1	Mid Term-1, Quiz & End Sem Exam
2	Measurement of resolution, sensitivity and non-linearity of thermistor:	Practical	ECE 427.1	Mid Term-1, Quiz & End Sem Exam
3	Measurement of thickness of LVDT:	Practical	ECE 427.1	Mid Term-1, Quiz

				& End Sem Exam
4	Measurement of resolution of LVDT (and displacement measurement):	Practical	ECE 427.1	Mid Term-1, Quiz & End Sem Exam
5	Vibration measurement by stroboscope:	Practical	ECE 427.1	Mid Term-1, Quiz & End Sem Exam
6	Angular frequency (speed of rotating objects) measurement by stroboscope:	Practical	ECE 427.1	Mid Term-1, Quiz & End Sem Exam
7	Pressure transducer study and calibration:	Practical	ECE 427.1	Mid Term-1, Quiz & End Sem Exam
8	Proving ring (force measurement):	Practical	ECE 427.1	Mid Term-1, Quiz & End Sem Exam
9	Study of Torque cell:	Practical	ECE 427.1	Mid Term-1, Quiz & End Sem Exam
10	Closed loop study of an electric circuit:	Practical	ECE 427.1	Mid Term-1, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ECE427.1	At the end of the course, students will be able to: Understand the different types of sensors exist and their use in advanced technology. To analyze the errors during measurements	3	3	1	3	1				2		2	1	1	2	1
ECE427.2	Analyze the various types of losses and Measure the resolution and sensitivity of thermocouple, thermistor and LVDT To specify the requirements in the calibration of sensors and instruments. To describe the measurement of electrical variables.	3	2	2	2	2				2		1	1	2	2	1

Attainments		Rubric
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	ECE427 INSTRUMENTATION & SENSOR TECHNOLOGIES FOR CIVIL ENGINEERING APPLICATIONS LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U16G16
1	A60215820001	Mr ABHI PRATAP	100	30	70	A	9	1	1	9
2	A60215820002	Mr AMRENDRA SINGH CHAUHAN	100	30	70	A	9	1	1	9
3	A60215820003	Mr SHYAM VEER SINGH	100	30	70	A+	10	1	1	10
4	A60215820004	Mr SAHIL SHARMA	100	30	70	A+	10	1	1	10
			Total No. of Students			=	4			
			Total No. of Students			>60% marks	4	100.00	%	
			Attainment Level					Level 3		

AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : MECHANICS OF MATERIALS
Course Code : CIV 501, Crédits : 03, Session :2021-22 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia, Dr. P. Mahakavi, Mr. Sachin Tiwari

K. **Introduction:**The objective of this course is to *provide the basic concepts and principles of strength of materials.* It aims to equip the students *to give an ability to calculate stresses and deformations of objects under external loadings and also to give an ability to apply the knowledge of strength of materials on engineering applications and design problems.*

L. Course Outcomes: At the end of the course, students will be able to:
CIV501.1. *Understand the fundamental concepts of stress and strain*
CIV501.2. *Evaluate the problems relating to pure and uniform bending of beams and other simple structures*
CIV501.3. *Examine the deflection of beams under various loading condition.*
CIV501.4. *Understand the concept of crushing and buckling*
CIV501.5. *Analyse the structural elements using Energy methods*

M. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

N. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

O. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves Includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

P. Syllabus

Module 1: Introduction to Stress and Strain: (8 hours)
Deformation and Strain covering description of finite deformation, Infinitesimal deformation; Analysis of statically determinate trusses; Stability of dams, retaining walls and chimneys; Stress analysis of thin, thick and compound cylinder.

Module 2: Failure Theories: (7 hours)
Generalized state of stress and strain: Stress and strain tensor, Yield criteria and theories of failure; Tresca, Von-Mises, Hill criteria, Heigh-Westerguard's stress space.

Module 3: Bending Moments Diagrams: (5 hours)
Momentum Balance and Stresses covering Forces and Moments Transmitted by Slender Members, Shear Force and Bending Moment Diagrams, Momentum Balance, Stress States / Failure Criterion.

Module 4:Determinacy and Indeterminacy of Structures: (5 hours)
Mechanics of Deformable Bodies covering Force-deformation Relationships and Static Indeterminacy, Uniaxial Loading and Material Properties, Trusses and Their Deformations, Statically Determinate and Indeterminate Trusses,

Module 5:Pressure Vessels and Torsion: (5 hours)
Force-Stress-Equilibrium covering Multiaxial Stress and Strain, Thin-walled Pressure Vessels,Stress and strain Transformations and Principal Stress, Failure of Materials. Statically Indeterminate Beams, Shear and Torsion, Torsion and Twisting.

Q. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

R. Suggested Text/Reference Books:

- Norris, C.H. and Wilber, J. B. and Utku, S. "Elementary Structural Analysis" Mc Graw Hill, Tokyo, Japan.
- Timoshenko, S. and Young, D. H., "Elements of Strength of Materials", DVNC, New York, USA. 3. Kazmi, S. M. A., 'Solid Mechanics" TMH, Delhi, India.
- Hibbeler, R. C. Mechanics of Materials. 6th ed. East Rutherford, NJ: Pearson Prentice Hall, 2004

S. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Deformation	Lecture	CIV501.1	Mid Term-1, Quiz & End Sem Exam
2	Strain covering description of finite deformation,	Lecture	CIV501.1	Mid Term-1, Quiz & End Sem Exam
3	Analysis of statically determinate trusses;	Lecture	CIV501.1	Mid Term-1, Quiz & End Sem Exam
4	Stability of dams,	Lecture	CIV501.1	Mid Term-1, Quiz & End Sem Exam
5	Infinitesimal deformation;	Lecture	CIV501.1	Mid Term-1, Quiz & End Sem Exam

6	retaining walls	Lecture	CIV501.1	Mid Term-1, Quiz & End Sem Exam
7	chimneys;	Lecture	CIV501.1	Mid Term-1, Quiz & End Sem Exam
8	Stress analysis of thin and thick compound cylinder	Lecture	CIV501.1	Mid Term-1, Quiz & End Sem Exam
9	Generalized state of stress	Lecture	CIV501.2	Mid Term-1, Quiz & End Sem Exam
10	Generalized state of strain:	Lecture	CIV501.2	Mid Term-1, Quiz & End Sem Exam
11	Stress and strain tensor	Lecture	CIV501.2	Mid Term-1, Quiz & End Sem Exam
12	Yield criteria	Lecture	CIV501.2	Mid Term-1, Quiz & End Sem Exam
13	Theories of failure	Lecture	CIV501.2	Mid Term-1, Quiz & End Sem Exam
14	Tresca, Von-Mises	Lecture	CIV501.2	Mid Term-1, Quiz & End Sem Exam
15	Hill criteria	Lecture	CIV501.2	Mid Term-1, Quiz & End Sem Exam
16	Heigh-Westerguard's stress space	Lecture	CIV501.2	Mid Term-1, Quiz & End Sem Exam
17	Momentum Balance Stresses covering Forces	Lecture	CIV501.3	Mid Term-1, Quiz & End Sem Exam
18	Moments Transmitted by Slender Members,	Lecture	CIV501.3	Mid Term-1, Quiz & End Sem Exam
19	Shear Force and Bending Moment Diagrams	Lecture	CIV501.3	Mid Term-1, Quiz & End Sem Exam
20	Momentum Balance and Stresses covering Forces	Lecture	CIV501.3	Mid Term-1, Quiz & End Sem Exam
21	Shear Force and Bending Moment Diagrams	Lecture	CIV501.3	Assignment, Quiz & End Sem Exam
22	Momentum Balance, Stress States / Failure Criterion.	Lecture	CIV501.3	Assignment, Quiz & End Sem Exam
23	Mechanics of Deformable Bodies covering Force-deformation Relationships	Lecture	CIV501.4	Assignment, Quiz & End Sem Exam
25	Static Indeterminacy	Lecture	CIV501.4	Assignment, Quiz & End Sem Exam
26	Uniaxial Loading and Material Properties	Lecture	CIV501.4	Assignment, Quiz & End Sem Exam
27	Trusses and Their Deformations	Lecture	CIV501.4	Assignment, Quiz & End Sem Exam
28	Statically Determinate and Indeterminate Trusses	Lecture	CIV501.4	Assignment, Quiz & End Sem Exam
29	Force-deformation Relationships	Lecture	CIV501.5	Assignment, Quiz & End Sem Exam
30	Force-Stress-Equilibrium	Lecture	CIV501.5	Assignment, Quiz

				& End Sem Exam
31	Multiaxial Stress and Strain	Lecture	CIV501.5	Assignment, Quiz & End Sem Exam
32	Thin-walled Pressure Vessels	Lecture	CIV501.5	Assignment, Quiz & End Sem Exam
33	Stress and strain Transformations	Lecture	CIV501.5	Assignment, Quiz & End Sem Exam
34	Principal Stress	Lecture	CIV501.5	Assignment, Quiz & End Sem Exam
35	Failure of Materials and Statically Indeterminate Beams	Lecture	CIV501.5	Assignment, Quiz & End Sem Exam
36	Shear, Torsion and Twisting	Lecture	CIV501.5	Assignment, Quiz & End Sem Exam

T. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV501.1.	Understand the fundamental concepts of stress and strain	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
CIV501.2.	Evaluate the problems relating to pure and uniform bending of beams and other simple structures	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
CIV501.3.	Examine the deflection of beams under various loading condition.	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
CIV501.4.	Understand the concept of crushing and buckling	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**
CIV501.5.	Analyse the structural elements using Energy methods.	3	3	2	3	3	2	2	-	3	2	3	3	**1**	**2**	**3**

Sample Question Paper

<table>
<tr><td colspan="7">Amity School of Engineering and Technology
Department of Civil Engineering
I MID-SEMESTER (SEM–V) 2021-22</td></tr>
<tr><td colspan="7">Class: B.Tech.(CE) V Semester</td></tr>
<tr><td colspan="2">Subject Name:
CIV501 Mechanics of Materials</td><td colspan="2">Time: 2 Hrs</td><td colspan="3">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3</td><td>Q.4</td><td>Q.2,5,6</td><td></td><td></td></tr>
<tr><td colspan="7">Student will be able to
CO1: Understand the fundamental concepts of stress and strain
CO2: Evaluate the problems relating to pure and uniform bending of beams and other simple structures</td></tr>
</table>

<table>
<tr><th>CO Map</th><th>Question No.</th><th>Question</th><th>Marks</th></tr>
<tr><td>CO1</td><td>Q.1</td><td>Explain about modulus of rigidity.</td><td>3</td></tr>
<tr><td rowspan="2">CO1</td><td>Q.2a</td><td>Define Shear stress and Shear strain.</td><td>3</td></tr>
<tr><td>Q.2b</td><td>Define principal planes and principal stresses.</td><td>3</td></tr>
<tr><td>CO1</td><td>Q.3</td><td>Two vertical rods one of steel and the other of copper are each rigidly fixed at the top and 50cm apart. Diameters and lengths of each rod are 2cm and 4m respectively. A cross bar fixed to the rods at the lower ends carries a load of 5000 N such that the cross bar remains horizontal even after loading. Find the stress in each rod and the position of the load on the bar. Take E for steel = 2 x 105 N/mm2 and E for copper = 1x 105 N/mm2 .</td><td>6</td></tr>
<tr><td>CO2</td><td>Q.4</td><td>Differentiate open coiled helical spring from the close coiled helical spring and state the type of stress induced in each spring due to an axial load</td><td>3</td></tr>
<tr><td rowspan="2">CO2</td><td>Q.5a</td><td>Write an expression for the angle of twist for a hollow circular shaft with external diameter D, internal diameter d, length l and rigidity modulus G.</td><td>3</td></tr>
<tr><td>Q.5b</td><td>Determine the diameter of a solid shaft which will transmit 300 KN at 250 rpm. The maximum shear stress should not exceed 30 N/mm2 and twist should not be more than 10 in a shaft length 2m. Take modulus of rigidity = 1 x 10 5 N/mm 2 .</td><td>3</td></tr>
<tr><td>CO2</td><td>Q6</td><td>List the advantages of Macaulay method over the double integration method, for finding the slope and</td><td>6</td></tr>
</table>

		deflections of beams?	

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	CIV501 MECHANICS OF MATERIALS								
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U4G4
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	B+	7	3	3	21
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	B+	7	3	3	21
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	B	6	3	3	18
4	A60215819004	Ms RIYA NAMDEV	100	30	70	B+	7	3	3	21
5	A60215819005	Mr YASH YOGI	100	30	70	A	9	3	3	27
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	1	20.00	%	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : HYDRAULIC ENGINEERING
Course Code : CIV 502, Crédits : 02, Session :2021-22 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Mr. Sachin Tiwari

A. **Introduction:** The objective of this course is to provide and train students of hydraulic engineering. The course will introduce students to various fluid properties, and their behavior under different condition.

B. Course Outcomes: At the end of the course, students will be able to:

CIV502.1. Analyse various hydraulic systems by applying the fundamental laws of fluid statics and
CIV502.2. Solve the fluid flow governing equations by taking suitable constraints and assumptions
CIV502.3. Evaluate major and minor losses in pipes and analyse the practical significance of open channel flows and Interpret the boundary layer aspects of laminar and turbulent flows
CIV502.4. Perform dimensional analysis on any real life problems
CIV502.5. Experimentally determine the fluid properties and flow parameters using various experimental setups.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module 1:Introduction to Different Types of Flow: (5 Hours)
Laminar Flow- Laminar flow through: circular pipes, annulus and parallel plates. Stoke's law, Measurement of viscosity.

Module 2:Flow Types and Profile Determination: (5 Hours)
Turbulent Flow- Reynolds experiment, Transition from laminar to turbulent flow. Definition of turbulence, scale and intensity, Causes of turbulence, instability, mechanism of turbulence and effect of turbulent flow in pipes. Reynolds stresses, semi-empirical theories of turbulence, Prandtl's mixing length theory, universal velocity distribution equation. Resistance to flow of fluid in smooth and rough pipes, Moody's diagram.

Module 3:Boundary Layer Theory: (5 Hours)
Boundary Layer Analysis-Assumption and concept of boundary layer theory. Boundary-layer thickness, displacement, momentum & energy thickness, laminar and Turbulent boundary layers on a

flat plate; Laminar sub-layer, smooth and rough boundaries. Local and average friction coefficients. Separation and Control.

Module 4:Different Types of Model Law: (5 Hours)
Dimensional Analysis and Hydraulic Similitude: Dimensional homogeneity, Rayleigh method, Buckingham's Pi method and other methods. Dimensionless groups. Similitude, Model studies, Types of models. Application of dimensional analysis and model studies to fluid flow problem. AICTE Model Curriculum for Undergraduate degree in Civil Engineering (Engineering & Technology) 133 | Page

Module 5:Introduction to Open Channel Flow: (4 Hours)
Introduction to Open Channel Flow-Comparison between open channel flow and pipe flow, Loss of head through pipes, Darcy-Wiesbatch equation, minor losses, total energy equation, hydraulic gradient line, Pipes in series, equivalent pipes, pipes in parallel, flow through laterals, flows in dead end pipes, siphon, power transmission through pipes, nozzles.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Hydraulics and Fluid Mechanics, P.M. Modi and S.M. Seth, Standard Book House
- Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill.
- Open channel Flow, K. Subramanya, Tata McGraw Hill.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Laminar Flow- Laminar flow through: circular pipes	Lecture	CIV 502.1	Mid Term-1, Quiz & End Sem Exam
2	Annulus and parallel plates. Stoke's law,	Lecture	CIV 502.1	Mid Term-1, Quiz & End Sem Exam
3	Measurement of viscosity.	Lecture	CIV 502.1	Mid Term-1, Quiz & End Sem Exam
4	*Turbulent Flow- Reynolds experiment, Transition from laminar to turbulent flow*	Lecture	CIV 502.2	Mid Term-1, Quiz & End Sem Exam
5	Definition of turbulence, scale and intensity, Causes of turbulence, instability, mechanism of turbulence and effect of turbulent flow	Lecture	CIV 502.2	Mid Term-1, Quiz & End Sem Exam

	in pipes			
6	Reynolds stresses, semi-empirical theories of turbulence, Prandtl's mixing length theory	Lecture	CIV 502.2	Mid Term-1, Quiz & End Sem Exam
7	universal velocity distribution equation	Lecture	CIV 502.2	Mid Term-1, Quiz & End Sem Exam
8	Resistance to flow of fluid in smooth and rough pipes, Moody's diagram	Lecture	CIV 502.2	Mid Term-1, Quiz & End Sem Exam
9	Boundary Layer Analysis-Assumption and concept of boundary layer theory	Lecture	CIV 502.3	Mid Term-1, Quiz & End Sem Exam
10	Boundary-layer thickness, displacement, momentum & energy thickness	Lecture	CIV 502.3	Mid Term-1, Quiz & End Sem Exam
11	laminar and Turbulent boundary layers on a flat plate	Lecture	CIV 502.3	Mid Term-1, Quiz & End Sem Exam
12	Laminar sub-layer, smooth and rough boundaries	Lecture	CIV 502.3	Mid Term-1, Quiz & End Sem Exam
13	Local and average friction coefficients. Separation and Control.	Lecture	CIV 502.3	Mid Term-1, Quiz & End Sem Exam
14	Dimensional Analysis and Hydraulic Similitude: Dimensional homogeneity	Lecture	CIV 502.4	Mid Term-1, Quiz & End Sem Exam
15	Rayleigh method, Buckingham's Pi method and other methods. Dimensionless groups	Lecture	CIV 502.4	Mid Term-1, Quiz & End Sem Exam
16	Similitude, Model studies, Types of models	Lecture	CIV 502.4	Mid Term-1, Quiz & End Sem Exam
17	Application of dimensional analysis and model studies to fluid flow problem.	Lecture	CIV 502.4	Mid Term-1, Quiz & End Sem Exam
18	Introduction to Open Channel Flow-Comparison between open channel flow and pipe flow	Lecture	CIV 502.5	Mid Term-1, Quiz & End Sem Exam
19	Loss of head through pipes, Darcy-Wiesbatch equation, minor losses	Lecture	CIV 502.5	Mid Term-1, Quiz & End Sem Exam
20	total energy equation, hydraulic gradient line, Pipes in series, equivalent pipes, pipes in parallel	Lecture	CIV 502.5	Mid Term-1, Quiz & End Sem Exam
21	Pipes in series, equivalent pipes,	Lecture	CIV 502.5	Assignment, Quiz & End Sem Exam

22	pipes in parallel	Lecture	CIV 502.5	Assignment, Quiz & End Sem Exam
23	flow through laterals, flows in dead end pipes	Lecture	CIV 502.5	Assignment, Quiz & End Sem Exam
24	siphon, power transmission through pipes, nozzles.	Lecture	CIV 502.5	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV502.1.	Analyse various hydraulic systems by applying the fundamental laws of fluid statics and	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
CIV502.2.	Solve the fluid flow governing equations by taking suitable constraints and assumptions	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
CIV502.3.	Evaluate major and minor losses in pipes and analyse the practical significance of open channel flows and Interpret the boundary layer aspects of laminar and turbulent flows	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
CIV502.4.	Perform dimensional analysis on any real life problems	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**

CIV502.5.	Experimentally determine the fluid properties and flow parameters using various experimental setups. .	3	3	2	3	3	2	2	-	3	2	3	3	**1**	**2**	**3**

<u>Sample Question Paper</u>

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–V) 2021-22						
Class: B.Tech.(CE) V Semester						
Subject Name: CIV502 Hydraulic Engineering		Time: 2 Hrs		Max.Marks:30		
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		
Student will be able to *CO1:* Analyse various hydraulic systems by applying the fundamental laws of fluid statics and CO2. Solve the fluid flow governing equations by taking suitable constraints and assumptions						

CO Map	Question No.	Question	Marks
CO1	Q.1	Differentiate closed flow closed conduit flow and open channel flow	3
CO1	Q.2a	What is meant by Hydraulic jump	3
	Q.2b	. Find the critical depth for a specific energy of 1.5 m in: (1) Rectangular channel of bottom width 2m (2)Triangular channel of side slope 1:1.5	3
CO1	Q.3	How do you classify open channels? Explain in detail. Also explain the velocity distribution in open channel.	6
CO2	Q.4	Write down the Manning"s formula for determining velocity of flow in an open channel.	3
CO2	Q.5a	Explain the concept of uniform flow with all the details	3
	Q.5b	Differentiate prismatic and non-prismatic channels	3
CO2	Q6	Explain the computation of uniform flow using	6

		Manning‟s and Chezy‟s method	

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	CIV502 HYDRAULIC ENGINEERING							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U5G5
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A+	10	2	2	20
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A+	10	2	2	20
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	B+	7	2	2	14
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A	9	2	2	18
5	A60215819005	Mr YASH YOGI	100	30	70	A	9	2	2	18
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	4	80.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : STRUCTURAL ENGINEERING
Course Code : CIV 503, Crédits : 03, Session :2021-22 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. P. Mahakavi, Mr. Sachin Tiwari

A. **Introduction:** The objective of this course is to understand the basic concepts of Limit state design and to obtain the knowledge of using Indian standard codes and special publication. It aims to equip the students to know the design concepts of all the structural members and learn economical design for materials saving and to know the design methodologies by limit state design for the beams, slabs, column and footings. The objective of this course is to learn the design of structural members such as prestress concrete members.

B. **Course Outcomes:** At the end of the course, students will be able to:
CIV503.1. Apply the usage of IS codes in design of reinforced concrete structures and Identify the types and design of beams and slabs
CIV503.2 Design the uniaxial and biaxial bending of column. and Design the simple footings and combined footings
CIV503.3 Develop skills in design of different types of steel connections
CIV503.4 Design the compression and tension member
CIV503.5 Design the prestress concrete elements

C. **Programme Outcomes:**
PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves	A	5%

	includingmedicalleaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module 1: Introduction Concepts of Energy Principles: (6 Hours)

Introduction- concepts of energy principles, safety, sustainable development in performance; what makes a structure; principles of stability, equilibrium; what is a structural engineer, role of engineer, architect, user, builder; what are the functions' what do the engineers design, first principles of process of design

Module 2:Different Types of Loads on Structures: (6 Hours)

Planning and Design Process; Materials, Loads, and Design Safety; Behaviour and Properties of Concrete and Steel; Wind and Earthquake Loads.

Module 3:Structural Design Criteria: (6 Hours)

Materials and Structural Design Criteria: Introduction to the analysis and design of structural systems. Analyses of determinate and indeterminate trusses, beams, and frames, and design philosophies for structural engineering. Laboratory experiments dealing with the analysis of determinate and indeterminate structures.

Module 4: Different Types of Structural Elements: (6 Hours)

Design of Structural Elements; Concrete Elements, Steel Elements, Structural Joints; Theories and concepts of both concrete and steel design and analysis both at the element and system levels. Approximate Analysis Methods as a Basis for Design; Design of AICTE Model Curriculum for Undergraduate degree in Civil Engineering (Engineering & Technology) 135 | Page Reinforced Concrete Beams for Flexure; Design of Reinforced Concrete Beams for Shear; Bond, Anchorage, and Serviceability; Reinforced Concrete Columns; Reinforced Concrete Slabs; Introduction to Steel Design; Tension Members and Connections; Bending Members; Structural Systems.

Module 5: Prestress Concrete Design: (6 Hours)

System Design Concepts; Special Topics that may be Covered as Part of the Design Project Discussions; Cable Structures; Prestressed Concrete Bridges; Constructability and Structural Control; Fire Protection.

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
- G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
- V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–West press, Reprint 2005.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Introduction- concepts of energy principles, safety	Lecture	CIV503.1	Mid Term-1, Quiz & End Sem Exam
2	sustainable development in performance	Lecture	CIV503.1	Mid Term-1, Quiz & End Sem Exam
3	what makes a structure; principles of stability	Lecture	CIV503.1	Mid Term-1, Quiz & End Sem Exam
4	architect, user, builder;	Lecture	CIV503.1	Mid Term-1, Quiz & End Sem Exam
5	*what are the functions'*	Lecture	CIV503.1	Mid Term-1, Quiz & End Sem Exam
6	equilibrium; what is a structural engineer, role of engineer	Lecture	CIV503.1	Mid Term-1, Quiz & End Sem Exam
7	what do the engineers design, first principles of process of design	Lecture	CIV503.1	Mid Term-1, Quiz & End Sem Exam
8	Planning and Design Process	Lecture	CIV503.2	Mid Term-1, Quiz & End Sem Exam
9	Materials, Loads, and Design Safety	Lecture	CIV503.2	Mid Term-1, Quiz & End Sem Exam
10	Behaviour and Properties of Concrete	Lecture	CIV503.2	Mid Term-1, Quiz & End Sem Exam
11	Behaviour and Properties of Concrete	Lecture	CIV503.2	Mid Term-1, Quiz & End Sem Exam
12	Behaviour and Properties of Steel	Lecture	CIV503.2	Mid Term-1, Quiz & End Sem Exam
13	Wind and Earthquake Loads.	Lecture	CIV503.2	Mid Term-1, Quiz & End Sem Exam
14	Wind and Earthquake Loads.	Lecture	CIV503.2	Mid Term-1, Quiz & End Sem Exam
15	Materials and Structural Design Criteria	Lecture	CIV503.3	Mid Term-1, Quiz & End Sem Exam
16	Introduction to the analysis and design of structural systems	Lecture	CIV503.3	Mid Term-1, Quiz & End Sem Exam

17	Analyses of determinate and indeterminate trusse	Lecture	CIV503.3	Mid Term-1, Quiz & End Sem Exam
18	beams, and frames, and design philosophies for structural engineering	Lecture	CIV503.3	Mid Term-1, Quiz & End Sem Exam
19	philosophies for structural engineering	Lecture	CIV503.3	Mid Term-1, Quiz & End Sem Exam
20	analysis of determinate structures	Lecture	CIV503.3	Mid Term-1, Quiz & End Sem Exam
21	Laboratory experiments dealing with the analysis of indeterminate structures	Lecture	CIV503.3	Assignment, Quiz & End Sem Exam
22	Design of Structural Elements; Concrete Elements, Steel Elements, Structural Joints;	Lecture	CIV503.4	Assignment, Quiz & End Sem Exam
23	Theories and concepts of both concrete and steel design and analysis both at the element and system levels	Lecture	CIV503.4	Assignment, Quiz & End Sem Exam
24	Approximate Analysis Methods as a Basis for Design	Lecture	CIV503.4	Assignment, Quiz & End Sem Exam
25	Reinforced Concrete Beams for Flexure; Design of Reinforced Concrete Beams for Shear; Bond, Anchorage, and Serviceability	Lecture	CIV503.4	Assignment, Quiz & End Sem Exam
26	Reinforced Concrete Columns; Reinforced Concrete Slabs; Introduction to Steel Design	Lecture	CIV503.4	Assignment, Quiz & End Sem Exam
27	Tension Members and Connections; Bending Members;	Lecture	CIV503.4	Assignment, Quiz & End Sem Exam
28	Structural Systems.	Lecture	CIV503.4	Assignment, Quiz & End Sem Exam
29	System Design Concepts;	Lecture	CIV503.5	Assignment, Quiz & End Sem Exam
30	Special Topics that may be Covered as Part of the Design Project Discussions;	Lecture	CIV503.5	Assignment, Quiz & End Sem Exam
31	Cable Structures;	Lecture	CIV503.5	Assignment, Quiz & End Sem Exam
32	Prestressed Concrete Bridges;	Lecture	CIV503.5	Assignment, Quiz & End Sem Exam

33	Constructability	Lecture	CIV503.5	Assignment, Quiz & End Sem Exam
34	Structural Control;	Lecture	CIV503.5	Assignment, Quiz & End Sem Exam
35	Fire Protection.	Lecture	CIV503.5	Assignment, Quiz & End Sem Exam
36	System Design Concepts;	Lecture	CIV503.5	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV503.1	Apply the usage of IS codes in design of reinforced concrete structures and Identify the types and design of beams and slabs	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
CIV503.2	Design the uniaxial and biaxial bending of column. and Design the simple footings and combined footings	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
CIV503.3	Develop skills in design of different types of steel connections	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
CIV503.4	Design the compression and tension member	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**

CIV503.5	Design the prestress concrete elements	3	3	2	3	3	2	2	-	3	2	3	3	**1**	**2**	**3**

Sample Question Paper

<table>
<tr><td colspan="7">Amity School of Engineering and Technology
Department of Civil Engineering
I MID-SEMESTER (SEM–V) 2021-22</td></tr>
<tr><td colspan="7">Class: B.Tech.(CE) V Semester</td></tr>
<tr><td colspan="2">Subject Name:
CIV503 Structural Engineering</td><td colspan="3">Time: 2 Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3</td><td>Q.4</td><td>Q.2,5,6</td><td></td><td></td></tr>
<tr><td colspan="7">Student will be able to
CO1: Apply the usage of IS codes in design of reinforced concrete structures and Identify the types and design of beams and slabs
CO2: Design the uniaxial and biaxial bending of column. and Design the simple footings and combined footings</td></tr>
</table>

CO Map	Question No.	Question	Marks
CO1	Q.1	Write short note on partial safety factor.	3
CO1	Q.2a	What are the various methods of design of reinforced concrete structural elements? Explain any one in detail.	3
	Q.2b	Define characteristic strength and design strength using suitable diagram.	3
CO1	Q.3	Describe the following in detail: (a) Steps involved in the Indian Standard recommendations for mix design (b) Behaviour of concrete under uniaxial compression. (c) Modulus of elasticity and Poisson's Ratio	6
CO2	Q.4	Write down the equation for the degree of static indeterminacy of the pin-jointed frames, Explaining the notations used..	3

CO2	Q.5a	Briefly mention the two types of matrix methods of analysis of indeterminate structure	3
	Q.5b	How would you define 'durable concrete'? Discuss the ways of ensuring durability?	3
CO2	Q6	What are the various code recommendations for the following in Limit state method: (a) Partial Safety Factors for Loads (b) Partial Safety Factors for Materials (c) Characteristic Strengths and Loads (d) Design Stress-Strain Curve for Concrete	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	CIV503 STRUCTURAL ENGINEERING Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U6G6
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A+	10	3	3	30
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A+	10	3	3	30
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	A+	10	3	3	30
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A+	10	3	3	30
5	A60215819005	Mr YASH YOGI	100	30	70	A+	10	3	3	30
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	5	100.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : GEOTECHNICAL ENGINEERING
Course Code : CIV 504, Crédits : 02, Session :2021-22 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Imran Ahmad Khan

A. Introduction: The objective of this course is to impart the fundamental concepts of soil mechanics and understand the bearing capacity and to understand the concept of compaction and consolidation of soils. It aims to understand the design aspects of foundation and to evaluate the stress developed in the soil medium.

B. Course Outcomes: At the end of the course, students will be able to:

CIV504.1*Compare the various engineering and index properties of soil.*

CIV504.2 *Explain the hydraulic conductivity of the soil and seepage actions*

CIV504.3. E*xamine the stress distribution at any point below the ground level.*

CIV504.4 *Evaluate the shear strength of the soil using Mohr Soil.*

CIV504.5 *Discuss the soil investigation techniques for advanced explorations and to conduct the field test like SPT & PLT.*

CIV504.6 *Evaluate the safe bearing capacity of shallow foundations*

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module 1:Introduction–Types of Soils, Their Formation and Deposition: (3 Hours)

Introduction–Types of soils, their formation and deposition, Definitions: soil mechanics, soil engineering, rock mechanics, geotechnical engineering. Scope of soil engineering. Comparison and difference between soil and rock. Basic Definitions and Relationships-Soil as three-phase system in terms of weight, volume, voids ratio. porosity. Definitions: moisture content, unit weights, degree of saturation, voids ratio, porosity, specific gravity, mass specific gravity.

Module 2:Different Soil Properties and Relations: (4 Hours)

Plasticity Characteristics of Soil - Introduction to definitions of: plasticity of soil, consistency limits-liquid limit, plastic limit, shrinkage limit, plasticity, liquidity and consistency indices, flow & toughness indices, definitions of activity and sensitivity. Determination of: liquid limit, plastic limit and shrinkage limit. Use of consistency limits. Classification of Soils-Introduction of soil classification: particle size classification, textural classification, unified soil classification system, Indian standard soil classification system.

Module 3:Determination of Coefficient of Permeability: (4 Hours)

Permeability of Soil - Darcy's law, validity of Darcy's law. Determination of coefficient of permeability: Laboratory method: constant-head method, falling-head method. Field method: pumping- in test, pumping- out test. Permeability aspects: permeability of stratified soils, factors affecting permeability of soil. Seepage Analysis- Introduction, stream and potential functions, characteristics of flow nets.

Module 4: Stresses Coming on Soil Specimen: (4 Hours)

Effective Stress Principle - Introduction, effective stress principle, nature of effective stress, effect of water table. Fluctuations of effective stress, effective stress in soils saturated by capillary action, seepage pressure, quick sand condition.

Module 5:Compaction of Soil: (2 Hours)

Compaction of Soil-Introduction, theory of compaction, laboratory determination of optimum moisture content and maximum dry density. Compaction in field, compaction specifications and field control.

Module 6: Consolidation of Soil: (3 Hours)

Consolidation of Soil - Introduction, comparison between compaction and consolidation, initial, primary & secondary consolidation, spring analogy for primary consolidation, interpretation of consolidation test results, Terzaghi's theory of consolidation, final settlement of soil deposits, computation of consolidation settlement and secondary consolidation. Introduction, stresses due to point load, line load, strip load, uniformly loaded circular area, rectangular loaded area. Influence factors, Isobars, Boussinesq's equation, Newmark's Influence Chart.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Soil Mechanics by Craig R.F., Chapman & Hall
- Fundamentals of Soil Engineering by Taylor, John Wiley & Sons
- An Introduction to Geotechnical Engineering, by Holtz R.D. and Kovacs, W.D., Prentice Hall, NJ 4. Principles of Geotechnical Engineering, by Braja M. Das, Cengage Learning
- Principles of Foundation Engineering, by Braja M. Das, Cengage Learning

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Introduction–Types of soils, their formation and deposition	Lecture	CIV504.1	Mid Term-1, Quiz & End Sem Exam
2	Definitions: soil mechanics, soil engineering, rock mechanics, geotechnical engineering.	Lecture	CIV504.1	Mid Term-1, Quiz & End Sem Exam
3	Scope of soil engineering. Comparison and difference between soil and rock	Lecture	CIV504.1	Mid Term-1, Quiz & End Sem Exam
4	*Basic Definitions and Relationships-Soil as three-phase system in terms of weight, volume, voids ratio*	Lecture	CIV504.1	Mid Term-1, Quiz & End Sem Exam
5	Definitions: moisture content, unit weights, degree of saturation, voids ratio, porosity, specific gravity, mass specific gravity.	Lecture	CIV504.1	Mid Term-1, Quiz & End Sem Exam
6	Plasticity Characteristics of Soil - Introduction to definitions of: plasticity of soil,	Lecture	CIV504.2	Mid Term-1, Quiz & End Sem Exam
7	consistency limits-liquid limit, plastic limit, shrinkage limit, plasticity, liquidity and consistency indices, flow & toughness indices	Lecture	CIV504.2	Mid Term-1, Quiz & End Sem Exam
8	definitions of activity and sensitivity. Determination of: liquid limit, plastic limit and shrinkage limit. Use of consistency units	Lecture	CIV504.2	Mid Term-1, Quiz & End Sem Exam
9	Classification of Soils-Introduction of soil classification: particle size classification, textural classification, unified soil	Lecture	CIV504.2	Mid Term-1, Quiz & End Sem Exam

	classification system, Indian standard soil classification system.			
10	Permeability of Soil - Darcy’s law, validity of Darcy’s law	Lecture	CIV504.3	Mid Term-1, Quiz & End Sem Exam
11	Determination of coefficient of permeability: Laboratory method: constant-head method, falling-head method	Lecture	CIV504.3	Mid Term-1, Quiz & End Sem Exam
12	Field method: pumping- in test, pumping- out test. Permeability aspects: permeability of stratified soils, factors affecting permeability of soil	Lecture	CIV504.3	Mid Term-1, Quiz & End Sem Exam
13	Seepage Analysis- Introduction, stream and potential functions, characteristics of flow nets.	Lecture	CIV504.3	Mid Term-1, Quiz & End Sem Exam
14	Effective Stress Principle -	Lecture	CIV504.4	Mid Term-1, Quiz & End Sem Exam
15	Introduction, effective stress principle, nature of effective stress	Lecture	CIV504.4	Mid Term-1, Quiz & End Sem Exam
16	effect of water table. Fluctuations of effective stress	Lecture	CIV504.4	Mid Term-1, Quiz & End Sem Exam
17	effective stress in soils saturated by capillary action	Lecture	CIV504.4	Mid Term-1, Quiz & End Sem Exam
18	seepage pressure, quick sand condition.	Lecture	CIV504.4	Mid Term-1, Quiz & End Sem Exam
19	Compaction of Soil- Introduction, theory of compaction	Lecture	CIV504.5	Mid Term-1, Quiz & End Sem Exam
20	laboratory determination of optimum moisture content ; maximum dry density. Compaction in field,	Lecture	CIV504.5	Mid Term-1, Quiz & End Sem Exam
21	compaction specifications and field control	Lecture	CIV504.5	Assignment, Quiz & End Sem Exam
22	Consolidation of Soil - Introduction, comparison between compaction and consolidation, initial, primary & secondary consolidation, spring analogy for primary	Lecture	CIV504.6	Assignment, Quiz & End Sem Exam

	consolidation, interpretation of consolidation test results,			
23	Terzaghi’s theory of consolidation, final settlement of soil deposits, computation of consolidation settlement and secondary consolidation. Introduction, stresses due to point load, line load, strip load, uniformly loaded circular area, rectangular loaded area	Lecture	CIV504.6	Assignment, Quiz & End Sem Exam
24	Influence factors, Isobars, Boussinesq’s equation, Newmark’s Influence Chart.	Lecture	CIV504.6	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV504.1	Compare the various engineering and index properties of soil.	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
CIV504.2	Explain the hydraulic conductivity of the soil and seepage actions	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
CIV504.3.	**Examine the stress distribution at any point below the ground level.**	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**

CIV504.4	**Evaluate the shear strength of the soil using Mohr Soil.**	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**
CIV504.5	**Discuss the soil investigation techniques for advanced explorations and to conduct the field test like SPT & PLT.**	3	3	2	3	3	2	2	-	3	2	3	3	**1**	**2**	**3**
CIV504.6	Evaluate the safe bearing capacity of shallow foundations	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**

<u>Sample Question Paper</u>

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<tr><td colspan="7">Amity School of Engineering and Technology
Department of Civil Engineering
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<tr><td colspan="7">Class: B.Tech.(CE) V Semester</td></tr>
<tr><td colspan="2">Subject Name:
Civ504 Geotechnical Engineering</td><td colspan="3">Time: 2 Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3</td><td>Q.4</td><td>Q.2,5,6</td><td></td><td></td></tr>
<tr><td colspan="7">Student will be able to
CO1: Compare the various engineering and index properties of soil.
CO2: Explain the hydraulic conductivity of the soil and seepage actions</td></tr>
</table>

CO Map	Question No.	Question	Marks
CO1	Q.1	Explain: Chemical weathering. Explain: Physical weathering	3
CO1	Q.2a	What do you mean by Consistency limits? What is Particle size Distribution of soil?	3
	Q.2b	What are the basic requirements of Soil Classification?	3
CO1	Q.3	Explain with neat sketches: 1. Total head, 2. Hydraulic head, 3. Hydraulic Gradient, 4. Seepage, 5.	6

		Seepage Velocity	
CO2	Q.4	What do you mean by Quick sand condition?	3
CO2	Q.5a	Explain in detail: Piping	3
	Q.5b	Explain In detail: Darcy's Law.	3
CO2	Q6	What do you mean by Placement water Content? Describe in detail. Differentiate between Standard Proctor and Modified Proctor.	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	CIV504 GEOTECHNICAL ENGINEERING							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U7G7
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A+	10	2	2	20
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A+	10	2	2	20
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	A+	10	2	2	20
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A+	10	2	2	20
5	A60215819005	Mr YASH YOGI	100	30	70	A+	10	2	2	20
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	5	100.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : HYDROLOGY & WATER RESOURCES ENGINEERING
Course Code : CIV 505 Crédits : 03, Session :2021-22 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Mr. Sachin Tiwari

A. Introduction: The objective of this course is *to motivate the students to identify, formulate, solve the complex problem to manage the water resource related issues and to prepare the students to synthesize data and technical concepts to apply in water resources engineering. It aims to develop the ability of the students to conduct appropriate experiments, analyse and interpret data and use engineering judgement to draw conclusions in water resources problems.*

B. Course Outcomes: At the end of the course, students will be able to:

CIV505.1. Identify the various components of hydrological cycle and the spatial and temporal variation of rainfall.
CIV505.2. Determine the different methods and hydrological models to estimate the stream flow.
CIV505.3. Examine the different techniques to calculate the probable maximum flood based on different returned period.
CIV505.4. Evaluate the basic aquifer parameters and groundwater resources for different hydro geological boundary conditions.
CIV505.5. Understand the different methods of irrigation and find the optimum methods of irrigation for judicious use of water resources.

C. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance	A	5%

	isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module 1:Introduction to Hydrology: (5 Hours)
Introduction - hydrologic cycle, water-budget equation, history of hydrology, world water balance, applications in engineering, sources of data**.**

Module 2:Different Forms of Precipitation: (5 Hours)
Precipitation - forms of precipitation, characteristics of precipitation in India, measurement of precipitation, rain gauge network, mean precipitation over an area, deptharea-duration relationships, maximum intensity/depth-duration-frequency relationship, Probable Maximum Precipitation (PMP), rainfall data in India.

Module 3:Different Methods for Rainfall Calculation: (7 Hours)
Abstractions from precipitation - evaporation process, evaporimeters, analytical methods of evaporation estimation, reservoir evaporation and methods for its reduction, evapotranspiration, measurement of evapotranspiration, evapotranspiration equations, potential evapotranspiration over India, actual evapotranspiration, interception, depression storage, infiltration, infiltration capacity, measurement of infiltration, modelling infiltration capacity, classification of infiltration capacities, infiltration indices.

Module 4: SCS-CN Method of Estimating Runoff: (6 Hours)
Runoff - runoff volume, SCS-CN method of estimating runoff volume, flow duration curve, flow-mass curve, hydrograph, factors affecting runoff hydrograph, components of hydrograph, base flow separation, effective rainfall, unit hydrograph surface water resources of India, environmental flows.

Module 5:Ground Water and Well Hydrology: (7 Hours)
Ground water and well hydrology - forms of subsurface water, saturated formation, aquifer properties, geologic formations of aquifers, well hydraulics: steady state flow in wells, equilibrium equations for confined and unconfined aquifers, aquifer tests. Design of channels- rigid boundary channels, alluvial channels, Kennedy’s and Lacey’s theory of regime channels. Water logging: causes, effects, consumptive use, irrigation requirement, frequency of irrigation; Methods of applying water to the fields: surface, sub-surface, sprinkler and trickle / drip irrigation.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- K Subramanya, Engineering Hydrology, Mc-Graw Hill.
- K N Muthreja, Applied Hydrology, Tata Mc-Graw Hill.
- K Subramanya, Water Resources Engineering through Objective Questions, Tata McGraw Hill.
- G L Asawa, Irrigation Engineering, Wiley Eastern

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction - hydrologic cycle,	Lecture	CIV505.1	Mid Term-1, Quiz & End Sem Exam
2	water-budget equation,	Lecture	CIV505.1	Mid Term-1, Quiz & End Sem Exam
3	history of hydrology,	Lecture	CIV505.1	Mid Term-1, Quiz & End Sem Exam
4	*world water balance,*	Lecture	CIV505.1	Mid Term-1, Quiz & End Sem Exam
5	applications in engineering, sources of data.	Lecture	CIV505.1	Mid Term-1, Quiz & End Sem Exam
6	Precipitation - forms of precipitation, characteristics of precipitation in India	Lecture	CIV505.1	Mid Term-1, Quiz & End Sem Exam
7	measurement of precipitation	Lecture	CIV505.1	Mid Term-1, Quiz & End Sem Exam
8	rain gauge network, mean precipitation over an area	Lecture	CIV505.2	Mid Term-1, Quiz & End Sem Exam
9	deptharea-duration relationships	Lecture	CIV505.2	Mid Term-1, Quiz & End Sem Exam
10	maximum intensity/depth	Lecture	CIV505.2	Mid Term-1, Quiz & End Sem Exam
11	duration-frequency relationship	Lecture	CIV505.2	Mid Term-1, Quiz & End Sem Exam
12	Probable Maximum Precipitation (PMP),	Lecture	CIV505.2	Mid Term-1, Quiz & End Sem Exam
13	rainfall data in India.	Lecture	CIV505.2	Mid Term-1, Quiz & End Sem Exam
14	Abstractions from precipitation - evaporation process	Lecture	CIV505.2	Mid Term-1, Quiz & End Sem Exam
15	evaporimeters, analytical methods of evaporation estimation,	Lecture	CIV505.3	Mid Term-1, Quiz & End Sem Exam
16	Reservoir evaporation and methods for its reduction	Lecture	CIV505.3	Mid Term-1, Quiz & End Sem Exam
17	evapotranspiration, measurement of evapotranspiration, evapotranspiration	Lecture	CIV505.3	Mid Term-1, Quiz & End Sem Exam

18	potential evapotranspiration over India,	Lecture	CIV505.3	Mid Term-1, Quiz & End Sem Exam
19	actual evapotranspiration, interception	Lecture	CIV505.3	Mid Term-1, Quiz & End Sem Exam
20	depression storage, infiltration, infiltration capacity, measurement of infiltration,	Lecture	CIV505.3	Mid Term-1, Quiz & End Sem Exam
21	modelling infiltration capacity, classification of infiltration capacities, infiltration indices	Lecture	CIV505.3	Assignment, Quiz & End Sem Exam
22	Runoff - runoff volume,	Lecture	CIV505.4	Assignment, Quiz & End Sem Exam
23	SCS-CN method of estimating runoff volume	Lecture	CIV505.4	Assignment, Quiz & End Sem Exam
24	flow duration curve, flow-mass curve	Lecture	CIV505.4	Assignment, Quiz & End Sem Exam
25	hydrograph, factors affecting runoff hydrograph	Lecture	CIV505.4	Assignment, Quiz & End Sem Exam
26	components of hydrograph, base flow separation	Lecture	CIV505.4	Assignment, Quiz & End Sem Exam
27	effective rainfall,	Lecture	CIV505.4	Assignment, Quiz & End Sem Exam
28	unit hydrograph surface water resources of India	Lecture	CIV505.4	Assignment, Quiz & End Sem Exam
29	Ground water and well hydrology - forms of subsurface water	Lecture	CIV505.5	Assignment, Quiz & End Sem Exam
30	saturated formation, aquifer properties, geologic formations of aquifers, well hydraulics: steady state flow in wells,	Lecture	CIV505.5	Assignment, Quiz & End Sem Exam
31	equilibrium equations for confined and unconfined aquifers, aquifer tests. Design of channels- rigid boundary channels, alluvial channels	Lecture	CIV505.5	Assignment, Quiz & End Sem Exam
32	Kennedy’s and Lacey’s theory of regime channels. Water logging: causes, effects, consumptive use, irrigation requirement,	Lecture	CIV505.5	Assignment, Quiz & End Sem Exam
33	frequency of irrigation; Methods of applying water	Lecture	CIV505.5	Assignment, Quiz & End Sem Exam

	to the fields			
34	surface, sub-surface	Lecture	CIV505.5	Assignment, Quiz & End Sem Exam
35	sprinkler and trickle / drip irrigation.	Lecture	CIV505.5	Assignment, Quiz & End Sem Exam
36	sprinkler and trickle / drip irrigation.	Lecture	CIV505.5	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV505.1.	Identify the various components of hydrological cycle and the spatial and temporal variation of rainfall.	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
CIV505.2.	Determine the different methods and hydrological models to estimate the stream flow.	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
CIV505.3.	Examine the different techniques to calculate the probable maximum flood based on different returned period.	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
CIV505.4	Evaluate the basic aquifer parameters and groundwater resources for different hydro geological	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**

	boundary conditions.															
CIV505.5.	Understand the different methods of irrigation and find the optimum methods of irrigation for judicious use of water resources.	3	3	2	3	3	2	2	-	3	2	3	3	**1**	**2**	**3**

Sample Question Paper

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–V) 2021-22						
Class: B.Tech.(CE) V Semester						
Subject Name: CIV505 Hydrology & Water Resources Engineering		Time: 2 Hrs		Max.Marks:30		
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		
Student will be able to CO1: . Identify the various components of hydrological cycle and the spatial and temporal variation of rainfall. CO2: Determine the different methods and hydrological models to estimate the stream flow.						

CO Map	Question No.	Question	Marks
CO1	Q.1	Distinguish between continental air mass and maritime air mass?	3
CO1	Q.2a	What are the basic data required for hydrological studies?	3
	Q.2b	What is meant by Probable Maximum Precipitation (PMP) over a basin?	3
CO1	Q.3	Describe the working principle of a non-recording type rain gauge with neat sketch, Mentioning its advantages and disadvantages.	6
CO2	Q.4	State Darcy‟s law	3

CO2	Q.5a	Distinguish between steam flow and runoff	3
	Q.5b	Why Rainfall-Runoff relationship is necessary? Justify	3
CO2	Q6	Two lake P-with surface evaporation 32.4m and Q -with surface evaporation 28.4m 1400m away are separated by land lying on an impervious layer with an elevation of 24.4m.determine the flow between the lakes taking the permeability as 34.4 m/day. Neglect the infiltration loss.	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	CIV505 HYDROLOGY & WATER RESOURCES ENGINEERING							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U15G15
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A+	10	3	3	30
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A+	10	3	3	30
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	A+	10	3	3	30
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A+	10	3	3	30
5	A60215819005	Mr YASH YOGI	100	30	70	A+	10	3	3	30

Total No. of Students	=	5		
Total No. of Students	>60 % marks	5	100.00	%
Attainment Level			Level 3	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : Environmental Engineering – I
Course Code : CIV 506, Crédits : 03, Session : 2021-22 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : DDr. Mohan Kantharia, Dr. Imran Ahmad Khan,

A. Introduction: The objective of this course is to teach students the basic principles and concepts of unit operations and processes involved in water and wastewater treatment and to develop a student's skill in the basic design of unit operations and processes involved in water and wastewater treatment. It aims to develop a student's skill in evaluating the performance of water and wastewater treatment plants and to teach students the various methods of sludge management.

B. Course Outcomes: At the end of the course, students will be able to:

CIV506.1. Examine the type and size of reactor required for various unit operations and processes involved in water and wastewater treatment

CIV506.2. Able to design individual unit operation or process appropriate to the situation by applying physical, chemical, biological and engineering principles.

CIV506.3. Able to identify the type of unit operations and processes involved in water and wastewater treatment plants based on the water quality

CIV506.4. Prepare the layout of water and wastewater treatment plants and evaluate the water and wastewater treatment plants

CIV506.5. Investigate the performance of various unit operations and processes to meet the desired health and environment related goals.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module 1:Basic water Qualities: (6 Hours)

Water: -Sources of Water and quality issues, water quality requirement for different beneficial uses, Water quality standards, water quality indices, water safety plans, Water Supply systems, Need for planned water supply schemes, Water demand industrial and agricultural water requirements, Components of water supply system; Transmission of water, Distribution system, Various valves used in W/S systems, service reservoirs and design. Water Treatment: aeration, sedimentation, coagulation flocculation, filtration, disinfection, advanced treatments like adsorption, ion exchange, membrane processes.

Module 2:Sewage and Its Disposal: (6 Hours)

Sewage- Domestic and Storm water, Quantity of Sewage, Sewage flow variations. Conveyance of sewage- Sewers, shapes design parameters, operation and maintenance of sewers, Sewage pumping; Sewerage, Sewer appurtenances, Design of sewerage systems. Small bore systems, Storm Water- Quantification and design of Storm water; Sewage and Sullage, Pollution due to improper disposal of sewage, National River cleaning plans.

Module 3: Air Quality and Pollutants: (6 Hours)

Air - Composition and properties of air, Quantification of air pollutants, Monitoring of air pollutants, Air pollution- Occupational hazards, Urban air pollution automobile pollution, Chemistry of combustion, Automobile engines, quality of fuel, operating conditions and interrelationship. Air quality standards, Control measures for Air pollution, construction and limitations

Module 4:Solid Waste Management: (4 Hours)

Noise- Basic concept, measurement and various control methods. Government authorities and their roles in water supply, sewerage disposal. Solid waste management and monitoring/control of environmental pollution.

Module 5: Physical and Methods for Waste Management: (5 Hours)

Solid waste management-Municipal solid waste, Composition and various chemical and physical parameters of MSW, MSW management: Collection, transport, treatment and disposal of MSW. Special MSW: waste from commercial establishments and other urban areas, solid waste from construction activities, biomedical wastes, Effects of solid waste on environment: effects on air, soil, water surface and ground health hazards. Disposal of solid waste-segregation, reduction at source, recovery and recycle. Disposal methods Integrated solid waste management. Hazardous waste: Types and nature of hazardous waste as per the HW Schedules of regulating authorities.

Module 6: Home Plumbing Systems for Water Supply: (3 Hours)

Building Plumbing-Introduction to various types of home plumbing systems for water supply and waste water disposal, high rise building plumbing, Pressure reducing valves, Break pressure tanks, Storage tanks, Building drainage for high rise buildings, various kinds of fixtures and fittings used.

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

Introduction to Environmental Engineering and Science by Gilbert Masters, Prentice Hall, New Jersey.
Introduction to Environmental Engineering by P. Aarne Vesilind, Susan M. Morgan, Thompson /Brooks/Cole; Second Edition 2008.
Peavy, H.s, Rowe, D.R, Tchobanoglous, G. Environmental Engineering, Mc-Graw - Hill International Editions, New York 1985.

I. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	Water: -Sources of Water and quality issues, water quality requirement for different beneficial uses,	Lecture	CIV506.1	Mid Term-1, Quiz & End Sem Exam
2	Water quality standards, water quality indices, water safety plans, Water Supply systems, Need for planned water supply schemes	Lecture	CIV506.1	Mid Term-1, Quiz & End Sem Exam
3	Water demand industrial and agricultural water requirements, Components of water supply system; Transmission of water	Lecture	CIV506.1	Mid Term-1, Quiz & End Sem Exam
4	*Distribution system, Various valves used in W/S systems, service reservoirs and design*	Lecture	CIV506.1	Mid Term-1, Quiz & End Sem Exam
5	Water Treatment: aeration, sedimentation, coagulation flocculation	Lecture	CIV506.1	Mid Term-1, Quiz & End Sem Exam
6	filtration, disinfection, advanced treatments like adsorption, ion exchange, membrane processes.	Lecture	CIV506.1	Mid Term-1, Quiz & End Sem Exam
7	Sewage- Domestic and Storm water, Quantity of Sewage, Sewage flow variations	Lecture	CIV506.2	Mid Term-1, Quiz & End Sem Exam
8	Conveyance of sewage- Sewers, shapes design parameters, operation and maintenance of sewers	Lecture	CIV506.2	Mid Term-1, Quiz & End Sem Exam
9	Sewage pumping; Sewerage, Sewer appurtenances, Design of	Lecture	CIV506.2	Mid Term-1, Quiz & End Sem Exam

	sewerage systems			
10	Small bore systems, Storm Water- Quantification and design of Storm water	Lecture	CIV506.2	Mid Term-1, Quiz & End Sem Exam
11	Sewage and Sullage, Pollution due to improper disposal of sewage	Lecture	CIV506.2	Mid Term-1, Quiz & End Sem Exam
12	National River cleaning plans	Lecture	CIV506.2	Mid Term-1, Quiz & End Sem Exam
13	Air - Composition and properties of air, Quantification of air pollutants	Lecture	CIV506.3	Mid Term-1, Quiz & End Sem Exam
14	Monitoring of air pollutants, Air pollution- Occupational hazards, Urban air pollution automobile pollution	Lecture	CIV506.3	Mid Term-1, Quiz & End Sem Exam
15	Chemistry of combustion, Automobile engines, quality of fuel, operating conditions and interrelationship	Lecture	CIV506.3	Mid Term-1, Quiz & End Sem Exam
16	Air quality standards, Control measures for Air pollution, construction and limitations	Lecture	CIV506.3	Mid Term-1, Quiz & End Sem Exam
17	Noise- Basic concept, measurement and various control methods.	Lecture	CIV506.4	Mid Term-1, Quiz & End Sem Exam
18	Government authorities and their roles in water supply, sewerage disposal	Lecture	CIV506.4	Mid Term-1, Quiz & End Sem Exam
19	Solid waste management and monitoring/control of environmental pollution.	Lecture	CIV506.4	Mid Term-1, Quiz & End Sem Exam
20	Solid waste management- Municipal solid waste,	Lecture	CIV506.5	Mid Term-1, Quiz & End Sem Exam
21	Composition and various chemical and physical parameters of MSW, MSW management:	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
22	Collection, transport, treatment and disposal of MSW.	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
23	Special MSW: waste from commercial establishments and other urban areas	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
24	solid waste from construction activities	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
25	biomedical wastes,	Lecture	CIV506.5	Assignment, Quiz

				& End Sem Exam
26	Effects of solid waste on environment: effects on air, soil,	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
27	water surface and ground health hazards	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
28	Disposal of solid waste-segregation	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
29	reduction at source, recovery and recycle	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
30	Disposal methods Integrated solid waste management	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
31	Hazardous waste	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
32	Types and nature of hazardous waste as per the HW Schedules of regulating authorities.	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
33	Building Plumbing-Introduction to various types of home plumbing systems for water supply and waste water disposal,	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
34	high rise building plumbing, Pressure reducing valves, Break pressure tanks,	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
35	Storage tanks, Building drainage for high rise buildings	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
36	various kinds of fixtures and fittings used	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV506.1.	Examine the type and size of reactor required for various unit operations and processes involved	3	2	3	1	2	-	1	-	3	2	3	3	**3**	**2**	**1**

	in water and wastewater treatment															
CIV506.2.	Able to design individual unit operation or process appropriate to the situation by applying physical, chemical, biological and engineering principles.	3	3	2	2	3	2	2	-	3	2	3	3	**3**	**1**	**2**
CIV506.3.	Able to identify the type of unit operations and processes involved in water and wastewater treatment plants based on the water quality	3	3	2	2	3	-	1	2	-	2	3	3	**2**	**2**	**1**
CIV506.4.	Prepare the layout of water and wastewater treatment plants and evaluate the water and wastewater treatment plants	3	3	2	1	1	2	1	-	1	2	3	3	**3**	**2**	**1**
CIV506.5.	Investigate the performance of various unit operations and processes to meet the desired health and environment related goals	3	3	2	3	3	2	2	-	2	2	3	3	**3**	**2**	**3**

<u>Sample Question Paper</u>

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–V) 2021-22						
Class: B.Tech.(CE) V Semester						
Subject Name: CIV506 Environmental Engineering - I		Time: 2 Hrs			Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: Examine the type and size of reactor required for various unit operations and processes involved in water and wastewater treatment

CO2: Able to design individual unit operation or process appropriate to the situation by applying physical, chemical, biological and engineering principles.

CO Map	Question No.	Question	Marks
CO1	Q.1	What is Design period? List any two factors influencing it?	3
CO1	Q.2a	State any two water quality parameters that can be analysed by titrometric method?	3
	Q.2b	State the purpose of carrying out water quality characterization?	3
CO1	Q.3	Explain the different methods of forecasting the future population of a town clearly bringing out their relative merits?	6
CO2	Q.4	Distinguish between shallow well and deep well.	3
CO2	Q.5a	What is Sustainable Development?	3
	Q.5b	Distinguish between confined and unconfined aquifier?	3
CO2	Q6	Explain the various sources of surface and groundwater.	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	CIV506 ENVIRONMENTAL ENGINEERING – I							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U8G8
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A+	10	3	3	30
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A	9	3	3	27
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	A-	8	3	3	24
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A+	10	3	3	30
5	A60215819005	Mr YASH YOGI	100	30	70	B+	7	3	3	21

Total No. of Students	=	5		
Total No. of Students	>60% marks	4	80.00	%
Attainment Level			Level 3	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : TRANSPORTATION ENGINEERING
Course Code : CIV 507, Crédits : 02, Session :2021-22 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Ripunjoy Gogoi, Dr. P. Mahakavi

A. Introduction: The objective of this course is to expose the students with various transportation modes and their advantages and disadvantages and to facilitate students to decide highway alignment and design highway geometry. It aims to enable students to select suitable materials for highway pavements and design the pavement and to explain students with various components of a railway track.

B. Course Outcomes: At the end of the course, students will be able to:

CIV507.1. Classify basic design of highway geometry according to the design specifications.

CIV507.2. Design a flexible pavement using IRC method and Describe various components of railways and their functions.

CIV507.3. Design a railway geometry according to the design specifications.

CIV507.4. Classify various components of an airport and identify the alignment and the required length of a runway.

CIV507.5. Identify various components of a harbor and their functions.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module 1:Highway Planning: (4 Hours)
Highway development and planning-Classification of roads, road development in India, Current road projects in India; highway alignment and project preparation.

Module 2:Geometric Properties of Highway: (4 Hours)
Geometric design of highways-: Introduction; highway cross section elements; sight distance, design of horizontal alignment; design of vertical alignment; design of intersections, problems

Module 3: Traffic Engineering & Control: (4 Hours)
Traffic engineering & control- Traffic Characteristics, traffic engineering studies, traffic flow and capacity, traffic regulation and control; design of road intersections; design of parking facilities; highway lighting; problems

Module 4:Pavement Design: (4 Hours)
Pavement materials- Materials used in Highway Construction- Soils, Stone aggregates, bituminous binders, bituminous paving mixes; Portland cement and cement concrete: desirable properties, tests, requirements for different types of pavements. Problems

Module 5:Flexible and IRC Guidelines: (4 Hours)
Design of pavements- Introduction; flexible pavements, factors affecting design and performance; stresses in flexible pavements; design of flexible pavements as per IRC; rigid pavements-components and functions; factors affecting design and performance of CC pavements; stresses in rigid pavements; design of concrete pavements as per IRC; problems.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Khanna, S.K., Justo, C.E.G and Veeraragavan, A, 'Highway Engineering', Revised 10th Edition, Nem Chand & Bros, 2017
- Kadiyalai, L.R., ' Traffic Engineering and Transport Planning', Khanna Publishers.
- Partha Chakraborty, ' Principles Of Transportation Engineering, PHI Learning,

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Highway development and planning	Lecture	CIV507.1	Mid Term-1, Quiz & End Sem Exam
2	Classification of roads, road development in India,	Lecture	CIV507.1	Mid Term-1, Quiz & End Sem Exam
3	Current road projects in India	Lecture	CIV507.1	Mid Term-1, Quiz & End Sem Exam
4	*highway alignment and project preparation*	Lecture	CIV507.1	Mid Term-1, Quiz & End Sem Exam
5	Geometric design of highways	Lecture	CIV507.2	Mid Term-1, Quiz & End Sem Exam
6	Introduction; highway cross section elements	Lecture	CIV507.2	Mid Term-1, Quiz & End Sem Exam
7	sight distance, design of horizontal alignment	Lecture	CIV507.2	Mid Term-1, Quiz & End Sem Exam
8	design of vertical alignment	Lecture	CIV507.2	Mid Term-1, Quiz & End Sem Exam
9	; design of intersections, problems	Lecture	CIV507.2	Mid Term-1, Quiz & End Sem Exam
10	Traffic engineering & control	Lecture	CIV507.3	Mid Term-1, Quiz & End Sem Exam
11	Traffic Characteristics, traffic engineering studies	Lecture	CIV507.3	Mid Term-1, Quiz & End Sem Exam
12	traffic flow and capacity	Lecture	CIV507.3	Mid Term-1, Quiz & End Sem Exam
13	traffic regulation and control	Lecture	CIV507.3	Mid Term-1, Quiz & End Sem Exam
14	design of road intersections	Lecture	CIV507.3	Mid Term-1, Quiz & End Sem Exam
15	design of parking facilities; highway lighting; problems	Lecture	CIV507.3	Mid Term-1, Quiz & End Sem Exam
16	Pavement materials	Lecture	CIV507.4	Mid Term-1, Quiz & End Sem Exam
17	Materials used in Highway	Lecture	CIV507.4	Mid Term-1, Quiz

	Construction			& End Sem Exam
18	Soils, Stone aggregates	Lecture	CIV507.4	Mid Term-1, Quiz & End Sem Exam
19	bituminous binders, bituminous paving mixes;	Lecture	CIV507.4	Mid Term-1, Quiz & End Sem Exam
20	Portland cement and cement concrete: desirable properties,	Lecture	CIV507.4	Mid Term-1, Quiz & End Sem Exam
21	tests, requirements for different types of pavements. Problems	Lecture	CIV507.4	Assignment, Quiz & End Sem Exam
22	Design of pavements- Introduction; flexible pavements, factors affecting design and performance; stresses in flexible pavements	Lecture	CIV507.5	Assignment, Quiz & End Sem Exam
23	design of flexible pavements as per IRC; rigid pavements- components and functions; factors affecting design and performance of CC pavements	Lecture	CIV507.5	Assignment, Quiz & End Sem Exam
24	stresses in rigid pavements; design of concrete pavements as per IRC; problems.	Lecture	CIV507.5	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV507.1.	Classify basic design of highway geometry according to the design specifications.	3	3	2	2	3	-	1	2	-	2	3	3	**2**	**2**	**1**

CIV507.2.	Design a flexible pavement using IRC method and Describe various components of railways and their functions.	3	3	2	1	1	2	1	-	1	2	3	3	**3**	**2**	**1**
CIV507.3.	Design a railway geometry according to the design specifications.	3	3	2	3	3	2	2	-	2	2	3	3	**3**	**2**	**3**
CIV507.4.	Classify various components of an airport and identify the alignment and the required length of a runway.	3	2	3	1	2	-	1	-	3	2	3	3	**3**	**2**	**1**
CIV507.5.	Identify various components of a harbor and their functions.	3	3	2	2	3	2	2	-	3	2	3	3	**3**	**1**	**2**

<u>Sample Question Paper</u>

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–V) 2021-22		
Class: B.Tech.(CE) V Semester		
Subject Name: CIV507 TRANSPORTATION ENGINEERING	Time: 2 Hrs	Max.Marks:30

Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: Classify basic design of highway geometry according to the design specifications.

CO2: Design a flexible pavement using IRC method and Describe various components of railways and their functions.

CO Map	Question No.	Question	Marks
CO1	Q.1	Discuss about maximum wheel load	3

CO1	Q.2a	How the excavation is done in highway construction?	3
	Q.2b	Derive an expression of summit curve for SSD	3
CO1	Q.3	Explain spot speed, running sped, space mean speed, time mean speed and average speed. How is spot speed studies carried out?	6
CO2	Q.4	Evaluate grain size analysis on highway materials.	3
CO2	Q.5a	Write a short note on setting out of a transition curve.	3
	Q.5b	Explain the role of kerb.	3
CO2	Q6	Explain briefly three different tests carried out to determine the abrasion of aggregates	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	CIV507 TRANSPORTATION ENGINEERING Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U14G14
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A	9	2	2	18
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A	9	2	2	18
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	A-	8	2	2	16
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A+	10	2	2	20
5	A60215819005	Mr YASH YOGI	100	30	70	A	9	2	2	18
			Total No. of Students			=	5			
			Total No. of Students			>60 % marks	5	100.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : HYDRAULIC ENGINEERING LAB
Course Code : CIV 522, Crédits : 02, Session :2021-22 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Mr. Sachin Tiwari

A. Introduction**:** T*he objective of this course is to To introduce the students to various hydraulic engineering problems like open channel flows and hydraulic machines. At the completion of the course, the student should be able to relate the theory and practice of problems in hydraulic engineering*

B. Course Outcomes: At the end of the course, students will be able to:

CIV522.1. Analyse various hydraulic systems by applying the fundamental laws of fluid statics.
CIV522.2. Solve the fluid flow governing equations by taking suitable constraints and assumptions
CIV522.3. Evaluate major and minor losses in pipes
CIV522.4. Analyse the practical significance of open channel flows 5. Perform dimensional analysis on any real life problems
CIV522.5. Interpret the boundary layer aspects of laminar and turbulent flows and experimentally determine the fluid properties and flow parameters using various experimental setups.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Practical Work:

i. Flow Visualization**: (2 Hours)**

ii. Studies in Wind Tunnel**: (2 Hours)**

iii. Boundary Layer**: (2 Hours)**
iv. Flow around an Aerofoil / circular cylinder**: (2 Hours)**
v. Uniform Flow**: (2 Hours)**
vi. Velocity Distribution in Open channel flow**: (2 Hours)**
vii. Venturi Flume**,** Standing Wave, Flume**: (2 Hours)**
viii. Gradually Varied Flow, Flow through pipes**: (2 Hours)**
ix. Turbulent flow through pipes**: (2 Hours)**
x. Flow visualization**: (2 Hours)**

G. Examination Scheme:

Components	**IA**				**EE**	
	A	**PR**	**LR**	**V**	**PR**	**V**
Weightage (%)	**5**	**10**	**10**	**5**	**35**	**35**

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

H. Suggested Text/Reference Books:

- Hydraulics and Fluid Mechanics, P.M. Modi and S.M. Seth, Standard Book House
- Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill.
- Open channel Flow, K. Subramanya, Tata McGraw Hill.

I. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	Flow Visualization	Lecture	CIV522.1	Internal Assessment, Viva &External Exam
2	Flow Visualization	Lecture	CIV522.1	Internal Assessment, Viva &External Exam
3	Studies in Wind Tunnel:	Lecture	CIV522.1	Internal Assessment, Viva &External Exam
4	Studies in Wind Tunnel:	Lecture	CIV522.1	Internal Assessment, Viva &External Exam
5	Boundary Layer	Lecture	CIV522.2	Internal Assessment, Viva &External Exam
6	*Boundary Layer*	Lecture	CIV522.2	Internal Assessment, Viva &External Exam
7	*Flow around an Aerofoil / circular cylinder*	Lecture	CIV522.2	Internal Assessment, Viva &External Exam

8	Flow around an Aerofoil / circular cylinder	Lecture	CIV522.2	Internal Assessment, Viva &External Exam
9	Uniform Flow	Lecture	CIV522.3	Internal Assessment, Viva &External Exam
10	Uniform Flow	Lecture	CIV522.3	Internal Assessment, Viva &External Exam
11	Velocity Distribution in Open channel flow	Lecture	CIV522.3	Internal Assessment, Viva &External Exam
12	Velocity Distribution in Open channel flow	Lecture	CIV522.3	Internal Assessment, Viva &External Exam
13	Venturi Flume**,** Standing Wave, Flume	Lecture	CIV522.3	Internal Assessment, Viva &External Exam
14	Venturi Flume**,** Standing Wave, Flume	Lecture	CIV522.3	Internal Assessment, Viva &External Exam
15	Gradually Varied Flow,	Lecture	CIV522.4	Internal Assessment, Viva &External Exam
16	Gradually Varied Flow,	Lecture	CIV522.4	Internal Assessment, Viva &External Exam
17	Turbulent flow through pipes	Lecture	CIV522.4	Internal Assessment, Viva &External Exam
18	Turbulent flow through pipes	Lecture	CIV522.4	Internal Assessment, Viva &External Exam
19	Flow visualization**:**	Lecture	CIV522.4	Internal Assessment, Viva &External Exam
20	Flow visualization**:**	Lecture	CIV522.4	Internal Assessment, Viva &External Exam
21	Venturi Flume**,** Standing Wave, Flume	Lecture	CIV522.5	Internal Assessment, Viva &External Exam
22	Flow through pipes**:**	Lecture	CIV522.5	Internal Assessment, Viva &External Exam
23	Flow through pipes**:**	Lecture	CIV522.5	Internal Assessment, Viva &External Exam
24	Flow around an Aerofoil /	Lecture	CIV522.5	Internal

	circular cylinder			Assessment, Viva &External Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV522.1.	CIV522.1. Analyse various hydraulic systems by applying the fundamental laws of fluid statics.	3	3	2	2	3	-	1	2	-	2	3	3	**2**	**2**	**1**
CIV522.2	CIV522.2. Solve the fluid flow governing equations by taking suitable constraints and assumptions	3	3	2	1	1	2	1	-	1	2	3	3	**3**	**2**	**1**
CIV522.3.	CIV522.3. Evaluate major and minor losses in pipes	3	3	2	2	3	2	2	-	3	2	3	3	**3**	**1**	**2**
CIV522.4.	Analyse the practical significance of open channel flows 5. Perform dimensional analysis on any real life problems	3	3	2	3	3	2	2	-	2	2	3	3	**3**	**2**	**3**
CIV522.5.	*Interpret the boundary layer aspects of laminar and turbulent flows and experimentally determine the fluid properties and flow parameters using various experimental setups.*	3	2	3	1	2	-	1	-	3	2	3	3	**3**	**2**	**1**

Sample Question Paper

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–V) 2021-22						
Class: B.Tech.(CE) V Semester						
Subject Name: CIV522 Hydraulics Engineering Lab		Time: 2 Hrs		Max.Marks:30		
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		
Student will be able to *CO1:* Analyse various hydraulic systems by applying the fundamental laws of fluid statics and CO2. Solve the fluid flow governing equations by taking suitable constraints and assumptions						

CO Map	Question No.	Question	Marks
CO1	Q.1	Define open channel flow with examples.	3
CO1	Q.2a	.Distinguish between critical, sub critical and subcritical flows.	3
	Q.2b	Differentiate prismatic and non-prismatic channels.	3
CO1	Q.3	Calculate the Specific energy ,Critical depth and the velocity of the flow of 10 m 3 in a cement lined rectangular channel 2.5m wide with 2 m depth of water. Is the given flow is sub critical or super critical	6
CO2	Q.4	List the factors affecting Manning‟s roughness coefficient.	3
CO2	Q.5a	What are the condition for obtaining most economical circular channel section for maximum velocity and discharge?	3
	Q.5b	A channel is designed to carry a discharge of 20 m 3 /s with Manning‟s n = 0.015 and bed slope of 1 in 1000 (for trapezoidal channel side slope M = 1/√3). Find the channel dimensions of the most efficient section if the channel is (i) trapezoidal (ii) rectangular.	3
CO2	Q6	A V - shaped open channel of included angle 90° conveys a discharge of 0.05 m 3 /s when the depth of flow at the center is 0.225 m. Assuming that C = 50 m 1/2 /s in the Chezy‟s equation, calculate the slope of the channel.	6

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	CIV522 HYDRAULIC ENGINEERING LAB Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U9G9
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A+	10	1	1	10
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A	9	1	1	9
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	A	9	1	1	9
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A+	10	1	1	10
5	A60215819005	Mr YASH YOGI	100	30	70	A	9	1	1	9
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	5	100.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : GEOTECHNICAL ENGINEERING LAB
Course Code : CIV 524, Crédits : 02, Session :2021-22 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Imran Ahmad Khan

A. **Introduction:** The objective of this course is *to* introduce basic soil properties and their significance to the students and to have a understanding of different soil properties and their uses in engineering..

B. Course Outcomes: At the end of the course, students will be able to:

CIV524.1. *To impart the fundamental concepts of soil mechanics and understand the bearing capacity*

CIV524.2. *To understand the concept of compaction and consolidation of soils*

CIV524.3. *To understand the design aspects of foundation*

CIV524.4. *To evaluate the stress developed in the soil medium*

C. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. **Assessment Plan:**

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. **Syllabus**

Practical Work:

1. Field Density using Core Cutter method**: (1 Hour)**
2. Field Density using Sand replacement method**:(1 Hour)**
3. Natural moisture content using Oven Drying method**:(1 Hour)**
4. Field identification of Fine Grained soils**:(1 Hour)**
5. Specific gravity of Soils**:(1 Hour)**
6. Grain size distribution by Sieve Analysis**:(1 Hour)**
7. Grain size distribution by Hydrometer Analysis**:(2 Hours)**
8. Consistency limits by Liquid limit**:(2 Hours)**
9. Consistency limits by Plastic limit**:(2 Hours)**

2. Consistency limits by Shrinkage limit**:(2 Hours)**
3. Permeability test using Constant-head test method**:(2 Hours)**
4. Permeability test using Falling-head. Triaxial Test (UU) **:(2 Hours)**
5. Vane Shear Test**:(1 Hours)**
6. Direct Shear Test**:(1 Hours)**

G. **Examination Scheme:**

Components	**IA**				**EE**	
	A	**PR**	**LR**	**V**	**PR**	**V**
Weightage (%)	**5**	**10**	**10**	**5**	**35**	**35**

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

H. Suggested Text/Reference Books:

- Soil Mechanics by Craig R.F., Chapman & Hall
- Fundamentals of Soil Engineering by Taylor, John Wiley & Sons
- An Introduction to Geotechnical Engineering, by Holtz R.D. and Kovacs, W.D., Prentice Hall, NJ

I. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	Field Density using Core Cutter method:	Lecture	CIV524.1	Internal Assessment, Viva &External Exam
2	Field Density using Core Cutter method:	Lecture	CIV524.1	Internal Assessment, Viva &External Exam
3	Field Density using Sand replacement method:	Lecture	CIV524.1	Internal Assessment, Viva &External Exam
4	Field Density using Sand replacement method:	Lecture	CIV524.1	Internal Assessment, Viva &External Exam
5	Natural moisture content using Oven Drying method:	Lecture	CIV524.2	Internal Assessment, Viva &External Exam
6	Natural moisture content using Oven Drying method:	Lecture	CIV524.2	Internal Assessment, Viva &External Exam
7	*Field identification of Fine Grained soils:*	Lecture	CIV524.2	Internal Assessment, Viva &External Exam
8	Field identification of Fine Grained soils:	Lecture	CIV524.2	Internal Assessment, Viva &External Exam
9	Specific gravity of Soils	Lecture	CIV524.3	Internal Assessment, Viva &External Exam
10	Specific gravity of Soils	Lecture	CIV524.3	Internal Assessment, Viva &External Exam
11	Grain size distribution by Sieve Analysis	Lecture	CIV524.3	Internal Assessment, Viva &External Exam
12	Grain size distribution by	Lecture	CIV524.3	Internal

	Sieve Analysis			Assessment, Viva &External Exam
13	Grain size distribution by Hydrometer Analysis:	Lecture	CIV524.3	Internal Assessment, Viva &External Exam
14	Grain size distribution by Hydrometer Analysis:	Lecture	CIV524.3	Internal Assessment, Viva &External Exam
15	Consistency limits by Liquid limit	Lecture	CIV524.4	Internal Assessment, Viva &External Exam
16	Consistency limits by Liquid limit	Lecture	CIV524.4	Internal Assessment, Viva &External Exam
17	Consistency limits by Plastic limit:	Lecture	CIV524.4	Internal Assessment, Viva &External Exam
18	Consistency limits by Plastic limit:	Lecture	CIV524.4	Internal Assessment, Viva &External Exam
19	Consistency limits by Shrinkage limit:	Lecture	CIV524.4	Internal Assessment, Viva &External Exam
20	Consistency limits by Shrinkage limit:	Lecture	CIV524.4	Internal Assessment, Viva &External Exam
21	Permeability test using Constant-head test method:	Lecture	CIV524.4	Internal Assessment, Viva &External Exam
22	Permeability test using Falling-head. Triaxial Test (UU) :	Lecture	CIV524.4	Internal Assessment, Viva &External Exam
23	Vane Shear Test	Lecture	CIV524.4	Internal Assessment, Viva &External Exam
24	Direct Shear Test:	Lecture	CIV524.4	Internal Assessment, Viva &External Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		P O	P O	P O	P O	P O	P O	P O	P O	P O	P O	P O	P O	P S	P S	P S

		1	2	3	4	5	6	7	8	9	10	11	12	O1	O2	O3
CIV524.1.	*To impart the fundamental concepts of soil mechanics and understand the bearing capacity*	3	3	1	3	1	**3**	**2**	**-**	2		2	1	**3**	**1**	**2**
CIV524.2.	*To understand the concept of compaction and consolidation of soils*	3	2	2	2	2	**1**	**-**	**-**	2		1	1	**1**	**1**	**3**
CIV524.3.	*To understand the design aspects of foundation*	3	2	2	2	2	**1**	**-**	**1**	3		3	1	**3**	**3**	**2**
CIV524.4.	*To evaluate the stress developed in the soil medium*	3	3	2	3	2	**-**	**-**	**-**	1		2	1	**1**	**2**	**2**

Sample Question Paper

Amity School of Engineering and Technology
Department of Civil Engineering
I MID-SEMESTER (SEM–V) 2021-22

Class: B.Tech.(CE) V Semester

Subject Name: Civ524 Geotechnical Engineering Lab	Time: 2 Hrs	Max.Marks:30

Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: *Compare the various engineering and index properties of soil.*

CO2: Explain *the hydraulic conductivity of the soil and seepage actions*

CO Map	Question No.	Question	Marks
CO1	Q.1	Describe in detail: Soil Formation in Geological cycle	3
	Q.2a	Define following terms: 1. Water content of soil, 2. Bulk unit	3

CO1		weight, 3. Specific Gravity, 4. Void ratio, 5. Density Index	
	Q.2b	What are the basic requirements of Soil Classification?	3
CO1	Q.3	What do you mean by Compaction? Explain theory of Compaction. List out all factors affecting Compaction. Explain each in detail.	6
CO2	Q.4	Differentiate between Standard Proctor and Modified Proctor	3
CO2	Q.5a	Explain: Effects of Compaction on Properties of Soil.	3
	Q.5b	What are the different methods of Compaction used in field? Explain each in detail	3
CO2	Q6	What are the different methods of Compaction used in field? Explain each in detail	6

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	CIV524 GEOTECHNICAL ENGINEERING LAB Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U10G10
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A+	10	1	1	10
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A	9	1	1	9
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	A+	10	1	1	10
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A+	10	1	1	10
5	A60215819005	Mr YASH YOGI	100	30	70	A+	10	1	1	10
			Total No. of Students		=	5				
			Total No. of Students		>60% marks	5	100.00	%		
			Attainment Level				Level 3			

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : TRANSPORTATION ENGINEERING LAB
Course Code : CIV 527, Crédits : 02, Session :2021-22 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Ripunjoy Gogoi, Dr. P. Mahakavi

A. Introduction: The objective of this course is to impart knowledge about different geometric properties of highway and different highway materials used in the construction..

B. Course Outcomes: At the end of the course, students will be able to:

CIV527.1. Understand the properties of materials used for construction of highways and airports.

CIV527.2. Understand the transportation characteristics, operations, design, planning, and maintenance.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

i. Los Angles Abrasion Test**: (2 Hours)**
ii. Crushing test**: (2 Hours)**
iii. Impact test for aggregates**: (2 Hours)**
iv. Elongation and flakiness index test**: (2 Hours)**
v. Marshall Stability test**: (2 Hours)**

vi. Flash point test**: (2 Hours)**
vii. Fire Test**: (2 Hours)**
viii. Ductility test**: (2 Hours)**
ix. Penetration test for bitumen**: (1 Hour)**
x. Specific gravity and water absorption of Aggregate**: (1 Hour)**
xi. Viscosity test**: (1 Hours)**
xii. Aggregate crushing value**: (1 Hour)**

G. Examination Scheme:

Components	IA				EE	
	A	PR	LR	V	PR	V
Weightage (%)	**5**	**10**	**10**	**5**	**35**	**35**

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

H. Suggested Text/Reference Books:

- Khanna, S.K., Justo, C.E.G and Veeraragavan, A, 'Highway Engineering', Revised 10th Edition, Nem Chand & Bros, 2017
- Kadiyalai, L.R., ' Traffic Engineering and Transport Planning', Khanna Publishers.
- Partha Chakraborty, ' Principles Of Transportation Engineering, PHI Learning

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Los Angles Abrasion Test:	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
2	Los Angles Abrasion Test:	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
3	Crushing test:	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
4	Crushing test:	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
5	Impact test for aggregates	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
6	Impact test for aggregates	Lecture	CIV527.1 &	Internal Assessment, Viva

			CIV527.2	&External Exam
7	*Elongation and flakiness index test:*	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
8	*Elongation and flakiness index test:*	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
9	Marshall Stability test	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
10	Marshall Stability test	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
11	Flash point test	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
12	Flash point test	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
13	Fire Test**:**	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
14	Fire Test**:**	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
15	Ductility test**:**	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
16	Ductility test**:**	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
17	Penetration test for bitumen	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
18	Penetration test for bitumen	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
19	Specific gravity and water absorption of Aggregate	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
20	Specific gravity and water absorption of Aggregate	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
21	Viscosity test:	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
22	Viscosity test:	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam

23	Aggregate crushing value	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
24	Aggregate crushing value	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV527.1.	Understand the properties of materials used for construction of highways and airports.	3	**2**	1	2	1	**-**	**1**	**-**	2		2	1	**2**	**1**	**3**
CIV527.2.	*Understand the transportation characteristics, operations, design, planning, and maintenance.*	3	2	1	2	2	**1**	**-**	**-**	2		1	1	**3**	**1**	**1**

<u>Sample Question Paper</u>

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–V) 2021-22		
Class: B.Tech.(CE) V Semester		
Subject Name: CIV527 TRANSPORTATION ENGINEERING Lab	Time: 2 Hrs	Max.Marks:30

Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: Classify basic design of highway geometry according to the design specifications.

CO2: Design a flexible pavement using IRC method and Describe various components of railways and their functions.

CO Map	Question No.	Question	Marks
CO1	Q.1	Explain briefly main features of Indian Road Congress.	3
CO1	Q.2a	Write a short note on Carriageway width?	3
	Q.2b	How the excavation is done in highway construction?	3
CO1	Q.3	Explain briefly the calculation of length of the transition curve.	6
CO2	Q.4	Evaluate grain size analysis on highway materials.	3
CO2	Q.5a	What are the objectives of Highway Research Board?	3
	Q.5b	How the map study is done? Discuss.	3
CO2	Q6	While aligning a highway in a built up area, it was necessary to provide a horizontal circular curve of radius 446 m. The design speed is 85 Kmph, the length of wheel base is 8m and the pavement width is 12m. Design super elevation, extra widening and length of transition curve.	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	CIV527 TRANSPORTATION ENGINEERING LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U16G16
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A+	10	1	1	10
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A+	10	1	1	10
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	A	9	1	1	9
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A+	10	1	1	10
5	A60215819005	Mr YASH YOGI	100	30	70	A	9	1	1	9
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	5	100.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **INDUSTRIAL PRACTICAL TRAINING – I**
Course Code : NPT550, Crédits : 03, Session :2021-22 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia, Dr. Imran Ahmad Khan, Dr. Ripunjoy Gogoi, Dr. P. Mahakavi, Mr. Sachin Tiwari

A. Introduction: The objective of this course is to enable the students to explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills. It will help them to manage the technical content and work. It will also help them to prepare and present technical report..

B. Course Outcomes: At the end of the course, students will be able to:

NPT550.1. Explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills.

NPT550.2. Manage the technical content and work.

NPT550.3. Learn the various administrative process followed in industry and prepare and present technical report.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
End Semester Examination	End Semester Examination	EE	100%
Total			**100%**

F. Syllabus
Methodology:

Practical training is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technicaland administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

G. Examination Scheme:

Feedback from industry/work place	20
Training Report	40
Viva	15
Presentation	25
Total	**100**

H. Suggested Text/Reference Books: NA

I. Lecture Plan : NA

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

NPT550.1	Explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills.	3	**2**	1	3	1	**-**	**-**	**-**	2		2	1	**1**	**2**	**1**
NPT550.2	Manage the technical content and work.	3	1	2	2	2	**-**	**-**	**-**	2		1	1	**3**	**2**	**3**
NPT550.3	Learn the various administrative process followed in industry.	2	2	2	2	2	**-**	**-**	**-**	3		3	1	**3**	**3**	**2**
NPT550.4	Prepare and present technical report.	1	2	1	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**3**

S. No.	Enrollment.No.	Student's Name	NPT550 INDUSTRIAL PRACTICAL TRAINING I (EVALUATION)							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U17G17
1	A60215819001	Mr MAYANK CHAHAR	100	0	100	A	9	3	3	27
2	A60215819002	Mr KULDEEP GUPTA	100	0	100	A	9	3	3	27
3	A60215819003	Mr MOHD SAIF KHAN	100	0	100	A-	8	3	3	24
4	A60215819004	Ms RIYA NAMDEV	100	0	100	A+	10	3	3	30
5	A60215819005	Mr YASH YOGI	100	0	100	A	9	3	3	27
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	5	100.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : CONSTRUCTION ENGINEERING & MANAGEMENT
Course Code : CIV601, Crédits : 03, Session :2021-22 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia

A. Introduction: The objective of this course is to to train the students with the latest and the best in the rapidly changing fields of Construction Engineering, Technology and Management and to prepare the students to be industry leaders who implement the best engineering and management practices and technologies in the construction industry. It aims to continually work with industry to enhance the program's effectiveness and the opportunities for innovation in the construction industry and to conduct research to develop advanced technologies and management approaches.

B. Course Outcomes: At the end of the course, students will be able to:

CIV601.1.*Able to describe the requirement of planning and management.*

CIV601.2.*Able to recognize the critical path and pert suitability for research projects and able to determine projects schedule and estimate the activity time of CPM.*

CIV601.3.*Able to illustrate various construction equipments, machinery and their utility*

CIV601.4.*Able to discuss resource scheduling and planning of civil engineering. Projects*

CIV601.5.*Perform rate analysis as required in preparing specifications, detailed estimate and tender documents etc*

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Construction Management and its features(6 Hours)

Basics of Construction- Unique features of construction, construction projects types and features, phases of a project, agencies involved and their methods of execution;

Module II: PERT and CPM (6 Hours)

Construction project planning- Stages of project planning: pre-tender planning, pre-construction planning, detailed construction planning, role of client and contractor, level of detail. Process of development of plans and schedules, work break-down structure, activity lists, assessment of work content, concept of productivities, estimating durations; Networks: basic terminology, types of precedence relationships, preparation of CPM networks: activity on link and activity on node representation, computation of float values, critical and semi critical paths, calendaring networks. PERT- Assumptions underlying PERT analysis, determining three time estimates, analysis, slack computations.

Module III: Methods of Constructions (6 Hours)

Construction Methods basics: Types of foundations and construction methods; Basics of Formwork and Staging; Common building construction methods (conventional walls and slabs; conventional framed structure with blockwork walls; Modular construction methods for repetitive works; Precast concrete construction methods; Basics of Slip forming for tall structures; Basic construction methods for steel structures; Basics of construction methods for Bridges. Construction Equipment basics: Conventional construction methods Vs Mechanized methods and advantages of latter; Equipment for Earthmoving, Dewatering; Concrete mixing, transporting & placing; Cranes, Hoists and other equipment for lifting; Equipment for transportation of materials. Equipment Productivities.

Module IV: Construction Site and Resources (6 Hours)

Planning and organizing construction site and resources- Site: site layout including enabling structures, developing site organization, Documentation at site; Manpower: planning, organizing, staffing, motivation; Materials: concepts of planning, procurement and inventory control; Equipment: basic concepts of planning and organizing; Funds: cash flow, sources of funds; Histograms and S-Curves. Earned Value; Resource Scheduling- Bar chart, line of balance technique, resource constraints and conflicts; resource aggregation, allocation, smoothening and leveling. Common Good Practices in Construction

Module V: Contracts (6 Hours)

Contracts Management basics: Importance of contracts; Types of Contracts, parties to a contract; Common contract clauses (Notice to proceed, rights and duties of various parties, notices to be given, Contract Duration and Price. Performance parameters; Delays, penalties and liquidated damages; Force Majeure, Suspension and Termination. Changes & variations, Dispute Resolution methods. Construction Costs: Make-up of construction costs; Classification of costs, timecost trade-off in construction projects, compression and decompression.

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Varghese, P.C., "Building Construction", Prentice Hall India, 2007.
- National Building Code, Bureau of Indian Standards, New Delhi, 2017.
- Chudley, R., Construction Technology, ELBS Publishers, 2007.
- Peurifoy, R.L. Construction Planning, Methods and Equipment, McGraw Hill, 2011
- Nunnally, S.W. Construction Methods and Management, Prentice Hall, 2006
- Jha, Kumar Neeraj., Construction Project management, Theory & Practice, Pearson Education India, 2015
- Punmia, B.C., Khandelwal, K.K., Project Planning with PERT and CPM, Laxmi Publications, 2016.

I. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	Basics of Construction	Lecture	CIV601.1	Mid Term-1, Quiz & End Sem Exam
2	Unique features of construction	Lecture	CIV601.1	Mid Term-1, Quiz & End Sem Exam
3	construction projects types and features	Lecture	CIV601.1	Mid Term-1, Quiz & End Sem Exam
4	*phases of a project, agencies involved and their methods of execution*	Lecture	CIV601.1	Mid Term-1, Quiz & End Sem Exam
5	Construction project planning- Stages of project planning: pre-tender planning, pre-construction planning, detailed construction planning	Lecture	CIV601.2	Mid Term-1, Quiz & End Sem Exam
6	role of client and contractor, level of detail. Process of development of plans and schedules	Lecture	CIV601.2	Mid Term-1, Quiz & End Sem Exam
7	work break-down structure, activity lists, assessment of work content	Lecture	CIV601.2	Mid Term-1, Quiz & End Sem Exam
8	concept of productivities, estimating durations; Networks: basic terminology	Lecture	CIV601.2	Mid Term-1, Quiz & End Sem Exam
9	types of precedence relationships, preparation of CPM networks: activity on link and activity on node	Lecture	CIV601.2	Mid Term-1, Quiz & End Sem Exam

	representation			
10	computation of float values, critical and semi critical paths, calendaring networks.	Lecture	CIV601.2	Mid Term-1, Quiz & End Sem Exam
11	PERT- Assumptions underlying PERT analysis, determining three time estimates, analysis, slack computations	Lecture	CIV601.2	Mid Term-1, Quiz & End Sem Exam
12	Construction Methods basics: Types of foundations and construction methods	Lecture	CIV601.3	Mid Term-1, Quiz & End Sem Exam
13	Formwork and Staging; Common building construction methods (conventional walls and slabs; conventional framed structure with blockwork walls	Lecture	CIV601.3	Mid Term-1, Quiz & End Sem Exam
14	Modular construction methods for repetitive works; Precast concrete construction methods; Basics of Slip forming for tall structures	Lecture	CIV601.3	Mid Term-1, Quiz & End Sem Exam
15	Basic construction methods for steel structures; Basics of construction methods for Bridges	Lecture	CIV601.3	Mid Term-1, Quiz & End Sem Exam
16	Construction Equipment basics: Conventional construction methods Vs Mechanized methods and advantages of latter; Equipment for Earthmoving, Dewatering	Lecture	CIV601.3	Mid Term-1, Quiz & End Sem Exam
17	Concrete mixing, transporting & placing; Cranes, Hoists and other equipment for lifting	Lecture	CIV601.3	Mid Term-1, Quiz & End Sem Exam
18	Equipment for transportation of materials. Equipment Productivities.	Lecture	CIV601.3	Mid Term-1, Quiz & End Sem Exam
19	Planning and organizing construction site and resources- Site: site layout including enabling	Lecture	CIV601.4	Mid Term-1, Quiz & End Sem Exam

	structures, developing site organization			
20	Documentation at site; Manpower: planning, organizing, staffing, motivation; Materials: concepts of planning, procurement and inventory control	Lecture	CIV601.4	Mid Term-1, Quiz & End Sem Exam
21	Equipment: basic concepts of planning and organizing	Lecture	CIV601.4	Assignment, Quiz & End Sem Exam
22	Funds: cash flow, sources of funds; Histograms and S-Curves. Earned Value; Resource Scheduling	Lecture	CIV601.4	Assignment, Quiz & End Sem Exam
23	Bar chart, line of balance technique, resource constraints and conflicts	Lecture	CIV601.4	Assignment, Quiz & End Sem Exam
24	resource aggregation, allocation, smoothening and leveling. Common Good Practices in Construction	Lecture	CIV601.4	Assignment, Quiz & End Sem Exam
25	Contracts Management basics: Importance of contracts	Lecture	CIV601.5	Assignment, Quiz & End Sem Exam
26	Types of Contracts, parties to a contract; Common contract clauses	Lecture	CIV601.5	Assignment, Quiz & End Sem Exam
27	Performance parameters; Delays, penalties and liquidated damages; Force Majeure,	Lecture	CIV601.5	Assignment, Quiz & End Sem Exam
28	Notice to proceed, rights and duties of various parties, notices to be given, Contract Duration and Price	Lecture	CIV601.5	Assignment, Quiz & End Sem Exam
29	Performance parameters; Delays, penalties and liquidated damages; Force Majeure,	Lecture	CIV601.5	Assignment, Quiz & End Sem Exam
30	Suspension and Termination. Changes & variations, Dispute Resolution methods	Lecture	CIV601.5	Assignment, Quiz & End Sem Exam
31	Construction Costs: Make-up of construction costs; Classification of costs	Lecture	CIV601.5	Assignment, Quiz & End Sem Exam
32	timecost trade-off in	Lecture	CIV601.5	Assignment, Quiz

	construction projects, compression and decompression			& End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV601.1.	Able to describe the requirement of planning and management.	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
CIV601.2.	Able to recognize the critical path and pert suitability for research projects and able to determine projects schedule and estimate the activity time of CPM.	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
CIV601.3.	Able to illustrate various construction equipments, machinery and their utility	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
CIV601.4.	Able to discuss resource scheduling and planning of civil engineering. Projects	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**
CIV601.5.	Perform rate analysis as required in preparing	3	3	2	3	3	2	2	-	3	2	3	3	**1**	**2**	**3**

	specifications, detailed estimate and tender documents etc															

Sample Question Paper

<table>
<tr><td colspan="7" align="center">Amity School of Engineering and Technology
Department of Civil Engineering
I MID-SEMESTER (SEM–VI) 2021-22</td></tr>
<tr><td colspan="7" align="center">Class: B.Tech.(CE) VI Semester</td></tr>
<tr><td colspan="3">Subject Name:
CIV 601 CONSTRUCTION ENGINEERING & MANAGEMENT</td><td colspan="2">Time: 2 Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3</td><td>Q.4</td><td>Q.2,5,6</td><td></td><td></td></tr>
<tr><td colspan="7">Student will be able to
CO1: Able to describe the requirement of planning and management.
CO2: Able to recognize the critical path and pert suitability for research projects and able to determine projects schedule and estimate the activity time of CPM.</td></tr>
</table>

CO Map	Question No.	Question	Marks
CO1	Q.1	Explain the necessity of labour legislation. Explain any two labour laws.	3
CO1	Q.2a	Define management. Explain functions and principles of management.	3
	Q.2b	Classify the equipments required in construction industry.	3
CO1	Q.3	Discuss objectives of construction management and Explain Planning, Scheduling and Controlling as a Function of Construction Management.	6
CO2	Q.4	State Rules for drawing network. Explain with suitable examples, errors in AOA networks	3
CO2	Q.5a	Explain the concept of time value of money.	3
	Q.5b	Explain, Why time cost trade off is necessary? Discuss various ways to reduce the activity duration.	3
CO2	Q6	A small project consists of twelve activities. Interrelationships amongst various activities are as follows: • Activity A is starting activity and proceeds activities B,C and D. • Activity E depends on activities	6

		B and C • Activity F follows activities C and D. • Activities G and H can start as soon as activity D is completed. • Activity I succeeds activities G, E and F. • Activities J and K can start only when activities H and I are completed. • Activity L is the last activity and it succeeds activities J and K. • Prepare dependency table and draw AOA diagram.	

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	**Enrollment.No.**	**Student's Name**	**CIV601 CONSTRUCTION ENGINEERING & MANAGEMENT**							
			Max Marks	**CE Weight Age (%)**	**ET Weight Age (%)**	**GO**	**GP**	**ACU**	**ECU**	**U4G4**
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A+	10	3	3	30
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A+	10	3	3	30
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	C+	4	3	3	12
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A	9	3	3	27
5	A60215819005	Mr YASH YOGI	100	30	70	B	6	3	3	18

Total No. of Students	=	5		
Total No. of Students	>60% marks	3	60.00	%
Attainment Level			Level 1	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : GEOMETRIC DESIGN OF HIGHWAYS
Course Code : CIV602, Crédits : 03, Session :2021-22 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name :, Dr. Ripunjoy Gogoi, Dr. P. Mahakavi

A. Introduction: The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis, and lin,ear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

B. Course Outcomes: At the end of the course, students will be able to:

CIV602.1. *Gain knowledge about highways, and able to design the roads & bridges by geometric method*

CIV602.2. *Know the different types of points and crossings used in railway track and Knowledge of signalling systems in railway stations and yards.*

CIV602.3. *design and orient airport runways and apply various visual aids in the designing of airport*

C. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Introduction: Classification of rural highways and urban roads. Objectives and requirements of highway geometric design; Design Controls: Topography, vehicle characteristics and design vehicle, driver characteristics, speed, traffic flow and capacity, levels of service, pedestrian and other facilities, environmental factors; Design Elements: Sight distances**: (5 Hours)**

Module II: Horizontal alignment - design considerations, stability at curves, super elevation, widening, transition curves; curvature at intersections, vertical alignment - grades, ramps, design of summit and valley curves, combination of vertical and horizontal alignment including design of hair pin bends, design of expressways**: (5 Hours)**

Module III: IRC standards and guidelines for design problems; Cross Section Elements: Right of way and width considerations, roadway, shoulders, kerbs traffic barriers, medians, frontage roads; Facilities for pedestrians, bicycles, buses and trucks, Pavement surface characteristics - types, cross slope, skid resistance, unevenness; Design Considerations: Design considerations for rural and urban arterials, freeways, and other rural and urban roads; Design Of Intersections: Characteristics and design considerations of at-grade intersections;; Rotary intersections; Grade separations and interchanges -; Design of Parking lots**: (10 Hours)**

Module IV: Aircraft characteristics; Aircraft performance characteristics: Airport planning and air travel demand forecasting: Airport Site Selection; Geometric Design of the Airfield: Determination of Runway Capacity and Delay - Taxiway and Gate Capacity - Holding Aprons - Terminal Aprons – Airport drainage - Function of Airport Passenger and Cargo Terminal - Design of Air Freight Terminals - Airport access - Airport Landside planning - Capacity**: (10 Hours)**

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Khanna, S.K., Justo, C.E.G and Veeraragavan, A, 'Highway Engineering', Revised 10th Edition, Nem Chand & Bros, 2017
- Kadiyalai, L.R., ' Traffic Engineering and Transport Planning', Khanna Publishers.
- Partha Chakraborty, ' Principles Of Transportation Engineering, PHI Learning, Tomlinson
- Fred L. Mannering, Scott S. Washburn, Walter P. Kilareski,'Principles of Highway Engineering and Traffic Analysis', 4th Edition, John Wiley
- Srinivasa Kumar, R, Textbook of Highway Engineering, Universities Press, 2011.
- Paul H. Wright and Karen K. Dixon, Highway Engineering, 7th Edition, Wiley Student Edition, 2009.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Classification of rural highways and urban roads	Lecture	CIV602.1	Mid Term-1, Quiz & End Sem Exam
2	Objectives and requirements of highway geometric design; Design Controls	Lecture	CIV602.1	Mid Term-1, Quiz & End Sem Exam
3	Topography, vehicle characteristics and design vehicle, driver characteristics, speed	Lecture	CIV602.1	Mid Term-1, Quiz & End Sem Exam
4	*traffic flow and capacity, levels of service, pedestrian and other facilities*	Lecture	CIV602.1	Mid Term-1, Quiz & End Sem Exam
5	Design Elements: Sight distances	Lecture	CIV602.1	Mid Term-1, Quiz & End Sem Exam
6	Horizontal alignment - design considerations, stability at curves, super elevation	Lecture	CIV602.1	Mid Term-1, Quiz & End Sem Exam
7	widening, transition curves; curvature at intersections, vertical alignment	Lecture	CIV602.1	Mid Term-1, Quiz & End Sem Exam
8	grades, ramps, design of summit and valley curves, combination of vertical and horizontal alignment including design of hair pin bends, design of expressways	Lecture	CIV602.1	Mid Term-1, Quiz & End Sem Exam
9	IRC standards and guidelines for design problems; Cross Section Elements	Lecture	CIV602.2	Mid Term-1, Quiz & End Sem Exam
10	Right of way and width considerations, roadway, shoulders, kerbs traffic barriers, medians, frontage roads	Lecture	CIV602.2	Mid Term-1, Quiz & End Sem Exam
11	Facilities for pedestrians, bicycles, buses and trucks,	Lecture	CIV602.2	Mid Term-1, Quiz & End Sem Exam
12	types, cross slope,	Lecture	CIV602.2	Mid Term-1, Quiz & End Sem Exam
13	Design Considerations: Design considerations for rural and urban arterials	Lecture	CIV602.2	Mid Term-1, Quiz & End Sem Exam

14	Pavement surface characteristics	Lecture	CIV602.2	Mid Term-1, Quiz & End Sem Exam
15	skid resistance, unevenness	Lecture	CIV602.2	Mid Term-1, Quiz & End Sem Exam
16	freeways, and other rural and urban roads	Lecture	CIV602.2	Mid Term-1, Quiz & End Sem Exam
17	Design Of Intersections: Characteristics	Lecture	CIV602.2	Mid Term-1, Quiz & End Sem Exam
18	design considerations of at-grade intersections	Lecture	CIV602.2	Mid Term-1, Quiz & End Sem Exam
19	Rotary intersections;	Lecture	CIV602.2	Mid Term-1, Quiz & End Sem Exam
20	Grade separations and interchanges	Lecture	CIV602.2	Mid Term-1, Quiz & End Sem Exam
21	Design of Parking lots	Lecture	CIV602.2	Assignment, Quiz & End Sem Exam
22	Aircraft characteristics	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
23	Aircraft performance characteristics	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
24	Airport planning	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
25	Airport Site Selection	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
26	Geometric Design of the Airfield	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
27	Determination of Runway Capacity and Delay	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
28	Taxiway and Gate Capacity	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
29	Holding Aprons	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
30	Terminal Aprons	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
31	Airport drainage	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
32	Function of Airport Passenger and Cargo Terminal	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
33	Design of Air Freight Terminals	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
34	Airport access	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
35	Airport Landside planning - Capacity	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
36	air travel demand forecasting	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV602.1.	**Gain knowledge about highways, and able to design the roads & bridges by geometric method**	3	**2**	1	**1**	1	**2**	**-**	**-**	2	**1**	2	1	**3**	**2**	**3**
CIV602.2.	**Know the different types of points and crossings used in railway track and Knowledge of signalling systems in railway stations and yards.**	3	2		2	2				2		1	1	**2**	**3**	**2**
CIV602.3.	**design and orient airport runways and apply various visual aids in the designing of airport**	3	2		2	2				3		3	1	**3**	**1**	**3**

<u>Sample Question Paper</u>

Amity School of Engineering and Technology
Department of Civil Engineering
I MID-SEMESTER (SEM–VI) 2021-22

<table>
<tr><td colspan="7">Class: B.Tech.(CE) VI Semester</td></tr>
<tr><td colspan="2">Subject Name:
CIV 602 GEOMETRIC DESIGN OF HIGHWAYS</td><td colspan="3">Time: 2 Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3</td><td>Q.4</td><td>Q.2,5,6</td><td></td><td></td></tr>
<tr><td colspan="7">Student will be able to
CO1: Gain knowledge about highways, and able to design the roads & bridges by geometric method
CO2: Know the different types of points and crossings used in railway track and Knowledge of signalling systems in railway stations and yards.</td></tr>
</table>

CO Map	Question No.	Question	Marks
CO1	Q.1	What do you understand by non-passing sight distance?	3
CO1	Q.2a	Write down the requirements of an ideal transition curve.	3
	Q.2b	What is mean by minimum gradient in highway? Why it is provided?	3
CO1	Q.3	What is the factor governing super elevation of a road surface? What is mean by super elevation?	6
CO2	Q.4	Define stopping sight distance.	3
CO2	Q.5a	State PIEV theory	3
	Q.5b	What is transition curve?	3
CO2	Q6	Briefly explain illumination sight distance.	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	CIV602 GEOMETRIC DESIGN OF HIGHWAYS						
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A+	10	3	3
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A+	10	3	3
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	B+	7	3	3
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A	9	3	3
5	A60215819005	Mr YASH YOGI	100	30	70	A	9	3	3
			Total No. of Students			=	5		
			Total No. of Students			>60% marks	4	80.00	%
			Attainment Level					Level 3	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : ENVIRONMENTAL ENGINEERING – II
Course Code : CIV603, Crédits : 03, Session :2021-22 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia

A. **Introduction:** The objective of the course is to make students gain insight into how the water and wastewater gets transported through conduits and open channels, and use the same for the design, operation and maintenance of these systems, to provide an in depth understanding of physical and physico-chemical processes used for water and wastewater treatment systems and to provide capability to design such systems..

B. **Course Outcomes:**At the end of the course, students will be able to:
CIV603.1. Know about sewerage system and its drainage.
CIV603.2.Implement technology related with purification of waste water according to IS parameters and low cost sanitation systems.
CIV603.3. Understand various fundamental scientific processes underlying the design and operation of waste water treatment plants.
CIV603.4 Understand chemical and biological principles behind unit processes used in waste water treatment unit processes.

C. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Water Quality Engineering. Fundamental theory underlying the unit processes utilized in the treatment of water for domestic and industrial usage, and in the treatment of domestic and industrial wastewaters**: (5 Hours)**

Module II: Transport of wastewater: Sanitary Sewerage Systems: Flow estimation, sewer materials, hydraulics of flow in sewers, sewer lay out, sewer transitions, materials for sewers, appurtenances, manholes, sewer design, conventional and model based design, sewage pumps and pumping stations, corrosion prevention, operation and maintenance, safety. Storm water Drainage Systems: Drainage layouts, storm runoff estimation, hydraulics of flow in storm water drains, materials, cross sections, design of storm water drainage systems, inlets, storm water pumping, operation and maintenance**: (10 Hours)**

Module III: Physico-Chemical Processes for wastewater treatment.
Water purification in natural systems, physical processes, chemical processes and biological processes. Primary, secondary and tertiary treatment. Unit operations, unit processes. Aeration and gas transfer. Sedimentation, different types of settling, sedimentation tank design. Coagulation and flocculation, coagulation processes, stability of colloids, destabilization of colloids, destabilization in water and wastewater treatment, transport of colloidal particles, design aspects**: (5 Hours)**

Module IV: Biological processes for contaminant removal

Characterization of waste. Aerobic, anaerobic and anoxic systems. Suspended and attached growth biological systems. Activated Sludge processand process modifications, Process design considerations, Treatment Ponds and aerated Lagoons, aerobic pond, facultative pond, anaerobic ponds, polishing ponds, constructed wet lands etc. Attached Growth Biological Treatment Systems, Trickling Filters, Rotating Biological Contactors, Activated Biofilters, Moving bed biological reactor (MBBR), Sequential Batch reactors (SBR), Membrane Biological Reactors (MBR) etc. Anaerobic processes, Process fundamentals, Standard, high rate and hybrid reactors, Anaerobic filters, Expanded /fluidized bed reactors, Upflow anaerobic sludge blanket reactors, Performance and design aspects, Expanded granular bed reactors, Two stage/phase anaerobic reactors. Sludge Digestion, anaerobic digestion, aerobic digestion**: (10 Hours)**

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Introduction to Environmental Engineering and Science by Gilbert Masters, Prentice Hall, New Jersey.
- Introduction to Environmental Engineering by P. Aarne Vesilind, Susan M. Morgan, Thompson /Brooks/Cole; Second Edition 2008.
- Peavy, H.s, Rowe, D.R, Tchobanoglous, G. *Environmental Engineering*, Mc-Graw - Hill International Editions, New York 1985.
- MetCalf and Eddy. Wastewater Engineering, Treatment, Disposal and Reuse, Tata McGraw-Hill, New Delhi.
- Manual on Water Supply and Treatment. Ministry of Urban Development, New Delhi.
- Plumbing Engineering. Theory, Design and Practice, S.M. Patil, 1999
- Integrated Solid Waste Management, Tchobanoglous, Theissen & Vigil. McGraw Hill Publication
- Manual on Sewerage and Sewage Treatment Systems, Part A, B and C. Central Public Health and Environmental Engineering Organization, Ministry of Urban Development.

I. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	Fundamental theory underlying the unit processes utilized in the treatment of water for domestic usage	Lecture	CIV603.1	Mid Term-1, Quiz & End Sem Exam

2	Fundamental theory underlying the unit processes utilized in the treatment of water for industrial usage	Lecture	CIV603.1	Mid Term-1, Quiz & End Sem Exam
3	treatment of domestic and industrial wastewaters	Lecture	CIV603.1	Mid Term-1, Quiz & End Sem Exam
4	*treatment of domestic and industrial wastewaters*	Lecture	CIV603.1	Mid Term-1, Quiz & End Sem Exam
5	Sanitary Sewerage Systems	Lecture	CIV603.2	Mid Term-1, Quiz & End Sem Exam
6	Flow estimation, sewer materials	Lecture	CIV603.2	Mid Term-1, Quiz & End Sem Exam
7	hydraulics of flow in sewers, sewer lay out	Lecture	CIV603.2	Mid Term-1, Quiz & End Sem Exam
8	sewer transitions, materials for sewers	Lecture	CIV603.2	Mid Term-1, Quiz & End Sem Exam
9	appurtenances, manholes	Lecture	CIV603.2	Mid Term-1, Quiz & End Sem Exam
10	sewer design, conventional and model based design	Lecture	CIV603.2	Mid Term-1, Quiz & End Sem Exam
11	sewage pumps and pumping stations	Lecture	CIV603.2	Mid Term-1, Quiz & End Sem Exam
12	corrosion prevention, operation and maintenance	Lecture	CIV603.2	Mid Term-1, Quiz & End Sem Exam
13	Storm water Drainage Systems: Drainage layouts, storm runoff estimation	Lecture	CIV603.2	Mid Term-1, Quiz & End Sem Exam
14	hydraulics of flow in storm water drains, materials, cross sections	Lecture	CIV603.2	Mid Term-1, Quiz & End Sem Exam
15	design of storm water drainage systems, inlets, storm water pumping, operation and maintenance	Lecture	CIV603.3	Mid Term-1, Quiz & End Sem Exam
16	Water purification in natural systems	Lecture	CIV603.3	Mid Term-1, Quiz & End Sem Exam
17	physical processes, chemical processes and biological processes	Lecture	CIV603.3	Mid Term-1, Quiz & End Sem Exam
18	Primary, secondary and tertiary treatment	Lecture	CIV603.3	Mid Term-1, Quiz & End Sem Exam
19	Unit operations, unit processes. Aeration and gas transfer	Lecture	CIV603.3	Mid Term-1, Quiz & End Sem Exam
20	Sedimentation, different types of settling,	Lecture	CIV603.3	Mid Term-1, Quiz & End Sem Exam

	sedimentation tank design			
21	Coagulation and flocculation, coagulation processes	Lecture	CIV603.3	Assignment, Quiz & End Sem Exam
22	stability of colloids, destabilization of colloids,	Lecture	CIV603.3	Assignment, Quiz & End Sem Exam
23	destabilization in water and wastewater treatment	Lecture	CIV603.3	Assignment, Quiz & End Sem Exam
24	transport of colloidal particles, design aspects**:**	Lecture	CIV603.3	Assignment, Quiz & End Sem Exam
25	Characterization of waste. Aerobic, anaerobic and anoxic systems	Lecture	CIV603.4	Assignment, Quiz & End Sem Exam
26	Suspended and attached growth biological systems. Activated Sludge processand process modifications, Process design considerations	Lecture	CIV603.4	Assignment, Quiz & End Sem Exam
27	Treatment Ponds and aerated Lagoons, aerobic pond	Lecture	CIV603.4	Assignment, Quiz & End Sem Exam
28	facultative pond, anaerobic ponds, polishing ponds	Lecture	CIV603.4	Assignment, Quiz & End Sem Exam
29	constructed wet lands etc. Attached Growth Biological Treatment Systems	Lecture	CIV603.4	Assignment, Quiz & End Sem Exam
30	Trickling Filters	Lecture	CIV603.4	Assignment, Quiz & End Sem Exam
31	Rotating Biological Contactors	Lecture	CIV603.4	Assignment, Quiz & End Sem Exam
32	Activated Biofilters, Moving bed biological reactor (MBBR)	Lecture	CIV603.4	Assignment, Quiz & End Sem Exam
33	quential Batch reactors (SBR), Membrane Biological Reactors (MBR)	Lecture	CIV603.4	Assignment, Quiz & End Sem Exam
34	Anaerobic processes, Process fundamentals, Standard, high rate and hybrid reactors, Anaerobic filters, Expanded /fluidized bed reactors	Lecture	CIV603.4	Assignment, Quiz & End Sem Exam
35	Upflow anaerobic sludge blanket reactors, Performance and design aspects, Expanded granular bed reactors	Lecture	CIV603.4	Assignment, Quiz & End Sem Exam
36	Two stage/phase anaerobic	Lecture	CIV603.4	Assignment, Quiz

	reactors. Sludge Digestion, anaerobic digestion, aerobic digestion			& End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV603.1.	Know about sewerage system and its drainage.	3	3	2	3	2	**-**	**2**	**1**	1	**-**	2	3	3	3	2
CIV603.2.	Implement technology related with purification of waste water according to IS parameters and low cost sanitation systems.	3	1	2	3	2	**-**	**2**	**1**	1	**-**	3	3	1	3	2
CIV603.3.	Understand various fundamental scientific processes underlying the design and operation of waste water treatment plants.	3	2	2	3	2	**-**	**2**	**1**	1	**-**	3	3	1	2	2
CIV603.4.	Understand chemical and biological principles behind unit processes used in waste water treatment unit processes.	3	2	2	**1**	2	**-**	**2**	**3**	3	**-**	2	3	3	1	2

Sample Question Paper

<table>
<tr><td colspan="7">Amity School of Engineering and Technology
Department of Civil Engineering
I MID-SEMESTER (SEM–VI) 2021-22</td></tr>
<tr><td colspan="7">Class: B.Tech.(CE) VI Semester</td></tr>
<tr><td colspan="2">Subject Name:
CIV 603 ENVIRONMENTAL ENGINEERING - II</td><td colspan="3">Time: 2 Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3</td><td>Q.4</td><td>Q.2,5,6</td><td></td><td></td></tr>
<tr><td colspan="7">Student will be able to
CO1: Know about sewerage system and its drainage.
CO2: Implement technology related with purification of waste water according to IS parameters and low cost sanitation systems.</td></tr>
</table>

CO Map	Question No.	Question	Marks
CO1	Q.1	How will you estimate storm water flow? Explain it	3
CO1	Q.2a	Enlist different methods used for population forecast. Explain Any one in detail	3
	Q.2b	Classify the legal requirements and standards regarding treatment of sewage.	3
CO1	Q.3	Enlist the different types of pipes used for water supply. And explain cast iron Pipe in detail State the requirement of good disinfectant	6
CO2	Q.4	What is optimum dose of coagulant? How it is determined?	3
CO2	Q.5a	Define the following terms: (1) prechlorination (2) post chlorination (3) super chlorination (4) double chlorination (5) de chlorination	3
	Q.5b	Discuss the Environmental Legislation requirements while planning sewerage system	3
CO2	Q6	Write a short note on rapid sand filter	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2

Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	CIV602 GEOMETRIC DESIGN OF HIGHWAYS						
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A+	10	3	3
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A+	10	3	3
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	B+	7	3	3
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A	9	3	3
5	A60215819005	Mr YASH YOGI	100	30	70	A	9	3	3

Total No. of Students	=	5	
Total No. of Students	>60% marks	4	80.00 %
Attainment Level			Level 3

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course :   ESTIMATING AND COSTING
Course Code : CIV604,   Crédits : 02 Session :2021-22 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name \ Dr. Ripunjoy Gogoi, Dr. P. Mahakavi

A. ***Introduction:*** This main objective is to develop in the student the art and skill whereby a monetary value can be placed on the volume of work previously measured. To develop an awareness of those factors that affect the cost of construction work and to analyze the influences that effect change in these factors. To encourage the habit of systematically recording all those statistics which are the stock in trade of the good estimator.

B. **Course Outcomes:**At the end of the course, students will be able to:

CIV604.1. Have an idea of Economics in general, Economics of India particularly for public sector agencies and private sector businesses

CIV604.2. Perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives.

CIV604.3. Quantify the worth of a structure by evaluating quantities of constituents, derive their cost rates and build up the overall cost of the structure.

CIV604.4.Understand how competitive bidding works and how to submit a competitive bid proposal.

C. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves	A	5%

	includingmedicalleaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: (5 Hours)

Basic Principles and Methodology of Economics. Demand/Supply – elasticity – Government Policies and Application. Theory of the Firm and Market Structure. Basic Macro-economic Concepts (including GDP/GNP/NI/Disposable Income) and Identities for both closed and open economies. Aggregate demand and Supply (IS/LM). Price Indices (WPI/CPI), Interest rates, Direct and Indirect Taxes

Module II: (5 Hours)

Public Sector Economics –Welfare, Externalities, Labour Market. Components of Monetary and Financial System, Central Bank –Monetary Aggregates; Commercial Banks & their functions; Capital and Debt Markets. Monetary and Fiscal Policy Tools & their impact on the economy – Inflation and Phillips Curve. Indian economy - Brief overview of post-independence period – plans. Post reform Growth, Structure of productive activity. Issues of Inclusion – Sectors, States/Regions, Groups of people (M/F), Urbanization. Employment–Informal, Organized, Unorganized, Public, Private. Challenges and Policy Debates in Monetary, Fiscal, Social, External sectors.

Module III: (10 Hours)

Estimation / Measurements for various items- Introduction to the process of Estimation; Use of relevant Indian Standard Specifications for the same, taking out quantities from the given requirements of the work, comparison of different alternatives, Bar bending schedules, Mass haul Diagrams, Estimating Earthwork and Foundations, Estimating Concrete and Masonry, Finishes, Interiors, MEP works; BIM and quantity take-offs; adding equipment costs; labour costs; rate analysis;

Module IV: (10 Hours)

Specifications-Types, requirements and importance, detailed specifications for buildings, roads, minor bridges and industrial structures. Rate analysis-Purpose, importance and necessity of the same, factors affecting, task work, daily output from different equipment/ productivity. Tender-Preparation of tender documents, importance of inviting tenders, contract types, relative merits, prequalification. general and special conditions, termination of contracts, extra work and Changes, penalty and liquidated charges, Settlement of disputes, R.A. Bill & Final Bill, Payment of advance, insurance, claims, price variation, etc. Preparing Bids- Bid Price buildup: Material, Labour, Equipment costs, Risks, Direct & Indirect Overheads, Profits; Bid conditions, alternative specifications; Alternative Bids. Bid process Management Introduction to Acts pertaining to-Minimum wages, Workman's compensation, Contracts, Arbitration, Easement rights.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Mankiw Gregory N. (2002), *Principles of Economics,* Thompson Asia
- V. Mote, S. Paul, G. Gupta(2004), *Managerial Economics,* Tata McGraw Hill
- Misra, S.K. and Puri (2009), *Indian Economy,* Himalaya
- Pareek Saroj (2003), *Textbook of Business Economics,* Sunrise Publishers
- M Chakravarty, Estimating, Costing Specifications & Valuation
- Joy P K, Handbook of Construction Management, Macmillan
- B.S. Patil, Building & Engineering Contracts
- Relevant Indian Standard Specifications.
- World Bank Approved Contract Documents.
- FIDIC Contract Conditions.
- Acts Related to Minimum Wages, Workmen's Compensation, Contract, and Arbitration
- Typical PWD Rate Analysis documents.
- UBS Publishers & Distributors, Estimating and Costing in Civil Engineering: Theory and Practice including Specification and Valuations,2016
- Dutta, B.N., Estimating and Costing in Civil Engineering (Theory & Practice), UBS Publishers, 2016

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Basic Principles and Methodology of Economics	Lecture	CIV604.1	Mid Term-1, Quiz & End Sem Exam
2	Demand/Supply – elasticity – Government Policies and Application	Lecture	CIV604.1	Mid Term-1, Quiz & End Sem Exam
3	Basic Macro-economic Concepts (including GDP/GNP/NI/Disposable Income)	Lecture	CIV604.1	Mid Term-1, Quiz & End Sem Exam
4	*Identities for both closed and open economies. Aggregate demand and Supply (IS/LM)*	Lecture	CIV604.1	Mid Term-1, Quiz & End Sem Exam
5	Price Indices (WPI/CPI), Interest rates, Direct and Indirect Taxes	Lecture	CIV604.1	Mid Term-1, Quiz & End Sem Exam
6	Public Sector Economics – Welfare, Externalities,	Lecture	CIV604.2	Mid Term-1, Quiz & End Sem Exam

	Labour Market. Components of Monetary and Financial System,			
7	Central Bank –Monetary Aggregates; Commercial Banks & their functions; Capital and Debt Markets. Monetary and Fiscal Policy Tools & their impact on the economy	Lecture	CIV604.2	Mid Term-1, Quiz & End Sem Exam
8	Inflation and Phillips Curve. Indian economy	Lecture	CIV604.2	Mid Term-1, Quiz & End Sem Exam
9	- Brief overview of post-independence period	Lecture	CIV604.2	Mid Term-1, Quiz & End Sem Exam
10	plans. Post reform Growth, Structure of productive activity. Issues of Inclusion	Lecture	CIV604.2	Mid Term-1, Quiz & End Sem Exam
11	Sectors, States/Regions, Groups of people (M/F), Urbanization. Employment	Lecture	CIV604.2	Mid Term-1, Quiz & End Sem Exam
12	Informal, Organized, Unorganized, Public, Private	Lecture	CIV604.2	Mid Term-1, Quiz & End Sem Exam
13	Challenges and Policy Debates in Monetary, Fiscal, Social, External sectors	Lecture	CIV604.2	Mid Term-1, Quiz & End Sem Exam
14	Estimation / Measurements for various items- Introduction to the process of Estimation	Lecture	CIV604.3	Mid Term-1, Quiz & End Sem Exam
15	Use of relevant Indian Standard Specifications for the same, taking out quantities from the given requirements of the work	Lecture	CIV604.3	Mid Term-1, Quiz & End Sem Exam
16	comparison of different alternatives, Bar bending schedules, Mass haul Diagrams	Lecture	CIV604.3	Mid Term-1, Quiz & End Sem Exam
17	Estimating Earthwork and Foundations	Lecture	CIV604.3	Mid Term-1, Quiz & End Sem Exam
18	Estimating Concrete and Masonry, Finishes, Interiors	Lecture	CIV604.3	Mid Term-1, Quiz & End Sem Exam
19	MEP works; BIM and quantity take-offs	Lecture	CIV604.3	Mid Term-1, Quiz & End Sem Exam
20	adding equipment costs; labour costs; rate analysis	Lecture	CIV604.3	Mid Term-1, Quiz & End Sem Exam
21	Specifications-Types,	Lecture	CIV604.4	Assignment, Quiz

	requirements and importance, detailed specifications for buildings, roads, minor bridges and industrial structures. Rate analysis-Purpose, importance and necessity of the same, factors affecting, task work, daily output from different equipment/ productivity			& End Sem Exam
22	Tender- Preparation of tender documents, importance of inviting tenders, contract types, relative merits, prequalification. general and special conditions	Lecture	CIV604.4	Assignment, Quiz & End Sem Exam
23	termination of contracts, extra work and Changes, penalty and liquidated charges, Settlement of disputes, R.A. Bill & Final Bill, Payment of advance, insurance, claims, price variation, etc. Preparing Bids- Bid Price buildup: Material, Labour, Equipment costs, Risks, Direct & Indirect Overheads	Lecture	CIV604.4	Assignment, Quiz & End Sem Exam
24	Profits; Bid conditions, alternative specifications; Alternative Bids. Bid process Management Introduction to Acts pertaining to-Minimum wages, Workman's compensation, Contracts, Arbitration, Easement rights.	Lecture	CIV604.4	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES	CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV604.1.	Have an idea of Economics in general, Economics of India particularly for public sector agencies and private sector businesses	3	2	1	3	1	**2**		**3**	2	**3**	2	3	**1**	**2**	**3**
CIV604.2.	Be able to perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives.	3	2	3	-	2	**2**	**-**	**3**	2	**3**	2	3	**3**	**1**	**1**
CIV604.3.	Quantify the worth of a structure by evaluating quantities of constituents, derive their cost rates and build up the overall cost of the structure.	3	2	1	2	-	**2**	**2**	**3**	-	**-**	2	3	**3**	**2**	**3**
CIV604.4.	*Understand how competitive bidding works and how to submit a competitive bid proposal*	3	2	1	3	1	**2**	**-**	**3**	2	**3**	2	3	**1**	**2**	**3**

<u>Sample Question Paper</u>

Amity School of Engineering and Technology
Department of Civil Engineering
I MID-SEMESTER (SEM–VI) 2021-22

Class: B.Tech.(CE) VI Semester						
Subject Name: CIV 604 ESTIMATING AND COSTING		Time: 2 Hrs			Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: Have an idea of Economics in general, Economics of India particularly for public sector agencies and private sector businesses

CO2: Perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives.

CO Map	Question No.	Question	Marks
CO1	Q.1	List the types of estimate.	3
CO1	Q.2a	What is a detailed estimate?	3
	Q.2b	What are the different types of Approximate Estimate?	3
CO1	Q.3	Identify the recommendations for degree of accuracy on measurements. Determine the methods to be adopted to calculate volume.	6
CO2	Q.4	Generalize the duties of quantity surveyor.	3
CO2	Q.5a	State the unit of measurements for earth work, D.P.C and brick	3
	Q.5b	Identify various types of paneled and glazed doors.	3
CO2	Q6	Mention the units of measurement for Steel reinforcement, plastering, flooring and painting.	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	CIV604 ESTIMATING AND COSTING Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A+	10	2	2
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A+	10	2	2
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	B+	7	2	2
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A	9	2	2
5	A60215819005	Mr YASH YOGI	100	30	70	B	6	2	2
			Total No. of Students			=	5		
			Total No. of Students			>60% marks	3	60.00	%
			Attainment Level					Level 1	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : GEOMETRIC DESIGN OF HIGHWAYS LAB
Course Code : CIV622, Crédits : 01, Session :2021-22 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Ripunjoy Gogoi, Dr. P. Mahakavi

A. ***Introduction:*** *The objective of this course is to learn and practice* of computer-aided design (CAD) software in the context of highway alignments. The roadway-design software used is that favored by the Texas Department of Transportation (TxDOT) & many others is GEOPAK. This software runs through MicroStation (a common CAD package).

B. **Course Outcomes:**At the end of the course, students will be able to:

CIV622.1*. U*se the features of MicroStation, GEOPAK, and engineering judgment to design one side of a grade-separated, Two-Quadrant, Partial Cloverleaf A Interchange as depicted in AASHTO 2004.

CIV622.2. Learn to work on a team and make effective project presentations and recognize the value of interactions with other professional disciplines.

C. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

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PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

- **List of experiments/demonstrations:**
- **Lab 1:** Introduction to MicroStation - Learn the basics of MicroStation required to operate GEOPAK. **(1 Hour)**
- **Lab 2:** Leg Centerline and Lanes using MicroStation - Learn the basics of MicroStation required to operate GEOPAK by drawing a simple leg centerline and lanes. **(1 Hour)**
- **Lab 3:** Areas & Dimensioning using MicroStation - Learn the concepts of points, lines, direction, distance, traverse, bearing and distance, Northing and Easting, dimensioning, and area measurement. **(1 Hour)**
- **Lab 4:** Pavement Edge Design using a Simple Arc with & without a Taper using MicroStation - Learn pavement edge design & vehicle off-tracking concepts using IGIDS-created vehicle turn template. Observe the reduction in circular arc radius and area when a taper section is added. **(1 Hour)**
- **Lab 5:** Horizontal Circular Curve using GEOPAK - Learn how to place a horizontal circular curve using GEOPAK. **(1 Hour)**
- **Lab 6:** Performing Lab 2 (Leg Centerline & Lanes) using GEOPAK - Learn horizontal alignment design using GEOPAK. **(1 Hour)**
- **Lab 7:** Define Superelevation Runoff using GEOPAK - Learn superelevation runoff design using GEOPAK. **(1 Hour)**
- **Lab 8:** Define a Spiral Curve using GEOPAK - Learn spiral curve design using GEOPAK. **(2 Hour)**
- **Lab 9:** Define a Vertical Profile using GEOPAK - Learn vertical alignment design using GEOPAK **(2 Hour)**.
- **Lab 10**: Design Project Part 1 - Define the Vertical Alignment for Road 2000 over the Freeway using GEOPAK**(2 Hour)**
- **Lab 11:** Design Project Part 2 - Design the Intersection Channelization of the Grade-Separated, Two-Quadrant, Partial Cloverleaf A Interchange using MicroStatio. **(2 Hour)**

- **Lab 12:** Design Project Part 3 - Design the Freeway Entrance Ramp of the Grade-Separated, Two-Quadrant, Partial Cloverleaf A Interchange using GEOPAK **(2 Hour)**
- **Lab 13:** Design Project Part 4 - Design the Freeway Exit Ramp of the Grade-Separated, Two-Quadrant, Partial Cloverleaf A Interchange using GEOPAK **(2 Hour)**
- **Lab 14:** Design Project Part 5 - Define the Superelevation & Complete the Grade-Separated, Two-Quadrant, Partial Cloverleaf A Interchange using MicroStation and GEOPAK **(2 Hour)**

G. Examination Scheme:

IA			EE			
A	**PR**	**Practical Based Test**	**Major Experiment**	**Minor Experimen t**	**LR**	**Viva**
5	10	15	35	15	10	10

Note: IA –InternalAssessment, EE- External Exam, A- Attendance PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Text/Reference Books:

- Khanna, S.K., Justo, C.E.G and Veeraragavan, A, 'Highway Engineering', Revised 10th Edition, Nem Chand & Bros, 2017
- Kadiyalai, L.R., ' Traffic Engineering and Transport Planning', Khanna Publishers.
- Partha Chakraborty, ' Principles Of Transportation Engineering, PHI Learning, Tomlinson
- Fred L. Mannering, Scott S. Washburn, Walter P. Kilareski,'Principles of Highway Engineering and Traffic Analysis', 4th Edition, John Wiley
- Srinivasa Kumar, R, Textbook of Highway Engineering, Universities Press, 2011.
- Paul H. Wright and Karen K. Dixon, Highway Engineering, 7th Edition, Wiley Student Edition, 2009.

I. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	**Lab 1:** Introduction to MicroStation - Learn the basics of MicroStation required to operate GEOPAK	Lecture	CIV622.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
2	**Lab 2:** Leg Centerline and Lanes using MicroStation - Learn the basics of MicroStation required to operate GEOPAK by drawing a simple leg centerline and lanes.	Lecture	CIV622.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
3	**Lab 3:** Areas &	Lecture	CIV622.1	Internal

	Dimensioning using MicroStation - Learn the concepts of points, lines, direction, distance, traverse, bearing and distance, Northing and Easting, dimensioning, and area measurement			Assessment, Lab Record, Quiz and End Sem Exam
4	*Pavement Edge Design using a Simple Arc with & without a Taper using MicroStation - Learn pavement edge design & vehicle off-tracking concepts using IGIDS-created vehicle turn template. Observe the reduction in circular arc radius and area when a taper section is added.*	Lecture	CIV622.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
5	Horizontal Circular Curve using GEOPAK - Learn how to place a horizontal circular curve using GEOPAK	Lecture	CIV622.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
6	Performing Lab 2 (Leg Centerline & Lanes) using GEOPAK - Learn horizontal alignment design using GEOPAK	Lecture	CIV622.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
7	Define Superelevation Runoff using GEOPAK - Learn superelevation runoff design using GEOPAK	Lecture	CIV622.2	Mid Term-1, Quiz & End Sem Exam
8	Define a Spiral Curve using GEOPAK - Learn spiral curve design using GEOPAK. Define a Vertical Profile using GEOPAK - Learn vertical alignment design using GEOPAK	Lecture	CIV622.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
9	Design Project Part 1 - Define the Vertical Alignment for Road 2000 over the Freeway using GEOPAK	Lecture	CIV622.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
10	Design Project Part 2 & 3 - Design the Intersection Channelization of the Grade-Separated, Two-Quadrant, Partial	Lecture	CIV622.2	Internal Assessment, Lab Record, Quiz and End Sem Exam

	Cloverleaf A Interchange using MicroStatio			
11	Design Project Part 4 - Design the Freeway Exit Ramp of the Grade-Separated, Two-Quadrant, Partial Cloverleaf A Interchange using GEOPAK	Lecture	CIV622.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
12	Design Project Part 5 - Define the Superelevation & Complete the Grade-Separated, Two-Quadrant, Partial Cloverleaf A Interchange using MicroStation and GEOPAK	Lecture	CIV622.2	Internal Assessment, Lab Record, Quiz and End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV622.1	Use the features of MicroStation, GEOPAK, and engineering judgment to design one side of a grade-separated, Two-Quadrant, Partial Cloverleaf A Interchange as depicted in AASHTO 2004.	3	3	1	3	1	**2**			2		2	1	**1**	**1**	**3**
CIV622.2	Learn to work on a team and make effective project presentations and recognize the value of interactions with other professional disciplines.	3	2	2	3	2				2	**2**	1	3	**3**	**2**	**3**

Sample Question Paper

<table>
<tr><td colspan="7">Amity School of Engineering and Technology
Department of Civil Engineering
I MID-SEMESTER (SEM–VI) 2021-22</td></tr>
<tr><td colspan="7">Class: B.Tech.(CE) VI Semester</td></tr>
<tr><td colspan="2">Subject Name:
CIV 622 GEOMETRIC DESIGN OF HIGHWAYS LAB</td><td colspan="3">Time: 2 Hrs</td><td colspan="2">Max.Marks:30</td></tr>
<tr><td>Levels of the questions as per Blooms Taxonomy</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td></tr>
<tr><td>Question Mapping</td><td>Q.1,4</td><td>Q.2,3</td><td>Q.4</td><td>Q.2,5,6</td><td></td><td></td></tr>
<tr><td colspan="7">Student will be able to
CO1: Use the features of MicroStation, GEOPAK, and engineering judgment to design one side of a grade-separated, Two-Quadrant, Partial Cloverleaf A Interchange as depicted in AASHTO 2004.
CO2: Learn to work on a team and make effective project presentations and recognize the value of interactions with other professional disciplines.</td></tr>
</table>

<table>
<tr><th>CO Map</th><th>Question No.</th><th>Question</th><th>Marks</th></tr>
<tr><td>CO1</td><td>Q.1</td><td>What is mean by geometric design?</td><td>3</td></tr>
<tr><td rowspan="2">CO1</td><td>Q.2a</td><td>What are the elements in geometric design?</td><td>3</td></tr>
<tr><td>Q.2b</td><td>What are the design factors are allowed in geometric design?</td><td>3</td></tr>
<tr><td>CO1</td><td>Q.3</td><td>What is meant by centrifugal ratio and effects of ratio?</td><td>6</td></tr>
<tr><td>CO2</td><td>Q.4</td><td>What are the categories allowed in gradients?</td><td>3</td></tr>
<tr><td rowspan="2">CO2</td><td>Q.5a</td><td>What are the factors considered in horizontal alignment?</td><td>3</td></tr>
<tr><td>Q.5b</td><td>Define the formula for centrifugal force?</td><td>3</td></tr>
<tr><td>CO2</td><td>Q6</td><td>Define design speed.
Define gradient.</td><td>6</td></tr>
</table>

Attainments	**Rubric**

Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	**Enrollment.No.**	**Student's Name**	**CIV622 GEOMETRIC DESIGN OF HIGHWAYS LAB**							
			Max Marks	**CE Weight Age (%)**	**ET Weight Age (%)**	**GO**	**GP**	**ACU**	**ECU**	**U9G9**
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A+	10	1	1	10
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A+	10	1	1	10
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	A	9	1	1	9
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A+	10	1	1	10
5	A60215819005	Mr YASH YOGI	100	30	70	A-	8	1	1	8
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	5	100	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : ENVIRONMENTAL ENGINEERING – II LAB
Course Code : CIV623, Crédits : 01, Session :2021-22 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia

A. Introduction: The objective of this course is to *understand various types of chemicals that contaminates water. Student will learn how the level of water contamination could be found out*.

B. Course Outcomes: At the end of the course, students will be able to:

CIV623.1. *Determine different parameters of water and waste water.*

CIV623.2. *Examine biochemical oxygen demand and chemical oxygen demand of given samples.*

CIV623.3. *Understand the technologies required for domestic and industrial wastewater treatment*

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

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PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

- Determination of solids (total, dissolved, organic, inorganic and settle able) in water **(2 hours)**
- Determination of turbidity and the optimum coagulant dose **(2 hours)**
- Determination of alkalinity and pH of water **(2 hours)**
- Determination of hardness and chlorides in water **(2 hours)**

- Determination of iron and manganese in water **(2 hours)**
- Determination of sulphates and sulphides in water **(2 hours)**
- Determination of D.O and B.O.D of waste water**(2 hours)**
- Determination of available chlorine in bleaching powder and the chlorine dose required to treat the given water sample **(2 hours)**
- Determination of coliforms in water **(2 hours)**
- Demonstration of Instrumental methods of pollutant analysis **(2 hours)**

G. Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Text/Reference Books:

- Standard method for the examination of water and waste water, 2005, APHA, AWWA, WPCF Publication

I. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	Determination of solids (total, dissolved, organic, inorganic and settle able) in water	Lecture	CIV623.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
2	Determination of turbidity and the optimum coagulant dose	Lecture	CIV623.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
3	Determination of alkalinity and pH of water	Lecture	CIV623.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
4	*Determination of hardness and chlorides in water*	Lecture	CIV623.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
5	Determination of iron and manganese in water	Lecture	CIV623.2	Internal Assessment, Lab

				Record, Quiz and End Sem Exam
6	Determination of sulphates and sulphides in water	Lecture	CIV623.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
7	Determination of D.O and B.O.D of waste water	Lecture	CIV623.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
8	Determination of D.O and B.O.D of waste water	Lecture	CIV623.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
9	Determination of available chlorine in bleaching powder and the chlorine dose required to treat the given water sample	Lecture	CIV623.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
10	Determination of available chlorine in bleaching powder and the chlorine dose required to treat the given water sample	Lecture	CIV623.3	Internal Assessment, Lab Record, Quiz and End Sem Exam
11	Determination of coliforms in water	Lecture	CIV623.3	Internal Assessment, Lab Record, Quiz and End Sem Exam
12	Demonstration of Instrumental methods of pollutant analysis	Lecture	CIV623.3	Internal Assessment, Lab Record, Quiz and End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV623.1.	Determine different parameters of water and waste water.	3	3	1	3	1	**2**	**3**		2		**3**	1	**3**	**2**	**1**

CIV623.2.	Examine biochemical oxygen demand and chemical oxygen demand of given samples.	3	3	1	3	1	**2**			2		2	1	**1**	**1**	**3**
CIV623.3.	Understand the technologies required for domestic and industrial wastewater treatment	3	2	2	3	2				2	**2**	1	3	**3**	**2**	**3**

Sample Question Paper

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I MID-SEMESTER (SEM–VI) 2021-22</td></tr>
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<tr><td colspan="7">Student will be able to
CO1: Determine different parameters of water and waste water.
CO2: Examine biochemical oxygen demand and chemical oxygen demand of given samples.</td></tr>
</table>

CO Map	Question No.	Question	Marks
CO1	Q.1	State the five parameters of effluent standards for sewage disposal into inland surface water bodies.	3

CO1	Q.2a	Name sewage characteristics with which organic matter concentration is expressed.	3
	Q.2b	List the factors influencing the fixing of Design period.	3
CO1	Q.3	List out the effluent standards for any four parameters recommended by the pollution control board.	6
CO2	Q.4	Differentiate between dry weather flow and wet weather flow.	3
CO2	Q.5a	Differentiate sewage flow and storm water run-off	3
	Q.5b	Draw the BOD demand curve.	3
CO2	Q6	Illustrate the different factors which affect the characteristics of sewage.	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
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S. No.	Enrollment.No.	Student's Name	CIV623 ENVIRONMENTAL ENGINEERING – II LAB							
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			Total No. of Students			=	5			
			Total No. of Students			>60% marks	5	100.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : ESTIMATING AND COSTING LAB
Course Code : CIV624, Crédits : 01, Session :2021-22 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Mohan Kantharia, Dr. Imran Ahmad Khan, Dr. P. Mahakavi,

A. **Introduction:** The main objective is to develop in the student the art and skill whereby a monetary value can be placed on the volume of work previously measured. To develop an awareness of those factors that affect the cost of construction work and to analyze the influences that effect change in these factors. To encourage the habit of systematically recording all those statistics which are the stock in trade of the good estimator..

B. **Course Outcomes:**At the end of the course, students will be able to:
CIV624.1. Understand the technical specifications for various works to be performed for a project and how they impact the cost of a structure.
CIV624.2. Quantify the worth of a structure by evaluating quantities of constituents, derive their cost rates and build up the overall cost of the structure.

C. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

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PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

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PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

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D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

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End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

a. Deriving an approximate estimate for a multistoried building by approximate methods.(3 hours)
b. Detailed estimate for the following with the required material survey for the same. (5 hours)
    1. Ground plus three storied RCC Framed structure building with blockwork walls
    2. bridge with minimum 2 spans
    3. factory building
    4. road work
    5. cross drainage work
    6. Ground plus three storied building with load-bearing walls
    7. Cost of finishes, MEP works for (f) above
c. Preparation of valuation report in standard Government form. (3 hours)
d. Assignments on rate analysis, specifications and simple estimates. (3 hours)
e. Detailed estimate of minor structure. (3 hours)
f. Preparation of Bar bending schedule. (3 hours)

G. Examination Scheme:

IA			EE			
A	**PR**	**Practical Based Test**	**Major Experiment**	**Minor Experiment**	**LR**	**Viva**
5	10	15	35	15	10	10

Note: IA –InternalAssessment, EE- External Exam, A- Attendance PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Text/Reference Books:

- Mankiw Gregory N. (2002), *Principles of Economics,* Thompson Asia
- V. Mote, S. Paul, G. Gupta(2004), *Managerial Economics,* Tata McGraw Hill
- Misra, S.K. and Puri (2009), *Indian Economy,* Himalaya
- Pareek Saroj (2003), *Textbook of Business Economics,* Sunrise Publishers
- M Chakravarty, Estimating, Costing Specifications & Valuation
- Joy P K, Handbook of Construction Management, Macmillan
- B.S. Patil, Building & Engineering Contracts
- Relevant Indian Standard Specifications.
- World Bank Approved Contract Documents.
- FIDIC Contract Conditions.
- Acts Related to Minimum Wages, Workmen's Compensation, Contract, and Arbitration
- Typical PWD Rate Analysis documents.
- UBS Publishers & Distributors, Estimating and Costing in Civil Engineering: Theory and Practice including Specification and Valuations, 2016
- Dutta, B.N., Estimating and Costing in Civil Engineering (Theory & Practice), UBS Publishers, 2016

I. Lecture Plan

Lecture	Topics	Mode	Correspon	Mode of

		of Delivery	ding CO	Assessing CO
1	Deriving an approximate estimate for a multistoried building by approximate methods	Lecture	CIV624.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
2	Detailed estimate for the following with the required material survey for the same.	Lecture	CIV624.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
3	Ground plus three storied RCC Framed structure building with blockwork walls	Lecture	CIV624.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
4	bridge with minimum 2 spans	Lecture	CIV624.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
5	factory building	Lecture	CIV624.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
6	road work	Lecture	CIV624.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
7	cross drainage work	Lecture	CIV624.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
8	Ground plus three storied building with load-bearing walls	Lecture	CIV624.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
9	Cost of finishes, MEP works for (f) above	Lecture	CIV624.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
10	Preparation of valuation report in standard Government form	Lecture	CIV624.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
11	Assignments on rate analysis, specifications and simple estimates	Lecture	CIV624.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
12	Detailed estimate of minor structure & Preparation of	Lecture	CIV624.2	Internal Assessment, Lab

	Bar bending schedule			Record, Quiz and End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV624.1.	Understand the technical specifications for various works to be performed for a project and how they impact the cost of a structure.	3	3	1	3	1	**2**	**3**		2	**-**	2	3	**3**	**2**	**1**
CIV624.2.	Quantify the worth of a structure by evaluating quantities of constituents, derive their cost rates and build up the overall cost of the structure.	3	2	2	3	1	**2**	**3**		2	**2**	2	3	**3**	**2**	**3**

<u>Sample Question Paper</u>

<table>
<tr><td colspan="3">Amity School of Engineering and Technology
Department of Civil Engineering
I MID-SEMESTER (SEM–VI) 2021-22</td></tr>
<tr><td colspan="3">Class: B.Tech.(CE) VI Semester</td></tr>
<tr><td>Subject Name:
CIV 624 ESTIMATING AND COSTING LAB</td><td>Time: 2 Hrs</td><td>Max.Marks:30</td></tr>
</table>

Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: Understand the technical specifications for various works to be performed for a project and how they impact the cost of a structure.

CO2: Quantify the worth of a structure by evaluating quantities of constituents, derive their cost rates and build up the overall cost of the structure.

CO Map	Question No.	Question	Marks
CO1	Q.1	State the necessity of Administrative Approval and Technical Sanction.	3
CO1	Q.2a	State the circumstances under which Revised and Supplementary Estimate is prepared.	3
	Q.2b	Mention the unit of measurement for i) Skirting up to 150 mm height ii) Partition wall 100mm thick iii)Hand Railing iv)Woodwork for door frame.	3
CO1	Q.3	Explain the role and responsibility of estimator Prepare a check list of items of work in chronological order for construction of load bearing structure.	6
CO2	Q.4	Explain the rules for deduction of opening in masonry and plastering work as per I.S.1200.	3
CO2	Q.5a	Describe the procedure of preparing approximate estimate for road project.	3
	Q.5b	Explain the data required for preparation of detailed estimate.	3
CO2	Q6	Describe the long wall and short wall method of estimating with suitable example	6

Attainments		**Rubric**
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

S. No.	Enrollment.No.	Student's Name	CIV624 ESTIMATING AND COSTING LAB Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U14G14
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A+	10	1	1	10
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A+	10	1	1	10
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	A-	8	1	1	8
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A+	10	1	1	10
5	A60215819005	Mr YASH YOGI	100	30	70	A-	8	1	1	8

Total No. of Students	=	5		
Total No. of Students	>60% marks	5	100.00	%
Attainment Level			Level 3	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : Open Channel Flow
Course Code : CIV606, Crédits : 03, Session :2021-22 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. P. Mahakavi, Mr. Sachin Tiwari

A. Introduction: The main objective is to *introduce the students to various hydraulic engineering problems like open channel flows and hydraulic machines. At the completion of the course, the student should be able to relate the theory and practice of problems in hydraulic engineering*.

B. Course Outcomes: At the end of the course, students will be able to:
CIV606.1. calibrate various flow measuring devices in pipe and open channel flow.

CIV606.2. Understand their knowledge of fluid mechanics in addressing problems in open channels.
CIV606.3. classify the flow in open channel and various momentum principles in open channels

C. Programme Outcomes:
PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Introduction to Open Channel Flow-Comparison between open channel flow and pipe flow, geometrical parameters of a channel, classification of open channels, classification of open channel flow, Velocity Distribution of channel section**:(5 Hours)**

Module II: Uniform Flow-Continuity Equation, Energy Equation and Momentum Equation, Characteristics of uniform flow, Chezy's formula, Manning's formula. Factors affecting Manning's Roughness Coefficient "n_.*Most economical section of ch*annel. Computation of Uniform flow, Normal depth**:(10 Hours)**

Module III: Non-Uniform Flow- Specific energy, Specific energy curve, critical flow, discharge curve Specific force Specific depth, and Critical depth. Channel Transitions. Measurement of Discharge and Velocity – Venturi Flume, Standing Wave Flume, Parshall Flume, Broad Crested Weir. Measurement of Velocity- Current meter, Floats, Hot-wire anemometer. Gradually Varied Flow-Dynamic Equation of Gradually Varied Flow, Classification of channel bottom slopes, Classification of surface profile, Characteristics of surface profile. Computation of water surface profile by graphical, numerical and analytical approaches. Direct Step method, Graphical Integration method and Direct integration method**:(10 Hours)**

Module IV: Hydraulic Jump- Theory of hydraulic jump, Elements and characteristics of hydraulic jump in a rectangular Channel, length and height of jump, location of jump, Types,applications and location of hydraulic jump. Energy dissipation and other uses, surge as a moving hydraulic jump. Positive and negative surges. Dynamics of Fluid Flow- Momentum principle, applications: Force on plates, pipe bends, moments of momentum equation**:(5 Hours)**

G. Examination Scheme:

Components	HA	V/S/Q	CT	AT	ESE
Weightage (%)	7	8	10	5	70

H. Suggested Text/Reference Books:

- Hydraulics and Fluid Mechanics, P.M. Modi and S.M. Seth, Standard Book House
- Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill.
- Open channel Flow, K. Subramanya, Tata McGraw Hill.
- Open Channel Hydraulics, Ven Te Chow, Tata McGraw Hill.
- Burnside, C.D., "Electromagnetic Distance Measurement," Beekman Publishers, 1971.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction to Open Channel Flow-Comparison	Lecture	CIV606.1	Mid Term-1, Quiz & End Sem Exam
2	open channel flow and pipe flow, geometrical parameters of a channel	Lecture	CIV606.1	Mid Term-1, Quiz & End Sem Exam
3	classification of open channels, classification of open channel flow	Lecture	CIV606.1	Mid Term-1, Quiz & End Sem Exam
4	*Velocity Distribution of channel section*	Lecture	CIV606.1	Mid Term-1, Quiz & End Sem Exam
5	Uniform Flow-Continuity Equation, Energy Equation and Momentum Equation	Lecture	CIV606.1	Mid Term-1, Quiz & End Sem Exam
6	Characteristics of uniform flow, Chezy's formula, Manning's formula. Factors affecting Manning's Roughness Coefficient	Lecture	CIV606.1	Mid Term-1, Quiz & End Sem Exam
7	*Most economical section of ch*annel. Computation of Uniform flow, Normal depth	Lecture	CIV606.1	Mid Term-1, Quiz & End Sem Exam
8	Non-Uniform Flow- Specific energy	Lecture	CIV606.1	Mid Term-1, Quiz & End Sem Exam
9	Specific energy curve	Lecture	CIV606.1	Mid Term-1, Quiz & End Sem Exam
10	discharge curve Specific	Lecture	CIV606.1	Mid Term-1, Quiz & End Sem Exam
11	force Specific depth	Lecture	CIV606.1	Mid Term-1, Quiz & End Sem Exam

12	Critical depth. Channel Transitions	Lecture	CIV606.1	Mid Term-1, Quiz & End Sem Exam
13	Measurement of Discharge and Velocity	Lecture	CIV606.2	Mid Term-1, Quiz & End Sem Exam
14	Venturi Flume, Standing Wave Flume	Lecture	CIV606.2	Mid Term-1, Quiz & End Sem Exam
15	Parshall Flume, Broad Crested Weir	Lecture	CIV606.2	Mid Term-1, Quiz & End Sem Exam
16	Measurement of Velocity-Current meter	Lecture	CIV606.2	Mid Term-1, Quiz & End Sem Exam
17	Floats, Hot-wire anemometer	Lecture	CIV606.2	Mid Term-1, Quiz & End Sem Exam
18	Gradually Varied Flow-Dynamic Equation of Gradually Varied Flow	Lecture	CIV606.2	Mid Term-1, Quiz & End Sem Exam
19	Classification of channel bottom slopes	Lecture	CIV606.2	Mid Term-1, Quiz & End Sem Exam
20	Classification of surface profile	Lecture	CIV606.2	Mid Term-1, Quiz & End Sem Exam
21	Computation of water surface profile by graphical, numerical and analytical approaches	Lecture	CIV606.2	Assignment, Quiz & End Sem Exam
22	Direct Step method	Lecture	CIV606.2	Assignment, Quiz & End Sem Exam
23	Graphical Integration method	Lecture	CIV606.2	Assignment, Quiz & End Sem Exam
24	Direct integration method	Lecture	CIV606.2	Assignment, Quiz & End Sem Exam
25	Hydraulic Jump	Lecture	CIV606.3	Assignment, Quiz & End Sem Exam
26	Theory of hydraulic jump	Lecture	CIV606.3	Assignment, Quiz & End Sem Exam
27	Elements and characteristics of hydraulic jump	Lecture	CIV606.3	Assignment, Quiz & End Sem Exam
28	rectangular Channel, length	Lecture	CIV606.3	Assignment, Quiz & End Sem Exam
29	length and height of jump, location of jump	Lecture	CIV606.3	Assignment, Quiz & End Sem Exam
30	ypes,applications and location of hydraulic jump	Lecture	CIV606.3	Assignment, Quiz & End Sem Exam
31	surge as a moving hydraulic jump	Lecture	CIV606.3	Assignment, Quiz & End Sem Exam
32	Energy dissipation and other uses	Lecture	CIV606.3	Assignment, Quiz & End Sem Exam
33	Positive and negative surges	Lecture	CIV606.3	Assignment, Quiz & End Sem Exam
34	Dynamics of Fluid Flow	Lecture	CIV606.3	Assignment, Quiz

				& End Sem Exam
35	Momentum principle, applications	Lecture	CIV606.3	Assignment, Quiz & End Sem Exam
36	Force on plates, pipe bends, moments of momentum equation	Lecture	CIV606.3	Assignment, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV606.1.	calibrate various flow measuring devices in pipe and open channel flow.	3	2	2	3	1	**2**	**3**		2	**2**	2	3	**3**	**2**	**3**
CIV606.2.	Understand their knowledge of fluid mechanics in addressing problems in open channels.	3	3	1	3	1	**2**	**3**		2	**-**	2	3	**3**	**2**	**1**
CIV606.3.	classify the flow in open channel and various momentum principles in open channels	3	2	2	3	1	**2**	**3**		2	**2**	2	3	**3**	**2**	**3**

S. No.	Enrollment.No.	Student's Name	CIV606 OPEN CHANNEL FLOW						
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A+	10	3	3
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A+	10	3	3
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	B-	5	3	3
4	A60215819004	Ms RIYA NAMDEV	100	30	70	B	6	3	3
5	A60215819005	Mr YASH YOGI	100	30	70	C+	4	3	3
			Total No. of Students			=	5		
			Total No. of Students			>60% marks	2	40.00	%
			Attainment Level					-	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : OPEN CHANNEL FLOW LAB
Course Code : CIV626, Crédits : 01, Session :2021-22 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Mr. Sachin Tiwari

A. Introduction: The main objective is to *to introduce the students to various hydraulic engineering problems like open channel flows and hydraulic machines. At the completion of the course, the student should be able to relate the theory and practice of problems in hydraulic engineering*.

B. Course Outcomes: At the end of the course, students will be able to:

CIV624.1. Understand knowledge of fluid mechanics in addressing problems in open channels.

CIV624.2. solve problems in uniform, gradually and rapidly varied flow in steady state conditions.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

a. Deriving an approximate estimate for a multistoried building by approximate methods.(3 hours)
b. Detailed estimate for the following with the required material survey for the same. (5 hours)
    1. Ground plus three storied RCC Framed structure building with blockwork walls
    2. bridge with minimum 2 spans
    3. factory building

4. road work
5. cross drainage work
6. Ground plus three storied building with load-bearing walls
7. Cost of finishes, MEP works for (f) above

c. Preparation of valuation report in standard Government form. (3 hours)
d. Assignments on rate analysis, specifications and simple estimates. (3 hours)
e. Detailed estimate of minor structure. (3 hours)
f. Preparation of Bar bending schedule. (3 hours)

G. Examination Scheme:

IA			EE			
A	**PR**	**Practical Based Test**	**Major Experiment**	**Minor Experiment**	**LR**	**Viva**
5	10	15	35	15	10	10

Note: IA –InternalAssessment, EE- External Exam, A- Attendance PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Text/Reference Books:

- Hydraulics and Fluid Mechanics, P.M. Modi and S.M. Seth, Standard Book House
- Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill.
- Open channel Flow, K. Subramanya, Tata McGraw Hill.
- Open Channel Hydraulics, Ven Te Chow, Tata McGraw Hill.
- Burnside, C.D., "Electromagnetic Distance Measurement," Beekman Publishers, 1971.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Flow Visualization	Lecture	CIV626.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
2	Uniform Flow	Lecture	CIV626.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
3	Velocity Distribution in Open channel flow	Lecture	CIV626.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
4	Venturi Flume	Lecture	CIV626.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
5	Standing Wave Flume	Lecture	CIV626.1	Internal Assessment, Lab Record, Quiz and

				End Sem Exam
6	Gradually Varied Flow	Lecture	CIV626.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
7	Hydraulic Jump	Lecture	CIV626.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
8	Flow through pipes	Lecture	CIV626.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
9	Turbulent flow through pipes	Lecture	CIV626.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
10	Laminar flow through pipes	Lecture	CIV626.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
11	Assignments on rate analysis, specifications and simple estimates	Lecture	CIV626.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
12	Detailed estimate of minor structure	Lecture	CIV626.2	Internal Assessment, Lab Record, Quiz and End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV626.1.	Understand knowledge of fluid mechanics in addressing problems in open channels.	3	3	1	3	1	**2**	**3**		2	**-**	2	3	**3**	**2**	**1**

CIV626.2.	solve problems in uniform, gradually and rapidly varied flow in steady state conditions.	3	2	2	3	1	**2**	**3**		2	**2**	2	3	**3**	**2**	**3**

S. No.	Enrollment.No.	Student's Name	CIV626 OPEN CHANNEL FLOW LAB Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U15G15
1	A60215819001	Mr MAYANK CHAHAR	100	30	70	A	9	1	1	9
2	A60215819002	Mr KULDEEP GUPTA	100	30	70	A	9	1	1	9
3	A60215819003	Mr MOHD SAIF KHAN	100	30	70	B+	7	1	1	7
4	A60215819004	Ms RIYA NAMDEV	100	30	70	A	9	1	1	9
5	A60215819005	Mr YASH YOGI	100	30	70	A-	8	1	1	8
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	4	80.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **MINOR PROJECT – I**
Course Code : NPT660, Crédits : 02, Session :2021-22 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia, Dr. Imran Ahmad Khan, Dr. Ripunjoy Gogoi, Dr. P. Mahakavi, Mr. Sachin Tiwari

A. Introduction: The objective of Minor project is to enable the student to take up investigative study in the broad field of Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the Department on an individual basis or two/three students in a group, under the guidance of a Supervisor.

B. Course Outcomes: At the end of the course, students will be able to:

NPT660.1. Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.

NPT660.2. Design, implement and test the prototype/algorithm in order to solve the conceived problem.

NPT660.3. Write comprehensive report on mini project work

C. Programme Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
End Semester Examination	End Semester Examination	EE	100%
Total			**100%**

F. Syllabus
Methodology:

Practical training is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

G. Examination Scheme:

Literature study/ Fabrication/ Experimentation	40
Written Report	20
Viva	15
Presentation	25
Total	**100**

H. Suggested Text/Reference Books: NA

I. Lecture Plan : NA

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

NPT660.1	*Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.*	3	**2**	1	3	1	-	-	-	2		2	1	**1**	**2**	**1**
NPT660.2	*Design, implement and test the prototype/algorithm in order to solve the conceived problem.*	3	1	2	2	2	-	-	-	2		1	1	**3**	**2**	**3**
NPT660.3	*Write comprehensive report on mini project work*	2	2	2	2	2	-	-	-	3		3	1	**3**	**3**	**2**
NPT550.4	Prepare and present technical report.	1	2	1	-	-	-	-	-	-	-	-	-	**1**	**2**	**3**

S. No.	Enrollment.No.	Student's Name	NMP660 MINOR PROJECT Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U17G17
1	A60215819001	Mr MAYANK CHAHAR	100	0	100	A	9	2	2	18
2	A60215819002	Mr KULDEEP GUPTA	100	0	100	A-	8	2	2	16
3	A60215819003	Mr MOHD SAIF KHAN	100	0	100	B+	7	2	2	14
4	A60215819004	Ms RIYA NAMDEV	100	0	100	A+	10	2	2	20
5	A60215819005	Mr YASH YOGI	100	0	100	B+	7	2	2	14
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	3	60.00	%	
			Attainment Level					Level 1		

AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : DESIGN OF CONCRETE STRUCTURES
Course Code : CIV 701, Crédits : 04, Session :2021-22 (Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. P. Mahakavi

A. Introduction: The objective of this course is to understand the basic concepts of Limit state design and to obtain the knowledge of using Indian standard codes and special publication. It aims to know the design concepts of all the structural members and learn economical design formaterials saving and to know the design methodologies by limit state design for the beams, slabs, column andfootings.

B. Course Outcomes: At the end of the course, students will be able to:

CIV701.1.*Apply the usage of IS codes in design of reinforced concrete structures*

CIV701.2.*Identify the types and design of beams and slabs*

CIV701.3.*Design the uniaxial and biaxial bending of column*

CIV701.4.*Design the simple footings and combined footings*

CIV701.5.*Design the structural members for shear, bond and development length*

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof	A	5%

	25%includesalltypesofleaves includingmedicalleaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: (8 Hours)

Study of the strength, behavior, and design of indeterminate reinforced concrete structures, Load and stresses, load combinations, Working stress and limit state approach.

Module II: (8 Hours)

Analysis and design of sections in bending – working stress and limit state method, Rectangular and T-sections, Beams with reinforcement in compression. Design for shear and bond, Mechanism of shear and bond failure, Design of shear using limit state concept, Development length of bars; Design of sections in torsion.

Module III: (8 Hours)

One-way slab, Design of two-way slabs; Design of flat slab – direct method; Circular slab; Slab type staircase, Placement of reinforcement in slabs; Voided slab.

Module IV: (8 Hours)

Design of compression members, Short column, Columns with uni-axial and bi-axial bending; Long columns, use of design charts.

Module V: (8 Hours)

Design of foundation; Wall footing, Isolated and combined footing for columns.

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Pillai S.U. & Menon D., Reinforced Concrete Design Tata McGraw Hill, 2003
- Varghese P.C., Limit State Design of Reinforced Concrete, Prentice Hall of India, 2003
- Mallick S.K. & Gupta A.K., Reinforced Concrete, Oxford & IBH, 1982
- Jain A.K., Reinforced Concrete - Limit State Design, Standard Book House, 1998
- Punmia B.C., Reinforced Concrete Structures Vol. I, Standard Book House,2005
- Jain & Jaikrishna, Plain & Reinforced Concrete Vol. I, Nemchand, 2000
- Sinha S.N., Reinforced Concrete Design, Tata McGraw Hill, 2005
- BIS codes (IS 456, SP 16, SP 24, SP 34)

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	Study of the strength	Lecture	CIV701.1	Mid Term-1, Quiz & End Sem Exam
2	behavior	Lecture	CIV701.1	Mid Term-1, Quiz & End Sem Exam
3	design of indeterminate reinforced concrete structures	Lecture	CIV701.1	Mid Term-1, Quiz & End Sem Exam
4	Load	Lecture	CIV701.1	Mid Term-1, Quiz & End Sem Exam
5	stresses	Lecture	CIV701.1	Mid Term-1, Quiz & End Sem Exam
6	load combinations	Lecture	CIV701.1	Mid Term-1, Quiz & End Sem Exam
7	Working stress method	Lecture	CIV701.1	Mid Term-1, Quiz & End Sem Exam
8	limit state approach	Lecture	CIV701.1	Mid Term-1, Quiz & End Sem Exam
9	Analysis and design of sections in bending	Lecture	CIV701.2	Mid Term-1, Quiz & End Sem Exam
10	working stress and limit state method	Lecture	CIV701.2	Mid Term-1, Quiz & End Sem Exam
11	Rectangular and T-sections	Lecture	CIV701.2	Mid Term-1, Quiz & End Sem Exam
12	Beams with reinforcement in compression	Lecture	CIV701.2	Mid Term-1, Quiz & End Sem Exam
13	Design for shear and bond	Lecture	CIV701.2	Mid Term-1, Quiz & End Sem Exam
14	Mechanism of shear and bond failure	Lecture	CIV701.2	Mid Term-1, Quiz & End Sem Exam
15	Design of shear using limit state concept	Lecture	CIV701.2	Mid Term-1, Quiz & End Sem Exam
16	Development length of bars; Design of sections in torsion	Lecture	CIV701.2	Mid Term-1, Quiz & End Sem Exam
17	One-way slab	Lecture	CIV701.3	Mid Term-1, Quiz & End Sem Exam
18	Design of two-way slabs	Lecture	CIV701.3	Mid Term-1, Quiz & End Sem Exam
19	Design of flat slab	Lecture	CIV701.3	Mid Term-1, Quiz & End Sem Exam
20	direct method	Lecture	CIV701.3	Mid Term-1, Quiz & End Sem Exam
21	Circular slab	Lecture	CIV701.3	Assignment, Quiz & End Sem Exam
22	Slab type staircase	Lecture	CIV701.3	Assignment, Quiz & End Sem Exam

23	Placement of reinforcement in slabs	Lecture	CIV701.3	Assignment, Quiz & End Sem Exam
24	Voided slab	Lecture	CIV701.3	Assignment, Quiz & End Sem Exam
25	Design of compression members	Lecture	CIV701.4	Assignment, Quiz & End Sem Exam
26	Short column	Lecture	CIV701.4	Assignment, Quiz & End Sem Exam
27	Columns with uni-axial bending	Lecture	CIV701.4	Assignment, Quiz & End Sem Exam
28	Columns with uni-axial bending	Lecture	CIV701.4	Assignment, Quiz & End Sem Exam
29	Columns with bi-axial bending	Lecture	CIV701.4	Assignment, Quiz & End Sem Exam
30	Columns with bi-axial bending	Lecture	CIV701.4	Assignment, Quiz & End Sem Exam
31	Long columns	Lecture	CIV701.4	Assignment, Quiz & End Sem Exam
32	use of design charts	Lecture	CIV701.4	Assignment, Quiz & End Sem Exam
33	Design of foundation	Lecture	CIV701.5	Assignment, Quiz & End Sem Exam
34	Design of foundation	Lecture	CIV701.5	Assignment, Quiz & End Sem Exam
35	Design of foundation	Lecture	CIV701.5	Assignment, Quiz & End Sem Exam
36	Design of foundation	Lecture	CIV701.5	Mid Term-1, Quiz & End Sem Exam
37	Design of foundation	Lecture	CIV701.5	Mid Term-1, Quiz & End Sem Exam
38	Design of foundation	Lecture	CIV701.5	Mid Term-1, Quiz & End Sem Exam
39	Wall footing for columns	Lecture	CIV701.5	Mid Term-1, Quiz & End Sem Exam
40	Wall footing for columns	Lecture	CIV701.5	Mid Term-1, Quiz & End Sem Exam
41	Wall footing for columns	Lecture	CIV701.5	Mid Term-1, Quiz & End Sem Exam
42	Wall footing for columns	Lecture	CIV701.5	Mid Term-1, Quiz & End Sem Exam
43	Isolated footing for columns	Lecture	CIV701.5	Mid Term-1, Quiz & End Sem Exam
44	Isolated footing for columns	Lecture	CIV701.5	Mid Term-1, Quiz & End Sem Exam
45	Isolated footing for columns	Lecture	CIV701.5	Mid Term-1, Quiz & End Sem Exam
46	Combined footing for columns	Lecture	CIV701.5	Mid Term-1, Quiz & End Sem Exam
47	combined footing for columns	Lecture	CIV701.5	Mid Term-1, Quiz

				& End Sem Exam
48	combined footing for columns	Lecture	CIV701.5	Mid Term-1, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV701.1.	Apply the usage of IS codes in design of reinforced concrete structures	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
CIV701.2.	Identify the types and design of beams and slabs	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
CIV701.3.	Design the uniaxial and biaxial bending of column	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
CIV701.4.	Design the simple footings and combined footings	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**
CIV701.5.	Design the structural members for shear, bond and development length	3	3	2	3	3	2	2	-	3	2	3	3	**1**	**2**	**3**

SampleQuestionPaper

Amity School of Engineering and Technology Departmentof Civil Engineering IMID-SEMESTER(SEM–VII)2021-22		
Class:B.Tech. (CE) VIISemester		
SubjectName: CIV701DESIGN OF CONCRETE STRUCTURES	Time:2 Hrs	Max.Marks: 30

Levels of thequestions as perBloomsTaxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student willbeableto
CO1:Apply the usage of IS codes in design of reinforced concrete structures
CO2: Identify the types and design of beams and slabs

COMap	QuestionNo.	Question	Marks
CO1	Q.1	Explaininbriefthecloudcomputingconcept.	3
CO1	Q.2a	Whataretheessentialcharacteristicsofcloudcomputing?	3
	Q.2b	Howiscloudcomputingrequirementsandclouds ervicerequirementservicesrelatedto eachother?	3
CO1	Q.3	Sketch NIST Cloud Computing Reference Architecture and depictitselements	6
CO2	Q.4	ExplainthesignificanceofCloudReferenceModel	3
CO2	Q.5a	Elaboratedifferentcloudtypeswithexample.	3
	Q.5b	Writecharacteristicsofprivatecloud.	3
CO2	Q6	Howvirtualizationisapplied incloudcomputingscenario?	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan 60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan 60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan 60%marksthenlevel3

S. No.	Enrollment.No.	Student's Name	CIV701 DESIGN OF CONCRETE STRUCTURES Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U1G1
1	A60215818001	Mr NAMAN GOYAL	100	30	70	A+	10	4	4	40
2	A60215818003	Mr SADAV KHAN	100	30	70	A+	10	4	4	40
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	A+	10	4	4	40

Total No. of Students	=	3		
Total No. of Students	>60% marks	3	100.00	%
Attainment Level			Level 3	

AMITY UNIVERSITY
MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course :SURFACE HYDROLOGY
Course Code : CIV 702, Crédits : 03, Session :2021-22 (Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Imran Ahmad Khan

A. ***Introduction:*** *The objective of this course is* to understand the physical processes that determines the exchange of water at the Earth's surface and to become familiar with the physical properties that govern the movement of water throughthe unsaturated zone and how these can be observed in the field and modelled mathematically. It aims to understand the physical factors that control evaporation and their representation usingenergy fluxes and diffusive transfer.

B. Course Outcomes: At the end of the course, students will be able to:

CIV702.1. Understand the process and mathematical representation of hydrologic cycle
CIV702.2. Differentiate the measure and apply precipitation for hydrologic design
CIV702.3. Understand the importance of catchment characteristics for runoff estimation
CIV702.4. Comprehend unit hydrograph theory and its applications to hydrologic design

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: (7 Hours)
Introduction hydrologic cycle, water budget equations, world water balance, application in engineering. Precipitation: Forms of precipitation, measurement, depth-area-duration & intensity- duration- frequency relationships, probable maximum precipitation.

Module II: (8 Hours)
Abstraction from Precipitation: Evaporation – process, measurement and estimation; Evapotranspiration- measurement and estimation; Initial Losses- Interception & Depression storage; Infiltration- process, capacities, indices, measurement & estimation

Module III: Runoff and Hydrographs: (7 Hours)
Hydrograph, runoff characteristics of stream, Yield, Rainfall-runoff correlations, flow duration curve, mass curve, droughts and floods. Factors affecting flood hydrographs, unit hydrograph and its analysis, s-curve hydrograph, synthetic and instantaneous unit hydrographs.

Module IV: Flood: (8 Hours)
Rational method, empirical formulae, unit hydrograph method, flood frequency studies, statistical analysis, regional flood frequency analysis, design storm & design flood, risk/reliability and safety factor; Flood Routing: Basic equation, hydrologic storage routing & attenuation, hydrologic channel routing, flood forecasting & control, hydraulic method of flood routing.

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- ‘Hydrology for Engineers’ by Linsley R. K., Kohler M. A. and Paulhus J. L. H.
- ‘Engineering Hydrology’ by K. Subramanya
- ‘Hydrology: Principles. Analysis. Design’ by Raghunath H. M.
- ‘Handbook of Applied Hydrology’ by Chow V. T.
- ‘Irrigation: Theory & Practice’ by Michael A. M.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction hydrologic cycle	Lecture	CIV 702.1	Mid Term-1, Quiz & End Sem Exam
2	water budget equations	Lecture	CIV 702.1	Mid Term-1, Quiz & End Sem Exam
3	world water balance	Lecture	CIV 702.1	Mid Term-1, Quiz & End Sem Exam
4	application in engineering	Lecture	CIV 702.1	Mid Term-1, Quiz & End Sem Exam
5	Precipitation	Lecture	CIV 702.1	Mid Term-1, Quiz & End Sem Exam
6	Forms of precipitation	Lecture	CIV 702.1	Mid Term-1, Quiz & End Sem Exam
7	measurement	Lecture	CIV 702.1	Mid Term-1, Quiz & End Sem Exam
8	depth-area-duration	Lecture	CIV 702.1	Mid Term-1, Quiz & End Sem Exam
9	depth-area-duration	Lecture	CIV 702.1	Mid Term-1, Quiz & End Sem Exam
10	intensity- duration- frequency relationships	Lecture	CIV 702.2	Mid Term-1, Quiz & End Sem Exam
11	probable maximum precipitation	Lecture	CIV 702.2	Mid Term-1, Quiz & End Sem Exam
12	probable maximum precipitation	Lecture	CIV 702.2	Mid Term-1, Quiz & End Sem Exam
13	Abstraction from Precipitation	Lecture	CIV 702.2	Mid Term-1, Quiz & End Sem Exam
14	Evaporation	Lecture	CIV 702.2	Mid Term-1, Quiz & End Sem Exam
15	Evaporation – process	Lecture	CIV 702.2	Mid Term-1, Quiz & End Sem Exam
16	measurement and estimation	Lecture	CIV 702.2	Mid Term-1, Quiz & End Sem Exam
17	Evapotranspiration	Lecture	CIV 702.2	Mid Term-1, Quiz & End Sem Exam
18	measurement and estimation	Lecture	CIV 702.2	Mid Term-1, Quiz & End Sem Exam

19	Initial Losses	Lecture	CIV 702.3	Mid Term-1, Quiz & End Sem Exam
20	Interception	Lecture	CIV 702.3	Mid Term-1, Quiz & End Sem Exam
21	Depression storage	Lecture	CIV 702.3	Assignment, Quiz & End Sem Exam
22	Infiltration- process	Lecture	CIV 702.3	Assignment, Quiz & End Sem Exam
23	capacities, indices	Lecture	CIV 702.3	Assignment, Quiz & End Sem Exam
24	measurement & estimation	Lecture	CIV 702.3	Assignment, Quiz & End Sem Exam
25	Hydrograph	Lecture	CIV 702.3	Assignment, Quiz & End Sem Exam
26	runoff characteristics of stream	Lecture	CIV 702.3	Assignment, Quiz & End Sem Exam
27	Yield	Lecture	CIV 702.3	Assignment, Quiz & End Sem Exam
28	Rainfall-runoff correlations	Lecture	CIV702.4	Assignment, Quiz & End Sem Exam
29	flow duration curve	Lecture	CIV702.4	Assignment, Quiz & End Sem Exam
30	mass curve, droughts and floods..	Lecture	CIV702.4	Assignment, Quiz & End Sem Exam
31	Factors affecting flood hydrographs	Lecture	CIV702.4	Assignment, Quiz & End Sem Exam
32	unit hydrograph and its analysis	Lecture	CIV702.4	Assignment, Quiz & End Sem Exam
33	s-curve hydrograph	Lecture	CIV702.4	Assignment, Quiz & End Sem Exam
34	synthetic and instantaneous unit hydrographs	Lecture	CIV702.4	Assignment, Quiz & End Sem Exam
35	Rational method, empirical formulae, unit hydrograph method, flood frequency studies, statistical analysis, regional flood frequency analysis,	Lecture	CIV702.4	Assignment, Quiz & End Sem Exam
36	design storm & design flood, risk/reliability and safety factor; Flood Routing: Basic equation, hydrologic storage routing & attenuation, hydrologic channel routing, flood forecasting & control, hydraulic method of flood routing.	Lecture	CIV702.4	Mid Term-1, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV702.1.	Understand the process and mathematical representation of hydrologic cycle	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
CIV702.2.	Differentiate the measure and apply precipitation for hydrologic design	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
CIV702.3.	Understand the importance of catchment characteristics for runoff estimation	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
CIV702.4.	Comprehend unit hydrograph theory and its applications to hydrologic design	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**

S. No.	Enrollment.No.	Student's Name	CIV702 SURFACE HYDROLOGY (ELECTIVE)							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U2G2
1	A60215818001	Mr NAMAN GOYAL	100	30	70	A+	10	3	3	30
2	A60215818003	Mr SADAV KHAN	100	30	70	A+	10	3	3	30
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	A+	10	3	3	30

Total No. of Students	=	3		
Total No. of Students	>60% marks	3	100.00	%
Attainment Level			Level 3	

AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course :PRE-STRESSED CONCRETE
Course Code : CIV 706, Crédits : 03, Session :2021-22 (Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia, Dr. Imran Ahmad Khan, Dr. Ripunjoy Gogoi, Dr. P. Mahakavi, Mr. Sachin Tiwari

K. **Introduction:** The objective of this course is to understand the concepts of pre-tensioning and post-tensioning members. Analyse the flexural member.Design a prestressed concrete beam accounting for losses. Calculate the deflection and crack width of prestressed members. Design the flexural member.Design the member subjected to shear.Design the composite members.

L. **Course Outcomes:** At the end of the course, students will be able to:

CIV706.1. Learn the principles, materials, methods and systems of prestressing

CIV706.2 Know the different types of losses and deflection of prestressed members

CIV706.3 Design of prestressed concrete beams for flexural, shear and tension and to calculate ultimate flexural strength of beam

CIV706.4 Design of anchorage zones, composite beams

M. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

N. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

O. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%

End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

P. Syllabus

Module I: Materials for Prestressed Concrete and Prestressing Systems: (8 Hours)
High strength concrete and high tensile steel – tensioning devices – pretensioning systems – post tensioning systems.

Module II: Analysis of Prestress and Bending Stresses: (7 Hours)
Analysis of prestress – resultant stresses at a sector – pressure line or thrust line and internal resisting couple – concept of load balancing – losses of prestress – deflection of beams.

Module III: Strength of Prestressed Concrete Sections in Flexure, Shear and Torsion: (8 Hours)
Types of flexural failure – strain compatibility method – IS code procedure – design for limit state of shear and torsion.

Module IV: Design of Prestressed Concrete Beams and Slabs: (7 Hours)
Transfer of prestress in pre tensioned and post tensioned members – design of anchorage zone reinforcement – design of simple beams – cable profiles – design of slabs.
A design project for the design and detailing of a large span beam is envisaged at this stage.

Q. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

R. Suggested Text/Reference Books:

- N. Krishna Raju, Prestressed concrete, Tata McGraw Hill, 2000
- T.Y. Lin, Ned H. Burns, Design of Prestressed Concrete Structures, John Wiley & Sons, 2004.
- P. Dayaratnam, Prestressed Concrete, Oxford & IBH,1982
- R. Rajagopalan, Prestressed Concrete, Narosa publishers, 2004.
- BIS codes (IS 1343)

S. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	High strength concrete and high tensile steel	Lecture	CIV 706.1	Mid Term-1, Quiz & End Sem Exam
2	High strength concrete and high tensile	Lecture	CIV 706.1	Mid Term-1, Quiz & End Sem Exam
3	High strength concrete and high tensile steel.	Lecture	CIV 706.1	Mid Term-1, Quiz & End Sem Exam
4	tensioning devices	Lecture	CIV 706.1	Mid Term-1, Quiz & End Sem Exam
5	*tensioning devices*	Lecture	CIV 706.1	Mid Term-1, Quiz & End Sem Exam
6	tensioning devices	Lecture	CIV 706.1	Mid Term-1, Quiz

				& End Sem Exam
7	pretensioning systems – post tensioning systems.	Lecture	CIV 706.1	Mid Term-1, Quiz & End Sem Exam
8	pretensioning systems – post tensioning systems.Process	Lecture	CIV 706.1	Mid Term-1, Quiz & End Sem Exam
9	pretensioning systems – post tensioning systems.	Lecture	CIV 706.1	Mid Term-1, Quiz & End Sem Exam
10	Analysis of prestress	Lecture	CIV 706.2	Mid Term-1, Quiz & End Sem Exam
11	Analysis of prestress	Lecture	CIV 706.2	Mid Term-1, Quiz & End Sem Exam
12	resultant stresses at a sector	Lecture	CIV 706.2	Mid Term-1, Quiz & End Sem Exam
13	pressure line or thrust line	Lecture	CIV 706.2	Mid Term-1, Quiz & End Sem Exam
14	internal resisting couple	Lecture	CIV 706.2	Mid Term-1, Quiz & End Sem Exam
15	concept of load balancing	Lecture	CIV 706.2	Mid Term-1, Quiz & End Sem Exam
16	losses of prestress	Lecture	CIV 706.2	Mid Term-1, Quiz & End Sem Exam
17	deflection of beams	Lecture	CIV 706.2	Mid Term-1, Quiz & End Sem Exam
18	deflection of beams	Lecture	CIV 706.2	Mid Term-1, Quiz & End Sem Exam
19	Types of flexural failure	Lecture	CIV 706.3	Mid Term-1, Quiz & End Sem Exam
20	Types of flexural failure	Lecture	CIV 706.3	Mid Term-1, Quiz & End Sem Exam
21	strain compatibility method	Lecture	CIV 706.3	Assignment, Quiz & End Sem Exam
22	strain compatibility method	Lecture	CIV 706.3	Assignment, Quiz & End Sem Exam
23	IS code procedure	Lecture	CIV 706.3	Assignment, Quiz & End Sem Exam
24	IS code procedure	Lecture	CIV 706.3	Assignment, Quiz & End Sem Exam
25	design for limit state of shear	Lecture	CIV 706.3	Assignment, Quiz & End Sem Exam
26	design for limit state of shear	Lecture	CIV 706.3	Assignment, Quiz & End Sem Exam
27	design for limit state of torsion.	Lecture	CIV 706.3	Assignment, Quiz & End Sem Exam
28	Transfer of prestress in pre tensioned members	Lecture	CIV 706.4	Assignment, Quiz & End Sem Exam
29	Transfer of prestress in post tensioned members	Lecture	CIV 706.4	Assignment, Quiz & End Sem Exam
30	design of anchorage zone	Lecture	CIV 706.4	Assignment, Quiz & End Sem Exam

31	design of anchorage zone.	Lecture	CIV 706.4	Assignment, Quiz & End Sem Exam
32	reinforcement	Lecture	CIV 706.4	Assignment, Quiz & End Sem Exam
33	design of simple beams	Lecture	CIV 706.4	Assignment, Quiz & End Sem Exam
34	cable profiles	Lecture	CIV 706.4	Assignment, Quiz & End Sem Exam
35	design of slabs.	Lecture	CIV 706.4	Assignment, Quiz & End Sem Exam
36	design of slabs.	Lecture	CIV 706.4	Assignment, Quiz & End Sem Exam

T. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV706.1	Learn the principles, materials, methods and systems of prestressing	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
CIV706.2	Know the different types of losses and deflection of prestressed members	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
CIV706.3	Design of prestressed concrete beams for flexural, shear and tension and to calculate ultimate flexural strength of beam	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
CIV706.4	CIV706.4 Design of anchorage zones, composite beams	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**

S. No.	Enrollment.No.	Student's Name	CIV706 PRES-STRESSED CONCRETE (ELECTIVE)							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U3G3
1	A60215818001	Mr NAMAN GOYAL	100	30	70	B+	7	3	3	21
2	A60215818003	Mr SADAV KHAN	100	30	70	A	9	3	3	27
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	A+	10	3	3	30
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	2	66.67	%	
			Attainment Level					Level 1		

AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : SURFACE HYDROLOGY LAB
Course Code : CIV 722, Crédits : 01, Session :2021-22 (Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia, Dr. Imran Ahmad Khan, Dr. Ripunjoy Gogoi, Dr. P. Mahakavi, Mr. Sachin Tiwari

K. ***Introduction:*** The objective of this course is to understand the physical processes that determines the exchange of water at the Earth's surface.To become familiar with the physical properties that govern the movement of water throughthe unsaturated zone and how these can be observed in the field and modelled mathematically.To be able to understand the processes which influence runoff from catchments and themethods for estimating the runoff. To use measured / estimated data like precipitation, runoff, infiltration, for hydrologic design

L. **Course Outcomes:** At the end of the course, students will be able to:

CIV722.1*Understand the process and mathematical representation of hydrologic cycle*

CIV722.2 *Understand the importance of catchment characteristics for runoff estimation*

CIV722.3. Evaluate the hydrologic abstractions and also learn about the factors affecting various hydrologic abstractions

CIV722.4 *Implementing the knowledge of precipitation and runoff measurement in hydrologic design*

M. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

N. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

O. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

P. Syllabus

1. To draw the hydrological cycle showing different transportation and storage components: (2 Hours)
2. To draw the depth-area-duration relationship for a particular catchment area: (2 Hours)
3. To draw the intensity- duration- frequency relationship for a particular catchment area: (2 Hours)
4. To study the rainfall-runoff correlations for a particular catchment area: (2 Hours)
5. To draw the flow duration curve for a particular catchment area: (2 Hours)
6. To draw the mass curve for a particular catchment area: (2 Hours)
7. To draw the flood hydrograph for a particular catchment area and particular storm: (2 Hours)
8. To draw the unit hydrograph for a particular catchment area and particular storm: (2 Hours)
9. To construct the unit hydrograph of different duration with the help of method of superposition:(2 Hours)
10. To construct the unit hydrograph of different duration with the help of S-curve method: (2 Hours)

Q. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

R. Suggested Text/Reference Books:

- ‘Hydrology for Engineers’ by Linsley R. K., Kohler M. A. and Paulhus J. L. H.
- ‘Engineering Hydrology’ by K. Subramanya
- ‘Hydrology: Principles. Analysis. Design’ by Raghunath H. M.
- ‘Handbook of Applied Hydrology’ by Chow V. T.
- ‘Irrigation: Theory & Practice’ by Michael A. M.

S. Lecture Plan

Lecture	**Topics**	**Mode of**	**Correspon ding CO**	**Mode of Assessing CO**

		Delivery		
1	To draw the hydrological cycle showing different transportation and storage components	Practical	CIV722.1	Mid Term-1, Quiz & End Sem Exam
2	To draw the depth-area-duration relationship for a particular catchment area	Practical	CIV722.1	Mid Term-1, Quiz & End Sem Exam
3	To draw the intensity- duration-frequency relationship for a particular catchment area	Practical	CIV722.1	Mid Term-1, Quiz & End Sem Exam
4	To study the rainfall-runoff correlations for a particular catchment area	Practical	CIV722.2	Mid Term-1, Quiz & End Sem Exam
5	To draw the flow duration curve for a particular catchment area	Practical	CIV722.2	Mid Term-1, Quiz & End Sem Exam
6	To draw the mass curve for a particular catchment area	Practical	CIV722.2	Mid Term-1, Quiz & End Sem Exam
7	To draw the flood hydrograph for a particular catchment area and particular storm	Practical	CIV722.3	Mid Term-1, Quiz & End Sem Exam
8	To draw the unit hydrograph for a particular catchment area and particular storm	Practical	CIV722.3	Mid Term-1, Quiz & End Sem Exam
9	To construct the unit hydrograph of different duration with the help of method of superposition	Practical	CIV722.3	Mid Term-1, Quiz & End Sem Exam
10	To construct the unit hydrograph of different duration with the help of method of superposition	Practical	CIV722.4	Mid Term-1, Quiz & End Sem Exam
11	To construct the unit hydrograph of different duration with the help of S-curve method	Practical	CIV722.4	Mid Term-1, Quiz & End Sem Exam
12	To construct the unit hydrograph of different duration with the help of S-curve method	Practical	CIV722.4	Mid Term-1, Quiz & End Sem Exam

T. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV722.1	Understand the process and mathematical representation of hydrologic cycle	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**

CIV722.2	CIV722.2 Understand the importance of catchment characteristics for runoff estimation	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
CIV722.3.	Evaluate the hydrologic abstractions and also learn about the factors affecting various hydrologic abstractions	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
CIV722.4	Implementing the knowledge of precipitation and runoff measurement in hydrologic design	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**

S. No.			**CIV722 SURFACE HYDROLOGY LAB (ELECTIVE)**							
	Enrollment.No.	**Student's Name**	**Max Marks**	**CE Weight Age (%)**	**ET Weight Age (%)**	**GO**	**GP**	**ACU**	**ECU**	**U4G4**
1	A60215818001	Mr NAMAN GOYAL	100	30	70	A+	10	1	1	10
2	A60215818003	Mr SADAV KHAN	100	30	70	A	9	1	1	9
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	A	9	1	1	9
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	3	100.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **INDUSTRIAL PRACTICAL TRAINING – II**
Course Code : NPT750, Crédits : 05, Session :2021-22 (Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia, Dr. Imran Ahmad Khan, Dr. Ripunjoy Gogoi, Dr. P. Mahakavi, Mr. Sachin Tiwari

A. Introduction: The objective of this course is to enable the students to explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills. It will help them to manage the technical content and work. It will also help them to prepare and present technical report..

B. Course Outcomes: At the end of the course, students will be able to:

NPT750.1. Explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills.

NPT750.2. Manage the technical content and work.

NPT750.3. Learn the various administrative process followed in industry and prepare and present technical report.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
End Semester Examination	End Semester Examination	EE	100%
Total			**100%**

F. Syllabus

Methodology:

Industrial training is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the practical

training the students are to present a report covering various aspects learnt by them and give a presentation on same.

G. Examination Scheme:

Feedback from industry/work place	20
Training Report	40
Viva	15
Presentation	25
Total	**100**

H. Suggested Text/Reference Books: NA

I. Lecture Plan : NA

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
NPT750.1	Explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills.	3	**2**	1	3	1	-	-	-	2		2	1	**1**	**2**	**1**
NPT750.2	Manage the technical content and work.	3	1	2	2	2	-	-	-	2		1	1	**3**	**2**	**3**
NPT750.3	Learn the various administrative process followed in industry and prepare and present technical report.	2	2	2	2	2	-	-	-	3		3	1	**3**	**3**	**2**

S. No.	Enrollment.No.	Student's Name	NPT750 INDUSTRIAL PRACTICAL TRAINING-II (EVALUATION) Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U9G9
1	A60215818001	Mr NAMAN GOYAL	100	0	100	A+	10	5	5	50
2	A60215818003	Mr SADAV KHAN	100	0	100	A	9	5	5	45
3	A60215818004	Mr SHASHWAT MOHANTY	100	0	100	A	9	5	5	45

Total No. of Students	=	3		
Total No. of Students	>60% marks	3	100.00	%
Attainment Level			Level 3	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **MAJORPROJECT -I**
Course Code : NMP760, Crédits : 06, Session :2021-22 (Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia, Dr. Imran Ahmad Khan, Dr. Ripunjoy Gogoi, Dr. P. Mahakavi, Mr. Sachin Tiwari

K. **Introduction:** The objective of major project is to enable the student to take up investigative study in the broad field of Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the Department on an individual basis or two/three students in a group, under the guidance of a Supervisor.

L. **Course Outcomes:**At the end of the course, students will be able to:
NMP760.1. Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.
NMP760.2. Design, implement and test the prototype/algorithm in order to solve the conceived problem.
NMP760.3. Write comprehensive report on major project work.

M. **Programme Outcomes:**
PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate

consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

N. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

O. Assessment Plan:

Component of Evaluation	Description	Code	Weightage

			%
End Semester Examination	End Semester Examination	EE	100%
Total			**100%**

P. Syllabus

Methodology:

Major Project is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

Q. Examination Scheme:

Literature study/ Fabrication/ Experimentation	40
Written Report	20
Viva	15
Presentation	25
Total	**100**

R. Suggested Text/Reference Books: NA

S. Lecture Plan : NA

T. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
NMP760.1	*Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.*	3	**2**	1	3	1	**-**	**-**	**-**	2		2	1	**1**	**2**	**1**

NMP760.2	*Design, implement and test the prototype/algorithm in order to solve the conceived problem.*	3	1	2	2	2	-	-	-	2		1	1	**3**	**2**	**3**
NMP760.3	*Write comprehensive report on major project work.*	2	2	2	2	2	-	-	-	3		3	1	**3**	**3**	**2**

S. No.	Enrollment.No.	Student's Name	NMP760 MAJOR PROJECT – I Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U8G8
1	A60215818001	Mr NAMAN GOYAL	100	0	100	A+	10	6	6	60
2	A60215818003	Mr SADAV KHAN	100	0	100	A	9	6	6	54
3	A60215818004	Mr SHASHWAT MOHANTY	100	0	100	A	9	6	6	54

Total No. of Students	=	3		
Total No. of Students	>60% marks	3	100.00	%
Attainment Level			Level 3	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : DESIGN OF STEEL STRUCTURES
Course Code : CIV 801, Crédits : 04, Session : 2021-22 (Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Mr. Sachin Tiwari

A. Introduction

This course aims at providing students with a solid background on principles of steel structural engineering design. Students will be exposed to the theories and concepts of steel design and analysis both at the element and system levels. Hands-on design experience and skills will be gained and learned through problem sets and a comprehensive design project. An understanding of real-world open-ended design issues will be developed. Weekly recitations and project discussions will be held besides lectures.

Course Outcomes: At the end of the course, students will be able to:

- **CIV801.1.**Ability to design and analyze steel structures.
- **CIV801.2.**The students will be able to apply their knowledge of steel structural mechanics in addressing design problems of steel structural engineering.
- **CIV801.3.**They will possess the skills to solve problems dealing with different loads and steel
- **CIV801.4.**They will have knowledge in steel structural engineering.

B. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage**

Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/H A	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentt o be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			100%

F. Course Content

Module I: Introduction To Load and Stresses on Steel Structures: Properties of materials; loads and stresses, design of semi-rigid, rigid and moment resistant connections.

Module II: Design of Tension and Compression Members: Built-up sections, design of tension members subjected to axial tension and bending, splicing of tension member, design of compression members, beam-column connections.

Module III: Column Design: Design of columns and their bases Design of flexural members and Plate girder; loads, specification and design Industrial buildings; loads.

Module IV: Purlins, Trusses and Girders: Design of purlins, trusses, bracings, gantry girders, introduction to Plastic analysis.

Module V: Overview on Beams and Frames: Simple cases of beams and frames.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- McCormac, J.C., Nelson, J.K. Jr., *Structural Steel Design*. 3rd edition. Prentice Hall, N.J., 2003.
- Galambos, T.V., Lin, F.J., Johnston, B.G., *Basic Steel Design with LRFD*, Prentice Hall, 1996
- Segui, W. T., *LRFD Steel Design*, 2nd Ed., PWS Publishing, Boston.
- Salmon, C.G. and Johnson, J.E., *Steel Structures: Design and Behavior*, 3rd Edition, Harper & Row, Publishers, New York, 1990.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Properties of materials	Lecture	CIV 801.1	Mid Term-1, Quiz & End Sem Exam
2	loads and stresses, design of semi connections	Lecture	CIV 801.1	Mid Term-1, Quiz & End Sem Exam
3	loads and stresses, design of semi connections	Lecture	CIV 801.1	Mid Term-1, Quiz & End Sem Exam
4	loads and stresses, design of semi connections	Lecture	CIV 801.1	Mid Term-1, Quiz & End Sem Exam
5	loads and stresses, design of semi rigid connections	Lecture	CIV 801.1	Mid Term-1, Quiz & End Sem Exam
6	rigid and moment resistant connections.	Lecture	CIV 801.1	Mid Term-1, Quiz & End Sem Exam
7	rigid and moment resistant connections.	Lecture	CIV 801.1	Mid Term-1, Quiz & End Sem Exam
8	rigid and moment resistant connections.	Lecture	CIV 801.1	Mid Term-1, Quiz & End Sem Exam
9	rigid and moment resistant connections.	Lecture	CIV 801.1	Mid Term-1, Quiz & End Sem Exam
10	Built-up sections,	Lecture	CIV 801.1	Mid Term-1, Quiz & End Sem Exam
11	design of tension members subjected to axial tension and bending	Lecture	CIV 801.1	Mid Term-1, Quiz & End Sem Exam
12	design of tension members subjected to axial tension and bending	Lecture	CIV 801.1	Mid Term-1, Quiz & End Sem Exam
13	design of tension members subjected to axial tension and bending	Lecture	CIV 801.2	Mid Term-1, Quiz & End Sem Exam
14	design of tension members subjected to axial tension and bending	Lecture	CIV 801.2	Mid Term-1, Quiz & End Sem Exam

15	splicing of tension member, design of compression members, beam	Lecture	CIV 801.2	Mid Term-1, Quiz & End Sem Exam
16	splicing of tension member, design of compression members, beam	Lecture	CIV 801.2	Mid Term-1, Quiz & End Sem Exam
17	Design of columns and their bases.	Lecture	CIV 801.2	Mid Term-1, Quiz & End Sem Exam
18	Design of columns and their bases Design of flexural members and Plate girder; loads	Lecture	CIV 801.2	Mid Term-1, Quiz & End Sem Exam
19	Design of flexural members and Plate girder; loads	Lecture	CIV 801.2	Mid Term-1, Quiz & End Sem Exam
20	Design of flexural members and Plate girder; loads	Lecture	CIV 801.2	Mid Term-1, Quiz & End Sem Exam
21	Design of flexural members and Plate girder; loads	Lecture	CIV 801.2	Mid Term-2, Quiz & End Sem Exam
22	Design of purlins, trusses, bracings, gantry girders, introduction to Plastic analysis.	Lecture	CIV 801.2	Mid Term-2, Quiz & End Sem Exam
23	Design of purlins, trusses, bracings, gantry girders, introduction to Plastic analysis.	Lecture	CIV 801.2	Mid Term-2, Quiz & End Sem Exam
24	Design of purlins, trusses, bracings, gantry girders, introduction to Plastic analysis.	Lecture	CIV 801.2	Mid Term-2, Quiz & End Sem Exam
25	Design of purlins, trusses, bracings, gantry girders, introduction to Plastic analysis.	Lecture	CIV 801.3	Mid Term-2, Quiz & End Sem Exam
26	Design of purlins, trusses, bracings, gantry girders, introduction to Plastic analysis.	Lecture	CIV 801.3	Mid Term-2, Quiz & End Sem Exam
27	Simple cases of beams and frames.	Lecture	CIV 801.3	Mid Term-2, Quiz & End Sem Exam
28	Simple cases of beams and frames.	Lecture	CIV 801.3	Mid Term-2, Quiz & End Sem Exam
29	Simple cases of beams and frames.	Lecture	CIV 801.3	Mid Term-2, Quiz & End Sem Exam
30	Simple cases of beams and frames.	Lecture	CIV 801.3	Mid Term-2, Quiz & End Sem Exam
31	Simple cases of beams and frames.	Lecture	CIV 801.3	Mid Term-2, Quiz & End Sem Exam

32	Simple cases of beams and frames.	Lecture	CIV 801.3	Mid Term-2, Quiz & End Sem Exam
33	Simple cases of beams and frames.	Lecture	CIV 801.3	Mid Term-2, Quiz & End Sem Exam
34	Simple cases of beams and frames.	Lecture	CIV 801.3	Mid Term-2, Quiz & End Sem Exam
35	Simple cases of beams and frames.	Lecture	CIV 801.3	Mid Term-2, Quiz & End Sem Exam
36	Simple cases of beams and frames.	Lecture	CIV 801.3	Mid Term-2, Quiz & End Sem Exam
37	Design of purlins, trusses, bracings, gantry girders, introduction to Plastic analysis.	Lecture	CIV 801.4	Mid Term-2, Quiz & End Sem Exam
38	Design of purlins, trusses, bracings, gantry girders, introduction to Plastic analysis.	Lecture	CIV 801.4	Mid Term-2, Quiz & End Sem Exam
39	Simple cases of beams and frames.	Lecture	CIV 801.4	Mid Term-2, Quiz & End Sem Exam
40	Simple cases of beams and frames.	Lecture	CIV 801.4	Mid Term-2, Quiz & End Sem Exam
41	Simple cases of beams and frames.	Lecture	CIV 801.4	Mid Term-2, Quiz & End Sem Exam
42	Simple cases of beams and frames.	Lecture	CIV 801.4	Mid Term-2, Quiz & End Sem Exam
43	Simple cases of beams and frames.	Lecture	CIV 801.4	Mid Term-2, Quiz & End Sem Exam
44	Simple cases of beams and frames.	Lecture	CIV 801.4	Mid Term-2, Quiz & End Sem Exam
45	Simple cases of beams and frames.	Lecture	CIV 801.4	Mid Term-2, Quiz & End Sem Exam
46	Simple cases of beams and frames.	Lecture	CIV 801.4	Mid Term-2, Quiz & End Sem Exam
47	Simple cases of beams and frames.	Lecture	CIV 801.4	Mid Term-2, Quiz & End Sem Exam
48	Simple cases of beams and frames.	Lecture	CIV 801.4	Mid Term-2, Quiz & End Sem Exam

E. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV 801.1	Ability to design and analyse steel structures.	3	3	1	3	1				2		2	1			
CIV 801.2	The students will be able to apply their knowledge of steel structural mechanics in addressing design problems of steel structural engineering.	3	2	2	2	2				2		1	1			
CIV 801.3	They will possess the skills to solve problems dealing with different loads and steel	3	3	1	3	1				2		2	1			
CIV 801.4	They will have knowledge in steel structural engineering.	3	2	2	2	2				2		1	1			

S. No.	Enrollment.No.	Student's Name	CIV801 DESIGN OF STEEL STRUCTURES							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U1G1
1	A60215818001	Mr NAMAN GOYAL	100	30	70	B+	7	4	4	28
2	A60215818003	Mr SADAV KHAN	100	30	70	B+	7	4	4	28
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	A	9	4	4	36
			Total No. of Students			=	3			
			Total No. of Students			>60 % marks	1	33.33	%	
			Attainment Level					-		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : AIRPORT PLANNING AND DESIGN
Course Code : CIV 802, Crédits : 03, Session : 2021-22 (Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Ripunjoy Gogoi

A. Introduction

This course aims at providing students with a solid background on principles of airport planning and design. Students will be exposed to the theories and concepts of airport design. Hands-on design experience and skills will be gained and learned through problem sets and a comprehensive design project.

B. Course Outcomes: At the end of the course, students will be able to:

- **CIV 802.1**.Design and analyze airports.
- **CIV 802.2**. Understand the skills to solve problems dealing with different airport design problems.
- **CIV 803.3**. Identify the alignment and length of airport runway and draw an airport layout.

C. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			100%

E. Course Content

Module I: Introduction: Aircraft characteristics, aircraft performance characteristics, airport planning and air travel demand forecasting.

Module II: Airport Site Selection and Geometric Design: Airport site selection, geometric design of the airfield, determination of runway capacity and delay, taxiway and gate capacity, holding aprons, terminal aprons, airport drainage.

Module III: Function of Airport Passenger and Cargo Terminal: Function of Airport Passenger and Cargo Terminal - Design of Air Freight Terminals, Airport access - Airport Landside planning – Capacity.

Module IV: Air Traffic Management: Air Traffic Management, navigational aids, ground based systems, satellite based systems.

Module V: Air Traffic Control and Surveillance Facilities: Air traffic control and surveillance facilities, airfield lighting, air traffic management.

F. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

G. Suggested Books

- "Planning and Design of Airports" by Robert Horonjeff Francis X. McKelvey William J. Sproule Seth B. Young, Fifth Edition, Mcgraw Hill, 2010.

H. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	Aircraft characteristics aircraft performance characteristics, airport planning and air travel demand forecasting.	Lecture	CIV 802.1	Mid Term-1, Quiz & End Sem Exam
2	Aircraft characteristics aircraft performance characteristics airport planning and air travel demand forecasting.	Lecture	CIV 802.1	Mid Term-1, Quiz & End Sem Exam
3	Aircraft characteristics aircraft performance characteristics airport planning and air travel demand forecasting.	Lecture	CIV 802.1	Mid Term-1, Quiz & End Sem Exam
4	Aircraft characteristics aircraft performance characteristics airport planning and air travel demand forecasting.	Lecture	CIV 802.1	Mid Term-1, Quiz & End Sem Exam

5	Aircraft characteristics aircraft performance characteristics airport planning and air travel demand forecasting.	Lecture	CIV 802.1	Mid Term-1, Quiz & End Sem Exam
6	Aircraft characteristics airport planning and air travel demand forecasting.	Lecture	CIV 802.1	Mid Term-1, Quiz & End Sem Exam
7	Aircraft characteristics airport planning and air travel demand forecasting.	Lecture	CIV 802.1	Mid Term-1, Quiz & End Sem Exam
8	Aircraft characteristics airport planning and air travel demand forecasting.	Lecture	CIV 802.1	Mid Term-1, Quiz & End Sem Exam
9	Airport site selection, geometric design of the airfield, determination of runway capacity and delay, taxiway and gate capacity, holding aprons, terminal aprons, airport drainage.	Lecture	CIV 802.1	Mid Term-1, Quiz & End Sem Exam
10	*Airport site selection, geometric design of the airfield, determination of runway capacity and delay, taxiway and gate capacity, holding aprons, terminal aprons, airport drainage.*	Lecture	CIV 802.1	Mid Term-1, Quiz & End Sem Exam
11	*Airport site selection, geometric design of the airfield, determination of runway capacity and delay, taxiway and gate capacity, holding aprons, terminal aprons, airport drainage.*	Lecture	CIV 802.1	Mid Term-1, Quiz & End Sem Exam
12	*Airport site selection, geometric design of the airfield, determination of runway capacity and delay, taxiway and gate capacity, holding aprons, terminal aprons, airport drainage.*	Lecture	CIV 802.1	Mid Term-1, Quiz & End Sem Exam
13	*Airport site selection, geometric design of the airfield, determination of runway capacity and delay, taxiway and gate capacity, holding aprons, terminal aprons, airport drainage.*	Lecture	CIV 802.2	Mid Term-1, Quiz & End Sem Exam

14	*Airport site selection, geometric design of the airfield, determination of runway capacity and delay, taxiway and gate capacity, holding aprons, terminal aprons, airport drainage.*	Lecture	CIV 802.2	Mid Term-1, Quiz & End Sem Exam
15	*Airport site selection, geometric design of the airfield, determination of runway capacity and delay, taxiway and gate capacity, holding aprons, terminal aprons, airport drainage.*	Lecture	CIV 802.2	Mid Term-1, Quiz & End Sem Exam
16	*Airport site selection, geometric design of the airfield, determination of runway capacity and delay, taxiway and gate capacity, holding aprons, terminal aprons, airport drainage.*	Lecture	CIV 802.2	Mid Term-1, Quiz & End Sem Exam
17	*Airport site selection, geometric design of the airfield, determination of runway capacity and delay, taxiway and gate capacity, holding aprons, terminal aprons, airport drainage.*	Lecture	CIV 802.2	Mid Term-1, Quiz & End Sem Exam
18	*Airport site selection, geometric design of the airfield, determination of runway capacity and delay, taxiway and gate capacity, holding aprons, terminal aprons, airport drainage.*	Lecture	CIV 802.2	Mid Term-1, Quiz & End Sem Exam
19	*Airport site selection, geometric design of the airfield, determination of runway capacity and delay, taxiway and gate capacity, holding aprons, terminal aprons, airport drainage.*	Lecture	CIV 802.2	Mid Term-1, Quiz & End Sem Exam
20	*Airport site selection, geometric design of the airfield, determination of runway capacity and delay, taxiway and gate capacity, holding aprons, terminal aprons, airport drainage.*	Lecture	CIV 802.2	Mid Term-1, Quiz & End Sem Exam
21	Function of Airport Passenger and Cargo Terminal - Design of Air Freight Terminals, Airport access - Airport Landside	Lecture	CIV 802.2	Mid Term-2, Quiz & End Sem Exam

	planning – Capacity.			
22	Function of Airport Passenger and Cargo Terminal - Design of Air Freight Terminals, Airport access - Airport Landside planning – Capacity.	Lecture	CIV 802.2	Mid Term-2, Quiz & End Sem Exam
23	Function of Airport Passenger and Cargo Terminal - Design of Air Freight Terminals, Airport access - Airport Landside planning – Capacity.	Lecture	CIV 802.2	Mid Term-2, Quiz & End Sem Exam
24	Function of Airport Passenger and Cargo Terminal Design of Air Freight Terminals, Airport access - Airport Landside planning – Capacity.	Lecture	CIV 802.2	Mid Term-2, Quiz & End Sem Exam
25	Function of Airport Passenger and Cargo Terminal Design of Air Freight Terminals, Airport access - Airport Landside planning – Capacity.	Lecture	CIV 802.3	Mid Term-2, Quiz & End Sem Exam
26	Function of Airport Passenger and Cargo Terminal Design of Air Freight Terminals, Airport access - Airport Landside planning – Capacity.	Lecture	CIV 802.3	Mid Term-2, Quiz & End Sem Exam
27	Function of Airport Passenger and Cargo Terminal Design of Air Freight Terminals, Airport access - Airport Landside planning – Capacity.	Lecture	CIV 802.3	Mid Term-2, Quiz & End Sem Exam
28	Air Traffic Managementnavigational aids, ground based systems, satellite based systems.	Lecture	CIV 802.3	Mid Term-2, Quiz & End Sem Exam
29	Air Traffic Managementnavigational aids, ground based systems, satellite based systems.	Lecture	CIV 802.3	Mid Term-2, Quiz & End Sem Exam
30	Air Traffic Managementnavigational aids, ground based systems, satellite based systems.	Lecture	CIV 802.3	Mid Term-2, Quiz & End Sem Exam
31	Air Traffic Managementnavigational aids, ground based systems, satellite based systems.	Lecture	CIV 802.3	Mid Term-2, Quiz & End Sem Exam
32	Air traffic control and	Lecture	CIV 802.3	Mid Term-2, Quiz

	surveillance facilities, airfield lighting, air traffic management.			& End Sem Exam
33	Air traffic control and surveillance facilities, airfield lighting, air traffic management.	Lecture	CIV 802.3	Mid Term-2, Quiz & End Sem Exam
34	Air traffic control and surveillance facilities, airfield lighting, air traffic management.	Lecture	CIV 802.3	Mid Term-2, Quiz & End Sem Exam
35	Air traffic control and surveillance facilities, airfield lighting, air traffic management.	Lecture	CIV 802.3	Mid Term-2, Quiz & End Sem Exam
36	Air traffic control and surveillance facilities, airfield lighting, air traffic management.	Lecture	CIV 802.3	Mid Term-2, Quiz & End Sem Exam

I. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV 802.1	Design and analyze airports.	3	3	1	3	1				2		2	1			
CIV 802.2	Understand the skills to solve problems dealing with different airport design problems.	3	2	2	2	2				2		1	1			
CIV 802.3	Identify the alignment and length of airport runway and draw an airport layout.	3	2	2	2	2				2		1	1			

S. No.	Enrollment.No.	Student's Name	CIV802 AIRPORT PLANNING AND DESIGN							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U2G2
1	A60215818001	Mr NAMAN GOYAL	100	30	70	A-	8	3	3	24
2	A60215818003	Mr SADAV KHAN	100	30	70	A	9	3	3	27
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	A	9	3	3	27
			Total No. of Students			=	3			
			Total No. of Students			>60 % marks	3	100.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING

Course Handout

Course : FOUNDATION ENGINEERING

Course Code : CIV 803, Crédits : 03, Session : 2021-22 (Odd Sem.), Class : B.Tech. 4th Year

Faculty Name : Dr. Imran Ahmad Khan

A. Introduction

This course aims at providing students with a background on principles of foundation design. Students will be exposed to the theories and concepts of foundation design. Skills will be gained and learned through problem sets and a comprehensive design projects.

B. Course Outcomes: At the end of the course, students will be able to:

- **CIV 803.1**.Learn about types and purposes of different foundation systems and structures.
- **CIV 803.2**.Have an exposure to the systematic methods for designing foundations.
- **CIV 803.3.** Be able evaluate the feasibility of foundation solutions to different types of soil conditions considering the time effect on soil behaviour.

- **CIV 803.4.** Have necessary theoretical background for design and construction of foundation systems.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			100%

E. Course Content

Module I: Introduction to Different Types of Foundation: Analysis and design of foundations, types of foundations. Different types of foundation suitable for structures based on soil type and design requirements.

Module II: Settlement of Foundation: Bearing capacity and settlement of foundations; ground movements due to construction. Soil properties for foundation design. Soil improvement requirement theory discussion.

Module III: Design of Excavation: Analysis and design of excavations, retaining walls, cuts & excavations.

Module IV: Underground Structures: Sheet piles, slopes and underground structures. Design and analysis.

Module V: Pile Foundations: Design of strap footings, isolated footing, pile foundations etc. Theory of design of foundations.

F. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

G. Suggested Books

- Singh, Modern Geotechnical Engineering, 3rd Ed., CBS Publishers, New Delhi, 1999.
- B.M. Das, Principles of Foundation Engineering, 5th Ed., Thomson Asia, Singapore, 2003.
- N. Som, Theory and Practice of Foundation Design, Prentice Hall, New Delhi, 2003.

H. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Correspon ding CO**	**Mode of Assessing CO**
1	Analysis and design of foundations, types of foundations. Different types of foundation suitable for structures based on soil type and design requirements.	Lecture	CIV 803.1	Mid Term-1, Quiz & End Sem Exam
2	Analysis and design of foundations, types of foundations. Different types of foundation suitable for structures based on soil type and design requirements.	Lecture	CIV 803.1	Mid Term-1, Quiz & End Sem Exam
3	Analysis and design of foundations, types of foundations. Different types of	Lecture	CIV 803.1	Mid Term-1, Quiz & End Sem Exam

	foundation suitable for structures based on soil type and design requirements.			
4	Analysis and design of foundations, types of foundations. Different types of foundation suitable for structures based on soil type and design requirements.	Lecture	CIV 803.1	Mid Term-1, Quiz & End Sem Exam
5	Analysis and design of foundations, types of foundations. Different types of foundation suitable for structures based on soil type and design requirements.	Lecture	CIV 803.1	Mid Term-1, Quiz & End Sem Exam
6	Analysis and design of foundations, types of foundations. Different types of foundation suitable for structures based on soil type and design requirements.	Lecture	CIV 803.1	Mid Term-1, Quiz & End Sem Exam
7	Analysis and design of foundations, types of foundations. Different types of foundation suitable for structures based on soil type and design requirements.	Lecture	CIV 803.1	Mid Term-1, Quiz & End Sem Exam
8	*Bearing capacity and settlement of foundations; ground movements due to construction. Soil properties for foundation design. Soil improvement requirement theorydiscussion.*	Lecture	CIV 803.1	Mid Term-1, Quiz & End Sem Exam
9	*Bearing capacity and settlement of foundations; ground movements due to construction. Soil properties for foundation design. Soil improvement requirement theorydiscussion.*	Lecture	CIV 803.1	Mid Term-1, Quiz & End Sem Exam

10	Bearing capacity and settlement of foundations; ground movements due to construction. Soil properties for foundation design. Soil improvement requirement theory discussion.	Lecture	CIV 803.2	Mid Term-1, Quiz & End Sem Exam
11	Bearing capacity and settlement of foundations; ground movements due to construction. Soil properties for foundation design. Soil improvement requirement theory discussion.	Lecture	CIV 803.2	Mid Term-1, Quiz & End Sem Exam
12	Bearing capacity and settlement of foundations; ground movements due to construction. Soil properties for foundation design. Soil improvement requirement theory discussion.	Lecture	CIV 803.2	Mid Term-1, Quiz & End Sem Exam
13	Bearing capacity and settlement of foundations; ground movements due to construction. Soil properties for foundation design. Soil improvement requirement theory discussion.	Lecture	CIV 803.2	Mid Term-1, Quiz & End Sem Exam
14	Bearing capacity and settlement of foundations; ground movements due to construction. Soil properties for foundation design. Soil improvement requirement theory discussion.	Lecture	CIV 803.2	Mid Term-1, Quiz & End Sem Exam
15	Analysis and design of excavations, retaining walls, cuts & excavations.	Lecture	CIV 803.2	Mid Term-1, Quiz & End Sem Exam
16	Analysis and design of excavations retaining walls, cuts & excavations.	Lecture	CIV 803.2	Mid Term-1, Quiz & End Sem Exam

17	Analysis and design of excavations retaining walls, cuts & excavations.	Lecture	CIV 803.2	Mid Term-1, Quiz & End Sem Exam
18	Analysis and design of excavations retaining walls, cuts & excavations	Lecture	CIV 803.2	Mid Term-1, Quiz & End Sem Exam
19	Analysis and design of excavations retaining walls, cuts & excavations	Lecture	CIV 803.3	Mid Term-1, Quiz & End Sem Exam
20	Analysis and design of excavations retaining walls, cuts & excavations	Lecture	CIV 803.3	Mid Term-1, Quiz & End Sem Exam
21	*Analysis and design of excavationsretaining walls, cuts & excavations*	Lecture	CIV 803.3	Mid Term-2, Quiz & End Sem Exam
22	Sheet piles, slopes and underground structures. Design and analysis. Design of strap footings, isolated footing, pile foundations etc. Theory of design of foundations.	Lecture	CIV 803.3	Mid Term-2, Quiz & End Sem Exam
23	Sheet piles, slopes and underground structures. Design and analysis.	Lecture	CIV 803.3	Mid Term-2, Quiz & End Sem Exam
24	Sheet piles, slopes and underground structures. Design and analysis.	Lecture	CIV 803.3	Mid Term-2, Quiz & End Sem Exam
25	Sheet piles, slopes and underground structures. Design and analysis.	Lecture	CIV 803.3	Mid Term-2, Quiz & End Sem Exam
26	Sheet piles, slopes and underground structures. Design and analysis.	Lecture	CIV 803.3	Mid Term-2, Quiz & End Sem Exam
27	Sheet piles, slopes and underground structures. Design and analysis.	Lecture	CIV 803.3	Mid Term-2, Quiz & End Sem Exam
28	Sheet piles, slopes and underground structures. Design and analysis.	Lecture	CIV 803.4	Mid Term-2, Quiz & End Sem Exam
29	Sheet piles, slopes and	Lecture	CIV 803.4	Mid Term-2, Quiz

	underground structures. Design and analysis.			& End Sem Exam
30	Design of strap footings, isolated footing, pile foundations etc. Theory of design of foundations.	Lecture	CIV 803.4	Mid Term-2, Quiz & End Sem Exam
31	Design of strap footings, isolated footing, pile foundations etc. Theory of design of foundations.	Lecture	CIV 803.4	Mid Term-2, Quiz & End Sem Exam
32	Design of strap footings, isolated footing, pile foundations etc. Theory of design of foundations.	Lecture	CIV 803.4	Mid Term-2, Quiz & End Sem Exam
33	Design of strap footings, isolated footing, pile foundations etc. Theory of design of foundations.	Lecture	CIV 803.4	Mid Term-2, Quiz & End Sem Exam
34	Design of strap footings, isolated footing, pile foundations etc. Theory of design of foundations.	Lecture	CIV 803.4	Mid Term-2, Quiz & End Sem Exam
35	Design of strap footings, isolated footing, pile foundations etc. Theory of design of foundations.	Lecture	CIV 803.4	Mid Term-2, Quiz & End Sem Exam
36	Design of strap footings, isolated footing, pile foundations etc. Theory of design of foundations.	Lecture	CIV 803.4	Mid Term-2, Quiz & End Sem Exam

I. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

CIV 803.1	Learn about types and purposes of different foundation systems and structures.	3	3	1	3	1				2		2	1			
CIV 803.2	Have an exposure to the systematic methods for designing foundations.	3	2	2	2	2				2		1	1			
CIV 803.3	Be able evaluate the feasibility of foundation solutions to different types of soil conditions considering the time effect on soil behaviour.	3	3	1	3	1				2		2	1			
CIV 803.4	Have necessary theoretical background for design and construction of foundation systems.	3	3	1	3	1				2		2	1			

S. No.	Enrollment.No.	Student's Name	BCU841 COMMUNICATION SKILLS – VIII							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U3G3
1	A60215818001	Mr NAMAN GOYAL	100	30	70	A-	8	1	1	8
2	A60215818003	Mr SADAV KHAN	100	30	70	B+	7	1	1	7
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	A-	8	1	1	8

Total No. of Students	=	3		
Total No. of Students	>60 % marks	2	66.67	%
Attainment Level			Level 1	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : Foundation Engineering Lab
Course Code : CIV 823, Crédits : 01, Session : 2021-22 (Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Imran Ahmad Khan

A. ntroduction

This course aims at providing students with a background on principles of foundation design. Students will be exposed to the theories and concepts of foundation design. Skills will be gained and learned through problem sets and a comprehensive design projects.

B. Course Outcomes: At the end of the course, students will be able to:

- **CIV 823.1**.Learn about types and purposes of different foundation systems and structures. Have an exposure to the systematic methods for designing foundations.
- **CIV 823.2**.Be able evaluate the feasibility of foundation solutions to different types of soil conditions considering the time effect on soil behaviour. Have necessary theoretical background for design and construction of foundation systems.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%

Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			100%

E. Course Content

- Drawing different elements of isolated footing. **(2 Hours)**
- Drawing different elements of strap footing. **(2 Hours)**
- Drawing different elements of pile foundation. **(2 Hours)**
- Drawing different elements of retaining walls. **(2 Hours)**
- Drawing different elements of sheet piles. **(2 Hours)**
- Drawing different elements of grouting for soil stabilization. **(2 Hours)**
- Drawing different elements of well foundation. **(2 Hours)**
- Drawing different elements of seepage (flow lines, equipotential lines) under water dams. **(2 Hours)**
- Drawing different elements of negative skin friction location on pile foundations. **(2 Hours)**
- Identification of earth quake zones. Show different earth quake zones in India. **(2 Hours)**

F. Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	**10**	**10**	**5**	**35**	**35**

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva. V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Singh, Modern Geotechnical Engineering, 3rd Ed., CBS Publishers, New Delhi, 1999.

- B.M. Das, Principles of Foundation Engineering, 5th Ed., Thomson Asia, Singapore, 2003.
- N. Som, Theory and Practice of Foundation Design, Prentice Hall, New Delhi, 2003.

G. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Drawing different elements of isolated footing.	Practical	CIV 823.1	Mid Term-1, Quiz & End Sem Exam
2	Drawing different elements of strap footing.	Practical	CIV 823.1	Mid Term-1, Quiz & End Sem Exam
3	Drawing different elements of pile foundation.	Practical	CIV 823.1	Mid Term-1, Quiz & End Sem Exam
4	Drawing different elements of retaining walls.	Practical	CIV 823.1	Mid Term-1, Quiz & End Sem Exam
5	Drawing different elements of sheet piles.	Practical	CIV 823.1	Mid Term-1, Quiz & End Sem Exam
6	Drawing different elements of grouting for soil stabilization.	Practical	CIV 823.1	Mid Term-1, Quiz & End Sem Exam
7	Drawing different elements of well foundation.	Practical	CIV 823.2	Mid Term-1, Quiz & End Sem Exam
8	Drawing different elements of seepage (flow lines, equipotential lines) under water dams.	Practical	CIV 823.2	Mid Term-1, Quiz & End Sem Exam
9	Drawing different elements of negative skin friction location on pile foundations.	Practical	CIV 823.2	Mid Term-1, Quiz & End Sem Exam
10	Identification of earth quake zones. Show different earth quake zones in India.	Practical	CIV 823.2	Mid Term-1, Quiz & End Sem Exam
11	Identification of earth quake zones. Show different earth quake zones in India.	Practical	CIV 823.2	Mid Term-1, Quiz & End Sem Exam
12	Identification of earth quake zones. Show different earth quake zones in India.	Practical	CIV 823.2	Mid Term-1, Quiz & End Sem Exam

H. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES	CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV 823.1	Learn about types and purposes of different foundation systems and structures. Have an exposure to the systematic methods for designing foundations. systems.	3	3	1	3	1				2		2	1			
CIV 823.2	Be able evaluate the feasibility of foundation solutions to different types of soil conditions considering the time effect on soil behaviour. Have necessary theoretical background for design and construction of foundation.	3	2	2	2	2				2		1	1			

S. No.	Enrollment.No.	Student's Name	CIV823 FOUNDATION ENGINEERING LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U8G8
1	A60215818001	Mr NAMAN GOYAL	100	30	70	A+	10	1	1	10
2	A60215818003	Mr SADAV KHAN	100	30	70	A+	10	1	1	10
3	A60215818004	Mr SHASHWAT MOHANTY	100	30	70	A+	10	1	1	10
			Total No. of Students			=	3			
			Total No. of Students			>60 % marks	3	100.00	%	
			Attainment Level					Level 3		

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : Major Project II
Course Code : NMP 860, Crédits : 09, Session : 2021-22 (Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Imran Ahmad Khan, Dr. Mohan Kantharia, Dr. P. Mahakavi

A. Introduction

The objective of Major project is to enable the student to take up investigative study in the broad field of Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the Department on an individual basis or two/three students in a group, under the guidance of a Supervisor. The aim is to provide students an opportunity to exercise their creative and innovative qualities in a group project environment and to excite the imagination of aspiring engineers, innovators .

B. Course Outcomes: At the end of the course, students will be able to:

- **NMP 860.1**.Apply critical and creative thinking in the design of engineering projects, Plan and manage time effectively as a team.
- **NMP 860.2**.Consider the business context and commercial positioning of designed devices or systems. Apply knowledge of the 'real world' situations that a professional engineer can encounter.
- **NMP 860.3.** Use fundamental knowledge and skills in engineering and apply it effectively on a project. Design and develop a functional product prototype while working in a team. Use various tools and techniques to study existing systems.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage**
Continuous	Mid Term 1	CT	15%

Internal Evaluation			
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			100%

E. Methodology:-Topics of project are to be based on the latest trends, verifying engineering concepts /principals and should involve elementary research work. The projects may involve design, fabrications, testing, computer modelling, and analysis of any engineering problem. On completion of the project the students are to present a report covering various aspects learnt by them and give a presentation on same.

F. Examination Scheme:

Literature study/ Fabrication/ Experimentation	**40**
Written Report	**20**
Viva	**15**
Presentation	**25**
Total	**100**

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva. V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

A. Suggested Text/Reference Books: NA

B. Lecture Plan : NA

C. Course Articulation Matrix (Mapping of COs with POs)

G. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
NMP 860.1	Consider the business context and commercial positioning of designed devices or systems. Apply knowledge of the 'real world' situations that a professional engineer can encounter.	3	3	1	3	1				2		2	1	**1**	**2**	**1**
NMP 860.2	Consider the business context and commercial positioning of designed devices or systems. Apply knowledge of the 'real world' situations that a professional engineer can encounter.	3	2	2	2	2				2		1	1	**2**	**1**	**3**
NMP 860.3	Use fundamental knowledge and skills in engineering and apply it effectively on a project. Design and develop a functional product prototype while working in a team. Use various tools and techniques to study existing systems.	3	2	2	2	2				2		1	1	1	2	3

S. No.	Enrollment.No.	Student's Name	NMP860 MAJOR PROJECT – II							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U6G6
1	A60215818001	Mr NAMAN GOYAL	100	0	100	A+	10	9	9	90
2	A60215818003	Mr SADAV KHAN	100	0	100	A	9	9	9	81
3	A60215818004	Mr SHASHWAT MOHANTY	100	0	100	A	9	9	9	81

Total No. of Students	=	3		
Total No. of Students	>60 % marks	3	100.00	%
Attainment Level			Level 3	

AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course : PROBLEM SOLVING TECHNIQUES - I
Course Code : CSE 604, Crédits : 03, Session :2018-19(Even Sem.), Class : B.Tech. 3RD Year
Faculty Name : Dr. Madhavi Dhingra

A. **Introduction:** The objective of this course is to improve problem solving skills using the concept of C,C++ and data structures and develop knowledge of basic data structures for storage and retrieval of ordered or unordered data. Data structures include: arrays, linked lists, binary trees, heaps, and hash tables etc.

B. **Course Outcomes:** At the end of the course, students will be able to:

CSE604.1. Understand the concepts of data structure, data types and array data structure.

CSE604.2. Implement linked list data structure to solve various problems.

CSE604.3. Apply concepts and techniques of object oriented programming.

CSE604.4.Apply various data structure such as stacks, queues, trees and graphs to solve various computing problems using programming language.

CSE604.5. Analyze various tree and graph based techniques to solve problems.

C. Program Outcomes:

[PO1].Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

[PO2]. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

[PO3]. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

[PO4]. Conduct Investigations of Complex Problems:Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

[PO5]. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

Amity School of Engineering & Technology Gwalior Madhya Pradesh

Maj.Gen. (Dr.) S.C Jain

Director-ASET
Amity University Madhya Pradesh Gwalior

[PO6]. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

[PO7]. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

[PO8]. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

[PO9]. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

[PO10]. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

[PO11]. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

[PO12]. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Program Specific Outcomes:

PSO1. Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.
PSO2. Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.
PSO3. Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%

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Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves Including medical leaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Programming in C –I: (04 Hours) Introduction: Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity. Managing Input and output Operation, formatting I/O. **Control Structures and Looping:** C Statements, conditional executing using if, else, nesting of if, switch and break Concepts of loops, example of loops in C using for, while and do-while, continue and break. Storage types (automatic, register etc.), predefined processor, Command Line Argument.

Module II: Programming in C – II: (06 Hours) Arrays and Functions: One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations. Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function, function argument, function with variable number of argument, recursion. **Pointers:** Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments. **String:** Strings and C string library. **Structure:** Structure and Union, Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments. **File Handling:** Basics of file Handling.

Module III: Object Oriented Programming in C++: (05 Hours) Difference between C and C++, Procedure Oriented and Object Oriented Approach, Characteristics of Object-Oriented Languages **Classes and Objects:** Abstract data types, Object & classes, attributes, methods, C++ class declaration, Local Class and Global Class, State identity and behaviour of an object, Local Object and Global Object, Scope resolution operator, Friend Functions, Inline functions, Constructors and destructors, instantiation of objects, Types of Constructors, Static Class Data, Array of Objects, Constant member functions and Objects, Memory management Operators. **Inheritance:** Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Aggregation, composition vs classification hiérarchies, Overriding inheritance methods, Constructors in derived classes, Nesting of Classes. **Polymorphism:** Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions.

Module IV: Data Structure –I: (07 Hours) Classification of Data structures, Abstract Data Types, Implementation aspects: Memory representation. Data structures operations and its cost estimation. **Linked List:** Representation of linked list in memory, different implementation of linked list. Circular linked list, doubly linked list, etc. Application of linked list: polynomial manipulation using linked list, etc. **Stacks:** Stacks as ADT, Different implementation of stack, multiple stacks. Application of Stack: Conversion of infix to postfix notation using stack, evaluation of postfix expression, Recursion. **Queues:** Queues as ADT, Different implementation of queue, Circular queue, Concept of Dqueue and

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Priority Queue, Application of queues.

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Module V: Data Structure-II: (08 Hours) Tree: Definitions - Height, depth, order, degree etc. Binary Search Tree - Operations, Traversal, Search. AVL Tree, Heap, Applications and comparison of various types of tree; Introduction to forest, multi-way Tree, B tree, B+ tree, B* tree and red-black tree. **Graphs:** Introduction, Classification of graph: Directed and Undirected graphs, etc, Representation, Graph Traversal: Depth First Search (DFS), Breadth First Search (BFS), Graph algorithm: Minimum Spanning Tree (MST)- Kruskal, Prim's algorithms. Dijkstra's shortest path algorithm; Comparison between different graph algorithms. Application of graphs. **Sorting:** Introduction, Sort methods like: Bubble Sort, Quick sort. Selection sort, Heap sort, Insertion sort, Shell sort, Merge sort and Radix sort; comparison of various sorting techniques. Basic Search Techniques: Sequential search, Binary search, Comparison of search methods, Hashing & Indexing.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

H.

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Yashwant Kanetkar, "Let us C", BPB Publications, 2nd Edition, 2001.
- Herbert Schildt, "C: The complete reference", Osbourne Mcgraw Hill, 4th Edition, 2002.
- A.R. Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997
- R. Lafore, "Object Oriented Programming using C++", BPB Publications, 2004.
- A. M. Tenenbaum, "Data Structures using C & C++", Prentice-Hall of India Pvt. Ltd., New Delhi.
- Kernighan & Ritchie, "C Programming Language", The (Ansi C Version), PHI, 2nd Edition.
- "Object Oriented Programming with C++" By E. Balagurusamy.
- Bruno R Preiss, "Data Structures and Algorithms with Object Oriented Design Pattern in C++", Jhon Wiley & Sons, Inc.
- Gilberg Forozan , "Data Structure – A pseudo code approach with C++", Cengage Learning, New Delhi

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Basic structure of C program, Concept of variables, constants and data types in C	Lecture	CSE604.1	Mid Term-1, Quiz & End Sem Exam

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2	Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity.	Lecture	CSE604.1	Mid Term-1, Quiz & End Sem Exam
3	Managing Input and output Operation, formatting I/O	Lecture	CSE604.1	Mid Term-1, Quiz & End Sem Exam
4	Control Structures and Looping: C Statements, conditional executing using if, else, nesting of if, switch and break	Lecture	CSE604.1	Mid Term-1, Quiz & End Sem Exam
5	Concepts of loops, example of loops in C using for, while and do-while, continue and break.	Lecture	CSE604.1	Mid Term-1, Quiz & End Sem Exam
6	Storage types (automatic, register etc.), predefined processor, Command Line Argument.	Lecture	CSE604.1	Mid Term-1, Quiz & End Sem Exam
7	Arrays and Functions: One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations.	Lecture	CSE604.2	Mid Term-1, Quiz & End Sem Exam
8	Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function	Lecture	CSE604.2	Mid Term-1, Quiz & End Sem Exam
9	function argument, function with variable number of argument, recursion.	Lecture	CSE604.2	Mid Term-1, Quiz & End Sem Exam
10	Pointers: Pointers, relationship between arrays and pointers Argument passing using pointers,	Lecture	CSE604.2	Mid Term-1, Quiz & End Sem Exam
11	Array of pointers. Passing arrays as arguments.	Lecture	CSE604.2	Mid Term-1, Quiz & End Sem Exam
12	String: Strings and C string library.	Lecture	CSE604.2	Mid Term-1, Quiz & End Sem Exam

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13	Structure: Structure and Union, Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments.	Lecture	CSE604.2	Mid Term-1, Quiz & End Sem Exam
14	File Handling: Basics of file Handling.	Lecture	CSE604.3	Mid Term-1, Quiz & End Sem Exam
15	Difference between C and C++, Procedure Oriented and Object Oriented Approach, Characteristics of Object-Oriented Languages Classes and Objects: Abstract data types, Object & classes, attributes, methods, C++ class declaration, Local Class and Global Class, State identity and behaviour of an object, Local Object and Global Object, Scope resolution operator	Lecture	CSE604.3	Mid Term-1, Quiz & End Sem Exam
16	Friend Functions, Inline functions, Constructors and destructors, instantiation of objects, Types of Constructors, Static Class Data, Array of Objects, Constant member functions and Objects, Memory management Operators.	Lecture	CSE604.3	Mid Term-1, Quiz & End Sem Exam
17	Inheritance: Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class	Lecture	CSE604.3	Mid Term-1, Quiz & End Sem Exam
18	Aggregation, composition vs classification hiérarchies, Overriding inheritance methods	Lecture	CSE604.3	Mid Term-1, Quiz & End Sem Exam
19	Constructors in derived classes, Nesting of Classes.	Lecture	CSE604.3	Mid Term-1, Quiz & End Sem Exam

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20	Polymorphism: Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading,	Lecture	CSE604.3	Mid Term-1, Quiz & End Sem Exam
21	Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions.	Lecture	CSE604.3	Mid Term-2, Quiz & End Sem Exam
22	Classification of Data structures, Abstract Data Types, Implementation aspects: Memory representation. Data structures operations and its cost estimation.	Lecture	CSE604.4	Mid Term-2, Quiz & End Sem Exam
23	**Linked List:** Representation of linked list in memory, different implementation of linked list. Circular linked list, doubly linked list, etc. Application of linked list: polynomial manipulation using linked list, etc.	Lecture	CSE604.4	Mid Term-2, Quiz & End Sem Exam
24	**Stacks:** Stacks as ADT, Different implementation of stack, multiple stacks.	Lecture	CSE604.4	Mid Term-2, Quiz & End Sem Exam
25	Application of Stack: Conversion of infix to postfix notation using stack, evaluation of postfix expression, Recursion.	Lecture	CSE604.4	Mid Term-2, Quiz & End Sem Exam
26	**Queues:** Queues as ADT, Different implementation of queue, Circular queue, Concept of Dqueue and Priority Queue, Application of queues.	Lecture	CSE604.4	Mid Term-2, Quiz & End Sem Exam
27	**Tree:** Definitions - Height, depth, order, degree etc. Binary Search Tree - Operations	Lecture	CSE604.4	Mid Term-2, Quiz & End Sem Exam
28	Traversal, Search. AVL Tree, Heap, Applications and comparison of various types of tree;	Lecture	CSE604.5	Mid Term-2, Quiz & End Sem Exam
29	Introduction to forest, multi-way Tree, B tree, B+ tree, B* tree and red-black tree.	Lecture	CSE604.5	Mid Term-2, Quiz & End Sem Exam

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30	**Graphs:** Introduction, Classification of graph: Directed and Undirected graphs, etc	Lecture	CSE604.5	Mid Term-2, Quiz & End Sem Exam
31	Representation, Graph Traversal: Depth First Search (DFS), Breadth First Search (BFS)	Lecture	CSE604.5	Mid Term-2, Quiz & End Sem Exam
32	Graph algorithm: Minimum Spanning Tree (MST)- Kruskal, Prim's algorithms.	Lecture	CSE604.5	Mid Term-2, Quiz & End Sem Exam
33	Dijkstra's shortest path algorithm; Comparison between different graph algorithms. Application of graphs.	Lecture	CSE604.5	Mid Term-2, Quiz & End Sem Exam
34	**Sorting:** Introduction, Sort methods like: Bubble Sort, Quick sort. Selection sort, Heap sort, Insertion sort, Shell sort, Merge sort and Radix sort	Lecture	CSE604.5	Mid Term-2, Quiz & End Sem Exam
35	Comparison of various sorting techniques. Basic Search Techniques: Sequential search, Binary search,	Lecture	CSE604.5	Mid Term-2, Quiz & End Sem Exam
36	Comparison of search methods, Hashing & Indexing.	Lecture	CSE604.5	Mid Term-2, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME-SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

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CSE323.1	Understand the concepts of data structure, data types and array data structure.															
CSE323.2	Implement linked list data structure to solve various problems.	3	2	1										1		
CSE323.3	Apply concepts and techniques of object oriented programming.	2														
CSE323.4	Apply various data structure such as stacks, queues, trees and graphs to solve various computing problems using programming language.	2														
CSE323.5	Analyze various tree and graph based techniques to solve problems.	3												1		

ESE Marks - CSE624

S. No.	Enrollment.No.	Student's Name	CSE604							
			PROBLEM SOLVING TECHNIQUES – I							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U21G21
1	A60205218008	Mr AKSHAT MISHRA	100	30	70	B	6	3	3	18
2	A60205218016	Mr SWAPNIL RAI	100	30	70	A-	8	3	3	24
3	A60205218024	Mr ASHISH TARKESHWAR SINGH	100	30	70	B-	5	3	3	15
4	A60205218032	Mr AYUSH SHARMA	100	30	70	B-	5	3	3	15
5	A60205218041	Mr ABHISHEK SINGH	100	30	70	B+	7	3	3	21
6	A60205218007	Ms PRIYANSHI GUPTA	100	30	70	A	9	3	3	27
7	A60205218015	Mr SHUBHAM JAIN	100	30	70	B-	5	3	3	15
8	A60205218023	Ms ADITI SHARMA	100	30	70	A	9	3	3	27
9	A60205218031	Mr KETANDEEP SHARMA	100	30	70	A-	8	3	3	24
10	A60205218040	Mr ASHIRWAD VERMA	100	30	70	B+	7	3	3	21
11	A60205218003	Mr ANURAG KOTNALA	100	30	70	B	6	3	3	18

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12	A60205218011	Ms TAMANNAKUMARI MANOJKU-MAR	100	30	70	A-	8	3	3	24
13	A60205218019	Mr PRAYAG DUBEY	100	30	70	A	9	3	3	27
14	A60205218027	Mr AYUSH CHANDRA	100	30	70	A	9	3	3	27
15	A60205218036	Mr AYUSH SHARMA	100	30	70	A	9	3	3	27
16	A60205218001	Ms MANASI SRIVASTAVA	100	30	70	B+	7	3	3	21
17	A60205218009	Ms ADITI LIKHAR	100	30	70	B	6	3	3	18
18	A60205218017	Mr ILAPANDA SUHASH	100	30	70	A-	8	3	3	24
19	A60205218025	Mr ARPIT SAXENA	100	30	70	A-	8	3	3	24
20	A60205218033	Ms PRIYANSHI SHARMA	100	30	70	A	9	3	3	27
21	A60205218002	Mr DHRUV KUMAR AGARWAL	100	30	70	A-	8	3	3	24
22	A60205218010	Mr AMAN BHATNAGAR	100	30	70	A-	8	3	3	24
23	A60205218018	Mr ANUBHAV KADAM	100	30	70	B-	5	3	3	15
24	A60205218026	Mr ABHISHEK PANCHOLI	100	30	70	B	6	3	3	18
25	A60205218034	Mr V. SAMARTH CHANDRA	100	30	70	B	6	3	3	18
26	A60205218006	Mr UDAY SINGH RAJAWAT	100	30	70	A	9	3	3	27
27	A60205218014	Mr KRATIK JAIN	100	30	70	A	9	3	3	27
28	A60205218022	Mr DEEPESH KUSHWAH	100	30	70	B-	5	3	3	15
29	A60205218030	Ms AEIKNOR KAUR VIRK	100	30	70	B+	7	3	3	21
30	A60205218039	Mr SIDDHANT SINGH KAURAV	100	30	70	A-	8	3	3	24
31	A60205218050	Mr DEEPAK SHARMA	100	30	70	B	6	3	3	18
32	A60205218062	Ms ANKITA SHUKLA	100	30	70	A	9	3	3	27
33	A60205218071	Mr MUKUL AGARWAL	100	30	70	A-	8	3	3	24
34	A60205218005	Mr SAKSHAM CHATURVEDI	100	30	70	A-	8	3	3	24
35	A60205218013	Mr PRANAY GUPTA	100	30	70	B+	7	3	3	21
36	A60205218021	Mr YOGENDRA BHADORIA	100	30	70	B-	5	3	3	15
37	A60205218029	Ms PRAGATI TIWARI	100	30	70	B+	7	3	3	21
38	A60205218038	Ms MANYA SINGH	100	30	70	B	6	3	3	18
39	A60205218004	Mr DEVASHISH PATIL	100	30	70	A-	8	3	3	24
40	A60205218012	Mr SOURABH SINGH TOMAR	100	30	70	B	6	3	3	18
41	A60205218020	Mr AMAN GUPTA	100	30	70	A-	8	3	3	24
42	A60205218028	Mr VARUN VIKRAM	100	30	70	B+	7	3	3	21
43	A60205218037	Ms NEHA VERMA	100	30	70	A-	8	3	3	24
44	A60205218049	Mr YOGESH SINGH	100	30	70	B	6	3	3	18
45	A60205218060	Mr PRABHANSHOO SHRIVASTA-VA	100	30	70	B-	5	3	3	15
46	A60205218070	Ms ANSHITA CHANDEL	100	30	70	A-	8	3	3	24
47	A60205218079	Mr RISHABH JAIN	100	30	70	B+	7	3	3	21
48	A60205218045	Mr VAIBHAV BANERJEE	100	30	70	B+	7	3	3	21
49	A60205218054	Mr ABHISHEK DWIVEDI	100	30	70	B+	7	3	3	21
50	A60205218065	Mr SATYAM SHARMA	100	30	70	B+	7	3	3	21
51	A60205218074	Ms APOORVA GOSAIN	100	30	70	B-	5	3	3	15
52	A60205218043	Mr ANMOL SAXENA	100	30	70	A-	8	3	3	24
53	A60205218051	Mr SHIVAM SHARMA	100	30	70	A+	10	3	3	30
54	A60205218063	Mr MILKY SHRIVASTAVA	100	30	70	A-	8	3	3	24
55	A60205218072	Mr SARTHAK GUPTA	100	30	70	A-	8	3	3	24

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56	A60205218044	Ms NIHARIKA SINGH	100	30	70	A-	8	3	3	24
57	A60205218053	Mr SWAPNIL PALIYA	100	30	70	B+	7	3	3	21
58	A60205218064	Ms ANVI TOMAR	100	30	70	A	9	3	3	27
59	A60205218073	Mr HRITUJ AGRAHARI	100	30	70	A	9	3	3	27
60	A60205218048	Ms VAISHNAVI RAWAT	100	30	70	B+	7	3	3	21
61	A60205218059	Mr KARAN TAMBAT	100	30	70	B+	7	3	3	21
62	A60205218068	Mr RISHABH SHRIVASTAVA	100	30	70	B-	5	3	3	15
63	A60205218078	Mr SHEIKH ABDUL ANAS	100	30	70	B+	7	3	3	21
64	A60205218047	Ms RIMJHIM CHHAYA	100	30	70	A-	8	3	3	24
65	A60205218058	Mr BHUPENDRA UPADHYAY	100	30	70	A	9	3	3	27
66	A60205218067	Mr RISHABH KULSHRESTHA	100	30	70	A	9	3	3	27
67	A60205218077	Mr PRIYANSH JAISWAL	100	30	70	A	9	3	3	27
68	A60205218046	Mr KETAN AGRAWAL	100	30	70	A-	8	3	3	24
69	A60205218055	Mr SURAJ NEEKHARA	100	30	70	B+	7	3	3	21
70	A60205218066	Mr PRATEEK SAHGAL	100	30	70	B-	5	3	3	15
71	A60205218075	Mr PRADYUMN SHARMA	100	30	70	B-	5	3	3	15

Average Grade Point = 517/71 (Total Grade point/Total no of students) = 7.3
No of students getting greater than average(7.3) marks = 35 students = 49.3%

Total No. of Students	=	71
Level 2	>50% average marks and < 60% average marks	49.3%
Attainment Level		Level 2

Note: Attainment Level

Level 1	< 50% Average mark
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average mark

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AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course : PROBLEM SOLVING TECHNIQUES LAB - I
Course Code : CSE624, Crédits : 02, Session :2018-19(Even Sem.), Class : B.Tech. 3RD Year
Faculty Name : Dr. Madhavi Dhingra

A. **Introduction:** The objective of this course is to write the programs for solving problems using the concept of C,C++ and data structures and develop knowledge of basic data structures for storage and retrieval of ordered or unordered data.

B. **Course Outcomes:** At the end of the course, students will be able to:

CSE624.1 Understand various concepts of C Programming and data structure.

CSE624.2 Apply C programming concepts to solve various problems.

CSE624.3 Implement various data structures in programming language.

CSE624.4 Implement various object oriented concepts to solve problems.

CSE624.5 Apply various data structure such as stacks, queues, trees and graphs to solve various computing problems using C/C++ programming language.

C. Program Outcomes:

[PO1].Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

[PO2]. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

[PO3]. Design/Development of Solutions:Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

[PO4]. Conduct Investigations of Complex Problems:Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

[PO5]. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

[PO6]. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

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[PO7]. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

[PO8]. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

[PO9]. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

[PO10]. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

[PO11]. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

[PO12]. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Program Specific Outcomes:

PSO1. Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO3. Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

E. Assessment Plan:

Compo-nent of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term Viva	CT	15%
	Mid Term Viva		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%

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Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance- of 25% includes all types of leaves Including medical leaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F.

F. **Syllabus**

Programming in C : (10 Hours)

1. Write a simple program based on operators (pre, post increment, bitwise and, or, etc.).
2. Write a simple program based on conversions (from int to float & float to int)
3. Write a program for find the max and min from the three numbers.
4. Write the program for the simple, compound interest.
5. Write program for students marks grading.
6. C program to check whether a given number is odd or even.
7. C program to Add digits of input number.
8. C program to Factorial of a given number.
9. C program to swap two numbers without using third variable.
10. C program to check whether a given year is leap year or not.
11. C program to check whether a given number Palindrome Number or not.
12. C programs to print different patterns.
13. Program for the following using switch statement: **Menu:-** (a) Sum of two numbers (b) Negative or Positive Number (c) Simple Interest (d) Area of Circle (e) Exit
14. C program to check whether a given number Prime Number or not.
15. C program to check whether a given number Armstrong Number or not.
16. C program to print Fibonacci series up to given term.
17. C program to find out sum of 10 numbers by using array.
18. C program to reverses of one array elements into another.
19. C program to find out maximum and minimum number in an array.
20. Write a C program that uses functions to perform the following: (a) Addition of Two Matrices (b) Multiplication of Two Matrices (c) Transpose of a matrix
21. C program to Factorial of a given number by using user define function.
22. Write a program for display values reverse order from array using pointer.
23. Write a program through pointer variable to sum of n elements from array.
24. Write a C program which copies one file to another.

Object Oriented Programming in C++ : (10 Hours)

1. Write a program that show the concept of class and object and having function for addition,subtraction,multiplication and division of two number.
2. Program that show the concept of inline function.
3. Program that show the concept of friend function.
4. Program that show the concept of all types of constructor and destructor.
5. Program that show the concept of local class and global class.

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6. Program that show the concept of local object and global object.
7. Program that show the concept of static class data and static member function.
8. Program that show the concept of constant member data and function .
9. Program that show the concept of dynamic memory allocation.
10. Program that show the concept of multiple inheritance.
11. Program that show the concept of multilevel inheritance.
12. Program that show the concept of function overloading.
13. Program that show the concept of function overriding.

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14. Program that illustrates the order of execution of constructors and destructors when new class is derived from more than one base class.
15. Program that show the concept of operator overloading (overload ++ operator).
16. Program that overload +,- for addition and subtraction of two complex number.
17. Program that show the concept of this pointer.
18. Program that illustrates how run time polymorphism is achieved using virtual functions.
19. Program that illustrates the role of virtual base class in building class hierarchy.
20. Program that illustrates the role of abstract class in building class hierarchy.

Data Structure : (20 Hours)

1. Write a C/C++ program that uses functions to perform the following: i) Create a singly linked list of integers. ii) Delete a given integer from the above linked list. iii) Display the contents of the above list after deletion.
2. Write a C/C++ program that uses functions to perform the following: i) Create a doubly linked list of integers. ii) Delete a given integer from the above doubly linked list. iii) Display the contents of the above list after deletion.
3. Write a C/C++ program that implement the concept of Stack using array/link list.
4. Write a C/C++ program that implement the concept of Queue using array/link list..
5. Write a C/C++ program that implement the concept of Circular Queue.
6. Write a C/C++ program that implement the solution of Tower of Hanoi problem.
7. Write a C/C++ program that uses stack operations to convert a given infix expression into its postfix Equivalent.
8. Write a C/C++ program that uses functions to perform the following: i) Create a binary search tree of characters. ii) Traverse the above Binary search tree recursively in postorder.
9. Write a C/C++ program that uses functions to perform the following: i) Create a binary search tree of integers. ii) Traverse the above Binary search tree non recursively in order.
10. Write C/C++ programs for implementing the following sorting methods to arrange a list of integers in ascending order: i) Insertion sort ii) Bubble Sort iii) Insertion Sort iv) Quick Sort v) Merge sort vi) Counting Sort etc.
11. Write C/C++ programs for implementing the following graph traversal algorithms: (i)Depth first traversal (ii)Breadth first traversal

G. Examination Scheme:

IA			EE			
A	**PR**	**Practical Based Test**	**Major Experiment**	**Minor Experiment**	**LR**	**Viva**
5	10	15	35	15	10	10

Note: IA -Internal Assessment, EE- External Exam, A- Attendance PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Text/Reference Books:

- Yashwant Kanetkar, “Let us C”, BPB Publications, 2nd Edition, 2001.
- Herbert Schildt, “C: The complete reference”, Osbourne Mcgraw Hill, 4th Edition, 2002.
- A.R. Venugopal, Rajkumar, T. Ravishanker “Mastering C++”, TMH, 1997
- R. Lafore, “Object Oriented Programming using C++”, BPB Publications, 2004.
- A. M. Tenenbaum, “Data Structures using C & C++”, Prentice-Hall of India Pvt. Ltd., New Delhi.
- Kernighan & Ritchie, “C Programming Language”, The (Ansi C Version), PHI, 2nd Edition.
- “Object Oriented Programming with C++” By E. Balagurusamy.

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- Bruno R Preiss, “Data Structures and Algorithms with Object Oriented Design Pattern in C++”, Jhon Wiley & Sons, Inc.

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- Gilberg Forozan , "Data Structure – A pseudo code approach with C++", Cengage Learning, New Delhi

I. **Lab Plan**

Lab	Topics	Mode of Delivery	Corre-sponding CO	Mode of As-sessing CO
1	1. Write a simple program based on operators (pre, post increment, bitwise and, or, etc.). 2. Write a simple program based on conversions (from int to float & float to int) 3. Write a program for find the max and min from the three numbers. 4. Write the program for the simple, compound interest.	Practical	CSE624.1	Mid Term Viva, Quiz & End Sem Exam
2	5. Write program for students marks grading. 6. C program to check whether a given number is odd or even. 7. C program to Add digits of input number. 8. C program to Factorial of a given number. 9. C program to swap two numbers without using third variable.	Practical	CSE624.1	Mid Term Viva, Quiz & End Sem Exam
3	10. C program to check whether a given year is leap year or not. 11. C program to check whether a given number Palindrome Number or not. 12. C programs to print different patterns. 13. Program for the following using switch statement: **Menu:-** (a) Sum of two numbers (b) Negative or Positive Number (c) Simple Interest (d) Area of Circle (e) Exit	Practical	CSE624.1	Mid Term Viva, Quiz & End Sem Exam

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4	14. C program to check whether a given number Prime Number or not. 15. C program to check whether a given number Armstrong Number or not. 16. C program to print Fibonacci series up to given term. 17. C program to find out sum of 10 numbers by using array.	Practical	CSE624.1	Mid Term Viva, Quiz & End Sem Exam
5	18. C program to reverses of one array elements into another. 19. C program to find out maximum and minimum number in an array. 20. Write a C program that uses functions to perform the following: (a) Addition of Two Matrices (b) Multiplication of Two Matrices (c) Transpose of a matrix	Practical	CSE624.1	Mid Term Viva, Quiz & End Sem Exam
6	21. C program to Factorial of a given number by using user define function. 22. Write a program for display values reverse order from array using pointer. 23. Write a program through pointer variable to sum of n elements from array . 24. Write a C program which copies one file to another.	Practical	CSE624.1	Mid Term Viva, Quiz & End Sem Exam

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7	1. Write a program that show the concept of class and object and having function for addition,subtraction,multiplication and division of two number. 2. Program that show the concept of inline function. 3. Program that show the concept of friend function. 4. Program that show the concept of all types of constructor and destructor. 5. Program that show the concept of local class and global class. 6. Program that show the concept of local object and global object.	Practical	CSE624.2	Mid Term Viva, Quiz & End Sem Exam
8	7. Program that show the concept of static class data and static member function. 8. Program that show the concept of constant member data and function .	Practical	CSE624.2	Mid Term Viva, Quiz & End Sem Exam
9	9. Program that show the concept of dynamic memory allocation. 10. Program that show the concept of multiple inheritance. 11. Program that show the concept of multilevel inheritance.	Practical	CSE624.2	Mid Term Viva, Quiz & End Sem Exam

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10	12. Program that show the concept of function overloading. 13. Program that show the concept of function overriding. 14. Program that illustrates the order of execution of constructors and destructors when new class is derived from more than one base class.	Practical	CSE624.2	Mid Term Viva, Quiz & End Sem Exam
11	15. Program that show the concept of operator overloading (overload ++ operator). 16. Program that overload +,- for addition and subtraction of two complex number.	Practical	CSE624.2	Mid Term Viva, Quiz & End Sem Exam
12	17. Program that show the concept of this pointer. 18. Program that illustrates how run time polymorphism is achieved using virtual functions. 19. Program that illustrates the role of virtual base class in building class hierarchy. 20. Program that illustrates the role of abstract class in building class hierarchy.	Practical	CSE624.2	Mid Term Viva, Quiz & End Sem Exam

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13	1. Write a C/C++ program that uses functions to perform the following: i) Create a singly linked list of integers. ii) Delete a given integer from the above linked list. iii) Display the contents of the above list after deletion. 2. Write a C/C++ program that uses functions to perform the following: i) Create a doubly linked list of integers. ii) Delete a given integer from the above doubly linked list. iii) Display the contents of the above list after deletion.	Practical	CSE624.3	Mid Term Viva, Quiz & End Sem Exam
14	3. Write a C/C++ program that implement the concept of Stack using array/link list. 4. Write a C/C++ program that implement the concept of Queue using array/link list..	Practical	CSE624.3	Mid Term Viva, Quiz & End Sem Exam
15	5. Write a C/C++ program that implement the concept of Circular Queue.	Practical	CSE624.3	Mid Term Viva, Quiz & End Sem Exam
16	6. Write a C/C++ program that implement the solution of Tower of Hanoi problem.	Practical	CSE624.3	Mid Term Viva, Quiz & End Sem Exam

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17	7. Write a C/C++ program that uses stack operations to convert a given infix expression into its postfix Equivalent.	Practical	CSE624.3	Mid Term Viva, Quiz & End Sem Exam
18	8. Write a C/C++ program that uses functions to perform the following: i) Create a binary search tree of characters. ii) Traverse the above Binary search tree recursively in postorder.	Practical	CSE624.3	Mid Term Viva, Quiz & End Sem Exam
19	9. Write a C/C++ program that uses functions to perform the following: i) Create a binary search tree of integers. ii) Traverse the above Binary search tree non recursively in order.	Practical	CSE624.3	Mid Term Viva, Quiz & End Sem Exam
20	10. Write C/C++ programs for implementing the following sorting methods to arrange a list of integers in ascending order: i) Insertion sort	Practical	CSE624.3	Mid Term Viva, Quiz & End Sem Exam
21	11. Write C/C++ programs for implementing the following sorting methods to arrange a list of integers in ascending order:Bubble Sort	Practical	CSE624.3	Mid Term Viva, Quiz & End Sem Exam
22	12. Write C/C++ programs for implementing the following sorting methods to arrange a list of integers in ascending order: Insertion Sort and Quick Sort	Practical	CSE624.3	Mid Term Viva, Quiz & End Sem Exam

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23	13. Write C/C++ programs for implementing the following sorting methods to arrange a list of integers in ascending order: Merge sort and Counting Sort etc.	Practical	CSE624.3	Mid Term Viva, Quiz & End Sem Exam
24	14. Write C/C++ programs for implementing the following graph traversal algorithms: (i)Depth first traversal (ii)Breadth first traversal	Practical	CSE624.3	Mid Term Viva, Quiz & End Sem Exam

J.

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME-SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE323.1	Understand various concepts of C Programming and data structure.															
CSE323.2	Apply C programming concepts to solve various problems.	3												1		
CSE323.3	Implement various data structures in programming language.	3		1										1		
CSE323.4	Implement various object oriented concepts to solve problems.	3		1										1		

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CSE323.5	Apply various data structure such as stacks, queues, trees and graphs to solve various computing problems using C/C++ programming language.	3												1		

ESE Marks – CSE624

S. No.	Enrollment.No.	Student's Name	CSE624 PROBLEM SOLVING TECHNIQUES LAB- I							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U16G16
1	A60205218008	Mr AKSHAT MISHRA	100	30	70	B	6	2	2	12
2	A60205218016	Mr SWAPNIL RAI	100	30	70	A-	8	2	2	16
3	A60205218024	Mr ASHISH TARKESHWAR SINGH	100	30	70	B-	5	2	2	10
4	A60205218032	Mr AYUSH SHARMA	100	30	70	A-	8	2	2	16
5	A60205218041	Mr ABHISHEK SINGH	100	30	70	A-	8	2	2	16
6	A60205218007	Ms PRIYANSHI GUPTA	100	30	70	A	9	2	2	18
7	A60205218015	Mr SHUBHAM JAIN	100	30	70	A	9	2	2	18
8	A60205218023	Ms ADITI SHARMA	100	30	70	A	9	2	2	18
9	A60205218031	Mr KETANDEEP SHARMA	100	30	70	B	6	2	2	12
10	A60205218040	Mr ASHIRWAD VERMA	100	30	70	B+	7	2	2	14
11	A60205218003	Mr ANURAG KOTNALA	100	30	70	B	6	2	2	12
12	A60205218011	Ms TAMANNA-KUMARI MANOJKUMAR	100	30	70	A	9	2	2	18
13	A60205218019	Mr PRAYAG DUBEY	100	30	70	B+	7	2	2	14
14	A60205218027	Mr AYUSH CHANDRA	100	30	70	A	9	2	2	18
15	A60205218036	Mr AYUSH SHARMA	100	30	70	B	6	2	2	12
16	A60205218001	Ms MANASI SRIVASTAVA	100	30	70	A	9	2	2	18
17	A60205218009	Ms ADITI LIKHAR	100	30	70	A	9	2	2	18
18	A60205218017	Mr ILAPANDA SUHASH	100	30	70	B-	5	2	2	10
19	A60205218025	Mr ARPIT SAXENA	100	30	70	B+	7	2	2	14
20	A60205218033	Ms PRIYANSHI SHARMA	100	30	70	A	9	2	2	18
21	A60205218002	Mr DHRUV KUMAR AGARWAL	100	30	70	A	9	2	2	18
22	A60205218010	Mr AMAN BHATNAGAR	100	30	70	B	6	2	2	12

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23	A60205218018	Mr ANUBHAV KADAM	100	30	70	B	6	2	2	12
24	A60205218026	Mr ABHISHEK PANCHOLI	100	30	70	B+	7	2	2	14
25	A60205218034	Mr V. SAMARTH CHANDRA	100	30	70	B	6	2	2	12
26	A60205218006	Mr UDAY SINGH RAJAWAT	100	30	70	A	9	2	2	18
27	A60205218014	Mr KRATIK JAIN	100	30	70	A-	8	2	2	16
28	A60205218022	Mr DEEPESH KUSHWAH	100	30	70	B+	7	2	2	14
29	A60205218030	Ms AEIKNOR KAUR VIRK	100	30	70	A-	8	2	2	16
30	A60205218039	Mr SIDDHANT SINGH KAURAV	100	30	70	A-	8	2	2	16
31	A60205218050	Mr DEEPAK SHARMA	100	30	70	A-	8	2	2	16
32	A60205218062	Ms ANKITA SHUKLA	100	30	70	A	9	2	2	18
33	A60205218071	Mr MUKUL AGARWAL	100	30	70	A-	8	2	2	16
34	A60205218005	Mr SAKSHAM CHATURVEDI	100	30	70	A	9	2	2	18
35	A60205218013	Mr PRANAY GUP-TA	100	30	70	A-	8	2	2	16
36	A60205218021	Mr YOGENDRA BHADORIA	100	30	70	B	6	2	2	12
37	A60205218029	Ms PRAGATI TIWARI	100	30	70	B+	7	2	2	14
38	A60205218038	Ms MANYA SINGH	100	30	70	A-	8	2	2	16
39	A60205218004	Mr DEVASHISH PATIL	100	30	70	A	9	2	2	18
40	A60205218012	Mr SOURABH SINGH TOMAR	100	30	70	B+	7	2	2	14
41	A60205218020	Mr AMAN GUPTA	100	30	70	B+	7	2	2	14
42	A60205218028	Mr VARUN VIKRAM	100	30	70	A-	8	2	2	16
43	A60205218037	Ms NEHA VERMA	100	30	70	A-	8	2	2	16
44	A60205218049	Mr YOGESH SINGH	100	30	70	A	9	2	2	18
45	A60205218060	Mr PRABHANS-HOO SHRIVASTAVA	100	30	70	B	6	2	2	12
46	A60205218070	Ms ANSHITA CHANDEL	100	30	70	A	9	2	2	18
47	A60205218079	Mr RISHABH JAIN	100	30	70	B+	7	2	2	14
48	A60205218045	Mr VAIBHAV BANERJEE	100	30	70	B+	7	2	2	14
49	A60205218054	Mr ABHISHEK DWIVEDI	100	30	70	A	9	2	2	18
50	A60205218065	Mr SATYAM SHARMA	100	30	70	A	9	2	2	18
51	A60205218074	Ms APOORVA GOSAIN	100	30	70	A-	8	2	2	16
52	A60205218043	Mr ANMOL SAXENA	100	30	70	B	6	2	2	12
53	A60205218051	Mr SHIVAM SHARMA	100	30	70	A	9	2	2	18
54	A60205218063	Mr MILKY SHRIVASTAVA	100	30	70	B	6	2	2	12
55	A60205218072	Mr SARTHAK GUPTA	100	30	70	B+	7	2	2	14
56	A60205218044	Ms NIHARIKA SINGH	100	30	70	B+	7	2	2	14
57	A60205218053	Mr SWAPNIL PALIYA	100	30	70	B-	5	2	2	10
58	A60205218064	Ms ANVI TOMAR	100	30	70	A	9	2	2	18
59	A60205218073	Mr HRITUJ AGRAHARI	100	30	70	B-	5	2	2	10
60	A60205218048	Ms VAISHNAVI RAWAT	100	30	70	A-	8	2	2	16
61	A60205218059	Mr KARAN TAM-BAT	100	30	70	B+	7	2	2	14

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62	A60205218068	Mr RISHABH SHRIVASTAVA	100	30	70	B	6	2	2	12
63	A60205218078	Mr SHEIKH AB-DUL ANAS	100	30	70	B-	5	2	2	10
64	A60205218047	Ms RIMJHIM CHHAYA	100	30	70	B+	7	2	2	14
65	A60205218058	Mr BHUPENDRA UPADHYAY	100	30	70	B-	5	2	2	10
66	A60205218067	Mr RISHABH KULSHRESTHA	100	30	70	A-	8	2	2	16
67	A60205218077	Mr PRIYANSH JAISWAL	100	30	70	B+	7	2	2	14
68	A60205218046	Mr KETAN AGRAWAL	100	30	70	B+	7	2	2	14
69	A60205218055	Mr SURAJ NEEKHARA	100	30	70	B-	5	2	2	10
70	A60205218066	Mr PRATEEK SAHGAL	100	30	70	A-	8	2	2	16
71	A60205218075	Mr PRADYUMN SHARMA	100	30	70	B+	7	2	2	14
							525			

Average Grade Point = 525/71 (Total Grade point/Total no of students) = 7.4
No of students getting greater than average(7.4) marks = 35 students = 49.3%

Total No. of Students	=	71
Level 2	>50% average marks and < 60% average marks	49.3%
Attainment Level		Level 2

Note: Attainment Level

Level 1	< 50% Average mark
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average mark

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course : SOFTWARE ENGINEERING Lab
Course Code : CSE 625, Crédits : 01, Session :2018-19(Even Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Arvind Kumar Upadhyay

A. Introduction: The basic objective of Software Engineering is to develop methods and procedures for software development that can scale up for large systems and that can be used to consistently produce high-quality software at low cost and with a small cycle time. Software Engineering is the systematic approach to the development, operation, maintenance, and requirements of software. The course provides a thorough introduction to the fundamental principles of software engineering. The organization of Software Engineering is based on the classical analysis-design-implementation framework.

B. Course Outcomes: At the end of the course, students will be:

CSE605.1. Understand the Software life cycle models and quality standards.

CSE*605*.2. Evaluate various cost estimation models in software engineering.

CSE*605*.3. Analyze the Problem Analysis, Software Requirement and Specifications, Behavioural and non-behavioural requirements.

CSE*605*.4. Implement various software engineering and testing models.

CSE605.5. Design UML, Use Case Diagrams, Class Diagram: State Diagram in UML Activity Diagram in UML Sequence Diagram in UML Collaboration Diagram in UML.

C. Program Outcomes:

[PO.1]. **Engineering knowledge**: Apply the knowledge of Software Engineering, Software Testing, UML and engineering specialization to the solution of complex engineering problems.

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of Software Engineering, Software Analysis and Design, UML diagrams.

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including Software Analysis and Design to complex engineering activities with an understanding of the limitations.

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess

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societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice.

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for

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sustainable development.

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices.

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverse teams, and in multidisciplinary settings.

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

[PO.11]. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

[PO.12]. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leaderin a team, to manage projects and in multidisciplinary environments.

D. Program Specific Outcomes:

PSO1: Professional Skills: An ability to understand, analyze and develop Software systems in the various areas using the concepts of Software Models, Software Metrics, Software Analysis and Design, Software Testing and the UML diagrams for efficient design of computer-based systems of varying complexity.

PSO2: Problem-solving skills: An ability to apply standard practices and strategies in Software Engineering in project development using open-ended programming environments to deliver a quality product for business success.

PSO3: Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	A	5%

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End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

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F. Syllabus

List of experiments/demonstrations:

1. Learning the concepts of Feasibility Study.
2. Understanding the concepts of Software Documentation.
3. Learning Project Management activities and techniques for designing of software.
4. Getting familiarized with the Unified Modelling Language (UML) Environment.
5. Working with the Use-case View of UML.
6. Working with the Class Diagrams of UML.
7. Working with the State Diagrams of UML.
8. Working with the Activity Diagrams of UML.
9. Working with the Collaboration Diagrams of UML.
10. Study of cost estimation modelling approaches in Software Engineering.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Text & References:

Text:

- K. K. Aggarwal & Yogesh Singh, "Software Engineering", 2nd Ed, New Age International, 2005.
- R. S. Pressman, "Software Engineering – A practitioner's approach", 5th Ed., McGraw Hill Int. Ed., 2001.

References:

- R. Fairley, "Software Engineering Concepts", Tata McGraw Hill, 1997.
- P. Jalote, "An Integrated approach to Software Engineering", Narosa, 1991.
- Stephen R. Schach, "Classical & Object Oriented Software Engineering", IRWIN, 1996.
- James Peter, W. Pedrycz, "Software Engineering", John Wiley & Sons.
- Sommerville, "Software Engineering", Addison Wesley, 1999.

I. Lab Plan

Practical	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Learning the concepts of Feasibility Study.	Practical	CSE625.1	Mid Term-1, Quiz & End Sem Exam
2	Understanding the concepts of Software Documentation.	Practical	CSE625.1	Mid Term-1, Quiz & End Sem Exam

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3	Learning Project Management activities and techniques for designing of software.	Practical	CSE625.1	Mid Term-1, Quiz & End Sem Exam
4	Getting familiarized with the Unified Modelling Language (UML) Environment.	Practical	CSE625.1	Mid Term-1, Quiz & End Sem
				Exam
5	Working with the Use-case View of UML.	Practical	CSE625.2	Mid Term-1, Quiz & End Sem Exam
6	Working with the Class Diagrams of UML.	Practical	CSE625.2	Mid Term-1, Quiz & End Sem Exam
7	Working with the State Diagrams of UML.	Practical	CSE625.3	Mid Term-1, Quiz & End Sem Exam
8	Working with the Activity Diagrams of UML.	Practical	CSE625.3	Mid Term-1, Quiz & End Sem Exam
9	Working with the Collaboration Diagrams of UML.	Practical	CSE625.4	Mid Term-1, Quiz & End Sem Exam
10	Study of cost estimation modelling approaches in Software Engineering.	Practical	CSE625.4	Mid Term-1, Quiz & End Sem Exam
11	DFD, ERD, STD For Software Systems	Practical	CSE625.5	Mid Term-1, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES	CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES

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		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE625.1	Understand the Software life cycle models and quality standards.															
CSE625.2	Evaluate various cost estimation models in software engineering.	2	2	1	1											
CSE625.3	Analyze the Problem Analysis, Software Requirement and Specifications, Behavioural and non-behavioural requirements.	2	1													
CSE625.4	Implement various software engineering and testing models.	2		1												
CSE625.5	Design UML, Use Case Diagrams, Class Diagram: State Diagram in UML Activity Diagram in UML Sequence Diagram in UML Collaboration Diagram in UML.	2		1												

ESE Marks - CSE625

S. No.	Enrollment.No.	Student's Name	CSE625 SOFTWARE ENGINEERING LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U17G17
1	A60205218008	Mr AKSHAT MISHRA	100	30	70	A+	10	1	1	10
2	A60205218016	Mr SWAPNIL RAI	100	30	70	B	6	1	1	6

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3	A60205218024	Mr ASHISH TARKESHWAR SINGH	100	30	70	A-	8	1	1	8
4	A60205218032	Mr AYUSH SHARMA	100	30	70	B+	7	1	1	7
5	A60205218041	Mr ABHISHEK SINGH	100	30	70	B-	5	1	1	5
6	A60205218007	Ms PRIYANSHI GUPTA	100	30	70	A-	8	1	1	8
7	A60205218015	Mr SHUBHAM JAIN	100	30	70	A-	8	1	1	8
8	A60205218023	Ms ADITI SHARMA	100	30	70	A	9	1	1	9
9	A60205218031	Mr KETANDEEP SHARMA	100	30	70	A-	8	1	1	8
10	A60205218040	Mr ASHIRWAD VERMA	100	30	70	B+	7	1	1	7
11	A60205218003	Mr ANURAG KOTNALA	100	30	70	B+	7	1	1	7
12	A60205218011	Ms TAMANNAKUMARI MANOJKUMAR	100	30	70	A-	8	1	1	8
13	A60205218019	Mr PRAYAG DUBEY	100	30	70	A	9	1	1	9
14	A60205218027	Mr AYUSH CHANDRA	100	30	70	B	6	1	1	6
15	A60205218036	Mr AYUSH SHARMA	100	30	70	B	6	1	1	6
16	A60205218001	Ms MANASI SRIVASTAVA	100	30	70	A-	8	1	1	8
17	A60205218009	Ms ADITI LIKHAR	100	30	70	A+	10	1	1	10
18	A60205218017	Mr ILAPANDA SUHASH	100	30	70	B+	7	1	1	7
19	A60205218025	Mr ARPIT SAXENA	100	30	70	B+	7	1	1	7
20	A60205218033	Ms PRIYANSHI SHARMA	100	30	70	A+	10	1	1	10
21	A60205218002	Mr DHRUV KUMAR AGARWAL	100	30	70	A	9	1	1	9
22	A60205218010	Mr AMAN BHATNAGAR	100	30	70	B	6	1	1	6
23	A60205218018	Mr ANUBHAV KADAM	100	30	70	B	6	1	1	6
24	A60205218026	Mr ABHISHEK PANCHOLI	100	30	70	B+	7	1	1	7
25	A60205218034	Mr V. SAMARTH CHANDRA	100	30	70	B	6	1	1	6
26	A60205218006	Mr UDAY SINGH RAJAWAT	100	30	70	A+	10	1	1	10
27	A60205218014	Mr KRATIK JAIN	100	30	70	A	9	1	1	9
28	A60205218022	Mr DEEPESH KUSHWAH	100	30	70	B-	5	1	1	5
29	A60205218030	Ms AEIKNOR KAUR VIRK	100	30	70	A	9	1	1	9
30	A60205218039	Mr SIDDHANT SINGH KAURAV	100	30	70	B-	5	1	1	5
31	A60205218050	Mr DEEPAK SHARMA	100	30	70	A-	8	1	1	8
32	A60205218062	Ms ANKITA SHUKLA	100	30	70	B+	7	1	1	7
33	A60205218071	Mr MUKUL AGARWAL	100	30	70	B+	7	1	1	7
34	A60205218005	Mr SAKSHAM CHATURVEDI	100	30	70	A-	8	1	1	8
35	A60205218013	Mr PRANAY GUPTA	100	30	70	B+	7	1	1	7
36	A60205218021	Mr YOGENDRA BHADORIA	100	30	70	A-	8	1	1	8
37	A60205218029	Ms PRAGATI TIWARI	100	30	70	A-	8	1	1	8
38	A60205218038	Ms MANYA SINGH	100	30	70	A-	8	1	1	8
39	A60205218004	Mr DEVASHISH PATIL	100	30	70	B+	7	1	1	7
40	A60205218012	Mr SOURABH SINGH TOMAR	100	30	70	B+	7	1	1	7
41	A60205218020	Mr AMAN GUPTA	100	30	70	A	9	1	1	9
42	A60205218028	Mr VARUN VIKRAM	100	30	70	B+	7	1	1	7
43	A60205218037	Ms NEHA VERMA	100	30	70	A+	10	1	1	10

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44	A60205218049	Mr YOGESH SINGH	100	30	70	B+	7	1	1	7
45	A60205218060	Mr PRABHANSHOO SHRIVASTAVA	100	30	70	B-	5	1	1	5
46	A60205218070	Ms ANSHITA CHANDEL	100	30	70	B+	7	1	1	7
47	A60205218079	Mr RISHABH JAIN	100	30	70	B-	5	1	1	5
48	A60205218045	Mr VAIBHAV BANERJEE	100	30	70	B+	7	1	1	7
49	A60205218054	Mr ABHISHEK DWIVEDI	100	30	70	A+	10	1	1	10
50	A60205218065	Mr SATYAM SHARMA	100	30	70	A	9	1	1	9
51	A60205218074	Ms APOORVA GOSAIN	100	30	70	B+	7	1	1	7
52	A60205218043	Mr ANMOL SAXENA	100	30	70	B	6	1	1	6
53	A60205218051	Mr SHIVAM SHARMA	100	30	70	A+	10	1	1	10
54	A60205218063	Mr MILKY SHRIVASTAVA	100	30	70	B	6	1	1	6
55	A60205218072	Mr SARTHAK GUPTA	100	30	70	B+	7	1	1	7
56	A60205218044	Ms NIHARIKA SINGH	100	30	70	B+	7	1	1	7
57	A60205218053	Mr SWAPNIL PALIYA	100	30	70	B-	5	1	1	5
58	A60205218064	Ms ANVI TOMAR	100	30	70	A+	10	1	1	10
59	A60205218073	Mr HRITUJ AGRAHARI	100	30	70	B+	7	1	1	7
60	A60205218048	Ms VAISHNAVI RAWAT	100	30	70	B	6	1	1	6
61	A60205218059	Mr KARAN TAMBAT	100	30	70	A-	8	1	1	8
62	A60205218068	Mr RISHABH SHRIVASTAVA	100	30	70	B	6	1	1	6
63	A60205218078	Mr SHEIKH ABDUL ANAS	100	30	70	B+	7	1	1	7
64	A60205218047	Ms RIMJHIM CHHAYA	100	30	70	A-	8	1	1	8
65	A60205218058	Mr BHUPENDRA UPADHYAY	100	30	70	A-	8	1	1	8
66	A60205218067	Mr RISHABH KULSHRESTHA	100	30	70	B+	7	1	1	7
67	A60205218077	Mr PRIYANSH JAISWAL	100	30	70	B	6	1	1	6
68	A60205218046	Mr KETAN AGRAWAL	100	30	70	B+	7	1	1	7
69	A60205218055	Mr SURAJ NEEKHARA	100	30	70	B+	7	1	1	7
70	A60205218066	Mr PRATEEK SAHGAL	100	30	70	A	9	1	1	9
71	A60205218075	Mr PRADYUMN SHARMA	100	30	70	B+	7	1	1	7

Average Grade Point = 528/71 (Total Grade point/Total no of students) = 7.4
No of students getting greater than average(7.4) marks = 30 students = 42.3%

Total No. of Students	=	71
Level 2	>50% average marks and < 60% average marks	42.3%
Attainment Level		Level 2

Note: Attainment Level

Level 1	< 50% Average mark
Level 2	>50% average marks and < 60% average marks

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Level 3	> 60% Average mark

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AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course: MACHINE LEARNING TECHNIQUES LAB
Course Code: CSA421, Crédits : 01, Session: 2019-20 (Even Sem.), Class : B.Tech. 2ND Year
Faculty Name: Dr. Samta Jain Goyal, Dr.Kuldeep Narayan Tripathi, Dr. Deepak Motwani

A. Introduction: The objective of this course is to make use of Data sets in implementing the machine learning algorithms and Implement the machine learning concepts and algorithms in any suitable language of choice.

B. Course Outcomes: At the end of the course, students will be able to:

CSA 421.1. Identify the various machine learning algorithms and its categories.
CSA 421.2. Understand the implementation procedures for the machine learning algorithms.
CSA 421.3. Apply appropriate data sets to the Machine Learning algorithms.
CSA 421.4. Apply Machine Learning algorithms to solve real world problems. **CSA 421.5.** Design Java/Python programs for various Learning algorithms.

C. Programme Outcomes:

[PO.1]. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. Problem analysis: Identity, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis, and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. The engineer and society: Apply to reason informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

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[PO.7]. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and

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norms of the engineering practices

[PO.9]. Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and multidisciplinary settings

[PO.10]. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's work, as a member and leaderin a team, to manage projects and in multidisciplinary environments

[PO.12]. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

D. Programme Specific Outcomes:

PSO1.Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO3. Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur and a zest for higher studies.

E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a studentto be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

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F. Syllabus

Lab-Experiments should include but not be limited to:

1. Learning basics of Python in Machine Learning
2. Write code to Data Preprocessing
3. Write a code to Data Analysis.
4. Write a code to Data Extraction.
5. Write a code for speech recognition.
6. Write a code to Summarizing the Dataset.
7. Write a code to Training Data & Test Data
8. Write a code to Performance Measures: Bias and Variance
9. Write a code for PYTHON MACHINE LEARNING – TECHNIQUES. Classification, Regression, Clustering
10. Write a code for PYTHON MACHINE LEARNING – ALGORITHMS
11. Traffic Congestion Analysis and Predictions
12. Write a code for medical diagnosis based on the pre-defined data set.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

Text:

- Machine Learning by Saikat Dutt , Subramanian Chandramouli, Pearson Education; First edition (1 October 2018)
- Chandra S.S.V, Artificial Intelligence and Machine Learning, Prentice Hall India Learning Private Limited; 1 edition (2014)

References:

- Tom M. Mitchell, ―Machine Learning, McGraw-Hill Education (India) Private Limited, 2013.
- Ethem Alpaydin, ―Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press 2004.
- Stephen Marsland, ―Machine Learning: An Algorithmic Perspective, CRC Press, 2009.
- Christopher M. Bishop, Pattern Recognition and Machine Learning.

I. Lecture Plan

Lectu r e	Topics	Mode of Delivery	Corresp o nding CO	Mode of Assessing CO
1	Learning basics of Python in Machine Learning	Practical	CSA 421.1	Mid Term-1, Quiz & End Sem Exam
2	Write code to Data Preprocessing	Practical	CSA 421.1	Mid Term-1, Quiz & End Sem Exam
3	Write a code to Data Analysis	Practical	CSA 421.1	Mid Term-1, Quiz & End Sem Exam

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4	Write a code to Data Extraction.	Practical	CSA 421.2	Mid Term-1, Quiz & End Sem Exam
5	Write a code for speech recognition.	Practical	CSA 421.2	Mid Term-1, Quiz & End Sem Exam
6	Write a code to Summarizing the Dataset.	Practical	CSA 421.2	Mid Term-1, Quiz & End Sem Exam
7	Write a code to Training Data & Test Data	Practical	CSA 421.3	Mid Term-1, Quiz & End Sem Exam
8	Write a code to Performance Measures: Bias and Variance	Practical	CSA 421.3	Mid Term-1, Quiz & End Sem Exam
9	Write a code for PYTHON MACHINE LEARNING - TECHNIQUES. Classification, Regression, Clustering	Practical	CSA 421.4	Mid Term-1, Quiz & End Sem Exam
10	Write a code for PYTHON MACHINE LEARNING - ALGORITHMS	Practical	CSA 421.4	Mid Term-1, Quiz & End Sem Exam
11	Traffic Congestion Analysis and Predictions	Practical	CSA 421.5	Mid Term-1, Quiz & End Sem Exam
12	Write a code for medical diagnosis based on the pre-defined data set.	Practical	CSA 421.5	Mid Term-1, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME-SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSA 421.1	Identify the various machine learning algorithms and its categories.													1		
CSA 421.2	Understand the implementation procedures for the machine learning algorithms.													2		
CSA 421.3	Apply appropriate data sets to the Machine Learning algorithms.	3	2	2	1	2									2	

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CSA 421.4	Apply Machine Learning algorithms to solve real world problems.	1	2	3	1	2									1	
CSA 421.5	Design Java/Python programs for various Learning algorithms.	3	1	2	1	2								2		

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ESE Marks -

S. No.	Enrollment.No.	Student's Name	CSA421							
			MACHINE LEARNING TECHNIQUES LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U3G3
1	A60205219019	Mr RICKY SHIVDASANI	100	30	70	A	9	1	1	9
2	A60205219039	Mr ASHISH VERMA	100	30	70	B-	5	1	1	5
3	A60205219050	Mr NAMISH ARORA	100	30	70	B+	7	1	1	7
4	A60205219010	Ms AAYUSHI CHAUHAN	100	30	70	B+	7	1	1	7
5	A60205219030	Mr PARAS BHARDWAJ	100	30	70	B-	5	1	1	5
6	A60205219040	Mr ADARSH RAI	100	30	70	B+	7	1	1	7
7	A60205219051	Mr ABHISHEKH KUMAR DAS	100	30	70	A	9	1	1	9
8	A60205219059	Mr PRADUMN PRAKASH DUBEY	100	30	70	B	6	1	1	6
9	A60205219008	Ms KAJAL MISHRA	100	30	70	A+	10	1	1	10
10	A60205219018	Mr AMITABH DEVNATH	100	30	70	B+	7	1	1	7
11	A60205219028	Mr AYUSH JAIN	100	30	70	A+	10	1	1	10
12	A60205219002	Mr SUSHMIT SATISH	100	30	70	B+	7	1	1	7
13	A60205219032	Ms AKSHITA SHARMA	100	30	70	B+	7	1	1	7
14	A60205219042	Mr ANIRUDH KHANDELWAL	100	30	70	A-	8	1	1	8
15	A60205219053	Mr ADITYA SAXENA	100	30	70	B	6	1	1	6
16	A60205219005	Mr PRASHANT AGRAWAL	100	30	70	A+	10	1	1	10
17	A60205219024	Mr SARTHAK JAIN	100	30	70	B-	5	1	1	5
18	A60205219034	Mr AMAN KHAN GAURI	100	30	70	B	6	1	1	6
19	A60205219063	Mr RAHUL SHARMA	100	30	70	A-	8	1	1	8
20	A60205219017	Mr SHUBHKANT DWIVEDI	100	30	70	B+	7	1	1	7
21	A60205219027	Mr AKSHIT DAHIYA	100	30	70	B+	7	1	1	7
22	A60205219048	Mr SHUBHAM DHAKAD	100	30	70	A+	10	1	1	10
23	A60205219056	Ms NISHA KUMARI	100	30	70	B+	7	1	1	7
24	A60205219064	Mr ANSHUL SINGH	100	30	70	B-	5	1	1	5
25	A60205219023	Mr DHEERAJ SHARMA	100	30	70	B-	5	1	1	5
26	A60205219062	Ms AYUSHI RAI	100	30	70	A-	8	1	1	8
27	A60205219001	Mr ASEEM VIKRAM	100	30	70	B	6	1	1	6
28	A60205219031	Ms MANPREET KAUR	100	30	70	B+	7	1	1	7
29	A60205219041	Mr ANUJ TIWARI	100	30	70	A-	8	1	1	8
30	A60205219052	Mr AJEET SIKARWAR	100	30	70	B	6	1	1	6
31	A60205219074	Mr KUNAL SAXENA	100	30	70	B	6	1	1	6
32	A60205219082	Mr MOHIT BHARDWAJ	100	30	70	B+	7	1	1	7
33	A60205219091	Mr VIDIT NIGAM	100	30	70	A+	10	1	1	10
34	A60205219099	Mr ANIL GAUD	100	30	70	A	9	1	1	9
35	A60205219107	Ms DARSHIKA SHARMA	100	30	70	B+	7	1	1	7
36	A60205219081	Mr PALASH MUKHERJEE	100	30	70	B	6	1	1	6

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37	A60205219098	Mr ASHAY SHRIVASTAV	100	30	70	B+	7	1	1	7
38	A60205219092	Ms KASHISH TOMAR	100	30	70	B+	7	1	1	7
39	A60205219069	Mr NEELMANI SHUKLA	100	30	70	B	6	1	1	6
40	A60205219121	Ms PRIYA DUBEY	100	30	70	B+	7	1	1	7
41	A60205219072	Mr NIKHIL GUPTA	100	30	70	B+	7	1	1	7
42	A60205219080	Mr ANURAG SINGH TOMAR	100	30	70	B+	7	1	1	7
43	A60205219089	Mr DEEPAK PANDEY	100	30	70	A+	10	1	1	10
44	A60205219124	Mr GURAASHISH SINGH	100	30	70	A+	10	1	1	10
45	A60205219088	Mr AAYUSH TIWARI	100	30	70	B	6	1	1	6
46	A60205219104	Ms ASHITA KARKARE	100	30	70	B+	7	1	1	7
47	A60205219123	Mr AMIT RAJOURIYA	100	30	70	B+	7	1	1	7
48	A60205219068	Mr MANASAV JAIN	100	30	70	B	6	1	1	6
49	A60205219076	Mr SUNNY CHAUDHARY	100	30	70	B-	5	1	1	5
50	A60205219093	Mr ASHISH YADAV	100	30	70	A+	10	1	1	10
51	A60205219101	Mr ADITYA SINGH DHAKRE	100	30	70	B	6	1	1	6
52	A60205219070	Ms DEVANSHI JADIYA	100	30	70	B+	7	1	1	7
53	A60205219078	Mr UMANG PRASAD	100	30	70	A-	8	1	1	8
54	A60205219087	Mr ARYAN SHARMA	100	30	70	B	6	1	1	6
55	A60205219114	Ms ANJALI KANKORIYA	100	30	70	B+	7	1	1	7

Average Grade Point = 396/55 (Total Grade point/Total no of students) = 7.20
No of students getting greater than average (7.20) marks = 16 students = 29.09%

Total No. of Students		55
Level 1	50% average marks	29.09%
Attainment Level		Level 1

Note: Attainment Level

Level 1	50% average marks and
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average mark

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AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course : Data Mining and Machine Learning
Course Code : CSD 401, Crédits : 03, Session : 2019-20 (Even Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Ashok Shrivastava

A. **Introduction:** The course will introduce data mining process which includes data selection and cleaning, machine learning techniques to ``learn" knowledge that is “hidden" in data, and the reporting and visuali- zation of the resulting knowledge. To introduce students to basic applications, concepts, and techniques of data mining. To develop skills for using recent data mining software (e.g. R) to solve practical problems in a variety of disciplines. To gain experience doing independent study and research.

B. **Course Outcomes:** At the end of the course, students will be able to:

CSD401.1 Identify appropriate data mining algorithms to solve real world problems

CSD401.2 Understand different data mining techniques like classification, prediction, clustering and asso- ciation rule mining

CSD401.3 Apply the complex data types with respect to spatial and web mining. **CSD401.4** Analyze the user experiences towards research, innovation, and integration. **CSD401.5** Evaluate the practical usage of data mining in the field of research.

C. Programme Outcomes:

[PO1]. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering funda- mentals, and an engineering specialization to the solution of complex engineering problems.

[**PO2]. Problem Analysis**: Identify, formulate, review research literature, and analyze complex engi- neering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

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[**PO3]. Design/Development of Solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate considera- tion for the public health and safety, and the cultural, societal, and environmental considerations.

[**PO4]. Conduct Investigations of Complex Problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

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[PO5]. **Modern Tool Usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

[PO6]. **The Engineer and Society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

[PO7]. **Environment and Sustainability**: Understand the impact of the professional engineering solu- tions in societal and environmental contexts, and demonstrate the knowledge of, and need for sus- tainable development.

[PO8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

[PO9]. **Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

[PO10]. **Communication**: Communicate effectively on complex engineering activities with the engi- neering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instruc- tions.

[PO11]. **Life-long Learning**: Recognize the need for, and have the preparation and ability to engage
in independent and life-long learning in the broadest context of technological change.

[PO12]. **Project Management and Finance**: Demonstrate knowledge and understanding of the engi- neering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1. Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and network- ing for efficient design of computer-based systems of varying complexity.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO3. Successful career and Entrepreneurship: An ability to employ modern computer languages, en- vironments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

E. Assessment Plan:

Compo-nent of Evaluatio	Description	Code	Weight age %

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n			
Continuo us Internal	Mid Term 1	CT	15%
Evaluation	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/ Q/HA	10%
Attendance	A minimum of 75% Attendance is re- quired to be maintained by a studentto be qualified for taking up the End Semester examination. The allowance of 25% in- cludes all types of leaves including medi- cal leaves.	A	5%
End Semester Exam- ination	End Semester Examination	EE	70%
Total			**100%**

F.

F. Syllabus

Module I: Introduction to Machine Learning and Data Mining:

Introduction to modern data analysis. Machine Learning. Data Mining and Knowledge Discovery in Data Bases. Basic tasks and examples, clustering and basic techniques: The task of clusterization. K-means and its modifi- cations (k-medoids and fuzzy c-means clustering). Density-based methods: DB-scan and Mean Shift. Hierar- chical clustering, Criteria of quality.

Module II: Classification and basic techniques:

The task of classification. 1-Rules. K-Nearest Neighbors approach. Naïve Bayes. Decision Trees. Logistic Regres- sion. Quality assessment: loss-function, error-matrix, cross validation and learning curves. Frequent Item set Mining and Association Rules.

Module III: Feature Selection and Dimensionality Reduction:

Feature selection versus feature extraction. Singular Value Decomposition, Latent Semantic Analysis and Prin- cipal Component Analysis. Boolean matrix factorization. Projections. Recommender Systems and Algorithms Collaborative filtering. User-based and item-based methods. Slope one. Ensemble methods of clusterization for k-means partitions' aggregation. Ensemble methods of classification: Bagging, Boosting, and Random For- est.

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Module IV: Multimodal relational clustering:
Bi-clustering. Spectral co-clustering. Tri-clustering. Two-mode networks. Folksonomies and resource-sharing systems. Multi-modal approaches. Artificial Neural Methods and Stochastic Optimization. Elements of Statisti- cal Learning, Artificial Neural Networks. Basic idea of Deep Learning. Gradient descent. Statistical (Bayesian) view on Machine learning.

Module V: Machine Learning Tools and Big Data:
Orange, Weka, Knime, and Scikit Learn. Machine Learning for Big Data: Mahout and MALLET

G. Examination Scheme:

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Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

H.

Note: CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

Text:

- Machine Learning by Saikat Dutt , Subramanian Chandramouli, Pearson Education; First edition (1 October 2018)
- Chandra S.S.V, Artificial Intelligence and Machine Learning, Prentice Hall India Learning Private Limited; 1 edition (2014)

References:

- Tom M. Mitchell, —Machine Learning, McGraw-Hill Education (India) Private Limited, 2013.
- Ethem Alpaydin, —Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press 2004.
- Stephen Marsland, —Machine Learning: An Algorithmic Perspective, CRC Press, 2009.
- Christopher M. Bishop, Pattern Recognition and Machine Learning.

I. Lecture Plan

Lecture	*Topics*	*Mode of De- livery*	*Correspondin g CO*	*Mode of Assessing CO*
1	Introduction to modern data analy- sis. Machine Learning.	Lecture	CSD401.1	Mid Term-1, Quiz & End Sem Exam
2	Data Mining and Knowledge Dis- covery in Data Bases.	Lecture	CSD401.1	Mid Term-1, Quiz & End Sem Exam
3	Basic tasks and examples, cluster- ing and basic techniques:	Lecture	CSD401.1	Mid Term-1, Quiz & End Sem Exam
4	The task of clusterization	Lecture	CSD401.1	Mid Term-1, Quiz & End Sem Exam
5	K-means and its modifications (k- medoids and fuzzy c-means cluster- ing).	Lecture	CSD401.1	Mid Term-1, Quiz & End Sem Exam

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6	Density-based methods: DB-scan and Mean Shift.	Lecture	CSD401.1	Mid Term-1, Quiz & End Sem Exam
7	Hierarchical clustering,	Lecture	CSD401.1	Mid Term-1, Quiz & End Sem Exam
8	Criteria of quality.	Lecture	CSD401.2	Mid Term-1, Quiz & End Sem Exam
9	The task of classification.	Lecture	CSD401.2	Mid Term-1, Quiz & End Sem Exam
10	1-Rules. K-Nearest Neighbors ap- proach.	Lecture	CSD401.2	Mid Term-1, Quiz & End Sem Exam
11	Naïve Bayes. Decision Trees.	Lecture	CSD401.2	Mid Term-1, Quiz & End Sem Exam
12	Logistic Regression.	Lecture	CSD401.2	Mid Term-1, Quiz & End Sem Exam
13	Quality assessment: loss-function, error-matrix	Lecture	CSD401.2	Mid Term-1, Quiz & End Sem Exam
14	Quality assessment: cross valida- tion and learning curves.	Lecture	CSD401.2	Mid Term-1, Quiz & End Sem Exam
15	Frequent Item set Mining	Lecture	CSD401.2	Mid Term-1, Quiz & End Sem Exam
16	Association Rules	Lecture	CSD401.2	Mid Term-1, Quiz & End Sem Exam
17	Feature selection versus feature extraction	Lecture	CSD401.2	Mid Term-1, Quiz & End Sem Exam
18	Singular Value Decomposition,	Lecture	CSD401.2	Mid Term-1, Quiz & End Sem Exam
19	Latent Semantic Analysis and Prin- cipal Component Analysis.	Lecture	CSD401.3	Mid Term-1, Quiz & End Sem Exam

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20	Boolean matrix factorization & Pro- jections	Lecture	CSD401.3	Mid Term-1, Quiz & End Sem Exam
21	Recommender Systems and Algo- rithms Collaborative filtering.	Lecture	CSD401.3	Mid Term-2, Quiz & End Sem Exam
22	User-based and item-based meth- ods. Slope one.	Lecture	CSD401.3	Mid Term-2, Quiz & End Sem Exam
23	Ensemble methods of clusteriza- tion for k-means partitions' aggre- gation.	Lecture	CSD401.3	Mid Term-2, Quiz & End Sem Exam
24	Ensemble methods of classifica- tion: Bagging, Boosting, and Ran- dom Forest.	Lecture	CSD401.3	Mid Term-2, Quiz & End Sem Exam
25	Bi clustering, Spectral co-cluster- ing.	Lecture	CSD401.3	Mid Term-2, Quiz & End Sem Exam
26	Tri clustering. Two-mode net- works.	Lecture	CSD401.4	Mid Term-2, Quiz & End Sem Exam
27	Folksonomies and resource-sharing systems.	Lecture	CSD401.4	Mid Term-2, Quiz & End Sem Exam
28	Multi-modal approaches	Lecture	CSD401.4	Mid Term-2, Quiz & End Sem Exam
29	Artificial Neural Methods and Sto- chastic Optimization	Lecture	CSD401.4	Mid Term-2, Quiz & End Sem Exam
30	Elements of Statistical Learning, Ar- tificial Neural Networks.	Lecture	CSD401.4	Mid Term-2, Quiz & End Sem Exam
31	Basic idea of Deep Learning. Gradi- ent descent.	Lecture	CSD401.5	Mid Term-2, Quiz & End Sem Exam
32	Statistical (Bayesian) view on Ma- chine learning.	Lecture	CSD401.5	Mid Term-2, Quiz & End Sem Exam
33	Machine Learning Tools: Orange and Weka	Lecture	CSD401.5	Mid Term-2, Quiz & End Sem Exam

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34	Machine Learning Tools: Knime, and Scikit Learn.	Lecture	CSD401.5	Mid Term-2, Quiz & End Sem Exam
35	Machine Learning for Big Data: Mahout	Lecture	CSD401.5	Mid Term-2, Quiz & End Sem Exam
36	Machine Learning for Big Data: MALLET	Lecture	CSD401.5	Mid Term-2, Quiz & End Sem Exam

J.

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J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3

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CSD 4 01.1	Identify appropriate data mining algorithms to solve real world problems	1	2	1	3	2										
CSD 4 01.2	Understand different data mining techniques like classification, prediction, clustering and association rule mining	1	3	1	1	2										
CSD 4 01.3	Apply the complex data types with respect to spatial and web mining.	1	2	1	2	2										
CSD 4 01.4	Analyze the user experiences towards research, innovation, and integration.	2	3	2	1	2										

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CSD 4 01.5	Evaluate the practical usage of data mining in the field of research.	1	3	2	2	1										

ESE Result

S. No.	Enroll-ment.No.	Student's Name	CSD401 DATA MINING AND MACHINE LEARNING Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U1G1
1	A60205219009	Mr CHURCHIL YASH RAJPAL	100	30	70	A-	8	3	3	24
2	A60205219019	Mr RICKY SHIVDASANI								
3	A60205219029	Ms ROSHNI JANARDHANAN	100	30	70	A+	10	3	3	30
4	A60205219039	Mr ASHISH VERMA								
5	A60205219050	Mr NAMISH ARORA								
6	A60205219058	Mr APOORVA KRISHANA	100	30	70	A-	8	3	3	24
7	A60205219066	Ms VAISHNAVI SINGH	100	30	70	A	9	3	3	27
8	A60205219010	Ms AAYUSHI CHAUHAN								
9	A60205219020	Mr RITESH KUMAR	100	30	70	B+	7	3	3	21
10	A60205219030	Mr PARAS BHARDWAJ								
11	A60205219040	Mr ADARSH RAI								
12	A60205219051	Mr ABHISHEKH KUMAR DAS								
13	A60205219059	Mr PRADUMN PRAKASH DUBEY								
14	A60205219067	Mr VIPIN SHARMA								
15	A60205219008	Ms KAJAL MISHRA								
16	A60205219018	Mr AMITABH DEVNATH								
17	A60205219028	Mr AYUSH JAIN								

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18	A60205219037	Mr MANOJ KUSHWAH	100	30	70	B-	5	3	3	15
19	A60205219049	Mr SHASHANK KUMAR	100	30	70	B-	5	3	3	15
20	A60205219057	Mr RAGHAV SINGHAL	100	30	70	A-	8	3	3	24
21	A60205219065	Ms NIKITA SINGH								
22	A60205219002	Mr SUSHMIT SATISH								
23	A60205219012	Mr RITIK CHANDEL	100	30	70	A-	8	3	3	24
24	A60205219022	Mr MADHAV DUBEY	100	30	70	B+	7	3	3	21
25	A60205219032	Ms AKSHITA SHARMA								
26	A60205219042	Mr ANIRUDH KHANDELWAL								
27	A60205219053	Mr ADITYA SAXENA								
28	A60205219061	Mr LAUKIT MANDAL	100	30	70	A-	8	3	3	24
29	A60205219005	Mr PRASHANT AGRAWAL								
30	A60205219016	Ms TANISHKA SAXENA	100	30	70	B	6	3	3	18
31	A60205219024	Mr SARTHAK JAIN								
32	A60205219034	Mr AMAN KHAN GAURI								
33	A60205219046	Mr TUSHAR SHARMA	100	30	70	A-	8	3	3	24
34	A60205219055	Mr YASH JAIN	100	30	70	B-	5	3	3	15
35	A60205219063	Mr RAHUL SHARMA								
36	A60205219007	Mr JAYANT KUMAR	100	30	70	A-	8	3	3	24
37	A60205219017	Mr SHUBHKANT DWIVEDI								
38	A60205219027	Mr AKSHIT DAHIYA								
39	A60205219036	Mr SAHIL TOMAR	100	30	70	A+	10	3	3	30
40	A60205219048	Mr SHUBHAM DHAKAD								
41	A60205219056	Ms NISHA KUMARI								
42	A60205219064	Mr ANSHUL SINGH								
43	A60205219004	Ms GARIMA SRIVASTAVA	100	30	70	A	9	3	3	27
44	A60205219013	Ms KHUSHI PURWAR	100	30	70	A+	10	3	3	30
45	A60205219023	Mr DHEERAJ SHARMA								
46	A60205219033	Mr ADITYA KUMAR KUSHWAH	100	30	70	A-	8	3	3	24
47	A60205219043	Ms PRANJALI AGRAWAL								
48	A60205219054	Ms PRIYAL BANSAL								

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49	A60205219062	Ms AYUSHI RAI								
50	A60205219001	Mr ASEEM VIKRAM								
51	A60205219011	Ms RAINA GUPTA	100	30	70	B+	7	3	3	21
52	A60205219021	Ms FARHAT AKHTAR	100	30	70	A-	8	3	3	24
53	A60205219031	Ms MAN-PREET KAUR								
54	A60205219041	Mr ANUJ TI-WARI								
55	A60205219052	Mr AJEET SI-KARWAR								
56	A60205219060	Mr MOHAK AGRAWAL								
57	A60205219074	Mr KUNAL SAXENA								
58	A60205219082	Mr MOHIT BHARDWAJ								
59	A60205219091	Mr VIDIT NI-GAM								
60	A60205219099	Mr ANIL GAUD								
61	A60205219107	Ms DARSHIKA SHARMA								
62	A60205219118	Mr GYANDEEP SINGH	100	30	70	B	6	3	3	18
63	A60205219128	Ms SMRITI BAM								
64	A60205219073	Mr RONAK PRAJAPATI								
65	A60205219081	Mr PALASH MUKHERJEE								
66	A60205219090	Ms SNEHA	100	30	70	B	6	3	3	18
67	A60205219098	Mr ASHAY SHRIVASTAV								
68	A60205219106	Mr RISHI RAJPUT								
69	A60205219117	Mr PARTH PORWAL	100	30	70	B+	7	3	3	21
70	A60205219127	Ms NEHA KUSHWAH	100	30	70	B+	7	3	3	21
71	A60205219075	Mr KSHITIJ AGRAWAL	100	30	70	A-	8	3	3	24
72	A60205219083	Mr HARSHIT SINGH	100	30	70	A	9	3	3	27
73	A60205219092	Ms KASHISH TOMAR								
74	A60205219100	Ms SEJAL J TIRKEY								
75	A60205219108	Mr HARSH TIWARI	100	30	70	B	6	3	3	18
76	A60205219119	Mr SHIVAM MUDGAL	100	30	70	B-	5	3	3	15
77	A60205219129	Mr SHARAD PRATAP SONI								
78	A60205219069	Mr NEELMANI SHUKLA								
79	A60205219077	Mr LOHAN P NAIDU								
80	A60205219086	Mr YASH TRIPATHI								

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81	A60205219094	Mr VIKAS NARWARIYA								
82	A60205219102	Ms GARVITA BHADAURIA	100	30	70	B+	7	3	3	21
83	A60205219113	Ms POOJA GUPTA								
84	A60205219121	Ms PRIYA DUBEY								
85	A60505218008	Mr ABHIJEET SINGH BHADORIYA								
86	A60205219072	Mr NIKHIL GUPTA								
87	A60205219080	Mr ANURAG SINGH TOMAR								
88	A60205219089	Mr DEEPAK PANDEY								
89	A60205219097	Mr MANAV JADIA	100	30	70	B+	7	3	3	21
90	A60205219105	Mr YASH SHARMA	100	30	70	B+	7	3	3	21
91	A60205219116	Mr AFRAN USMANI	100	30	70	B+	7	3	3	21
92	A60205219124	Mr GURAASH-ISH SINGH								
93	A60205219071	Mr JAYRAM KARAN	100	30	70	B+	7	3	3	21
94	A60205219079	Mr RISHABH BANSAL								
95	A60205219088	Mr AAYUSH TIWARI								
96	A60205219096	Mr RUJMAN KHAN	100	30	70	B+	7	3	3	21
97	A60205219104	Ms ASHITA KARKARE								
98	A60205219115	Mr SANIDHYA DAVE								
99	A60205219123	Mr AMIT RA-JOURIYA								
100	A60205219068	Mr MA-NASAV JAIN								
101	A60205219076	Mr SUNNY CHAUDHARY								
102	A60205219085	Mr MAYANK SOLANKI	100	30	70	B-	5	3	3	15
103	A60205219093	Mr ASHISH YADAV								
104	A60205219101	Mr ADITYA SINGH DHAKRE								
105	A60205219109	Mr SUMIT BANPURIA	100	30	70	A-	8	3	3	24
106	A60205219120	Mr ASHISH RAJA NA-GABATHULA	100	30	70	B+	7	3	3	21
107	A60205219070	Ms DE-VANSHI JADIYA								
108	A60205219078	Mr UMANG PRASAD								
109	A60205219087	Mr ARYAN SHARMA								
110	A60205219095	Mr HIMANSHU BHADORIA	100	30	70	B	6	3	3	18

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111	A602052191 03	Mr KAMAL NAYAN	100	30	70	B+	7	3	3	21
112	A602052191 14	Ms ANJALI KANKORIYA								
113	A602052191 22	Mr VINAYAK SHARMA								
114	A602052191 30	Mr AMIT SINGH	100	30	70	A-	8	3	3	24
							299			

Average Grade Point = 299/41 (Total Grade point/Total no of students) = 7.29 No of students getting greater than average(7.2) marks = 18 students = 43.9%

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Total No. of Students	=	**41**
Level 1	>50% average marks	**43.9%**
Attainment Level		**Level 1**

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MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course : Data Mining and Machine Learning Lab
Course Code : CSD 421, Crédits : 01, Session : 2019-20 (Even Sem.), Class : B.Tech. 2nd Year
Faculty Name : Devendra Kumar Mishra

A. **Introduction:** The course will introduce data mining process which includes data selection and clean- ing, machine learning techniques to "learn" knowledge that is ``hidden" in data, and the reporting and visualization of the resulting knowledge. To introduce students to basic applications, concepts, and techniques of data mining. To develop skills for using recent data mining software to solve practical problems in a variety of disciplines. To gain experience doing independent study and research.

B. **Course Outcomes:** At the end of the course, students will be able to:

CSD421.1 Understand the implementation procedures for the machine learning algorithms.

CSD421.2 Apply appropriate data sets to the machine learning algorithms. **CSD421.3** Apply machine learning algorithms to solve real world problems. **CSD421.4** Analyze to use appropriate data sets to the machine learning algorithms. **CSD421.5** Design python programs for various learning algorithms.

C. Programme Outcomes:

[PO1]. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fun- damentals, and an engineering specialization to the solution of complex engineering problems.

[PO2]. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

[PO3]. Design/Development of Solutions: Design solutions for complex

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engineering problems and design system components or processes that meet the specified needs with appropriate con- sideration for the public health and safety, and the cultural, societal, and environmental consid- erations.

[**PO4]. Conduct Investigations of Complex Problems**: Use research-based knowledge and re- search methods including design of experiments, analysis and interpretation of data, and synthe- sis of the information to provide valid conclusions.

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[**PO5]. Modern Tool Usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering ac- tivities with an understanding of the limitations.

[**PO6]. The Engineer and Society**: Apply reasoning informed by the contextual knowledge to as- sess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

[**PO7]. Environment and Sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

[**PO8]. Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and
norms of the engineering practice.

[**PO9]. Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

[**PO10]. Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

[**PO11]. Life-long Learning**: Recognize the need for, and have the preparation and ability to en-
gage in independent and life-long learning in the broadest context of technological change.

[**PO12]. Project Management and Finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1.Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and net- working for efficient design of computer-based systems of varying complexity.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in software pro- ject development using open-ended programming environments to deliver a quality product for business success.

PSO3. Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

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E. Assessment Plan:

Component of Evalu- ation	**Description**	**Code**	**Weight age %**
Continuous Internal	Mid Term Viva	CT	15%
Evaluation	Mid Term Viva		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/ Q/H A	10%
Attendance	A minimum of 75% Attendance is re- quired to be maintained by a studentto be qualified for taking up the End Se- mester examination. The allowance of 25% includes all types of leaves includ- ing medical leaves.	A	5%
End Semester Exami- nation	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus:

List of experiments/demonstrations:

1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.
2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candi- date-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appro- priate data set for building the decision tree and apply this knowledge to classify a new sample.
4. Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.
5. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a
   .CSV file. Compute the accuracy of the classifier, considering few test data sets.
6. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to

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write the program. Calculate the accuracy, precision, and recall for your data set.

7. Write a program to construct a Bayesian network considering medical data. Use this model to demon- strate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.
8. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.
9. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
10. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.
11. Case Study of existing problems.
12. Implementation of practical example.

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Examination Scheme:

IA			EE			
A	PR	Practical Based Test	Major Ex- periment	Minor Experi- ment	LR	Viva
5	10	15	35	15	10	10

Note: IA –Internal Assessment, EE- External Exam, A- Attendance, PR- Performance, LR – Lab Record, V –
Viva.

Text & References:

Text Books:

- Luger George F, Artificial Intelligence: Structures and Strategies for Complex Problem Solving, 6th Edi- tion, Addison-Wesley, 2009. (Q335.L951).
- Dunham Margaret H, Data Mining Introductory and Advanced Topics, Pearson/Prentice-Hall, 2003. QA76.9.D343D917)

REFERENCES:

- Tom M. Mitchell, Machine Learning, India Edition 2013, McGraw Hill Education.
- Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical
- Learning, 2nd edition, Springer series in statistics.
- Ethem Alpaydın, Introduction to machine learning, second edition, MIT press.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspond- ing CO	Mode of Assessing CO
1	Implement and demonstrate the FIND-S algo- rithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.	Practical	CSD421.1	Mid Term Viva, Quiz & End Sem Exam
2	For a given set of training data examples stored .CSV file, implement and demonstrate the Candid Elimination algorithm to output a description o set of all hypotheses consistent with the trainin amples.	Practical	CSD421.1	Mid Term Viva, Quiz & End Sem Exam
3	Write a program to demonstrate the working o decision tree based ID3 algorithm. Use an appr ate data set for building the decision tree and a this	Practical	CSD421.1	Mid Term Viva, Quiz & End Sem Exam

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	knowledge to classify a new sample.			
4	Build an Artificial Neural Network by impleme the Backpropagation algorithm and test the sam ing appropriate data sets.	Practical	CSD421.2	Mid Term Viva, Quiz & End Sem Exam
5	Write a program to implement the naïve Baye classifier for a sample training data set stored .CSV file. Compute the accuracy of the classifier, sidering few test data sets.	Practical	CSD421.2	Mid Term Viva, Quiz & End Sem Exam
6	Assuming a set of documents that need to be cl fied, use the naïve Bayesian Classifier model to form this task. Built-in Java classes/API can be to write the program. Calculate the accuracy, p sion, and recall for your data set.	Practical	CSD421.3	Mid Term Viva, Quiz & End Sem Exam
7	Write a program to construct a Bayesian net- work considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.	Practical	CSD421.3	Mid Term Viva, Quiz & End Sem Exam
8	Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and com- ment on the quality of clustering. You can add Java/Python ML library classes/API in the pro- gram.	Practical	CSD421.3	Mid Term Viva, Quiz & End Sem Exam
9	Write a program to implement k-Nearest Neigh- bour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Py- thon ML library classes can be	Practical	CSD421.4	Mid Term Viva, Quiz & End Sem Exam

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	used for this prob- lem.			
10	Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.	Practical	CSD421.4	Mid Term Viva, Quiz & End Sem Exam
11	Case Study of existing problems.	Practical	CSD421.5	Mid Term Viva, Quiz & End Sem Exam
12	Implementation of practical example.	Practical	CSD421.5	Mid Term Viva, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

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CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSD421.1	Understand the implementation procedures for the machine learning algorithms.													2		
CSD421.2	Apply appropriate data sets to the machine learning algorithms.	1	3	3	2	2								1		
CSD421.3	Apply machine learning algorithms to solve real world problems.	2	3	3	2	1								1		
CSD421.4	Analyze to use appropriate data sets to the machine learning algorithms.	2	1	1	2	1										

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CSD 421.5	Design python programs for various learn- ing algo- rithms.	1	2	1	1	3										

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ESE Marks :

S. No.	Enrollment.No.	Student's Name	CSD421 DATA MINING AND MACHINE LEARNING LAB Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U2G2
1	A60205219009	Mr CHURCHIL YASH RAJPAL	100	30	70	A-	8	1	1	8
2	A60205219029	Ms ROSHNI JANARDHANAN	100	30	70	A-	8	1	1	8
3	A60205219058	Mr APOORVA KRISHANA	100	30	70	A-	8	1	1	8
4	A60205219066	Ms VAISHNAVI SINGH	100	30	70	A	9	1	1	9
5	A60205219020	Mr RITESH KUMAR	100	30	70	B+	7	1	1	7
6	A60205219037	Mr MANOJ KUSHWAH	100	30	70	B-	5	1	1	5
7	A60205219049	Mr SHASHANK KUMAR	100	30	70	B+	7	1	1	7
8	A60205219057	Mr RAGHAV SINGHAL	100	30	70	A	9	1	1	9
9	A60205219012	Mr RITIK CHANDEL	100	30	70	A-	8	1	1	8
10	A60205219022	Mr MADHAV DUBEY	100	30	70	B+	7	1	1	7
11	A60205219061	Mr LAUKIT MANDAL	100	30	70	A	9	1	1	9
12	A60205219016	Ms TANISHKA SAXENA	100	30	70	B	6	1	1	6
13	A60205219046	Mr TUSHAR SHARMA	100	30	70	A-	8	1	1	8
14	A60205219055	Mr YASH JAIN	100	30	70	B	6	1	1	6
15	A60205219007	Mr JAYANT KUMAR	100	30	70	B+	7	1	1	7
16	A60205219036	Mr SAHIL TOMAR	100	30	70	A+	10	1	1	10
17	A60205219004	Ms GARIMA SRIVASTAVA	100	30	70	A	9	1	1	9
18	A60205219013	Ms KHUSHI PURWAR	100	30	70	A+	10	1	1	10
19	A60205219033	Mr ADITYA KUMAR KUSHWAH	100	30	70	B+	7	1	1	7
20	A60205219011	Ms RAINA GUPTA	100	30	70	A-	8	1	1	8
21	A60205219021	Ms FARHAT AKHTAR	100	30	70	A-	8	1	1	8
22	A60205219118	Mr GYANDEEP SINGH	100	30	70	B+	7	1	1	7
23	A60205219090	Ms SNEHA	100	30	70	A-	8	1	1	8
24	A60205219117	Mr PARTH PORWAL	100	30	70	A-	8	1	1	8
25	A60205219127	Ms NEHA KUSHWAH	100	30	70	B+	7	1	1	7
26	A60205219075	Mr KSHITIJ AGRAWAL	100	30	70	A	9	1	1	9
27	A60205219083	Mr HARSHIT SINGH	100	30	70	A	9	1	1	9
28	A60205219108	Mr HARSH TIWARI	100	30	70	B+	7	1	1	7
29	A60205219119	Mr SHIVAM MUDGAL	100	30	70	B-	5	1	1	5
30	A60205219102	Ms GARVITA BHADAURIA	100	30	70	B	6	1	1	6
31	A60205219097	Mr MANAV JADIA	100	30	70	B+	7	1	1	7
32	A60205219105	Mr YASH SHARMA	100	30	70	B	6	1	1	6
33	A60205219116	Mr AFRAN USMANI	100	30	70	B+	7	1	1	7
34	A60205219071	Mr JAYRAM KARAN	100	30	70	B	6	1	1	6
35	A60205219096	Mr RUJMAN KHAN	100	30	70	B-	5	1	1	5

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36	A60205219085	Mr MAYANK SOLANKI	100	30	70	B-	5	1	1	5
37	A60205219109	Mr SUMIT BANPURIA	100	30	70	B+	7	1	1	7
38	A60205219120	Mr ASHISH RAJA NAGABATH-ULA	100	30	70	B+	7	1	1	7
39	A60205219095	Mr HIMANSHU BHADORIA	100	30	70	B+	7	1	1	7
40	A60205219103	Mr KAMAL NAYAN	100	30	70	B+	7	1	1	7
41	A60205219130	Mr AMIT SINGH	100	30	70	A+	10	1	1	10

Average Grade Point = 304/41 (Total Grade point/Total no of students) = 7.41
No of students getting greater than average (7.41) marks = 18 students = 43.90%

Total No. of Students		41
Level 1	50% average marks	43.90%
Attainment Level		Level 1

Note: Attainment Level

Level 1	50% average marks and
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average mark

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Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course : PROGRAMMING FOR PROBLEM SOLVING
Course Code : CSE104, Crédits : 03, Session :2019-20 (Odd Sem.), Class : B.Tech. 1st Year
Faculty Name : Dr.Rajeev Goyal

A. **Introduction:** The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure oriented programming language i.e. C.

B. Course Outcomes: At the end of the course, students will be able to:

CSE 104.1. Understand the basic concept of algorithm, flowchart, and programs.

CSE 104.2. Understand the arithmetic expressions and precedence, Conditional Branching and Loop.

CSE 104.3. Apply arrays (1-D, 2-D), Character arrays and string operations.

CSE 104.4. Analyse Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations and complexity.

CSE 104.5. implement functions, structures, pointers and file handling.

C. Programme Outcomes:

[PO.1]. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

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[PO.7]. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

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[PO.8]. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

D. Programme Specific Outcomes:

PSO1.Professional Skills: Design, develop and test software systems for world-wide network of computers to provide solutions to real world problems.

PSO2. Problem-solving skills: Analyze and recommend the appropriate IT infrastructure required for the implementation of a project

PSO3. Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies..

E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%

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Attendance	A minimum of 75% Attendance is required to be maintained by a studentto be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

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F. **Syllabus**

Module I: Introduction to Programming:

Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.) Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/ Pseudocode with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code.

Module II: Programming Essential:

Arithmetic expressions and precedence, Conditional Branching and Loop, Writing and evaluation of conditionals and consequent branching , Iteration and loops.

Module III: Arrays:

Arrays (1-D, 2-D), Character arrays and Strings.

Module IV: Basic Algorithms:

Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)

Module V: *Function*:

Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference

Module VI: Function:

Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

Module VII: Structure:

Structures, Defining structures and Array of Structures.

Module VIII: Pointers:

Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)

Module IX: File handling:

Basics of file Handling.

Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

G. **Suggested Text/Reference Books:**

- Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.
- E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill.
- Brian W. Kernighan and Dennis M. Ritchie, the C Programming Language, Prentice Hall of India

H. **Lecture Plan**

Lecture	Topics	Mode of Delivery	Corresp on ding CO	Mode of Assessing CO

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1	Introduction to components of a computer system	Lecture	CSE 104.1	Mid Term-1, Quiz & End Sem Exam
2	Introduction to components of a computer system	Lecture	CSE 104.1	Mid Term-1, Quiz & End Sem Exam
3	Idea of Algorithm: steps to solve logical and numerical problems	Lecture	CSE 104.1	Mid Term-1, Quiz & End Sem Exam
4	Flowchart/ Pseudocode with examples	Lecture	CSE 104.1	Mid Term-1, Quiz & End Sem Exam
5	Flowchart/ Pseudocode with examples	Lecture	CSE 104.1	Mid Term-1, Quiz & End Sem Exam
6	source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code.	Lecture	CSE 104.1	Mid Term-1, Quiz & End Sem Exam
7	Arithmetic expressions and precedence, Conditional Branching and Loop	Lecture	CSE 104.2	Mid Term-1, Quiz & End Sem Exam
8	Arithmetic expressions and precedence, Conditional Branching and Loop	Lecture	CSE 104.2	Mid Term-1, Quiz & End Sem Exam
9	Writing and evaluation of conditionals and consequent branching	Lecture	CSE 104.2	Mid Term-1, Quiz & End Sem Exam
10	Iteration and loops	Lecture	CSE 104.2	Mid Term-1, Quiz & End Sem Exam
11	Iteration and loops	Lecture	CSE 104.2	Mid Term-1, Quiz & End Sem Exam
12	Iteration and loops	Lecture	CSE 104.2	Mid Term-1, Quiz & End Sem Exam
13	Iteration and loops	Lecture	CSE 104.2	Mid Term-1, Quiz & End Sem Exam
14	Arrays (1-D, 2-D)	Lecture	CSE 104.3	Mid Term-1, Quiz & End Sem Exam
15	Arrays (1-D, 2-D)	Lecture	CSE 104.3	Mid Term-1, Quiz & End Sem Exam
16	Character arrays and Strings.	Lecture	CSE 104.3	Mid Term-1, Quiz & End Sem Exam
17	Searching	Lecture	CSE 104.4	Quiz & End Sem Exam
18	Basic Sorting Algorithms	Lecture	CSE 104.4	Quiz & End Sem Exam
19	Basic Sorting Algorithms	Lecture	CSE 104.4	Quiz & End Sem Exam

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20	Finding roots of equations, notion of order of complexity through example programs	Lecture	CSE 104.4	Quiz & End Sem Exam
21	Functions	Lecture	CSE 104.5	Quiz & End Sem Exam
22	Parameter passing in functions	Lecture	CSE 104.5	Quiz & End Sem Exam
23	call by value, Passing arrays to functions: idea of call by	Lecture	CSE 104.5	Quiz & End Sem Exam
	reference			
24	call by value, Passing arrays to functions: idea of call by reference	Lecture	CSE 104.5	Quiz & End Sem Exam
25	Recursion, as a different way of solving problems. Example programs	Lecture	CSE 104.5	Quiz & End Sem Exam
26	Finding Factorial, Fibonacci series, Ackerman function etc.	Lecture	CSE 104.5	Quiz & End Sem Exam
27	Quick sort or Merge sort.	Lecture	CSE 104.5	Quiz & End Sem Exam
28	Structures, Defining structures	Lecture	CSE 104.5	Quiz & End Sem Exam
29	Structures, Defining structures	Lecture	CSE 104.5	Quiz & End Sem Exam
30	Array of Structures.	Lecture	CSE 104.5	Quiz & End Sem Exam
31	Idea of pointers, Defining pointers, Use of Pointers in self-referential structures	Lecture	CSE 104.5	Quiz & End Sem Exam
32	Idea of pointers, Defining pointers, Use of Pointers in self-referential structures	Lecture	CSE 104.5	Quiz & End Sem Exam
33	notion of linked list	Lecture	CSE 104.5	Quiz & End Sem Exam
34	Basics of file Handling.	Lecture	CSE 104.5	Quiz & End Sem Exam
35	Basics of file Handling.	Lecture	CSE 104.5	Quiz & End Sem Exam
36	Basics of file Handling.	Lecture	CSE 104.5	Quiz & End Sem Exam

I. Course Articulation Matrix (Mapping of COs with POs)

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CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE 104.1	Understand the basic concept of algorithm, flowchart, and programs.													1		
CSE 104.2	Understand the arithmetic expressions and precedence, Conditional Branching and Loop													1		
CSE 104.3	Apply arrays (1-D, 2-D), Character arrays and string operations.	2												2		
CSE 104.4	Analyse Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations and complexity.	1	2											2		
CSE 104.5	implement functions, structures, pointers and file handling.	2	1		1									3		

ESE MARKS : CSE 104

S. No.	Enrollment.No.	Student's Name	CSE104 PROGRAMMING FOR PROBLEM SOLVING							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U6G6

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1	A60205220023	Mr ANURAG AJEET	100	30	70	A	9	3	3	27
2	A60205220004	Ms T.J .PRAKRUTHI	100	30	70	A+	10	3	3	30
3	A60205220010	Ms ANUSHKA SHARMA	100	30	70	A+	10	3	3	30
4	A60205220011	Mr MOHIT RATHORE	100	30	70	A-	8	3	3	24
5	A60205220012	Mr HARSH RAJPUT	100	30	70	A-	8	3	3	24
6	A60205220034	Mr AMAN VERMA	100	30	70	B+	7	3	3	21
7	A60205220001	Mr RAJDEEP CHOWDHURY	100	30	70	B	6	3	3	18
8	A60205220007	Mr HARSH DUBEY	100	30	70	A-	8	3	3	24
9	A60205220041	Mr VINEET TOMAR	100	30	70	A-	8	3	3	24
10	A60205220040	Ms PRIYAL GUPTA	100	30	70	A-	8	3	3	24
11	A60205220030	Mr HARSH KUMAR GUPTA	100	30	70	B-	5	3	3	15
12	A60205220031	Mr JASPREET SINGH	100	30	70	A	9	3	3	27
13	A60205220021	Ms PURVA CHAUHAN	100	30	70	A+	10	3	3	30
14	A60205220042	Mr HARIOM SHARMA	100	30	70	B	6	3	3	18
15	A60205220029	Mr RAHUL CHOUBEY	100	30	70	A	9	3	3	27
16	A60205220035	Mr AMAN DIXIT	100	30	70	B+	7	3	3	21
17	A60205220019	Mr HARSHIT SHARMA	100	30	70	C+	4	3	3	12
18	A60205220013	Mr PARLA CHARANTEJA REDDY	100	30	70	A-	8	3	3	24
19	A60205220072	Ms NETRA KULSHRESTHA	100	30	70	B+	7	3	3	21
20	A60205220006	Mr HARSHVARDHAN RATHOD	100	30	70	A-	8	3	3	24
21	A60205220050	Mr ADITYA SINGH BHADOURIA	100	30	70	B-	5	3	3	15
22	A60205220032	Mr RISHABH CHAUHAN	100	30	70	A	9	3	3	27
23	A60205220033	Ms KAJAL JAIN	100	30	70	A	9	3	3	27

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24	A60205220066	Mr VIVEK SHARMA	100	30	70	B+	7	3	3	21
25	A60205220038	Ms HARSHITA SHARMA	100	30	70	A-	8	3	3	24
26	A60205220051	Mr YADVENDRA SINGH DHAKAD	100	30	70	B-	5	3	3	15
27	A60205220099	Mr PRADHUMN MITTAL	100	30	70	A	9	3	3	27
28	A60205220062	Mr NIKHIL SINGH DHAKAD	100	30	70	B+	7	3	3	21
29	A60205220097	Mr SURYANSH MISHRA	100	30	70	A-	8	3	3	24
30	A60205220060	Mr MOHIT SHARMA	100	30	70	A-	8	3	3	24
31	A60205220061	Mr P.SRI HARI	100	30	70	B-	5	3	3	15
32	A60205220075	Ms AKSHITA TRIPATHI	100	30	70	B+	7	3	3	21
33	A60205220025	Ms KHUSHI YADAV	100	30	70	B+	7	3	3	21
34	A60205220018	Mr ADITYA NARAYAN UPADHYAY	100	30	70	B	6	3	3	18
35	A60205220005	Mr AYUSH SINGH GAUR	100	30	70	A-	8	3	3	24
36	A60205220071	Mr MOHIT ARGADE	100	30	70	A-	8	3	3	24
37	A60205220057	Mr SHRAVAN SHARMA	100	30	70	B+	7	3	3	21
38	A60205220008	Ms SHRUTI DUBEY	100	30	70	A-	8	3	3	24
39	A60205220058	Mr NIKHIL TOMAR	100	30	70	B+	7	3	3	21
40	A60205220146	Mr RAHUL SHARMA	100	30	70	B+	7	3	3	21
41	A60205220054	Mr PRASHANT GOSWAMI	100	30	70	B+	7	3	3	21
42	A60205220037	Mr SATYAM SHARMA	100	30	70	A	9	3	3	27
43	A60205220117	Mr ROHAN SHUKLA	100	30	70	B+	7	3	3	21
44	A60205220098	Mr KINSHUK DAYAL SARASWAT	100	30	70	A-	8	3	3	24
45	A60205220076	Ms JYOTIKA DALAL	100	30	70	A	9	3	3	27

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46	A60205220055	Mr CHITRANSHU SINGH TOMAR	100	30	70	A-	8	3	3	24
47	A60205220088	Mr RAJAT GUPTA	100	30	70	B+	7	3	3	21
48	A60205220162	Ms AJITA MISHRA	100	30	70	B+	7	3	3	21
49	A60205220052	Ms RISHITA AGARWAL	100	30	70	A+	10	3	3	30
50	A60205220024	Mr ADITYA TOMAR	100	30	70	B-	5	3	3	15
51	A60205220089	Mr YASH BANSAL	100	30	70	B-	5	3	3	15
52	A60205220070	Ms DEEPANJALI UPADHYAY	100	30	70	A	9	3	3	27
53	A60205220069	Mr ABSAAR MALIK	100	30	70	B+	7	3	3	21
54	A60205220009	Mr KOTIREDDY RANJITH KUMAR REDDY	100	30	70	A	9	3	3	27
55	A60205220045	Mr SHIVAM RATHORE	100	30	70	A	9	3	3	27
56	A60205220153	Mr SUYASH TRIPATHI	100	30	70	A-	8	3	3	24
57	A60205220091	Mr AMBROSE JUDE PREMINGER	100	30	70	A	9	3	3	27
58	A60205220080	Ms GUN GUPTA	100	30	70	B	6	3	3	18
59	A60205220134	Mr ABHAY PRATAP SINGH	100	30	70	A-	8	3	3	24
60	A60205220116	Mr ARUN SINGH TOMAR	100	30	70	A	9	3	3	27
61	A60205220077	Mr AMAN RUHELA	100	30	70	A	9	3	3	27
62	A60205220084	Ms NIDHI KUSHWAH	100	30	70	B-	5	3	3	15
63	A60205220083	Mr PRIYANSHU SENGAR	100	30	70	A-	8	3	3	24
64	A60205220172	Mr NEELESH GOUR	100	30	70	B	6	3	3	18
65	A60205220124	Mr VIRAT SINGH KUSHWAH	100	30	70	B	6	3	3	18
66	A60205220016	Mr SHUBH PACHORI	100	30	70	A-	8	3	3	24

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67	A60205220161	Mr ANURAG GAJENDRA DIXIT	100	30	70	A-	8	3	3	24
68	A60205220107	Mr ADARSH SHARMA	100	30	70	B+	7	3	3	21
69	A60205220095	Mr SHASHANK DIXIT	100	30	70	A	9	3	3	27
70	A60205220044	Mr GAURAV SHARMA	100	30	70	B	6	3	3	18
71	A60205220155	Ms MANSI BHARTI	100	30	70	B+	7	3	3	21
72	A60205220094	Ms DISHA BHADORIA	100	30	70	B+	7	3	3	21
73	A60205220145	Ms ANKITA UPADHYAY	100	30	70	B	6	3	3	18
74	A60205220073	Ms SUNAINA ARORA	100	30	70	A	9	3	3	27
75	A60205220181	Mr ADARSH RATHORE	100	30	70	B	6	3	3	18
76	A60205220126	Mr HASMATULLA H KHAN	100	30	70	B-	5	3	3	15
77	A60205220114	Mr AKSHAT JAIN	100	30	70	B-	5	3	3	15
78	A60205220092	Mr DEVASHISH SHARMA	100	30	70	A	9	3	3	27
79	A60205220105	Mr GAURAV PANWAR	100	30	70	B+	7	3	3	21
80	A60205220121	Mr SHIVAM PANDEY	100	30	70	B	6	3	3	18
81	A60205220079	Mr ARYAN SONI	100	30	70	A	9	3	3	27
82	A60205220090	Mr DEEPAK THAKUR	100	30	70	B	6	3	3	18
83	A60205220118	Mr ALPESH TOMAR	100	30	70	B	6	3	3	18
84	A60205220046	Mr SAJAL KUMAR	100	30	70	B	6	3	3	18
85	A60205220017	Mr ANIRUDH NAIR	100	30	70	B	6	3	3	18
86	A60205220147	Mr UJJWAL SHRIVASTAVA	100	30	70	B-	5	3	3	15
87	A60205220100	Mr ABHISHEK PANDEY	100	30	70	B	6	3	3	18
88	A60205220192	Mr ANSH SHARMA	100	30	70	B	6	3	3	18
89	A60205220173	Mr VAIBHAV ARYA	100	30	70	B-	5	3	3	15

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90	A60205220125	Mr SATYAM CHAUDHARY	100	30	70	B	6	3	3	18
91	A60205220136	Mr ABHINAV AGARWAL	100	30	70	A-	8	3	3	24
92	A60205220102	Mr GAURAV SINGHAL	100	30	70	B+	7	3	3	21
93	A60205220074	Mr ANKIT RAJ	100	30	70	B+	7	3	3	21
94	A60205220174	Ms SUNEHA GOYAL	100	30	70	A-	8	3	3	24
95	A60205220165	Ms SEJAL GUPTA	100	30	70	A-	8	3	3	24
96	A60205220182	Mr RANDIP SINGH SIKARWAR	100	30	70	A	9	3	3	27
97	A60205220036	Mr ADITHYA S KUMAR	100	30	70	B	6	3	3	18
98	A60205220039	Ms PALAK TOMAR	100	30	70	A	9	3	3	27
99	A60205220112	Mr PRABHAT GUPTA	100	30	70	A	9	3	3	27
100	A60205220087	Mr MOHD ADNAN KHAN	100	30	70	B-	5	3	3	15
101	A60205220014	Mr MUKUL KHANDELWAL	100	30	70	B+	7	3	3	21
102	A60205220184	Mr AMAN SINGH	100	30	70	B-	5	3	3	15
103	A60205220115	Mr KRISHNA GOYAL	100	30	70	A-	8	3	3	24
104	A60205220119	Mr ANURAJ SINGH TOMAR	100	30	70	B+	7	3	3	21
105	A60205220093	Mr RAMAN SHARMA	100	30	70	A-	8	3	3	24
106	A60205220096	Mr UTKARSH SHARMA	100	30	70	B+	7	3	3	21
107	A60205220130	Mr MUKUL BINDAL	100	30	70	C+	4	3	3	12
108	A60205220103	Mr VIVEK SINGH	100	30	70	B	6	3	3	18
109	A60205220159	Mr SOJAL MEHRA	100	30	70	A-	8	3	3	24
110	A60205220154	Ms MANSI TRIPATHI	100	30	70	A	9	3	3	27
111	A60205220160	Mr ANIRUDDH JHA	100	30	70	B+	7	3	3	21
112	A60205220138	Mr PRIYANSHU SAMAL	100	30	70	B	6	3	3	18
113	A60205220191	Mr VIVEK YADAV	100	30	70	B+	7	3	3	21

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114	A60205220078	Mr ARPIT SHUKLA	100	30	70	B+	7	3	3	21
115	A60205220065	Mr YUVRAJ SINGH	100	30	70	A	9	3	3	27
116	A60205220137	Mr PRIYANSH SHARMA	100	30	70	B	6	3	3	18
117	A60205220188	Mr AYUSH KUMAR	100	30	70	B-	5	3	3	15
118	A60205220142	Mr YUVRAJ RAJPUT	100	30	70	A-	8	3	3	24
119	A60205220185	Mr ROHIT JAIN	100	30	70	A-	8	3	3	24
120	A60205220068	Mr DEVDEEP SINGH SIKARWAR	100	30	70	B+	7	3	3	21
121	A60205220122	Mr KALEPU PRASHANT SAI	100	30	70	A-	8	3	3	24
122	A60205220190	Mr RAHUL SHARMA	100	30	70	B	6	3	3	18
123	A60205220101	Mr ISHANT SAXENA	100	30	70	A-	8	3	3	24
124	A60205220163	Mr JEWAL SHARMA	100	30	70	B	6	3	3	18
125	A60205220193	Mr SAFIR AFJAL ZAFIR	100	30	70	B-	5	3	3	15
126	A60205220152	Ms ABHA TIWARI	100	30	70	A+	10	3	3	30
127	A60205220179	Mr RAJ PRAJAPATI	100	30	70	A	9	3	3	27
128	A60205220141	Mr ABHISHEK MISHRA	100	30	70	A	9	3	3	27
129	A60205220151	Mr ATUL SINGH TOMAR	100	30	70	B+	7	3	3	21
130	A60205220150	Mr YAMAN JAIN	100	30	70	A+	10	3	3	30
131	A60205220104	Mr ABHISHEK CHOUHAN	100	30	70	B+	7	3	3	21
132	A60205220106	Mr YASH JHA	100	30	70	B+	7	3	3	21
133	A60205220171	Mr NAMAN MISHRA	100	30	70	A-	8	3	3	24
134	A60205220002	Mr SATNAM SINGH	100	30	70	B+	7	3	3	21
135	A60205220187	Mr AMAN DIXIT	100	30	70	A	9	3	3	27
136	A60205220020	Ms DIVYANSHI SIKARWAR	100	30	70	A-	8	3	3	24
137	A60205220110	Mr MD AZAM	100	30	70	B-	5	3	3	15
138	A60205220169	Mr VIVEK MISHRA	100	30	70	B+	7	3	3	21

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139	A60205220133	Mr JATIN JHA	100	30	70	B+	7	3	3	21
140	A60205220063	Mr AKHAND PRATAP SIKARWAR	100	30	70	A+	10	3	3	30
141	A60205220120	Mr SATISH PAL	100	30	70	B+	7	3	3	21
142	A60205220198	Mr KARTIK KHARE	100	30	70	B+	7	3	3	21
143	A60205220195	Mr HARSHVARDHAN SINGH PARIHAR	100	30	70	B+	7	3	3	21
144	A60205220189	Mr VANSH GOYAL	100	30	70	A-	8	3	3	24
145	A60205220175	Mr AKSHAT GOYAL	100	30	70	A	9	3	3	27
146	A60205220082	Mr KARTHIKEYA MARINGANTI	100	30	70	A	9	3	3	27
147	A60205220127	Ms AASTHA BHADORIA	100	30	70	B	6	3	3	18
148	A60205220156	Mr ASHISH SINGH TOMAR	100	30	70	A-	8	3	3	24
149	A60205220056	Ms RADHIKA BEGWANI	100	30	70	A-	8	3	3	24
150	A60205220140	Mr RAJ SINGH	100	30	70	B+	7	3	3	21
151	A61613320005	Mr SHIVAM KATARE	100	30	70	B+	7	3	3	21
152	A60205220158	Mr BHANU PRATAP SINGH YADAV	100	30	70	A	9	3	3	27
153	A60205220003	Mr SUSEEM VIKRAM	100	30	70	A	9	3	3	27
154	A60205220170	Mr SATYAM SINGH GURJAR	100	30	70	B-	5	3	3	15
155	A60205220148	Mr KESHAV BAJPAI	100	30	70	B+	7	3	3	21
156	A60205220132	Ms SHRUTI TRIPATHI	100	30	70	A	9	3	3	27
157	A60205220047	Ms AKANKSHA SRIVASTAVA	100	30	70	B+	7	3	3	21
158	A60205220139	Ms MALIKA TRIPATHI	100	30	70	B+	7	3	3	21
159	A60205220178	Ms VAISHNAVI JAISWAL	100	30	70	B+	7	3	3	21
160	A60205220027	Mr OJASWA CHATURVEDI	100	30	70	A-	8	3	3	24
161	A60205220180	Mr ABHAY SINGH TOMAR	100	30	70	B	6	3	3	18

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162	A60205220123	Ms BHOOMIKA SINGHAL	100	30	70	A-	8	3	3	24
163	A60205220157	Ms VANSHITA AGRAWAL	100	30	70	A	9	3	3	27
164	A60205220049	Mr ANURAG SHARMA	100	30	70	A	9	3	3	27
165	A60205220194	Mr AMIT SHARMA	100	30	70	A-	8	3	3	24
166	A60205220129	Mr PRADEEP RAWAT	100	30	70	A	9	3	3	27
167	A60205220111	Ms AASTHA SINGH	100	30	70	B+	7	3	3	21
168	A60205220149	Mr BHUPENDRA JADON	100	30	70	A-	8	3	3	24
169	A60205220167	Ms KHUSHI GUPTA	100	30	70	A-	8	3	3	24
170	A60205220186	Ms AYUSHI BAIJAL	100	30	70	B	6	3	3	18
171	A60205220176	Mr DEVANSH PARASHAR	100	30	70	B	6	3	3	18

Average Grade Point = 1259/171 (Total Grade point/Total no of students) = 7.36
No of students getting greater than average (7.36) marks = 81 students = 52.63%

Total No. of Students	=	171
Level 2	>50% average marks and < 60% average marks	52.63%
Attainment Level		Level 2

Level 1	< 50% Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course : PROGRAMMING FOR PROBLEM SOLVING LAB
Course Code : CSE124, Crédits : 02, Session :2019-20 (Odd Sem.), Class : B.Tech. 1st Year
Faculty Name : Dr.Rajeev Goyal

A. Introduction: The objective of this course module is to acquaint the students with the basics of computers programming language, data representation inside computer and to get them familiar with various important features of procedure-oriented programming language i.e. C.

B. Course Outcomes: At the end of the course, students will be able to:

CSE124.1. Understand the algorithms for simple problems.

CSE124.2. Analyse the looping statements, arrays and its applications.

CSE124.3. Implement problems using functions, structures and recursive programs.

CSE124.4. Formulate the problems in pointers.

CSE124.5. Create the various problems in file handling.

C. Programme Outcomes:

[PO.1]. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

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[PO.7]. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and

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norms of the engineering practices

[PO.9]. Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

[PO.12]. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

D. Programme Specific Outcomes:

PSO1: Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2: Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO3: Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term Viva	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a studentto be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	A	5%
End Semester Examination	End Semester Practical Examination	EE	70%
Total			**100%**

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F. List of experiments/demonstrations

Tutorial 1: Problem solving using computers: (2 Hours)
Lab1: Familiarization with programming environment

Tutorial 2: Variable types and type conversions: (2 Hours)
Lab 2: Simple computational problems using arithmetic expressions

Tutorial 3: Branching and logical expressions: (4 Hours)
Lab 3: Problems involving if-then-else structures

Tutorial 4: Loops, while and for loops: (4 Hours)
Lab 4: Iterative problems e.g., sum of series

Tutorial 5: 1D Arrays: searching, sorting: (4 Hours)
Lab 5: 1D Array manipulation

Tutorial 6: 2D arrays and Strings: (4 Hours)
Lab 6: Matrix problems, String operations

Tutorial 7: Functions, call by value: (4 Hours)
Lab 7: Simple functions

Tutorial 8 &9: Numerical methods (Root finding, numerical differentiation, numerical integration): (4 Hours)
Lab 8 and 9: Programming for solving Numerical methods problems

Tutorial 10: Recursion, structure of recursive calls: (4 Hours)
Lab 10: Recursive functions

Tutorial 11: Pointers, structures and dynamic memory allocation: (4 Hours)
Lab 11: Pointers and structures

Tutorial 12: File handling: (4 Hours)
Lab 12: File operations

G. Examination Scheme:

IA			EE			
A	PR	Practical Based Test	Major Experiment	Minor Experiment	LR	Viva
5	10	15	35	15	10	10

Note: IA -Internal Assessment, EE- External Exam, A- Attendance PR- Performance, LR - Lab Record, V - Viva.

H. Suggested Text/Reference Books:

- Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.
- E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill.

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- Brian W. Kernighan and Dennis M. Ritchie, the C Programming Language, Prentice Hall of India

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I. Lab Plan

Practical	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Understanding the various concepts of OS, Programming and Compiler	Practical	CSE124.1	Mid Term Viva, Quiz & End Sem Practical Exam
2	Understanding the various concepts of OS, Programming and Compiler	Practical	CSE124.1	Mid Term Viva, Quiz & End Sem Practical Exam
3	Understanding and creating programs using various data types.	Practical	CSE124.1	Mid Term Viva, Quiz & End Sem Practical Exam
4	Understanding and creating programs using various data types.	Practical	CSE124.1	Mid Term Viva, Quiz & End Sem Practical Exam
5	Programs using logical construct and loops.	Practical	CSE124.2	Mid Term Viva, Quiz & End Sem Practical Exam
6	Programs using logical construct and loops.	Practical	CSE124.2	Mid Term Viva, Quiz & End Sem Practical Exam
7	Programs using various types of loops	Practical	CSE124.2	Mid Term Viva, Quiz & End Sem Practical Exam
8	Programs using various types of loops	Practical	CSE124.2	Mid Term Viva, Quiz & End Sem Practical Exam
9	Write programs for implementing array and advance array.	Practical	CSE124.2	Mid Term Viva, Quiz & End Sem Practical Exam
10	Write programs for implementing array and advance array.	Practical	CSE124.2	Mid Term Viva, Quiz & End Sem Practical Exam
11	Write programs for implementing various sorting and searching techniques	Practical	CSE124.2	Mid Term Viva, Quiz & End Sem Practical Exam
12	Write programs for implementing various sorting and searching techniques	Practical	CSE124.2	Mid Term Viva, Quiz & End Sem Practical Exam
13	Understanding Implementing function fundamental.	Practical	CSE124.3	Quiz & End Sem Practical Exam
14	Understanding Implementing function fundamental.	Practical	CSE124.3	Quiz & End Sem Practical Exam
15	Program for implementing roots of equation. and other numerical method problems	Practical	CSE124.3	Quiz & End Sem Practical Exam

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16	Program for implementing roots of equation. and other numerical method problems	Practica l	CSE124.3	Quiz & End Sem Practical Exam
17	Write programs to solve problems of structure	Practica l	CSE124.3	Quiz & End Sem Practical Exam
18	Write programs to solve problems of structure	Practica l	CSE124.3	Quiz & End Sem Practical Exam
19	Write programs using recursion	Practica l	CSE124.3	Quiz & End Sem Practical Exam
20	Write programs using recursion	Practica l	CSE124.3	Quiz & End Sem Practical Exam
21	Write programs for Implementing pointers	Practica l	CSE124.4	Quiz & End Sem Practical Exam
22	Write programs for Implementing pointers	Practica l	CSE124.4	Quiz & End Sem Practical Exam
23	Write programs for file handling	Practica l	CSE124.5	Quiz & End Sem Practical Exam
24	Write programs for file handling	Practica l	CSE124.5	Quiz & End Sem Practical Exam

ESE Marks - CSE124

S. No .	Enrollment. N o.	Student's Name	CSE124 PROGRAMMING FOR PROBLEM SOLVING LAB							
			Ma x Mar k s	CE Weig h t Age (%)	ET Weig h t Age (%)	GO	GP	ACU	ECU	U10G 1 0
1	A60205220023	Mr ANURAG AJEET	100	30	70	A-	8	2	2	16
2	A60205220004	Ms T.J .PRAKRUTHI	100	30	70	A+	10	2	2	20
3	A60205220010	Ms ANUSHKA SHARMA	100	30	70	A-	8	2	2	16
4	A60205220011	Mr MOHIT RATHORE	100	30	70	A-	8	2	2	16
5	A60205220012	Mr HARSH RAJPUT	100	30	70	A-	8	2	2	16
6	A60205220034	Mr AMAN VERMA	100	30	70	B+	7	2	2	14
7	A60205220001	Mr RAJDEEP CHOWDHURY	100	30	70	A	9	2	2	18

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8	A60205220007	Mr HARSH DUBEY	100	30	70	B	6	2	2	12
9	A60205220041	Mr VINEET TOMAR	100	30	70	A-	8	2	2	16
10	A60205220040	Ms PRIYAL GUPTA	100	30	70	A	9	2	2	18
11	A60205220030	Mr HARSH KUMAR GUPTA	100	30	70	B+	7	2	2	14
12	A60205220031	Mr JASPREET SINGH	100	30	70	B+	7	2	2	14
13	A60205220021	Ms PURVA CHAUHAN	100	30	70	A-	8	2	2	16
14	A60205220042	Mr HARIOM SHARMA	100	30	70	B+	7	2	2	14
15	A60205220029	Mr RAHUL CHOUBEY	100	30	70	A-	8	2	2	16
16	A60205220035	Mr AMAN DIXIT	100	30	70	B+	7	2	2	14
17	A60205220019	Mr HARSHIT SHARMA	100	30	70	B-	5	2	2	10
18	A60205220013	Mr PARLA CHARANTEJA REDDY	100	30	70	A-	8	2	2	16
19	A60205220072	Ms NETRA KULSHRESTHA	100	30	70	A-	8	2	2	16
20	A60205220006	Mr HARSHVARDHAN RATHOD	100	30	70	A	9	2	2	18
21	A60205220050	Mr ADITYA SINGH BHADOURIA	100	30	70	B-	5	2	2	10
22	A60205220032	Mr RISHABH CHAUHAN	100	30	70	A-	8	2	2	16
23	A60205220033	Ms KAJAL JAIN	100	30	70	A	9	2	2	18
24	A60205220066	Mr VIVEK SHARMA	100	30	70	A	9	2	2	18
25	A60205220038	Ms HARSHITA SHARMA	100	30	70	A-	8	2	2	16
26	A60205220051	Mr YADVENDRA SINGH DHAKAD	100	30	70	B+	7	2	2	14
27	A60205220099	Mr PRADHUMN MITTAL	100	30	70	A-	8	2	2	16
28	A60205220062	Mr NIKHIL SINGH DHAKAD	100	30	70	B+	7	2	2	14

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29	A60205220097	Mr SURYANSH MISHRA	100	30	70	A-	8	2	2	16
30	A60205220060	Mr MOHIT SHARMA	100	30	70	B+	7	2	2	14
31	A60205220061	Mr P.SRI HARI	100	30	70	B+	7	2	2	14
32	A60205220075	Ms AKSHITA TRIPATHI	100	30	70	A-	8	2	2	16
33	A60205220025	Ms KHUSHI YADAV	100	30	70	A	9	2	2	18
34	A60205220018	Mr ADITYA NARAYAN UPADHYAY	100	30	70	B-	5	2	2	10
35	A60205220005	Mr AYUSH SINGH GAUR	100	30	70	A	9	2	2	18
36	A60205220071	Mr MOHIT ARGADE	100	30	70	A-	8	2	2	16
37	A60205220057	Mr SHRAVAN SHARMA	100	30	70	A-	8	2	2	16
38	A60205220008	Ms SHRUTI DUBEY	100	30	70	A-	8	2	2	16
39	A60205220058	Mr NIKHIL TOMAR	100	30	70	A-	8	2	2	16
40	A60205220146	Mr RAHUL SHARMA	100	30	70	B+	7	2	2	14
41	A60205220054	Mr PRASHANT GOSWAMI	100	30	70	A+	10	2	2	20
42	A60205220037	Mr SATYAM SHARMA	100	30	70	A-	8	2	2	16
43	A60205220117	Mr ROHAN SHUKLA	100	30	70	B-	5	2	2	10
44	A60205220098	Mr KINSHUK DAYAL SARASWAT	100	30	70	A-	8	2	2	16
45	A60205220076	Ms JYOTIKA DALAL	100	30	70	A	9	2	2	18
46	A60205220055	Mr CHITRANSHU SINGH TOMAR	100	30	70	A-	8	2	2	16
47	A60205220088	Mr RAJAT GUPTA	100	30	70	A	9	2	2	18
48	A60205220162	Ms AJITA MISHRA	100	30	70	A	9	2	2	18
49	A60205220052	Ms RISHITA AGARWAL	100	30	70	A-	8	2	2	16
50	A60205220024	Mr ADITYA TOMAR	100	30	70	B-	5	2	2	10
51	A60205220089	Mr YASH BANSAL	100	30	70	B	6	2	2	12

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52	A60205220070	Ms DEEPANJALI UPADHYAY	100	30	70	A	9	2	2	18
53	A60205220069	Mr ABSAAR MALIK	100	30	70	B+	7	2	2	14
54	A60205220009	Mr KOTIREDDY RANJITH KUMAR REDDY	100	30	70	A-	8	2	2	16
55	A60205220045	Mr SHIVAM RATHORE	100	30	70	A	9	2	2	18
56	A60205220153	Mr SUYASH TRIPATHI	100	30	70	B	6	2	2	12
57	A60205220091	Mr AMBROSE JUDE PREMINGER	100	30	70	A	9	2	2	18
58	A60205220080	Ms GUN GUPTA	100	30	70	A	9	2	2	18
59	A60205220134	Mr ABHAY PRATAP SINGH	100	30	70	A-	8	2	2	16
60	A60205220116	Mr ARUN SINGH TOMAR	100	30	70	B+	7	2	2	14
61	A60205220077	Mr AMAN RUHELA	100	30	70	A-	8	2	2	16
62	A60205220084	Ms NIDHI KUSHWAH	100	30	70	A-	8	2	2	16
63	A60205220083	Mr PRIYANSHU SENGAR	100	30	70	B+	7	2	2	14
64	A60205220172	Mr NEELESH GOUR	100	30	70	B+	7	2	2	14
65	A60205220124	Mr VIRAT SINGH KUSHWAH	100	30	70	B+	7	2	2	14
66	A60205220016	Mr SHUBH PACHORI	100	30	70	B+	7	2	2	14
67	A60205220161	Mr ANURAG GAJENDRA DIXIT	100	30	70	A	9	2	2	18
68	A60205220107	Mr ADARSH SHARMA	100	30	70	B	6	2	2	12
69	A60205220095	Mr SHASHANK DIXIT	100	30	70	A-	8	2	2	16
70	A60205220044	Mr GAURAV SHARMA	100	30	70	A-	8	2	2	16
71	A60205220155	Ms MANSI BHARTI	100	30	70	B+	7	2	2	14
72	A60205220094	Ms DISHA BHADORIA	100	30	70	A-	8	2	2	16
73	A60205220145	Ms ANKITA UPADHYAY	100	30	70	A-	8	2	2	16

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74	A60205220073	Ms SUNAINA ARORA	100	30	70	A-	8	2	2	16
75	A60205220181	Mr ADARSH RATHORE	100	30	70	A-	8	2	2	16
76	A60205220126	Mr HASMATULLAH KHAN	100	30	70	B+	7	2	2	14
77	A60205220114	Mr AKSHAT JAIN	100	30	70	B-	5	2	2	10
78	A60205220092	Mr DEVASHISH SHARMA	100	30	70	A-	8	2	2	16
79	A60205220105	Mr GAURAV PANWAR	100	30	70	B+	7	2	2	14
80	A60205220121	Mr SHIVAM PANDEY	100	30	70	B-	5	2	2	10
81	A60205220079	Mr ARYAN SONI	100	30	70	B+	7	2	2	14
82	A60205220090	Mr DEEPAK THAKUR	100	30	70	A-	8	2	2	16
83	A60205220118	Mr ALPESH TOMAR	100	30	70	B-	5	2	2	10
84	A60205220046	Mr SAJAL KUMAR	100	30	70	A-	8	2	2	16
85	A60205220017	Mr ANIRUDH NAIR	100	30	70	B+	7	2	2	14
86	A60205220147	Mr UJJWAL SHRIVASTAVA	100	30	70	B+	7	2	2	14
87	A60205220100	Mr ABHISHEK PANDEY	100	30	70	A-	8	2	2	16
88	A60205220192	Mr ANSH SHARMA	100	30	70	B-	5	2	2	10
89	A60205220173	Mr VAIBHAV ARYA	100	30	70	B	6	2	2	12
90	A60205220125	Mr SATYAM CHAUDHARY	100	30	70	B+	7	2	2	14
91	A60205220136	Mr ABHINAV AGARWAL	100	30	70	A	9	2	2	18
92	A60205220102	Mr GAURAV SINGHAL	100	30	70	B+	7	2	2	14
93	A60205220074	Mr ANKIT RAJ	100	30	70	A-	8	2	2	16
94	A60205220174	Ms SUNEHA GOYAL	100	30	70	A-	8	2	2	16
95	A60205220165	Ms SEJAL GUPTA	100	30	70	A	9	2	2	18
96	A60205220182	Mr RANDIP SINGH SIKARWAR	100	30	70	A-	8	2	2	16

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97	A60205220036	Mr ADITHYA S KUMAR	100	30	70	B-	5	2	2	10
98	A60205220039	Ms PALAK TOMAR	100	30	70	A	9	2	2	18
99	A60205220112	Mr PRABHAT GUPTA	100	30	70	A-	8	2	2	16
100	A60205220087	Mr MOHD ADNAN KHAN	100	30	70	B+	7	2	2	14
101	A60205220014	Mr MUKUL KHANDELWAL	100	30	70	B+	7	2	2	14
102	A60205220184	Mr AMAN SINGH	100	30	70	B-	5	2	2	10
103	A60205220115	Mr KRISHNA GOYAL	100	30	70	B-	5	2	2	10
104	A60205220119	Mr ANURAJ SINGH TOMAR	100	30	70	B-	5	2	2	10
105	A60205220093	Mr RAMAN SHARMA	100	30	70	B-	5	2	2	10
106	A60205220096	Mr UTKARSH SHARMA	100	30	70	B-	5	2	2	10
107	A60205220130	Mr MUKUL BINDAL	100	30	70	A-	8	2	2	16
108	A60205220103	Mr VIVEK SINGH	100	30	70	B-	5	2	2	10
109	A60205220159	Mr SOJAL MEHRA	100	30	70	A-	8	2	2	16
110	A60205220154	Ms MANSI TRIPATHI	100	30	70	A	9	2	2	18
111	A60205220160	Mr ANIRUDDH JHA	100	30	70	B	6	2	2	12
112	A60205220138	Mr PRIYANSHU SAMAL	100	30	70	B-	5	2	2	10
113	A60205220191	Mr VIVEK YADAV	100	30	70	B-	5	2	2	10
114	A60205220078	Mr ARPIT SHUKLA	100	30	70	A-	8	2	2	16
115	A60205220065	Mr YUVRAJ SINGH	100	30	70	A-	8	2	2	16
116	A60205220137	Mr PRIYANSH SHARMA	100	30	70	B+	7	2	2	14
117	A60205220188	Mr AYUSH KUMAR	100	30	70	A-	8	2	2	16
118	A60205220142	Mr YUVRAJ RAJPUT	100	30	70	B+	7	2	2	14
119	A60205220185	Mr ROHIT JAIN	100	30	70	A-	8	2	2	16
120	A60205220068	Mr DEVDEEP SINGH SIKARWAR	100	30	70	A-	8	2	2	16

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121	A60205220122	Mr KALEPU PRASHANT SAI	100	30	70	A-	8	2	2	16
122	A60205220190	Mr RAHUL SHARMA	100	30	70	B-	5	2	2	10
123	A60205220101	Mr ISHANT SAXENA	100	30	70	B+	7	2	2	14
124	A60205220163	Mr JEWAL SHARMA	100	30	70	B	6	2	2	12
125	A60205220193	Mr SAFIR AFJAL ZAFIR	100	30	70	B-	5	2	2	10
126	A60205220152	Ms ABHA TIWARI	100	30	70	A	9	2	2	18
127	A60205220179	Mr RAJ PRAJAPATI	100	30	70	A-	8	2	2	16
128	A60205220141	Mr ABHISHEK MISHRA	100	30	70	A	9	2	2	18
129	A60205220151	Mr ATUL SINGH TOMAR	100	30	70	A-	8	2	2	16
130	A60205220150	Mr YAMAN JAIN	100	30	70	A	9	2	2	18
131	A60205220104	Mr ABHISHEK CHOUHAN	100	30	70	B-	5	2	2	10
132	A60205220106	Mr YASH JHA	100	30	70	B-	5	2	2	10
133	A60205220171	Mr NAMAN MISHRA	100	30	70	B+	7	2	2	14
134	A60205220002	Mr SATNAM SINGH	100	30	70	A+	10	2	2	20
135	A60205220187	Mr AMAN DIXIT	100	30	70	B	6	2	2	12
136	A60205220020	Ms DIVYANSHI SIKARWAR	100	30	70	A-	8	2	2	16
137	A60205220110	Mr MD AZAM	100	30	70	B-	5	2	2	10
138	A60205220169	Mr VIVEK MISHRA	100	30	70	B	6	2	2	12
139	A60205220133	Mr JATIN JHA	100	30	70	B+	7	2	2	14
140	A60205220063	Mr AKHAND PRATAP SIKARWAR	100	30	70	A	9	2	2	18
141	A60205220120	Mr SATISH PAL	100	30	70	B-	5	2	2	10
142	A60205220198	Mr KARTIK KHARE	100	30	70	A-	8	2	2	16
143	A60205220195	Mr HARSHVARDHAN SINGH PARIHAR	100	30	70	B-	5	2	2	10

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144	A60205220189	Mr VANSH GOYAL	100	30	70	B	6	2	2	12
145	A60205220175	Mr AKSHAT GOYAL	100	30	70	A-	8	2	2	16
146	A60205220082	Mr KARTHIKEYA MARINGANTI	100	30	70	A	9	2	2	18
147	A60205220127	Ms AASTHA BHADORIA	100	30	70	A-	8	2	2	16
148	A60205220156	Mr ASHISH SINGH TOMAR	100	30	70	B-	5	2	2	10
149	A60205220056	Ms RADHIKA BEGWANI	100	30	70	A-	8	2	2	16
150	A60205220140	Mr RAJ SINGH	100	30	70	B+	7	2	2	14
151	A61613320005	Mr SHIVAM KATARE	100	30	70	B	6	2	2	12
152	A60205220158	Mr BHANU PRATAP SINGH YADAV	100	30	70	A-	8	2	2	16
153	A60205220003	Mr SUSEEM VIKRAM	100	30	70	A-	8	2	2	16
154	A60205220170	Mr SATYAM SINGH GURJAR	100	30	70	B	6	2	2	12
155	A60205220148	Mr KESHAV BAJPAI	100	30	70	B+	7	2	2	14
156	A60205220132	Ms SHRUTI TRIPATHI	100	30	70	A-	8	2	2	16
157	A60205220047	Ms AKANKSHA SRIVASTAVA	100	30	70	A-	8	2	2	16
158	A60205220139	Ms MALIKA TRIPATHI	100	30	70	A-	8	2	2	16
159	A60205220178	Ms VAISHNAVI JAISWAL	100	30	70	B+	7	2	2	14
160	A60205220027	Mr OJASWA CHATURVEDI	100	30	70	A-	8	2	2	16
161	A60205220180	Mr ABHAY SINGH TOMAR	100	30	70	A-	8	2	2	16
162	A60205220123	Ms BHOOMIKA SINGHAL	100	30	70	A-	8	2	2	16
163	A60205220157	Ms VANSHITA AGRAWAL	100	30	70	A	9	2	2	18
164	A60205220049	Mr ANURAG SHARMA	100	30	70	A-	8	2	2	16
165	A60205220194	Mr AMIT SHARMA	100	30	70	B+	7	2	2	14
166	A60205220129	Mr PRADEEP RAWAT	100	30	70	B+	7	2	2	14

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167	A60205220111	Ms AASTHA SINGH	100	30	70	B	6	2	2	12
168	A60205220149	Mr BHUPENDRA JADON	100	30	70	B	6	2	2	12
169	A60205220167	Ms KHUSHI GUPTA	100	30	70	A	9	2	2	18
170	A60205220186	Ms AYUSHI BAIJAL	100	30	70	A-	8	2	2	16
171	A60205220176	Mr DEVANSH PARASHAR	100	30	70	B	6	2	2	12

Average Grade Point = 1256 /171 (Total Grade point/Total no of students) = 7.34
No of students getting greater than average (7.34) marks = 94 students = 54.97%

Total No. of Students	=	171
Level 2	>50% average marks and < 60% average marks	54.97%
Attainment Level		Level 2

Level 1	< 50% Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course : COMPUTER ORGANIZATION AND ARCHITECTURE
Course Code : CSE 402 Crédits : 03, Session : 2019-20 (Even Sem.), Class : B. Tech CSE 2nd Year
Faculty Name : Dr. Amrita Parashar and Dr. Kapil Sharma

Introduction: To conceptualize the basics of organizational and architectural issues of a digital computer. To analyse performance issues in processor and memory design of a digital computer. To understand various data transfer techniques in digital computer. To analyse processor performance improvement using instruction level parallelism.

A. Course Outcomes: At the end of the course, students will be able to:
CSE 402.1 Understand basic structure of computer and control unit operations.
CSE 402.2 Conceptualize instruction level parallelism.
CSE 402.3 Analyze the concept of cache mapping techniques.
CSE 402.4 Evaluate the concept of I/O organization.
CSE 402.5 Design memory organization that uses banks for different word size operations.

B. Programme Outcomes:

[PO.1]. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

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[PO.7]. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. Individual and teamwork: Function effectively as an individual, and as a member or leader indiverse teams, and in multidisciplinary settings

[PO.10]. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leaderin a team, to manage projects and in multidisciplinary environments

[PO.12]. Life-long learning: Recognize the need for, and have the preparation and ability to engage inindependent and life-long learning in the broadest context of technological change

C. Programme Specific Outcomes:

PSO1: Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2: Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO3: Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

D. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Quiz		

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	Seminar/Viva-Voce/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

E. Syllabus

Module I: Overview of Computer Architecture & Organization:

Introduction of Computer Organization and Architecture. Basic organization of computer and block level description of the functional units. Performance measure of Computer Architecture. Introduction to buses and connecting I/O devices to CPU and Memory, bus structure.

Module II: CPU and Register Transfer Operations

Instruction Codes, Computer Registers, Computer Instructions, Register Transfer Language, Timing and Control, Instruction Cycle, Memory, Input-Output and Interrupt Reference Instructions, Signed multiplication, Booth's algorithm. Division of integers: Restoring and non-restoring division Floating point arithmetic: Addition, subtraction.

Module III: Processor Organization and Architecture:

Introduction to CPU Architecture, General Register Organization, Stack Organization, Instruction representation, Instruction Formats, Instruction type, Control Unit: Soft wired (Micro-programmed) and hardwired control unit design methods. Microinstruction sequencing and execution. Micro operations. Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer RISC and CISC. Design of Accumulator Logic. Hardwired and Microprogrammed control: Control Memory, Address Sequencing, Design of Control Unit.

Module IV: Memory Organization:

Memory hierarchy and characteristics. Cache memory: Concept, architecture (L1, L2, L3), mapping techniques. Cache Coherency, Interleaved and Associative Memory. Virtual Memory, Concept, Segmentation and Paging, Page replacement policies.

Module V: I/O Organization and Peripherals:

Input/output systems, I/O modules and IO processor. Pipeline processing, Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Types of data transfer techniques: Programmed I/O, Interrupt driven I/O and DMA. Introduction to parallel processing systems.

F. Examination Scheme:

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Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

G. Suggested Text/Reference Books:

- Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer Organization", Fifth Edition, Tata McGraw-Hill.
- John P. Hayes, "Computer Architecture and Organization", Third Edition.
- William Stallings, "Computer Organization and Architecture: Designing for Performance", Eighth Edition, Pearson.
- B. Govindarajulu, "Computer Architecture and Organization: Design Principles and Applications", Second Edition, Tata McGraw-Hill.

Reference:

- WIliam Stallings, Computer Organization and Architecture, 4th Edition-2000, Prentice-Hall of India Private Limited.
- M.J Flynn, "Computer Architecture, Pipelined and Parallel Processor Design", Narosa Publishing, 1998.
- Hwang and Briggs, "Computer Architecture and Parallel Processing"; MGH, 2000.
- Kai Hwang & Faye a Briggs, McGrew Hill, inc., Computer Architecture & Parallel Processing. John D. Carpinelli, Computer system Organization & Architecture, Edition 2001, Addison Wesley, Delhi John P Hayes, McGraw-Hill Inc, Computer Architecture and Organization.
- M. Morris Mano and Charles, Logic and Computer Design Fundamentals, 2nd Edition Updated, Pearson Education, ASIA.
- Hamacher, "Computer Organization," McGraw hill.
- Tennenbaum," Structured Computer Organization," PHI
- B. Ram, "Computer Fundamentals architecture and organization," New age international Gear C. W., "Computer Organization and Programming, McGraw hill.

H. Lecture Plan

Lectu r e	Topics	Mo de of Del i very	Corr e spon d ing CO	Mode of Assessin g CO
1	Introduction of Computer Organization and Architecture.	Lect ure	CSE40 2.1	Mid Term-1 & End Sem Exam
2	Basic organization of computer	Lect ure	CSE40 2.1	Mid Term-1 & End Sem Exam

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3	Block level description of the functional units	Lecture	CSE402.1	Mid Term-1 & End Sem Exam
4	Performance measure of Computer Architecture	Lecture	CSE402.1	Mid Term-1 & End Sem Exam
5	Introduction to buses and connecting I/O devices to CPU	Lecture	CSE402.1	Mid Term-1 & End Sem Exam
6	Memory, bus structure.	Lecture	CSE402.1	Mid Term-1 & End Sem Exam
7	Instruction Codes, Computer Registers, Computer Instructions,	Lecture	CSE402.2	Mid Term-1 & End Sem Exam
8	Register Transfer Language, Timing and Control,	Lecture	CSE402.2	Mid Term-1 & End Sem Exam
9	Instruction Cycle, Memory, Input-Output and Interrupt Reference Instructions	Lecture	CSE402.2	Mid Term-1 & End Sem Exam
10	Signed multiplication, Booth's algorithm.	Lecture	CSE402.2	Mid Term-1 & End Sem Exam
11	Division of integers: Restoring and non-restoring division	Lecture	CSE402.2	Mid Term-1 & End Sem Exam
12	Floating point arithmetic: Addition, subtraction.	Lecture	CSE402.2	Mid Term-1 & End Sem Exam
13	Introduction to CPU Architecture, General Register Organization	Lecture	CSE402.3	Mid Term-1 & End Sem Exam
14	Stack Organization, Instruction representation	Lecture	CSE402.3	Mid Term-1 & End Sem Exam
15	Instruction Formats, Instruction type	Lecture	CSE402.3	Mid Term-1 & End Sem Exam
16	Control Unit: Soft wired (Micro-programmed) and hardwired control unit design methods.	Lecture	CSE402.3	Mid Term-1 & End Sem Exam

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17	Microinstruction sequencing and execution. Micro operations. Addressing Modes, Data	Lecture	CSE402.3	Mid Term-1 & End Sem Exam
	Transfer and Manipulation			
18	Program Control, Reduced Instruction Set Computer RISC and CISC. Design of Accumulator Logic.	Lecture	CSE402.3	Mid Term-1 & End Sem Exam
19	Hardwired and Microprogrammed control: Control Memory	Lecture	CSE402.3	Mid Term-1 & End Sem Exam
20	Hardwired and Microprogrammed control: Control Memory	Lecture	CSE402.3	Mid Term-1 & End Sem Exam
21	Address Sequencing, Design of Control Unit.	Lecture	CSE402.3	Mid Term-1 & End Sem Exam
22	Memory hierarchy and characteristics.	Lecture	CSE402.4	Mid Term-1 & End Sem Exam
23	Cache memory: Concept, architecture (L1, L2, L3),	Lecture	CSE402.4	Mid Term-1 & End Sem Exam
24	mapping techniques. Cache Coherency, Interleaved and Associative Memory	Lecture	CSE402.4	Mid Term-1 & End Sem Exam
25	Virtual Memory, Concept, Segmentation and Paging	Lecture	CSE402.4	Mid Term-1 & End Sem Exam
26	Virtual Memory, Concept, Segmentation and Paging	Lecture	CSE402.4	Mid Term-1 & End Sem Exam
27	Page replacement policies	Lecture	CSE402.4	Mid Term-1 & End Sem Exam
28	Page replacement policies	Lecture	CSE402.4	Mid Term-1 & End Sem Exam

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29	Input/output systems, I/O modules and IO processor.	Lecture	CSE402.5	Mid Term-1 & End Sem Exam
30	Pipeline processing, Parallel Processing,	Lecture	CSE402.5	Quiz & End Sem Exam
31	Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline	Lecture	CSE402.5	Quiz & End Sem Exam
32	Types of data transfer techniques: Programmed I/O	Lecture	CSE402.5	Quiz & End Sem Exam
33	Types of data transfer techniques: Programmed I/O	Lecture	CSE402.5	Quiz & End Sem Exam
34	Introduction to parallel processing systems.	Lecture	CSE402.5	Quiz & End Sem Exam
35	Introduction to parallel processing systems.	Lecture	CSE402.5	Quiz & End Sem Exam
36	Interrupt driven I/O and DMA.	Lecture	CSE402.5	Quiz & End Sem Exam

I. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE402.1	Understand basic structure of computer and control unit operations.													1	3	
CSE402.2	Conceptualize instruction level parallelism.	1	1	3	1	2										

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CSE402.3	Analyze the concept of cache mapping techniques.	1	1	3	1	2										
CSE402.4	Evaluate the concept of I/O organization.	1	1	3	1	2										
CSE402.5	Design memory organization that uses banks for different word size operations.	1	1	2	1	2										

ESE Marks - CSE 402

Enrollment.No.	Student's Name	CSE402 COMPUTER ORGANIZATION AND ARCHITECTURE							
		Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U8G8
A60205219009	Mr CHURCHIL YASH RAJPAL	100	30	70	B-	5	3	3	15
A60205219019	Mr RICKY SHIVDASANI	100	30	70	A-	8	3	3	24
A60205219029	Ms ROSHNI JANARDHANAN	100	30	70	A+	10	3	3	30
A60205219039	Mr ASHISH VERMA	100	30	70	B-	5	3	3	15
A60205219050	Mr NAMISH ARORA	100	30	70	B-	5	3	3	15
A60205219058	Mr APOORVA KRISHANA	100	30	70	A-	8	3	3	24
A60205219066	Ms VAISHNAVI SINGH	100	30	70	A	9	3	3	27
A60205219010	Ms AAYUSHI CHAUHAN	100	30	70	B+	7	3	3	21
A60205219020	Mr RITESH KUMAR	100	30	70	A-	8	3	3	24
A60205219030	Mr PARAS BHARDWAJ	100	30	70	B	6	3	3	18
A60205219040	Mr ADARSH RAI	100	30	70	A-	8	3	3	24
A60205219051	Mr ABHISHEKH KUMAR DAS	100	30	70	B+	7	3	3	21
A60205219059	Mr PRADUMN PRAKASH DUBEY	100	30	70	A-	8	3	3	24
A60205219067	Mr VIPIN SHARMA	100	30	70	A-	8	3	3	24
A60205219008	Ms KAJAL MISHRA	100	30	70	A+	10	3	3	30
A60205219018	Mr AMITABH DEVNATH	100	30	70	B	6	3	3	18
A60205219028	Mr AYUSH JAIN	100	30	70	A+	10	3	3	30
A60205219037	Mr MANOJ KUSHWAH	100	30	70	A-	8	3	3	24
A60205219049	Mr SHASHANK KUMAR	100	30	70	A-	8	3	3	24
A60205219057	Mr RAGHAV SINGHAL	100	30	70	A-	8	3	3	24
A60205219065	Ms NIKITA SINGH	100	30	70	A-	8	3	3	24
A60205219002	Mr SUSHMIT SATISH	100	30	70	A-	8	3	3	24

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A60205219012	Mr RITIK CHANDEL	100	30	70	B	6	3	3	18
A60205219022	Mr MADHAV DUBEY	100	30	70	B+	7	3	3	21
A60205219032	Ms AKSHITA SHARMA	100	30	70	B	6	3	3	18
A60205219042	Mr ANIRUDH KHANDELWAL	100	30	70	B	6	3	3	18
A60205219053	Mr ADITYA SAXENA	100	30	70	B	6	3	3	18
A60205219061	Mr LAUKIT MANDAL	100	30	70	B+	7	3	3	21
A60205219005	Mr PRASHANT AGRAWAL	100	30	70	A	9	3	3	27
A60205219016	Ms TANISHKA SAXENA	100	30	70	B	6	3	3	18
A60205219024	Mr SARTHAK JAIN	100	30	70	A-	8	3	3	24
A60205219034	Mr AMAN KHAN GAURI	100	30	70	A-	8	3	3	24
A60205219046	Mr TUSHAR SHARMA	100	30	70	A	9	3	3	27
A60205219055	Mr YASH JAIN	100	30	70	B+	7	3	3	21
A60205219063	Mr RAHUL SHARMA	100	30	70	B+	7	3	3	21
A60205219007	Mr JAYANT KUMAR	100	30	70	A-	8	3	3	24
A60205219017	Mr SHUBHKANT DWIVEDI	100	30	70	A-	8	3	3	24
A60205219027	Mr AKSHIT DAHIYA	100	30	70	B+	7	3	3	21
A60205219036	Mr SAHIL TOMAR	100	30	70	A	9	3	3	27
A60205219048	Mr SHUBHAM DHAKAD	100	30	70	A-	8	3	3	24
A60205219056	Ms NISHA KUMARI	100	30	70	A+	10	3	3	30
A60205219064	Mr ANSHUL SINGH	100	30	70	B+	7	3	3	21
A60205219004	Ms GARIMA SRIVASTAVA	100	30	70	A+	10	3	3	30
A60205219013	Ms KHUSHI PURWAR	100	30	70	A+	10	3	3	30
A60205219023	Mr DHEERAJ SHARMA	100	30	70	B-	5	3	3	15
A60205219033	Mr ADITYA KUMAR KUSHWAH	100	30	70	B	6	3	3	18
A60205219043	Ms PRANJALI AGRAWAL	100	30	70	A+	10	3	3	30
A60205219054	Ms PRIYAL BANSAL	100	30	70	B+	7	3	3	21
A60205219062	Ms AYUSHI RAI	100	30	70	A	9	3	3	27
A60205219001	Mr ASEEM VIKRAM	100	30	70	A-	8	3	3	24
A60205219011	Ms RAINA GUPTA	100	30	70	A-	8	3	3	24
A60205219021	Ms FARHAT AKHTAR	100	30	70	B+	7	3	3	21
A60205219031	Ms MANPREET KAUR	100	30	70	A	9	3	3	27
A60205219041	Mr ANUJ TIWARI	100	30	70	A-	8	3	3	24
A60205219052	Mr AJEET SIKARWAR	100	30	70	A-	8	3	3	24
A60205219060	Mr MOHAK AGRAWAL	100	30	70	B+	7	3	3	21
A60205219074	Mr KUNAL SAXENA	100	30	70	B-	5	3	3	15
A60205219082	Mr MOHIT BHARDWAJ	100	30	70	B	6	3	3	18
A60205219091	Mr VIDIT NIGAM	100	30	70	B	6	3	3	18
A60205219099	Mr ANIL GAUD	100	30	70	A-	8	3	3	24
A60205219107	Ms DARSHIKA SHARMA	100	30	70	A-	8	3	3	24
A60205219118	Mr GYANDEEP SINGH	100	30	70	B	6	3	3	18
A60205219128	Ms SMRITI BAM	100	30	70	A-	8	3	3	24

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A60205219073	Mr RONAK PRAJAPATI	100	30	70	A+	10	3	3	30
A60205219081	Mr PALASH MUKHERJEE	100	30	70	B+	7	3	3	21
A60205219090	Ms SNEHA	100	30	70	A	9	3	3	27
A60205219098	Mr ASHAY SHRIVASTAV	100	30	70	A-	8	3	3	24
A60205219106	Mr RISHI RAJPUT	100	30	70	B	6	3	3	18
A60205219117	Mr PARTH PORWAL	100	30	70	B+	7	3	3	21
A60205219127	Ms NEHA KUSHWAH	100	30	70	A-	8	3	3	24
A60205219075	Mr KSHITIJ AGRAWAL	100	30	70	B+	7	3	3	21
A60205219083	Mr HARSHIT SINGH	100	30	70	A-	8	3	3	24
A60205219092	Ms KASHISH TOMAR	100	30	70	B	6	3	3	18
A60205219100	Ms SEJAL J TIRKEY	100	30	70	A-	8	3	3	24
A60205219108	Mr HARSH TIWARI	100	30	70	A	9	3	3	27
A60205219119	Mr SHIVAM MUDGAL	100	30	70	B	6	3	3	18
A60205219129	Mr SHARAD PRATAP SONI	100	30	70	A-	8	3	3	24
A60205219069	Mr NEELMANI SHUKLA	100	30	70	A-	8	3	3	24
A60205219077	Mr LOHAN P NAIDU	100	30	70	B	6	3	3	18
A60205219086	Mr YASH TRIPATHI	100	30	70	B-	5	3	3	15
A60205219094	Mr VIKAS NARWARIYA	100	30	70	A-	8	3	3	24
A60205219102	Ms GARVITA BHADAURIA	100	30	70	B-	5	3	3	15
A60205219113	Ms POOJA GUPTA	100	30	70	A-	8	3	3	24
A60205219121	Ms PRIYA DUBEY	100	30	70	B+	7	3	3	21
A60505218008	Mr ABHIJEET SINGH BHADORIYA	100	30	70	B-	5	3	3	15
A60205219072	Mr NIKHIL GUPTA	100	30	70	B	6	3	3	18
A60205219080	Mr ANURAG SINGH TOMAR	100	30	70	B	6	3	3	18
A60205219089	Mr DEEPAK PANDEY	100	30	70	A-	8	3	3	24
A60205219097	Mr MANAV JADIA	100	30	70	B-	5	3	3	15
A60205219105	Mr YASH SHARMA	100	30	70	B+	7	3	3	21
A60205219116	Mr AFRAN USMANI	100	30	70	A-	8	3	3	24
A60205219124	Mr GURAASHISH SINGH	100	30	70	A-	8	3	3	24
A60205219071	Mr JAYRAM KARAN	100	30	70	B+	7	3	3	21
A60205219079	Mr RISHABH BANSAL	100	30	70	A-	8	3	3	24
A60205219088	Mr AAYUSH TIWARI	100	30	70	B	6	3	3	18
A60205219096	Mr RUJMAN KHAN	100	30	70	B-	5	3	3	15
A60205219104	Ms ASHITA KARKARE	100	30	70	B	6	3	3	18
A60205219115	Mr SANIDHYA DAVE	100	30	70	A	9	3	3	27
A60205219123	Mr AMIT RAJOURIYA	100	30	70	B	6	3	3	18
A60205219068	Mr MANASAV JAIN	100	30	70	B-	5	3	3	15
A60205219076	Mr SUNNY CHAUDHARY	100	30	70	B-	5	3	3	15
A60205219085	Mr MAYANK SOLANKI	100	30	70	B+	7	3	3	21
A60205219093	Mr ASHISH YADAV	100	30	70	B	6	3	3	18
A60205219101	Mr ADITYA SINGH DHAKRE	100	30	70	A-	8	3	3	24

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A60205219109	Mr SUMIT BANPURIA	100	30	70	B+	7	3	3	21
A60205219120	Mr ASHISH RAJA NAGABATHULA	100	30	70	A-	8	3	3	24
A60205219070	Ms DEVANSHI JADIYA	100	30	70	A-	8	3	3	24
A60205219078	Mr UMANG PRASAD	100	30	70	B	6	3	3	18
A60205219087	Mr ARYAN SHARMA	100	30	70	A-	8	3	3	24
A60205219095	Mr HIMANSHU BHADORIA	100	30	70	B	6	3	3	18
A60205219103	Mr KAMAL NAYAN	100	30	70	B+	7	3	3	21
A60205219114	Ms ANJALI KANKORIYA	100	30	70	B	6	3	3	18
A60205219122	Mr VINAYAK SHARMA	100	30	70	A-	8	3	3	24
A60205219130	Mr AMIT SINGH	100	30	70	A-	8	3	3	24

Average Grade Point = 833/114 (Total Grade point/Total no of students) = 7.30 No of students getting greater than average(7.30) marks = 58 students = 50.8%

Total No. of Students		114
Level 2	>50% average marks and < 60% average marks	50%
Attainment Level		Level 2

Note: Attainment Level

Level 1	50% average marks and
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average mark

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AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course: DESIGN AND ANALYSIS OF ALGORITHMS
Course Code: CSE 303, Crédits : 04, Session: 2019-20 (Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name: Dr. Samta Jain Goyal

A. **Introduction:** The objective of this course is to develop Ability to write programs in java to solve problems using algorithm design techniques such as Divide and Conquer, Greedy, Dynamic programming, and Backtracking.

B. **Course Outcomes:** At the end of the course, students will be able to:

CSE303.1. Analyze the asymptotic performance of algorithms.

CSE303.2. Understand rigorous correctness proofs for algorithms.

CSE303.3. Evaluate a familiarity with major algorithms and data structures.

CSE303.4. Apply important algorithmic design paradigms and methods of analysis.

CSE305.5. Understand efficient algorithms in common engineering design situations.

C. **Program Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

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PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Program Specific Outcomes:

PSO1. Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO3. Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur and a zest for higher studies.

E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q /HA	10%

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Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves Including medical leaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F.

F. Syllabus

Module I: Introduction: Algorithm Design paradigms - Motivation, Concept of algorithmic efficiency, Run Time Analysis of algorithms, Asymptotic Notations. Recurrences- Substitution Method, Recursion Tree Method, Masters Method.

Module II: Divide and conquer: Structure of divide-and-conquer algorithms: examples; Binary search, quick sort, Merge sort, Strassen Multiplication; Analysis of divide and conquer run time recurrence relations. Greedy Method Overview of the greedy paradigm examples of exact optimization solution (minimum cost spanning tree), Approximate solution (Knapsack problem), Single source shortest paths, traveling salesman

Module III: Dynamic programming: Overview, difference between dynamic programming and divide and conquer, Applications: Shortest path in graph, chain Matrix multiplication, Traveling salesman Problem, longest Common sequence, knapsack problem

Module IV: Graph searching and Traversal: Overview, Representation of graphs, strongly connected components, Traversal methods (depth first and breadth first search) Back tracking Overview, 8-queen problem, and Knapsack problem Brach and bound LC searching Bounding, FIFO branch and bound, LC branch and bound application: 0/1 Knapsack problem, Traveling Salesman Problem

Module V: Computational Complexity: Complexity measures, Polynomial Vs non-polynomial time complexity; NP-hard and NP-complete classes, examples.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

H.

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

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H. Text and References:

Text:

E. Horowitz, S. Sahni, and S. Rajsekaran, "Funadmentals of Computer Algorithms", Galgotia Publication.

T. H. Cormen, Leiserson, Rivest and Stein, "Introduction of Computer algorithm", PHI.

References:

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Sara Basse, A. V. Gelder, “Computer Algorithms”, Addison-Wesley.

J.E Hopcroft, J.D Ullman, “Design and analysis of algorithms”, Addison-Wesley.

D. E. Knuth , “The art of Computer Program”, Addison-Wesley.

I. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Corresponding CO**	**Mode of Assessing CO**
1	Algorithm Design paradigms - Motivation,	Lecture	CSE303.1	Mid Term-1& End Sem Exam
2	Concept of algorithmic efficiency,	Lecture	CSE303.1	Mid Term-1 & End Sem Exam
3	Run Time Analysis of algorithms,	Lecture	CSE303.1	Mid Term-1 & End Sem Exam
4	Asymptotic Notations..	Lecture	CSE303.1	Mid Term-1 &End Sem Exam
5	Recurrences-Substitution Method,	Lecture	CSE303.1	Mid Term-1 & End Sem Exam

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6	Recursion Tree Method,	Lecture	CSE303.1	Mid Term-1 & End Sem Exam
7	Masters Method	Lecture	CSE303.1	Mid Term-1 & End Sem Exam
8	Structure of divide-and-conquer algorithms:	Lecture	CSE303.1	Mid Term-1& End Sem Exam
9	examples; Binary search	Lecture	CSE303.1	Mid Term-1 & End Sem Exam
10	quick sort, Merge sort,	Lecture	CSE303.1	Mid Term-1 & End Sem Exam
11	Strassen Multiplication;	Lecture	CSE303.1	Mid Term-1& End Sem Exam
12	Analysis of divide and conquer	Lecture	CSE303.1	Mid Term-1& End Sem Exam

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13	run time recurrence relations.	Lectu re	CSE303.1	Mid Term-1 & End Sem Exam
14	Greedy Method Overview of the greedy paradigm examples of exact optimization solution	Lectu re	CSE303.1	Mid Term-1 & End Sem Exam
15	(minimum cost spanning tree),	Lectu re	CSE303.1	Mid Term-1 & End Sem Exam
16	Approximate solution	Lectu re	CSE303.1	Mid Term-1& End Sem Exam
17	(Knapsack problem),	Lectu re	CSE303.2	Mid Term-1 & End Sem Exam
18	Single source shortest paths,	Lectu re	CSE303.2	Mid Term-1 & End Sem Exam
19	traveling salesman	Lectu re	CSE303.2	Mid Term-1 & End Sem Exam

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20	Overview, difference between dynamic programming	Lecture	CSE303.2	Mid Term-1 & End Sem Exam
21	and divide and conquer, Applications:	Lecture	CSE303.2	Mid Term-1& End Sem Exam
22	Shortest path in graph,	Lecture	CSE303.2	Mid Term-1& End Sem Exam
23	chain Matrix multiplication,	Lecture	CSE303.2	Mid Term-1& End Sem Exam
24	Traveling salesman Problem	Lecture	CSE303.2	Mid Term-1& End Sem Exam
25	longest Common sequence	Lecture	CSE303.3	Quiz & End Sem Exam
26	, knapsack problem	Lecture	CSE303.3	Quiz & End Sem Exam
27	Graph searching	Lecture	CSE303.3	Quiz & End Sem Exam

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28	Traversal Overview,	Lectu re	CSE303.3	Quiz & End Sem Exam
29	Representation of graphs,	Lectu re	CSE303.3	Quiz & End Sem Exam
30	strongly connected components,	Lectu re	CSE303.3	Quiz & End Sem Exam
31	Traversal methods (depth first and breadth first search)	Lectu re	CSE303.4	Quiz & End Sem Exam
32	Back tracking Overview,	Lectu re	CSE303.4	Quiz & End Sem Exam
33	8-queen problem,	Lectu re	CSE303.4	Quiz & End Sem Exam
34	and Knapsack problem Brach and bound LC searching Bounding, FIFO branch and bound, LC branch and bound application: 0/1 Knapsack problem, Traveling Salesman Problem	Lectu re	CSE303.5	Quiz & End Sem Exam
35	Computational Complexity: Complexity measures, Polynomial Vs non-polynomial time complexity;	Lectu re	CSE303.5	Quiz & End Sem Exam

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36	NP-hard and NP-complete classes, examples.	Lecture	CSE303.5	Quiz & End Sem Exam

J.

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

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CSE303.1	Analyze the asymptotic performance of algorithms.	3	2											1		

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CSE303.2	Understand rigorous correctness proofs for algorithms.															
CSE303.3	Evaluate a familiarity with major algorithms and data structures.	3	2	1	1									1		
CSE303.4	Apply important algorithmic design paradigms and methods of analysis.	3												1		

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CSE305.5	Understand efficient algorithms in common engineering design situations.																

ESE Marks - CSE 303

			CSE303								
			DESIGN AND ANALYSIS OF ALGORITHMS								
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U19G19
1	A60205219009	Mr CHURCHIL YASH RAJPAL	100	30	70	A-	8	4	4	
2	A60205219019	Mr RICKY SHIVDASANI	100	30	70	A-	8	4	4	
3	A60205219029	Ms ROSHNI JANARDHANAN	100	30	70	A-	8	4	4	
4	A60205219039	Mr ASHISH VERMA	100	30	70	B	6	4	4	

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5	A60205219050	Mr NAMISH ARORA	100	30	70	B-	5	4	4
6	A60205219004	Ms GARIMA SRIVASTAVA	100	30	70	A+	10	4	4
7	A60205219013	Ms KHUSHI PURWAR	100	30	70	A+	10	4	4
8	A60205219023	Mr DHEERAJ SHARMA	100	30	70	B-	5	4	4
9	A60205219033	Mr ADITYA KUMAR KUSHWAH	100	30	70	B	6	4	4
10	A60205219043	Ms PRANJALI AGRAWAL	100	30	70	A+	10	4	4
11	A60205219002	Mr SUSHMIT SATISH	100	30	70	A-	8	4	4
12	A60205219012	Mr RITIK CHANDEL	100	30	70	B+	7	4	4
13	A60205219022	Mr MADHAV DUBEY	100	30	70	A-	8	4	4
14	A60205219032	Ms AKSHITA SHARMA	100	30	70	B	6	4	4
15	A60205219042	Mr ANIRUDH KHANDELWAL	100	30	70	A	9	4	4
16	A60205219001	Mr ASEEM VIKRAM	100	30	70	A	9	4	4
17	A60205219011	Ms RAINA GUPTA	100	30	70	A-	8	4	4
18	A60205219021	Ms FARHAT AKHTAR	100	30	70	A-	8	4	4
19	A60205219031	Ms MANPREET KAUR	100	30	70	B+	7	4	4
20	A60205219041	Mr ANUJ TIWARI	100	30	70	B+	7	4	4
21	A60205219008	Ms KAJAL MISHRA	100	30	70	A-	8	4	4
22	A60205219018	Mr AMITABH DEVNATH	100	30	70	A-	8	4	4
23	A60205219028	Mr AYUSH JAIN	100	30	70	A	9	4	4
24	A60205219037	Mr MANOJ KUSHWAH	100	30	70	A-	8	4	4
25	A60205219049	Mr SHASHANK KUMAR	100	30	70	A	9	4	4
26	A60205219007	Mr JAYANT KUMAR	100	30	70	B+	7	4	4
27	A60205219017	Mr SHUBHKANT DWIVEDI	100	30	70	A-	8	4	4
28	A60205219027	Mr AKSHIT DAHIYA	100	30	70	A-	8	4	4
29	A60205219036	Mr SAHIL TOMAR	100	30	70	A-	8	4	4
30	A60205219048	Mr SHUBHAM DHAKAD	100	30	70	A	9	4	4
31	A60205219005	Mr PRASHANT AGRAWAL	100	30	70	A+	10	4	4
32	A60205219016	Ms TANISHKA SAXENA	100	30	70	A-	8	4	4
33	A60205219024	Mr SARTHAK JAIN	100	30	70	B+	7	4	4
34	A60205219034	Mr AMAN KHAN GAURI	100	30	70	B+	7	4	4
35	A60205219046	Mr TUSHAR SHARMA	100	30	70	B+	7	4	4
36	A60205219010	Ms AAYUSHI CHAUHAN	100	30	70	A+	10	4	4
37	A60205219020	Mr RITESH KUMAR	100	30	70	A-	8	4	4
38	A60205219030	Mr PARAS BHARDWAJ	100	30	70	A-	8	4	4

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39	A60205219040	Mr ADARSH RAI	100	30	70	A+	10	4	4
40	A60205219051	Mr ABHISHEKH KUMAR DAS	100	30	70	A-	8	4	4
41	A60205219058	Mr APOORVA KRISHANA	100	30	70	B	6	4	4
42	A60205219066	Ms VAISHNAVI SINGH	100	30	70	B+	7	4	4
43	A60205219074	Mr KUNAL SAXENA	100	30	70	B-	5	4	4
44	A60205219082	Mr MOHIT BHARDWAJ	100	30	70	B+	7	4	4
45	A60205219091	Mr VIDIT NIGAM	100	30	70	A-	8	4	4
46	A60205219054	Ms PRIYAL BANSAL	100	30	70	B+	7	4	4
47	A60205219062	Ms AYUSHI RAI	100	30	70	A	9	4	4
48	A60205219070	Ms DEVANSHI JADIYA	100	30	70	A-	8	4	4
49	A60205219078	Mr UMANG PRASAD	100	30	70	A-	8	4	4
50	A60205219087	Mr ARYAN SHARMA	100	30	70	B+	7	4	4
51	A60205219053	Mr ADITYA SAXENA	100	30	70	B	6	4	4
52	A60205219061	Mr LAUKIT MANDAL	100	30	70	B-	5	4	4
53	A60205219069	Mr NEELMANI SHUKLA	100	30	70	B+	7	4	4
54	A60205219077	Mr LOHAN P NAIDU	100	30	70	B	6	4	4
55	A60205219086	Mr YASH TRIPATHI	100	30	70	A-	8	4	4
56	A60205219052	Mr AJEET SIKARWAR	100	30	70	A-	8	4	4
57	A60205219060	Mr MOHAK AGRAWAL	100	30	70	B+	7	4	4
58	A60205219068	Mr MANASAV JAIN	100	30	70	B-	5	4	4
59	A60205219076	Mr SUNNY CHAUDHARY	100	30	70	B	6	4	4
60	A60205219085	Mr MAYANK SOLANKI	100	30	70	B	6	4	4
61	A60205219056	Ms NISHA KUMARI	100	30	70	A	9	4	4
62	A60205219064	Mr ANSHUL SINGH	100	30	70	B	6	4	4
63	A60205219072	Mr NIKHIL GUPTA	100	30	70	A-	8	4	4
64	A60205219080	Mr ANURAG SINGH TOMAR	100	30	70	A	9	4	4
65	A60205219089	Mr DEEPAK PANDEY	100	30	70	B	6	4	4
66	A60205219057	Mr RAGHAV SINGHAL	100	30	70	A-	8	4	4
67	A60205219065	Ms NIKITA SINGH	100	30	70	B+	7	4	4
68	A60205219073	Mr RONAK PRAJAPATI	100	30	70	A-	8	4	4
69	A60205219081	Mr PALASH MUKHERJEE	100	30	70	B+	7	4	4
70	A60205219090	Ms SNEHA	100	30	70	B	6	4	4
71	A60205219055	Mr YASH JAIN	100	30	70	A-	8	4	4
72	A60205219063	Mr RAHUL SHARMA	100	30	70	B+	7	4	4

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73	A60205219071	Mr JAYRAM KARAN	100	30	70	B	6	4	4
74	A60205219079	Mr RISHABH BANSAL	100	30	70	B+	7	4	4
75	A60205219088	Mr AAYUSH TIWARI	100	30	70	A-	8	4	4
76	A60205219059	Mr PRADUMN PRAKASH DUBEY	100	30	70	A	9	4	4
77	A60205219067	Mr VIPIN SHARMA	100	30	70	A-	8	4	4
78	A60205219075	Mr KSHITIJ AGRAWAL	100	30	70	A	9	4	4
79	A60205219083	Mr HARSHIT SINGH	100	30	70	A-	8	4	4
80	A60205219092	Ms KASHISH TOMAR	100	30	70	B-	5	4	4
81	A60205219099	Mr ANIL GAUD	100	30	70	A-	8	4	4
82	A60205219107	Ms DARSHIKA SHARMA	100	30	70	B+	7	4	4
83	A60205219118	Mr GYANDEEP SINGH	100	30	70	B	6	4	4
84	A60205219128	Ms SMRITI BAM	100	30	70	B+	7	4	4
85	A60205219095	Mr HIMANSHU BHADORIA	100	30	70	A-	8	4	4
86	A60205219103	Mr KAMAL NAYAN	100	30	70	A-	8	4	4
87	A60205219114	Ms ANJALI KANKORIYA	100	30	70	A-	8	4	4
88	A60205219122	Mr VINAYAK SHARMA	100	30	70	B+	7	4	4
89	A60205219098	Mr ASHAY SHRIVASTAV	100	30	70	B+	7	4	4
90	A60205219106	Mr RISHI RAJPUT	100	30	70	A	9	4	4
91	A60205219117	Mr PARTH PORWAL	100	30	70	A-	8	4	4
92	A60205219127	Ms NEHA KUSHWAH	100	30	70	B	6	4	4
93	A60205219097	Mr MANAV JADIA	100	30	70	B	6	4	4
94	A60205219105	Mr YASH SHARMA	100	30	70	B	6	4	4
95	A60205219116	Mr AFRAN USMANI	100	30	70	A+	10	4	4
96	A60205219124	Mr GURAASHISH SINGH	100	30	70	A	9	4	4
97	A60205219093	Mr ASHISH YADAV	100	30	70	A-	8	4	4
98	A60205219101	Mr ADITYA SINGH DHAKRE	100	30	70	B	6	4	4
99	A60205219109	Mr SUMIT BANPURIA	100	30	70	B+	7	4	4
100	A60205219120	Mr ASHISH RAJA NAGABATHULA	100	30	70	B-	5	4	4
101	A60205219130	Mr AMIT SINGH	100	30	70	A	9	4	4
102	A60205219096	Mr RUJMAN KHAN	100	30	70	B-	5	4	4
103	A60205219104	Ms ASHITA KARKARE	100	30	70	A-	8	4	4
104	A60205219115	Mr SANIDHYA DAVE	100	30	70	B+	7	4	4
105	A60205219123	Mr AMIT RAJOURIYA	100	30	70	B+	7	4	4
106	A60205219094	Mr VIKAS NARWARIYA	100	30	70	B	6	4	4

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Maj.Gen. (Dr.) S.C Jain

Director-ASET
Amity University Madhya Pradesh Gwalior

107	A60205219102	Ms GARVITA BHADAURIA	100	30	70	B	6	4	4
108	A60205219113	Ms POOJA GUPTA	100	30	70	A-	8	4	4
109	A60205219121	Ms PRIYA DUBEY	100	30	70	B+	7	4	4
110	A60505218008	Mr ABHIJEET SINGH BHADORIYA	100	30	70	B	6	4	4
111	A60205219100	Ms SEJAL J TIRKEY	100	30	70	A-	8	4	4
112	A60205219108	Mr HARSH TIWARI	100	30	70	B	6	4	4
113	A60205219119	Mr SHIVAM MUDGAL	100	30	70	B	6	4	4
114	A60205219129	Mr SHARAD PRATAP SONI	100	30	70	A-	8	4	4
							846		

Average Grade Point = 846/114 (Total Grade point/Total no of students) = 7.4
No of students getting greater than average(7.4) marks = 58 students = 50.8%

Note: Attainment Level

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Total No. of Students		**114**
Level 2	>50% average marks and < 60% average marks	**50.8%**
Attainment Level		**Level 2**

Level 1	<50% - Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course: DESIGN AND ANALYSIS OF ALGORITHMS LAB
Course Code: CSE 323, Crédits : 01, Session: 2019-20 (Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name: Dr. Samta Jain Goyal

A. **Introduction:** The objective of this course is to develop Ability to write programs in java to solve problems using algorithm design techniques such as Divide and Conquer, Greedy, Dynamic programming, and Backtracking.

B. **Course Outcomes:** At the end of the course, students will be able to:

CSE323.1. Understand Various soring algorithms.

CSE323.2. Analyze and implement different tree traversing techniques.

CSE323.3. Implement Backtracking technique to solve some problems.

CSE323.4. Implement various shortest path algorithms.

CSE323.5. Apply dynamic programming to solve problems.

C. Program Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

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PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Program Specific Outcomes:

PSO1. Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO3. Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur and a zest for higher studies.

E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term Viva	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q /HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves Including medical leaves.	A	5%

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End Semester	End Semester Examination	EE	70%
Examination			
Total			**100%**

F.

F. Syllabus

List of experiments/demonstrations

1. Write a program to implement Quick sort algorithm for sorting a list of integers in ascending order,
2. Write a program to implement Merge sort algorithm for sorting a list of integers in ascending order.
3. i) Write a program to implement the DFS algorithm for a graph.
   ii) Write a program to implement the BFS algorithm for a graph.
4. Write a program to implement backtracking algorithm for the N-queens problem.
5. Write a program to implement the backtracking algorithm for the sum of subsets problem.
6. Write a program to implement the backtracking algorithm for the Hamiltonian Circuits problem.
7. Write a program to implement greedy algorithm for job sequencing with deadlines.
8. Write a program to implement Dijkstra's algorithm for the Single source shortest path problem.
9. Write a program that implements Prim's algorithm to generate minimum cost spanning tree.
10. Write a program that implements Kruskal's algorithm to generate minimum cost spanning tree.
11. Write a program to implement Dynamic Programming algorithm for the 0/1 Knapsack.

G. Examination Scheme:

IA			EE			
A	PR	Practical Based Test	Major Experiment	Minor Experiment	LR	Viva
5	10	15	35	15	10	10

H.

Note: IA- Internal Assessment, EE- External Exam, A-Attendance, PR- Performance, LR- Lab Record, V-Viva.

H. Suggested Text/Reference Books:

- Algorithm Design, Jon Kleinberg and Eva Tardos, Pearson Education.
- Introduction to Algorithms: A Creative Approach, Udi Manber, Pearson Education.
- Data structures with C++, John R. Hubbard, Schaum's Outlines, TMH.
- Data structures and algorithms in Java, 2nd Edition, R. Lafore, Pearson Education.

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- Data Structures using C++, D S Malik, Cengage Learning.

I. Lab Plan

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Practical	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Write a program to implement Quick sort algorithm for sorting a list of integers in ascending order.	Practical	CSE323.1	Mid Term-1, Quiz & End Sem Exam
2	Write a program to implement Merge sort algorithm for sorting a list of integers in ascending order.	Practical	CSE323.1	Mid Term-1, Quiz & End Sem Exam
3	Write a program to implement the DFS algorithm for a graph. ii) Write a program to implement the BFS algorithm for a graph	Practical	CSE323.1	Mid Term-1, Quiz & End Sem Exam
4	Write a program to implement backtracking algorithm for the N-queens problem.	Practical	CSE323.1	Mid Term-1, Quiz & End Sem Exam
5	Write a program to implement the backtracking algorithm for the sum of subsets problem.	Practical	CSE323.1	Mid Term-1, Quiz & End Sem Exam

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6	Write a program to implement the backtracking algorithm for the Hamiltonian Circuits problem.	Practi cal	CSE323.2	Mid Term-1, Quiz & End Sem Exam
7	Write a program to implement greedy algorithm for job sequencing with deadlines.	Practi cal	CSE323.2	Mid Term-1, Quiz & End Sem Exam
8	Write a program to implement Dijkstra's algorithm for the Single source shortest path problem.	Practi cal	CSE323.3	Mid Term-1, Quiz & End Sem Exam
9	Write a program that implements Prim's algorithm to generate minimum cost spanning tree.	Practi cal	CSE323.3	Mid Term-1, Quiz & End Sem Exam
10	Write a program that implements Kruskal's algorithm to generate minimum cost spanning tree.	Practi cal	CSE323.4	Mid Term-1, Quiz & End Sem Exam

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11	Write a program to implement Dynamic Programming algorithm for the 0/1 Knapsack.	Practi cal	CSE323.5	Mid Term-1, Quiz & End Sem Exam

J.

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J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME-SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

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CSE323.1	Understand and implement Various sor															
	ing algorithms.															

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CSE323.2	Analyze and implement different tree trave	3	2											1		

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	rsing techniques.															
CSE323.3	Implement Backtracking technique to solve some problems.	3													1	
CSE323.4	Implement various shortest path algorithms.	3													1	

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CSE323.5	Apply dynamic programming to solve problems.	3														

ESE Result

S. No.	Enrollment.No.	Student's Name	CSE323 DESIGN AND ANALYSIS OF ALGORITHMS LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U20G20
1	A60205219009	Mr CHURCHIL YASH RAJPAL	100	30	70	B	6	1	1	6
2	A60205219019	Mr RICKY SHIVDASANI	100	30	70	B+	7	1	1	7
3	A60205219029	Ms ROSHNI JANARDHANAN	100	30	70	B+	7	1	1	7
4	A60205219039	Mr ASHISH VERMA	100	30	70	B+	7	1	1	7
5	A60205219050	Mr NAMISH ARORA	100	30	70	B+	7	1	1	7
6	A60205219004	Ms GARIMA SRIVASTAVA	100	30	70	A+	10	1	1	10
7	A60205219013	Ms KHUSHI PURWAR	100	30	70	A+	10	1	1	10
8	A60205219023	Mr DHEERAJ SHARMA	100	30	70	B+	7	1	1	7
9	A60205219033	Mr ADITYA KUMAR KUSHWAH	100	30	70	B+	7	1	1	7
10	A60205219043	Ms PRANJALI AGRAWAL	100	30	70	A+	10	1	1	10
11	A60205219002	Mr SUSHMIT SATISH	100	30	70	B+	7	1	1	7
12	A60205219012	Mr RITIK CHANDEL	100	30	70	B-	5	1	1	5
13	A60205219022	Mr MADHAV DUBEY	100	30	70	A-	8	1	1	8
14	A60205219032	Ms AKSHITA SHARMA	100	30	70	A+	10	1	1	10
15	A60205219042	Mr ANIRUDH KHANDELWAL	100	30	70	A-	8	1	1	8
16	A60205219001	Mr ASEEM VIKRAM	100	30	70	A	9	1	1	9
17	A60205219011	Ms RAINA GUPTA	100	30	70	B+	7	1	1	7
18	A60205219021	Ms FARHAT AKHTAR	100	30	70	A+	10	1	1	10
19	A60205219031	Ms MANPREET KAUR	100	30	70	B+	7	1	1	7

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20	A60205219041	Mr ANUJ TIWARI	100	30	70	A-	8	1	1	8
21	A60205219008	Ms KAJAL MISHRA	100	30	70	A+	10	1	1	10
22	A60205219018	Mr AMITABH DEVNATH	100	30	70	B+	7	1	1	7
23	A60205219028	Mr AYUSH JAIN	100	30	70	A+	10	1	1	10
24	A60205219037	Mr MANOJ KUSHWAH	100	30	70	A-	8	1	1	8
25	A60205219049	Mr SHASHANK KUMAR	100	30	70	A	9	1	1	9
26	A60205219007	Mr JAYANT KUMAR	100	30	70	B+	7	1	1	7
27	A60205219017	Mr SHUBHKANT DWIVEDI	100	30	70	A	9	1	1	9
28	A60205219027	Mr AKSHIT DAHIYA	100	30	70	B	6	1	1	6
29	A60205219036	Mr SAHIL TOMAR	100	30	70	A+	10	1	1	10
30	A60205219048	Mr SHUBHAM DHAKAD	100	30	70	A-	8	1	1	8
31	A60205219005	Mr PRASHANT AGRAWAL	100	30	70	A+	10	1	1	10
32	A60205219016	Ms TANISHKA SAXENA	100	30	70	B+	7	1	1	7
33	A60205219024	Mr SARTHAK JAIN	100	30	70	B-	5	1	1	5
34	A60205219034	Mr AMAN KHAN GAURI	100	30	70	B	6	1	1	6
35	A60205219046	Mr TUSHAR SHARMA	100	30	70	B+	7	1	1	7
36	A60205219010	Ms AAYUSHI CHAUHAN	100	30	70	A+	10	1	1	10
37	A60205219020	Mr RITESH KUMAR	100	30	70	B+	7	1	1	7
38	A60205219030	Mr PARAS BHARDWAJ	100	30	70	B+	7	1	1	7
39	A60205219040	Mr ADARSH RAI	100	30	70	A	9	1	1	9
40	A60205219051	Mr ABHISHEKH KUMAR DAS	100	30	70	B+	7	1	1	7
41	A60205219058	Mr APOORVA KRISHANA	100	30	70	A-	8	1	1	8
42	A60205219066	Ms VAISHNAVI SINGH	100	30	70	B+	7	1	1	7
43	A60205219074	Mr KUNAL SAXENA	100	30	70	B+	7	1	1	7
44	A60205219082	Mr MOHIT BHARDWAJ	100	30	70	B	6	1	1	6
45	A60205219091	Mr VIDIT NIGAM	100	30	70	B	6	1	1	6
46	A60205219054	Ms PRIYAL BANSAL	100	30	70	A	9	1	1	9
47	A60205219062	Ms AYUSHI RAI	100	30	70	A+	10	1	1	10
48	A60205219070	Ms DEVANSHI JADIYA	100	30	70	A-	8	1	1	8
49	A60205219078	Mr UMANG PRASAD	100	30	70	A-	8	1	1	8
50	A60205219087	Mr ARYAN SHARMA	100	30	70	A-	8	1	1	8
51	A60205219053	Mr ADITYA SAXENA	100	30	70	B	6	1	1	6
52	A60205219061	Mr LAUKIT MANDAL	100	30	70	B+	7	1	1	7
53	A60205219069	Mr NEELMANI SHUKLA	100	30	70	B+	7	1	1	7
54	A60205219077	Mr LOHAN P NAIDU	100	30	70	A	9	1	1	9
55	A60205219086	Mr YASH TRIPATHI	100	30	70	B+	7	1	1	7
56	A60205219052	Mr AJEET SIKARWAR	100	30	70	B+	7	1	1	7
57	A60205219060	Mr MOHAK AGRAWAL	100	30	70	B	6	1	1	6
58	A60205219068	Mr MANASAV JAIN	100	30	70	B+	7	1	1	7
59	A60205219076	Mr SUNNY CHAUDHARY	100	30	70	B	6	1	1	6
60	A60205219085	Mr MAYANK SOLANKI	100	30	70	B-	5	1	1	5

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61	A60205219056	Ms NISHA KUMARI	100	30	70	A	9	1	1	9
62	A60205219064	Mr ANSHUL SINGH	100	30	70	B-	5	1	1	5
63	A60205219072	Mr NIKHIL GUPTA	100	30	70	B+	7	1	1	7
64	A60205219080	Mr ANURAG SINGH TOMAR	100	30	70	A+	10	1	1	10
65	A60205219089	Mr DEEPAK PANDEY	100	30	70	A	9	1	1	9
66	A60205219057	Mr RAGHAV SINGHAL	100	30	70	B+	7	1	1	7
67	A60205219065	Ms NIKITA SINGH	100	30	70	B+	7	1	1	7
68	A60205219073	Mr RONAK PRAJAPATI	100	30	70	B-	5	1	1	5
69	A60205219081	Mr PALASH MUKHERJEE	100	30	70	B	6	1	1	6
70	A60205219090	Ms SNEHA	100	30	70	A-	8	1	1	8
71	A60205219055	Mr YASH JAIN	100	30	70	B+	7	1	1	7
72	A60205219063	Mr RAHUL SHARMA	100	30	70	B+	7	1	1	7
73	A60205219071	Mr JAYRAM KARAN	100	30	70	B+	7	1	1	7
74	A60205219079	Mr RISHABH BANSAL	100	30	70	B	6	1	1	6
75	A60205219088	Mr AAYUSH TIWARI	100	30	70	A-	8	1	1	8
76	A60205219059	Mr PRADUMN PRAKASH DUBEY	100	30	70	B+	7	1	1	7
77	A60205219067	Mr VIPIN SHARMA	100	30	70	B+	7	1	1	7
78	A60205219075	Mr KSHITIJ AGRAWAL	100	30	70	A+	10	1	1	10
79	A60205219083	Mr HARSHIT SINGH	100	30	70	B+	7	1	1	7
80	A60205219092	Ms KASHISH TOMAR	100	30	70	B+	7	1	1	7
81	A60205219099	Mr ANIL GAUD	100	30	70	A-	8	1	1	8
82	A60205219107	Ms DARSHIKA SHARMA	100	30	70	B+	7	1	1	7
83	A60205219118	Mr GYANDEEP SINGH	100	30	70	B+	7	1	1	7
84	A60205219128	Ms SMRITI BAM	100	30	70	B+	7	1	1	7
85	A60205219095	Mr HIMANSHU BHADORIA	100	30	70	A-	8	1	1	8
86	A60205219103	Mr KAMAL NAYAN	100	30	70	B+	7	1	1	7
87	A60205219114	Ms ANJALI KANKORIYA	100	30	70	A	9	1	1	9
88	A60205219122	Mr VINAYAK SHARMA	100	30	70	B-	5	1	1	5
89	A60205219098	Mr ASHAY SHRIVASTAV	100	30	70	B+	7	1	1	7
90	A60205219106	Mr RISHI RAJPUT	100	30	70	B	6	1	1	6
91	A60205219117	Mr PARTH PORWAL	100	30	70	B+	7	1	1	7
92	A60205219127	Ms NEHA KUSHWAH	100	30	70	B+	7	1	1	7
93	A60205219097	Mr MANAV JADIA	100	30	70	B	6	1	1	6
94	A60205219105	Mr YASH SHARMA	100	30	70	B+	7	1	1	7
95	A60205219116	Mr AFRAN USMANI	100	30	70	A+	10	1	1	10
96	A60205219124	Mr GURAASHISH SINGH	100	30	70	B+	7	1	1	7
97	A60205219093	Mr ASHISH YADAV	100	30	70	A-	8	1	1	8
98	A60205219101	Mr ADITYA SINGH DHAKRE	100	30	70	B	6	1	1	6
99	A60205219109	Mr SUMIT BANPURIA	100	30	70	B	6	1	1	6
100	A60205219120	Mr ASHISH RAJA NAGABATHULA	100	30	70	B+	7	1	1	7

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101	A60205219130	Mr AMIT SINGH	100	30	70	A	9	1	1	9
102	A60205219096	Mr RUJMAN KHAN	100	30	70	B-	5	1	1	5
103	A60205219104	Ms ASHITA KARKARE	100	30	70	A+	10	1	1	10
104	A60205219115	Mr SANIDHYA DAVE	100	30	70	A-	8	1	1	8
105	A60205219123	Mr AMIT RAJOURIYA	100	30	70	B+	7	1	1	7
106	A60205219094	Mr VIKAS NARWARIYA	100	30	70	B+	7	1	1	7
107	A60205219102	Ms GARVITA BHADAURIA	100	30	70	B-	5	1	1	5
108	A60205219113	Ms POOJA GUPTA	100	30	70	A	9	1	1	9

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Total No. of Students	=	114
Level 1	<50% average marks	36.8%
Attainment Level		Level 1

109	A60205219121	Ms PRIYA DUBEY	100	30	70	B+	7	1	1	7
110	A60505218008	Mr ABHIJEET SINGH BHADORIYA	100	30	70	B	6	1	1	6
111	A60205219100	Ms SEJAL J TIRKEY	100	30	70	A	8	1	1	8
112	A60205219108	Mr HARSH TIWARI	100	30	70	B+	7	1	1	7
113	A60205219119	Mr SHIVAM MUDGAL	100	30	70	B+	7	1	1	7
114	A60205219129	Mr SHARAD PRATAP SONI	100	30	70	B+	7	1	1	7
							850			

Average Grade Point = 850/114 (Total Grade point/Total no of students) = 7.45
No of students getting greater than average(7.4) marks = 42 students = 36.8%

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course : IOT PROGRAMMING AND BIG DATA
Course Code: CSI 401, Crédits : 03, Session: 2019-20(Even Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Shyam S. Gupta

A. Introduction*:* The Internet of Things is creating massive quantities of data and managing and analysing it requires a unique approach to programming and statistics for distributed data sources. This course will teach introductory programming concepts that allow connection to, and implementation of some functionality on, IoT devices, using the Python programming language. In addition, students will learn how to use Python to process text log files, such as those generated automatically by IoT sensors and other network-connected systems.

B. Course Outcomes: At the end of the course, students will be able to:

CSI401.1 Identify the usage of IoT in the field of Big Data.

CSI401.2 Understand the fundamental concepts of Data Analysis and Hadoop

CSI401.4 Apply and analyse the Data Analytics, Machine Learning, and Visualising.

CSI401.4 Analyse the concepts of Data at the Edge level and Cloud level.

CSI401.5 Evaluate the practical implementation of IOT in the field of big data analytics.

C. Programme Outcomes:

[PO.1]. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. Modern tool usage: Create, select, and apply appropriate techniques, resources, and

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modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

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[PO.6]. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. Individual and teamwork: Function effectively as an individual, and as a member or leader indiverse teams, and in multidisciplinary settings

[PO.10]. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

D. Programme Specific Outcomes:

PSO 1: Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO 2: Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO 3: Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance is required to	A	5%

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	be maintained by a studentto be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Introduction to I0T with Big Data:

Introduction of IoT and Big Data, Programming for IoT in Big Data, IoT data processing with big data analytics, requirements for data security, device identity, Data and the Internet of Things Concepts of Big Data & Analytics, and the role of Big Data in IoT systems, the basic of cloud computing.

Module II: Data at the Edge and Cloud:

Introduction to Data acquisition, processing small and big data, Basics of descriptive statistics, the practical aspects in acquiring data from a sensor, Data in the Cloud, Data Cleaning Process, Cloud and Fog Computing for Big Data.

Module III: Fundamentals of Data Analysis and Big Data:

Fundamentals of Data Analysis and how to create visual 20 representations of the data. Data Analysis, data visualization tool, explore data using statistics and visualization to extract information and create hypotheses, Architecture for Big Data and Data Engineering: the basic principles behind the most important scalable solutions for Big Data such as Apache Hadoop and the related ecosystem of technologies.

Module IV: Data Analytics and Machine Learning:

Advanced Data Analytics and Machine Learning, Storytelling with Data, learn about predictive analytics, the supervised and unsupervised approaches to machine learning and how to apply models to make predictions from the data. Obtaining, visualising and analysing data, IoT MicroMasters overview, Learn how to transform analytics results into a clear and convincing narrative and visual communication

Module V: Use of Machine Learning in Big Data Analytics and Data Engineering:

Data wrangling, reshaping and cleaning, Cleaning the dataset for Big Data, Visualising the data Engineering, Predicting location, IoT Programming and Big Data, Visualising Big Data, Machine Learning for handling Big Data

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- The Second Machine Age: Work, Progress and Prosperity in a Time of Brilliant Technologies by Erik

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Brynjolfsson and Andrew McAfee. ISBN-10: 0393239357

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- Getting started with Internet of Things, by Cuno Pfister, Shroff; First edition (17 May 2011), ISBN-10: 9350234130
- Big Data and The Internet of Things, by Robert Stackowiak, Art licht, Springer Nature; 1st ed. edition (12 May 2015), ISBN-10: 1484209877.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspond i ng CO	Mode of Assessing CO
1	Introduction of IoT and Big Data,	Lecture	CSI401.1	Mid Term-1, Quiz & End Sem Exam
2	Programming for IoT in Big Data	Lecture	CSI401.1	Mid Term-1, Quiz & End Sem Exam
3	IoT data processing with big data analytics,	Lecture	CSI401.1	Mid Term-1, Quiz & End Sem Exam
4	requirements for data security,	Lecture	CSI401.1	Mid Term-1, Quiz & End Sem Exam
5	Data and the Internet of Things	Lecture	CSI401.1	Mid Term-1, Quiz & End Sem Exam
6	Big Data & Analytics	Lecture	CSI401.1	Mid Term-1, Quiz & End Sem Exam
7	role of Big Data in IoT systems	Lecture	CSI401.1	Mid Term-1, Quiz & End Sem Exam
8	basic of cloud computing	Lecture	CSI401.1	Mid Term-1, Quiz & End Sem Exam
9	Introduction to Data acquisition	Lecture	CSI401.2	Mid Term-1, Quiz & End Sem Exam
10	processing small and big data	Lecture	CSI401.2	Mid Term-1, Quiz & End Sem Exam
11	Basics of descriptive statistics	Lecture	CSI401.2	Mid Term-1, Quiz & End Sem Exam
12	the practical aspects in acquiring data from a sensor	Lecture	CSI401.2	Mid Term-1, Quiz & End Sem Exam
13	Data in the Cloud, Data Cleaning Process	Lecture	CSI401.2	Mid Term-1, Quiz & End Sem Exam
14	Cloud and Fog Computing for Big Data.	Lecture	CSI401.2	Mid Term-1, Quiz & End Sem Exam
15	Fundamentals of Data Analysis and how to create visual 20 representations of the data	Lecture	CSI401.3	Mid Term-1, Quiz & End Sem Exam
16	data visualization tool, explore data using statistics	Lecture	CSI401.3	Mid Term-1, Quiz & End Sem Exam
17	visualization to extract information and create hypotheses	Lecture	CSI401.3	Mid Term-1, Quiz & End Sem Exam
18	Architecture for Big Data such as Apache Hadoop	Lecture	CSI401.3	Quiz & End Sem Exam

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19	Overview of the Method - Determining the Number of Clusters	Lecture	CSI401.3	Quiz & End Sem Exam
20	Hadoop eco system	Lecture	CSI401.3	Quiz & End Sem Exam
21	Advanced Data Analytics	Lecture	CSI401.4	Quiz & End Sem Exam
22	Concepts of Machine Learning	Lecture	CSI401.4	Quiz & End Sem Exam
23	Storytelling with Data	Lecture	CSI401.4	Quiz & End Sem Exam
24	learn about predictive analytics	Lecture	CSI401.4	Quiz & End Sem Exam
25	supervised and unsupervised approaches	Lecture	CSI401.4	Quiz & End Sem Exam
26	how to apply models to make predictions from the data.	Lecture	CSI401.4	Quiz & End Sem Exam
27	Obtaining, visualising and analysing data,	Lecture	CSI401.4	Quiz & End Sem Exam
28	how to transform analytics results into a clear and convincing narrative and visual communication	Lecture	CSI401.4	Quiz & End Sem Exam
29	how to transform analytics results into a clear and convincing narrative and visual communication	Lecture	CSI401.4	Quiz & End Sem Exam
30	Data wrangling, reshaping and cleaning,	Lecture	CSI401.5	Quiz & End Sem Exam
31	Cleaning the dataset for Big Data,	Lecture	CSI401.5	Quiz & End Sem Exam
32	Visualising the data Engineering,	Lecture	CSI401.5	Quiz & End Sem Exam
33	Predicting location	Lecture	CSI401.5	Quiz & End Sem Exam
34	IoT Programming and Big Data,	Lecture	CSI401.5	Quiz & End Sem Exam
35	Visualising Big Data,	Lecture	CSI401.5	Quiz & End Sem Exam
36	Machine Learning for handling Big Data	Lecture	CSI401.5	Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

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CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CSI 401.1	Identify the usage of IoT in the field of Big Data.	3	3	2	1	2								1		
CSI 401.2	Understand the fundamental concepts of Data Analysis and Hadoop	3	2	1	2	1								2		
CSI 401.3	Apply and analyse the Data Analytics, Machine Learning, and Visualising.	3	3	2	1	2								3		
CSI 401.4	Analyse the concepts of Data at the Edge level and Cloud level.	3	2	1	1	3								1		
CSI 401.5	Evaluate the practical implementation of IOT in the field of big data analytics	2	3	1	2	3								2		

ESE Marks - CSI 401

S. No.	Enrollment.No.	Student's Name	CSI401 IOT PROGRAMMING AND BIG DATA							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U4G4
1	A60205219067	Mr VIPIN SHARMA	100	30	70	A	9	3	3	27
2	A60205219065	Ms NIKITA SINGH	100	30	70	A+	10	3	3	30
3	A60205219043	Ms PRANJALI AGRAWAL	100	30	70	A+	10	3	3	30

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4	A60205219054	Ms PRIYAL BANSAL	100	30	70	A+	10	3	3	30
5	A60205219060	Mr MOHAK AGRAWAL	100	30	70	A	9	3	3	27
6	A60205219128	Ms SMRITI BAM	100	30	70	A	9	3	3	27
7	A60205219073	Mr RONAK PRAJAPATI	100	30	70	A	9	3	3	27
8	A60205219106	Mr RISHI RAJPUT	100	30	70	A	9	3	3	27
9	A60205219100	Ms SEJAL J TIRKEY	100	30	70	A+	10	3	3	30
10	A60205219129	Mr SHARAD PRATAP SONI	100	30	70	B-	5	3	3	15
11	A60205219077	Mr LOHAN P NAIDU	100	30	70	A	9	3	3	27
12	A60205219086	Mr YASH TRIPATHI	100	30	70	B+	7	3	3	21
13	A60205219094	Mr VIKAS NARWARIYA	100	30	70	A+	10	3	3	30
14	A60205219113	Ms POOJA GUPTA	100	30	70	A	9	3	3	27
15	A60205219079	Mr RISHABH BANSAL	100	30	70	B	6	3	3	18
16	A60205219115	Mr SANIDHYA DAVE	100	30	70	A+	10	3	3	30
17	A60205219122	Mr VINAYAK SHARMA	100	30	70	B+	7	3	3	21

Average Grade Point = 148/17 (Total Grade point/Total no of students) = 8.70 No of students getting greater than average(8.70) marks = 13 students = 50.8%

Total No. of Students		17
Level 3	> 60% Average mark	76%
Attainment Level		Level 3

Note: Attainment Level

Level 1	50% average marks and
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average mark

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MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course : IOT PROGRAMMING AND BIG DATA LAB
Course Code : CSI 421, Crédits : 01, Session: 2019-20 (Even Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Shyam S. Gupta and Dr. Kapil Sharma

A. Introduction*:* The Internet of Things (IoT) fundamentals curriculum provides students with a comprehensive understanding of the IoT. It develops foundational skills using hands-on lab activities that stimulate the students in applying creative problem-solving and rapid prototyping in the interdisciplinary domain of electronics, networking, security, data analytics, and business.

B. Course Outcomes: At the end of the course, students will be able to:

CSI421.1 Identify the software needs of an IoT project.

CSI421.2 Understand the software needs for big data and use of pyspark.

CSI421.3 Apply the Software installation for Hadoop.

CSI421.4 Analyze the needs for practical implementation of IoT programming in Big data.

CSI421.5 Implement various algorithms for supervised and unsupervised learning.

C. Programme Outcomes:

[PO.1]. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and

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interpretation of data, and

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synthesis of the information to provide valid conclusions

[PO.5]. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

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[PO.9]. Individual and teamwork: Function effectively as an individual, and as a member or leader indiverse teams, and in multidisciplinary settings

[PO.10]. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leaderin a team, to manage projects and in multidisciplinary environments

[PO.12]. Life-long learning: Recognize the need for, and have the preparation and ability to engage inindependent and life-long learning in the broadest context of technological change

D. Programme Specific Outcomes:

PSO 1: Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO 2: Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO 3: Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

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E. Assessment Plan:

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Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a studentto be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

1. Installation of software needs of an IoT project
2. Understand how data is managed in an IoT network
3. Apply software solutions for different systems and Big Data to your IoT concept designs: (2 Hours)
4. Create Python scripts to manage large data files collected from sensor data and interact with the real world via actuators and other output devices
5. Implementation of pyspark
6. Implementation of map and reduce
7. Implementation of filter function
8. Implementation of spark using Python Libraries
9. Software installation for Hadoop
10. How can write, compile and execute program on hadoop platform
11. Implementation of supervised learning
12. Implementation of unsupervised learning

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

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H. Suggested Text/Reference Books:

- The Second Machine Age: Work, Progress and Prosperity in a Time of Brilliant Technologies by Erik Brynjolfsson and Andrew McAfee. ISBN-10: 0393239357
- Getting started with Internet of Things, by Cuno Pfister, Shroff; First edition (17 May 2011), ISBN-10: 9350234130
- Big Data and The Internet of Things, by Robert Stackowiak, Art licht, Springer Nature; 1st ed. edition (12 May 2015), ISBN-10: 1484209877.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Installation of software needs of an IoT project	Practical	CSI421.1	Mid Term Viva/Quiz & End Sem Practical Exam
2	Understand how data is managed in an IoT network	Practical	CSI421.1	Mid Term Viva/Quiz & End Sem Practical Exam
3	Apply software solutions for different systems and Big Data to your IoT concept designs: (2 Hours)	Practical	CSI421.1	Mid Term Viva/Quiz & End Sem Practical Exam
4	Create Python scripts to manage large data files collected from sensor data and interact with the real world via actuators and other output devices	Practical	CSI421.2	Mid Term Viva/Quiz & End Sem Practical Exam
5	Implementation of pyspark	Practical	CSI421.2	Mid Term Viva/Quiz & End Sem Practical Exam
6	Implementation of map and reduce	Practical	CSI421.3	Mid Term Viva/Quiz & End Sem Practical Exam
7	Implementation of filter function	Practical	CSI421.3	Mid Term Viva/Quiz & End Sem Practical Exam

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8	Implementation of spark using Python Libraries	Practical	CSI421.3	Mid Term Viva/Quiz & End Sem Practical Exam
9	Software installation for Hadoop	Practical	CSI421.4	Mid Term Viva/Quiz & End Sem Practical Exam
10	How can write, compile and execute program on hadoop platform	Practical	CSI421.4	Mid Term Viva/Quiz & End Sem Practical Exam
11	Implementation of supervised learning	Practical	CSI421.5	Mid Term Viva/Quiz & End Sem Practical Exam
12	Implementation of unsupervised learning	Practical	CSI421.5	Mid Term Viva/Quiz & End Sem Practical Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO		CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CSI421. 1	Identify the software needs of an IoT project.													1	2	
CSI421. 2	Understand the software needs for big data and use of pyspark.													2	3	

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CSI421. 3	Apply the Software	3	2	1	2	1								1		
	installation for Hadoop.															
CSI421. 4	Analyze the needs for practical implementation of IoT programming in Big data.	3	2	2	1	2								2		
CSI421. 5	Implement various algorithms for supervised and unsupervised learning.	3	2	1	2	3								1		

ESE Marks - CSI 421

S. No .	Enrollment.No.	Student's Name	CSI421							
			IOT PROGRAMMING AND BIG DATA LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	USG5
1	A60205219067	Mr VIPIN SHARMA	100	30	70	A	9	1	1	9
2	A60205219065	Ms NIKITA SINGH	100	30	70	A+	10	1	1	10
3	A60205219043	Ms PRANJALI AGRAWAL	100	30	70	A+	10	1	1	10
4	A60205219054	Ms PRIYAL BANSAL	100	30	70	A+	10	1	1	10
5	A60205219060	Mr MOHAK AGRAWAL	100	30	70	A+	10	1	1	10
6	A60205219128	Ms SMRITI BAM	100	30	70	A+	10	1	1	10

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7	A60205219073	Mr RONAK PRAJAPATI	100	30	70	A+	10	1	1	10
8	A60205219106	Mr RISHI RAJPUT	100	30	70	A+	10	1	1	10
9	A60205219100	Ms SEJAL J TIRKEY	100	30	70	A+	10	1	1	10
10	A60205219129	Mr SHARAD PRATAP SONI	100	30	70	A-	8	1	1	8
11	A60205219077	Mr LOHAN P NAIDU	100	30	70	A+	10	1	1	10
12	A60205219086	Mr YASH TRIPATHI	100	30	70	A-	8	1	1	8
13	A60205219094	Mr VIKAS NARWARIYA	100	30	70	A+	10	1	1	10
14	A60205219113	Ms POOJA GUPTA	100	30	70	A	9	1	1	9
15	A60205219079	Mr RISHABH BANSAL	100	30	70	A+	10	1	1	10
16	A60205219115	Mr SANIDHYA DAVE	100	30	70	A+	10	1	1	10
17	A60205219122	Mr VINAYAK SHARMA	100	30	70	B+	7	1	1	7

Average Grade Point = 161/17 (Total Grade point/Total no of students) = 9.47 No of students getting greater than average(9.47) marks = 12 students = 70.00%

Total No. of Students		17
Level 3	> 60% Average mark	70%
Attainment Level		Level 3

Note: Attainment Level

Level 1	50% average marks and
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average mark

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course : PYTHON PROGRAMMING
Course Code : CSE 302, Crédits : 03, Session : 2020-21 (Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Ashok Kumar Shrivastava, Dr. Pratiksha Gautam, Dr. Madhavi Dhingra

A. **Introduction:** The objective of this course is to understand the basic concepts such as lists, tuples and dictionary Data structures. To understand concepts like networking and website development using frameworks of python. To understand working third party libraries in python. To understand scientific programming paradigm.

B. **Course Outcomes:** At the end of the course, students will be able to:

CSE302.1. Understand the basic concept of programing using python.

CSE302.2. Identify the applications which are based on oops concepts along with Python modules, python package, and File operation.

CSE302.3. Apply GUI Programming in real world problems with Database.

CSE302.4. Analyze the complex problems that can be solved using python.

CSE302.5. Create client-server application for real world problems by using Regular Expres- sion, and CGI.

C. **Programme Outcomes:**

[PO.1]. Engineering knowledge: Apply the knowledge of mathematics, science, engineer- ing fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex en- gineering problems reaching substantiated conclusions using first principles of mathemat- ics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions:** Design solutions for complex engineering prob- lems and design system components or processes that meet the specified needs with ap- propriate consideration for the public health and safety, and the cultural, societal, and en- vironmental considerations

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[PO.4]. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modernengineering and IT tools including prediction and modeling to complex engi- neering activities with an understanding of the limitations

[PO.6]. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibil- ities relevant to the professional engineering practice

[PO.7]. Environment and sustainability: Understand the impact of the professional engi- neering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. Ethics: Apply ethical principles and commit to professional ethics and responsibili- ties and norms of the engineering practices

[PO.9]. Individual and teamwork: Function effectively as an individual, and as a member or leader indiverse teams, and in multidisciplinary settings

[PO.10]. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

[PO.12]. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leaderin a team, to manage projects and in multidisciplinary environments

D. Programme Specific Outcomes:

PSO1. Professional Skills: An ability to understand, analyze and develop computer pro- grams in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in soft- ware project development using open-ended programming environments to

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deliver a qual- ity product for business success.

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PSO3. Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an en- trepreneur, and a zest for higher studies.

E. Assessment Plan:

Component of Evalua- tion	**Description**	**Code**	**Weig h tage %**
Continuous Internal Eval- uation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/ Q/HA	10%
Attendance	A minimum of 75% Attendance is r quired to be maintained by a stude to be qualified for taking up the En Semester examination. The allow- ance of 25% includes all types of leaves including medical leaves.	A	5%
End Semester Examina- tion	End Semester Examination	EE	70%
Total			**100%**

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F. Syllabus

Module I: Introduction of Python:

History of Python, Features of Python Programming, Applications of Python, Use of python, install and Run Python in Windows/Linux, Keyword and Identifier, Statements and Comments, Python Variables, Python Data types, Python Type Conversion, Python I/O and Import, Python Operators, Python Namespace.

Python If-else statements, Python for Loop, while loop, break and continue, String manipulation, List Tuple, dictionaries, pass statement, looping technique, functions, function arguments, recursion, anonymous function, python global, local and Nonlocal.

Module II: Object and Class:

Python modules, python package, File operation, Python directory, Python exception, Exception Handling, User-Define Exception, Python OOP, class, inheritance, multiple inheritance, operator overloading.

Module III: Regular Expression, CGI and Database:

Match function, Search function, matching vs. searching, modifier, pattern, Introduction of CGI,CGI Architecture, CGI environment Variable, GET/POST Method, Cookies, File upload, Introduction of Database, connections, Executing queries, transactions, handling errors.

Module IV: GUI Programming:

Tkinter Programming, Tkinter widgets, Standard Attributes, CGI Programming, Introduction to Web Framework: - Django, Application Lifecycle, creating a Django Project, Creating Admin Interface, Creating Views, URL Mapping, Template System, Creating Database Models, Interfacing database: - PostgreSQL with the Django Project, Page Redirection, Form Processing.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

H.

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Core Python Programming, Wesley J. Chun, Publisher: Prentice Hall PTR, First Edition.
- Django Unleashed, Andrew Pinkham, SAMS, second edition
- OpenCV 4, Roy Shilkrot, Packt Pub, third edition
- Elegant Scipy, Juan Nunez, O'Reilly, third edition.

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- Learning Python, Mark Lutz, O'Reilly. Ltd., Second Edition.
- Python CookBook, Alex Martelli, O'Reilly. Ltd., Third Edition.

I. Lecture Plan

Lecture	Topics	Mode of De- livery	Corresponding CO	Mode of Assessing CO
1	Introduction of Python	Lecture	CSE302.1	Mid Term-1, Quiz & End Sem Exam
2	History, Application and uses	Lecture	CSE302.1	Mid Term-1, Quiz & End Sem Exam
3	Keyword and Identifier	Lecture	CSE302.1	Mid Term-1, Quiz & End Sem Exam
4	Statements and Comments	Lecture	CSE302.1	Mid Term-1, Quiz & End Sem Exam
5	Variable and Data types	Lecture	CSE302.1	Mid Term-1, Quiz & End Sem Exam
6	Type Conversion	Lecture	CSE302.1	Mid Term-1, Quiz & End Sem Exam
7	Python IO and Import	Lecture	CSE302.1	Mid Term-1, Quiz & End Sem Exam
8	Python Operators	Lecture	CSE302.1	Mid Term-1, Quiz & End Sem Exam
9	Namespaces and Scope in Python	Lecture	CSE302.1	Mid Term-1, Quiz & End Sem Exam
10	Python If-else and loops	Lecture	CSE302.1	Mid Term-1, Quiz & End Sem Exam
11	String Manipulation	Lecture	CSE302.1	Mid Term-1, Quiz & End Sem Exam
12	List and Tuple	Lecture	CSE302.1	Mid Term-1, Quiz & End Sem Exam
13	Dictionary	Lecture	CSE302.1	Mid Term-1, Quiz & End Sem Exam
14	Python functions	Lecture	CSE302.1	Mid Term-1, Quiz & End Sem Exam

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15	Python Global, Local and Non Local variable	Lecture	CSE302.1	Mid Term-1, Quiz & End Sem Exam
16	Python modules	Lecture	CSE302.2	Mid Term-1, Quiz & End Sem Exam
17	Python packages	Lecture	CSE302.2	Mid Term-1, Quiz & End Sem Exam
18	File operation	Lecture	CSE302.2	Mid Term-1, Quiz & End Sem Exam
19	Python exception	Lecture	CSE302.2	Mid Term-1, Quiz & End Sem Exam
20	Python OOP	Lecture	CSE302.2	Mid Term-1, Quiz & End Sem Exam
21	Concept of class, inheritance, multiple inheritance, operator overloading	Lecture	CSE302.2	Mid Term-2, Quiz & End Sem Exam
22	Match function, Search function, matching vs. searching	Lecture	CSE302.3	Mid Term-2, Quiz & End Sem Exam
23	Modifier, pattern	Lecture	CSE302.3	Mid Term-2, Quiz & End Sem Exam
24	Introduction of CGI,	Lecture	CSE302.3	Mid Term-2, Quiz & End Sem Exam
25	CGI Architecture	Lecture	CSE302.3	Mid Term-2, Quiz & End Sem Exam
26	CGI environment Variable	Lecture	CSE302.3	Mid Term-2, Quiz & End Sem Exam
27	CGI Cookies	Lecture	CSE302.4	Mid Term-2, Quiz & End Sem Exam
28	Using Cookies in CGI	Lecture	CSE302.4	Mid Term-2, Quiz & End Sem Exam
29	GET/POST Method, Cookies, File upload	Lecture	CSE302.4	Mid Term-2, Quiz & End Sem Exam
30	Introduction of Database, connections,	Lecture	CSE302.4	Mid Term-2, Quiz & End Sem Exam
31	Executing queries, transactions, handling errors.	Lecture	CSE302.4	Mid Term-2, Quiz & End Sem Exam

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32	Tkinter Programing	Lecture	CSE302.5	Mid Term-2, Quiz & End Sem Exam
33	Tkinter widgets, Standard Attributes, CGI Programming	Lecture	CSE302.5	Mid Term-2, Quiz & End Sem Exam
34	Introduction to Web Framework: - Django	Lecture	CSE302.5	Mid Term-2, Quiz & End Sem Exam
35	Application Lifecycle, creating a Django Project, Creating Admin Interface, Creating Views, URL Mapping, Template System, Creating Database Models	Lecture	CSE302.5	Mid Term-2, Quiz & End Sem Exam
36	Interfacing database PostgreSQL with the Django Project, Page Redirection, Form Processing.	Lecture	CSE302.5	Mid Term-2, Quiz & End Sem Exam

J. **Course Articulation Matrix (Mapping of COs with POs)**

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE302.1	Understand the basic concept of programing using python.													1	2	
CSE302.2	Identify the applications which are based on oops concepts along with Python modules, python package, and File operation.													1	3	
CSE302.3	Apply GUI Programming in real world problems with Database.	3	2	3	1	2										
CSE302.4	Analyze the complex problems that can be solved using python.	3	3	2	3	2										

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CSE302.5	Create client-server application for real world problems by using Regular Expression, and CGI.	2	1	2	3	1										

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ESE Marks CSE 302

S. No.	Enroll-ment.No.	Student's Name	CSE302 PYTHON PROGRAMMING Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U9G9
1	A60205219009	Mr CHURCHIL YASH RAJ-PAL	100	30	70	B+	7	3	3	21
2	A60205219019	Mr RICKY SHIVDASANI	100	30	70	A	9	3	3	27
3	A60205219029	Ms ROSHNI JA-NARDHANAN	100	30	70	A	9	3	3	27
4	A60205219039	Mr ASHISH VERMA	100	30	70	B+	7	3	3	21
5	A60205219050	Mr NAMISH ARORA	100	30	70	B	6	3	3	18
6	A60205219004	Ms GARIMA SRIVASTAVA	100	30	70	A-	8	3	3	24
7	A60205219013	Ms KHUSHI PURWAR	100	30	70	A+	10	3	3	30
8	A60205219023	Mr DHEERAJ SHARMA	100	30	70	B	6	3	3	18
9	A60205219033	Mr ADITYA KUMAR KUSHWAH	100	30	70	A-	8	3	3	24
10	A60205219043	Ms PRANJALI AGRAWAL	100	30	70	A	9	3	3	27
11	A60205219002	Mr SUSHMIT SATISH	100	30	70	A	9	3	3	27
12	A60205219012	Mr RITIK CHANDEL	100	30	70	B	6	3	3	18
13	A60205219022	Mr MADHAV DUBEY	100	30	70	A-	8	3	3	24
14	A60205219032	Ms AKSHITA SHARMA	100	30	70	B+	7	3	3	21
15	A60205219042	Mr ANIRUDH KHANDEL-WAL	100	30	70	A-	8	3	3	24
16	A60205219001	Mr ASEEM VIKRAM	100	30	70	A-	8	3	3	24
17	A60205219011	Ms RAINA GUPTA	100	30	70	A	9	3	3	27
18	A60205219021	Ms FARHAT AKHTAR	100	30	70	B+	7	3	3	21
19	A60205219031	Ms MANPREET KAUR	100	30	70	A	9	3	3	27
20	A60205219041	Mr ANUJ TIWARI	100	30	70	A-	8	3	3	24
21	A60205219008	Ms KAJAL MISHRA	100	30	70	A-	8	3	3	24
22	A60205219018	Mr AMITABH DEVNATH	100	30	70	B+	7	3	3	21
23	A60205219028	Mr AYUSH JAIN	100	30	70	A	9	3	3	27
24	A60205219037	Mr MANOJ KUSHWAH	100	30	70	B	6	3	3	18
25	A60205219049	Mr SHASHANK KUMAR	100	30	70	A	9	3	3	27
26	A60205219007	Mr JAYANT KUMAR	100	30	70	A-	8	3	3	24
27	A60205219017	Mr SHUBHKANT DWIVEDI	100	30	70	A	9	3	3	27
28	A60205219027	Mr AKSHIT DAHIYA	100	30	70	A-	8	3	3	24
29	A60205219036	Mr SAHIL TOMAR	100	30	70	A	9	3	3	27
30	A60205219048	Mr SHUBHAM DHAKAD	100	30	70	A	9	3	3	27
31	A60205219005	Mr PRASHANT AGRAWAL	100	30	70	A-	8	3	3	24
32	A60205219016	Ms TANISHKA SAXENA	100	30	70	A	9	3	3	27
33	A60205219024	Mr SARTHAK JAIN	100	30	70	B	6	3	3	18

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34	A60205219034	Mr AMAN KHAN GAURI	100	30	70	B-	5	3	3	15
35	A60205219046	Mr TUSHAR SHARMA	100	30	70	A-	8	3	3	24
36	A60205219010	Ms AAYUSHI CHAUHAN	100	30	70	A-	8	3	3	24
37	A60205219020	Mr RITESH KUMAR	100	30	70	A	9	3	3	27
38	A60205219030	Mr PARAS BHARDWAJ	100	30	70	A-	8	3	3	24
39	A60205219040	Mr ADARSH RAI	100	30	70	A-	8	3	3	24
40	A60205219051	Mr ABHISHEKH KUMAR DAS	100	30	70	A	9	3	3	27
41	A60205219058	Mr APOORVA KRISHANA	100	30	70	A-	8	3	3	24
42	A60205219066	Ms VAISHNAVI SINGH	100	30	70	B	6	3	3	18
43	A60205219074	Mr KUNAL SAXENA	100	30	70	B	6	3	3	18
44	A60205219082	Mr MOHIT BHARDWAJ	100	30	70	A	9	3	3	27
45	A60205219091	Mr VIDIT NIGAM	100	30	70	A	9	3	3	27
46	A60205219054	Ms PRIYAL BANSAL	100	30	70	A-	8	3	3	24
47	A60205219062	Ms AYUSHI RAI	100	30	70	B+	7	3	3	21
48	A60205219070	Ms DEVANSHI JADIYA	100	30	70	B+	7	3	3	21
49	A60205219078	Mr UMANG PRASAD	100	30	70	B+	7	3	3	21
50	A60205219087	Mr ARYAN SHARMA	100	30	70	B+	7	3	3	21
51	A60205219053	Mr ADITYA SAXENA	100	30	70	B	6	3	3	18
52	A60205219061	Mr LAUKIT MANDAL	100	30	70	B+	7	3	3	21
53	A60205219069	Mr NEELMANI SHUKLA	100	30	70	A	9	3	3	27
54	A60205219077	Mr LOHAN P NAIDU	100	30	70	B+	7	3	3	21
55	A60205219086	Mr YASH TRIPATHI	100	30	70	A-	8	3	3	24
56	A60205219052	Mr AJEET SIKARWAR	100	30	70	B	6	3	3	18
57	A60205219060	Mr MOHAK AGRAWAL	100	30	70	A-	8	3	3	24
58	A60205219068	Mr MANASAV JAIN	100	30	70	B+	7	3	3	21
59	A60205219076	Mr SUNNY CHAUDHARY	100	30	70	B-	5	3	3	15
60	A60205219085	Mr MAYANK SOLANKI	100	30	70	B-	5	3	3	15
61	A60205219056	Ms NISHA KUMARI	100	30	70	A	9	3	3	27
62	A60205219064	Mr ANSHUL SINGH	100	30	70	B-	5	3	3	15
63	A60205219072	Mr NIKHIL GUPTA	100	30	70	A	9	3	3	27
64	A60205219080	Mr ANURAG SINGH TOMAR	100	30	70	B+	7	3	3	21
65	A60205219089	Mr DEEPAK PANDEY	100	30	70	B	6	3	3	18
66	A60205219057	Mr RAGHAV SINGHAL	100	30	70	A-	8	3	3	24
67	A60205219065	Ms NIKITA SINGH	100	30	70	B+	7	3	3	21
68	A60205219073	Mr RONAK PRAJAPATI	100	30	70	A	9	3	3	27
69	A60205219081	Mr PALASH MUKHERJEE	100	30	70	A	9	3	3	27
70	A60205219090	Ms SNEHA	100	30	70	B	6	3	3	18
71	A60205219055	Mr YASH JAIN	100	30	70	A	9	3	3	27
72	A60205219063	Mr RAHUL SHARMA	100	30	70	B+	7	3	3	21
73	A60205219071	Mr JAYRAM KARAN	100	30	70	B-	5	3	3	15
74	A60205219079	Mr RISHABH BANSAL	100	30	70	B	6	3	3	18
75	A60205219088	Mr AAYUSH TIWARI	100	30	70	B+	7	3	3	21
76	A60205219059	Mr PRADUMN PRAKASH DUBEY	100	30	70	A-	8	3	3	24

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77	A60205219067	Mr VIPIN SHARMA	100	30	70	B+	7	3	3	21
78	A60205219075	Mr KSHITIJ AGRAWAL	100	30	70	B+	7	3	3	21
79	A60205219083	Mr HARSHIT SINGH	100	30	70	A+	10	3	3	30
80	A60205219092	Ms KASHISH TOMAR	100	30	70	A-	8	3	3	24
81	A60205219099	Mr ANIL GAUD	100	30	70	B-	5	3	3	15
82	A60205219107	Ms DARSHIKA SHARMA	100	30	70	A-	8	3	3	24
83	A60205219118	Mr GYANDEEP SINGH	100	30	70	B	6	3	3	18
84	A60205219128	Ms SMRITI BAM	100	30	70	B	6	3	3	18
85	A60205219095	Mr HIMANSHU BHA-DORIA	100	30	70	B+	7	3	3	21
86	A60205219103	Mr KAMAL NAYAN	100	30	70	A-	8	3	3	24
87	A60205219114	Ms ANJALI KANKORIYA	100	30	70	A-	8	3	3	24
88	A60205219122	Mr VINAYAK SHARMA	100	30	70	B	6	3	3	18
89	A60205219098	Mr ASHAY SHRIVASTAV	100	30	70	B+	7	3	3	21
90	A60205219106	Mr RISHI RAJPUT	100	30	70	A-	8	3	3	24
91	A60205219117	Mr PARTH PORWAL	100	30	70	A-	8	3	3	24
92	A60205219127	Ms NEHA KUSHWAH	100	30	70	B-	5	3	3	15
93	A60205219097	Mr MANAV JADIA	100	30	70	B-	5	3	3	15
94	A60205219105	Mr YASH SHARMA	100	30	70	A	9	3	3	27
95	A60205219116	Mr AFRAN USMANI	100	30	70	A-	8	3	3	24
96	A60205219124	Mr GURAASHISH SINGH	100	30	70	A-	8	3	3	24
97	A60205219093	Mr ASHISH YADAV	100	30	70	A-	8	3	3	24
98	A60205219101	Mr ADITYA SINGH DHAKRE	100	30	70	B+	7	3	3	21
99	A60205219109	Mr SUMIT BANPURIA	100	30	70	A-	8	3	3	24
100	A60205219120	Mr ASHISH RAJA NA-GABATHULA	100	30	70	B-	5	3	3	15
101	A60205219130	Mr AMIT SINGH	100	30	70	A-	8	3	3	24
102	A60205219096	Mr RUJMAN KHAN	100	30	70	B-	5	3	3	15
103	A60205219104	Ms ASHITA KARKARE	100	30	70	B+	7	3	3	21
104	A60205219115	Mr SANIDHYA DAVE	100	30	70	A	9	3	3	27
105	A60205219123	Mr AMIT RAJOURIYA	100	30	70	B+	7	3	3	21
106	A60205219094	Mr VIKAS NARWARIYA	100	30	70	B+	7	3	3	21
107	A60205219102	Ms GARVITA BHADAURIA	100	30	70	B	6	3	3	18
108	A60205219113	Ms POOJA GUPTA	100	30	70	B	6	3	3	18
109	A60205219121	Ms PRIYA DUBEY	100	30	70	B-	5	3	3	15
110	A60505218008	Mr ABHIJEET SINGH BHADORIYA	100	30	70	A-	8	3	3	24
111	A60205219100	Ms SEJAL J TIRKEY	100	30	70	A	9	3	3	27
112	A60205219108	Mr HARSH TIWARI	100	30	70	B+	7	3	3	21
113	A60205219119	Mr SHIVAM MUDGAL	100	30	70	B+	7	3	3	21
114	A60205219129	Mr SHARAD PRATAP SONI	100	30	70	C+	4	3	3	12
							844			

Average Grade Point = 844/114 (Total Grade point/Total no of students) = 7.4

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No of students getting greater than average (7.4) marks = 59 students = 51.8%

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Total No. of Students	=	**114**
Level 2	>50% average marks and < 60% average marks	**51.8%**
Attainment Level		**Level 2**

Note: Attainment Level

Level 1	< 50% Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course : B.Tech CSE (Theory of Computation)
Course Code : CSE 501, Crédits : 04, Session :2020-21(Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Ashok Kumar Shrivastava

A. Introduction: Students will able to understand the formal mathematical models of computation along with their relationships with formal languages. In particular, they will learn regular languages and context free languages which are crucial to understand how compilers and programming languages are built. Also students will learn that not all problems are solvable by computers, and some problems do not admit efficient algorithms. Throughout this course, students will strengthen their rigorous mathematical reasoning skills.

B. Course Outcomes: At the end of the course, students will be able to:

CSE501.1. Understand the basic concepts of formal languages of finite automata techniques.

CSE501.2.Solve various problems of applying normal form techniques, push down automata and Turing Machines.

CSE501.3. Evaluate the basic mathematical models of computation and describe how they relate to formal languages.

CSE501.4. Analyze limitations on what computers can do, and learn examples of unsolvable problems.

CSE501.5. Analyze some problems that do not admit efficient algorithms, and identify such problems.

C. Program Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

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PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Program Specific Outcomes:

PSO 1: Will be able to design, develop and implement efficient software for a given real life problem.
PSO 2: Will be able to apply knowledge of AI, Machine Learning and Data Mining in analyzing big data for extracting useful information from it and for performing predictive analysis.
PSO 3: Will be able to design, manage and secure wired/ wireless computer networks for transfer and sharing ofinformation.

E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a	A	5%

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	student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Finite Automata and Regular Languages: (12 Hours)

Introduction- Basic Mathematical Notation and techniques- Finite State systems – Basic Definitions – Finite Automaton – DFA & NDFA – Finite Automaton with €- moves – Regular Languages- Regular Expression – Equivalence of NFA and DFA – Equivalence of NDFA"s with and without €-moves – Equivalence of finite Automaton and regular expressions –Minimization of DFA- – Pumping Lemma for Regular sets – Problems based on Pumping Lemma.

Module II: Grammars: (10 Hours)

Grammar Introduction– Types of Grammar – Context Free Grammars and Languages– Derivations and Languages – Ambiguity- Relationship between derivation and derivation trees – Simplification of CFG – Elimination of Useless symbols – Unit productions – Null productions – Greibach Normal form – Chomsky normal form – Problems related to CNF and GNF. Chomsky hierarchy of languages.

Module III: Pushdown Automata (6 Hours)

Pushdown Automata- Definitions – Moves – Instantaneous descriptions – Deterministic pushdown automata – Equivalence of Pushdown automata and CFL – pumping lemma for CFL – problems based on pumping Lemma. Linear Bounded Automata (LBA).

Module IV: Turing Machines: (6 Hours)

The Turing Machine Model, Language acceptability of Turing Machine, Design of TM, Variation of TM, Universal TM, Church's Machine. Turing machine halting Problem, Post correspondence problems (PCP) and Modified Post correspondence problems.

Module V: Unsolvable Problems and Computable Functions: (6 Hours)

Unsolvable Problems and Computable Functions – Primitive recursive functions – Recursive and recursively enumerable languages.

Tractable and Intractable problems: P and NP Class problems, NP completeness, Satisfiability problem.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination, A: Attendance

H. Text & References:

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Text:

- Hopcroft and Ullman, "Introduction to Automata Theory, languages and computation", Addision Wesley.
- "An introduction to formal languages and Automata (2nd ed)" by Peter Linz, D. C. Health and Company.

References:

- "Introduction to theory of computation (2nd Ed)" by Michael sipser.
- Mishra & Chandrashekharan, "Theory of Computer Sciences", PHI.
- Zavi Kohavi, "Switching and finite Automata Theory "
- Kohan, "Theory of Computer Sciences".
- Korral, "Theory of Computer Sciences".

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction- Basic Mathematical Notation and techniques	Lecture	CSE501.1	Mid Term-1, Quiz & End Sem Exam
2	Finite State systems	Lecture	CSE501.1	Mid Term-1, Quiz & End Sem Exam
3	Finite Automaton – DFA & NDFA	Lecture	CSE501.1	Mid Term-1, Quiz & End Sem Exam
4	Finite Automaton with €-moves	Lecture	CSE501.1	Mid Term-1, Quiz & End Sem Exam
5	Regular Languages	Lecture	CSE501.1	Mid Term-1, Quiz & End Sem Exam

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6	Regular Expression	Lecture	CSE501.1	Mid Term-1, Quiz & End Sem Exam
7	Equivalence of NFA and DFA	Lecture	CSE501.1	Mid Term-1, Quiz & End Sem Exam
8	Equivalence of NDFA"s with and without €-moves	Lecture	CSE501.1	Mid Term-1, Quiz & End Sem Exam
9	Equivalence of finite Automaton and regular expressions	Lecture	CSE501.1	Mid Term-1, Quiz & End Sem Exam
10	Minimization of DFA	Lecture	CSE501.1	Mid Term-1, Quiz & End Sem Exam
11	Pumping Lemma for Regular sets	Lecture	CSE501.1	Mid Term-1, Quiz & End Sem Exam
12	Problems based on Pumping Lemma.	Lecture	CSE501.1	Mid Term-1, Quiz & End Sem Exam
13	Grammar Introduction– Types of Grammar	Lecture	CSE501.2	Mid Term-1, Quiz & End Sem Exam
14	Context Free Grammars and Languages	Lecture	CSE501.2	Mid Term-1, Quiz & End Sem Exam

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15	Derivations and Languages	Lecture	CSE501.2	Mid Term-1, Quiz & End Sem Exam
16	Ambiguity- Relationship between derivation and derivation trees	Lecture	CSE501.2	Mid Term-1, Quiz &
				End Sem Exam
17	Simplification of CFG	Lecture	CSE501.2	Mid Term-1, Quiz & End Sem Exam
18	Elimination of Useless symbols	Lecture	CSE501.2	Mid Term-1, Quiz & End Sem Exam
19	Unit productions	Lecture	CSE501.2	Mid Term-1, Quiz CO.3& End Sem Exam
20	Null productions	Lecture	CSE501.2	Mid Term-1, Quiz & End Sem Exam
21	Greibach Normal form	Lecture	CSE501.2	Mid Term-2, Quiz & End Sem Exam
22	Chomsky normal form	Lecture	CSE501.2	Mid Term-2, Quiz & End Sem Exam
23	Problems related to CNF and GNF	Lecture	CSE501.2	Mid Term-2, Quiz & End Sem Exam

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24	Chomsky hierarchy of languages	Lecture	CSE501.2	Mid Term-2, Quiz & End Sem Exam
25	Pushdown Automata-Definitions	Lecture	CSE501.2	Mid Term-2, Quiz & End Sem Exam
26	Moves – Instantaneous descriptions	Lecture	CSE501.2	Mid Term-2, Quiz & End Sem Exam
27	Deterministic pushdown automata	Lecture	CSE501.2	Mid Term-2, Quiz & End Sem Exam
28	Equivalence of Pushdown automata and CFL	Lecture	CSE501.2	Mid Term-2, Quiz & End Sem Exam
29	pumping lemma for CFL	Lecture	CSE501.3	Mid Term-2, Quiz & End Sem Exam
30	Problems based on pumping Lemma.	Lecture	CSE501.3	Mid Term-2, Quiz & End Sem Exam
31	Linear Bounded Automata (LBA).	Lecture	CSE501.3	Mid Term-2, Quiz & End Sem Exam
32	The Turing Machine Model, Language acceptability of Turing Machine	Lecture	CSE501.3	Mid Term-2, Quiz & End Sem Exam

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33	Design of TM, Variation of TM	Lecture	CSE501.3	Mid Term-2, Quiz & End Sem Exam
34	Universal TM, Church's Machine. Turing machine halting Problem	Lecture	CSE501.5	Mid Term-2, Quiz & End Sem Exam
35	Post correspondence problems (PCP) and Modified Post correspondence problems.	Lecture	CSE501.5	Mid Term-2, Quiz & End Sem Exam
36	Unsolvable Problems and Computable Functions	Lecture	CSE501.4	Mid Term-2, Quiz & End Sem Exam
37	Primitive recursive functions	Lecture	CSE501.4	Mid Term-2, Quiz & End Sem Exam
38	Recursive and recursively enumerable languages.	Lecture	CSE501.4	Mid Term-2, Quiz & End Sem Exam
39	P and NP Class problems	Lecture	CSE501.5	Mid Term-2, Quiz & End Sem Exam
40	NP completeness, Satisfiability problem	Lecture	CSE501.4	Mid Term-2, Quiz & End Sem Exam

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J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE501.1	Understand the basic concepts of formal languages of finite automata techniques.															
CSE501.2	Solve various problems of applying normal form techniques, push down automata and Turing Machines.	3	2													
CSE501.3	Evaluate the basic mathematical models of computation and describe how they relate to formal languages.	3	2	1										1		
CSE501.4	Analyze limitations on what computers can do, and learn examples of unsolvable problems.	3	2											1		
CSE501.5	Analyze some problems that do not admit efficient algorithms, and identify such problems.	3	2											1		

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ESE Marks – CSE501

S. No.	Enrolment No.	Student's Name	CSE501 THEORY OF COMPUTATION Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U13G13
1	A60205218006	Mr UDAY SINGH RAJAWAT	100	30	70	A-	8	4	4	32
2	A60205218002	Mr DHRUV KUMAR AGARWAL	100	30	70	B	6	4	4	24
3	A60205218001	Ms MANASI SRIVASTAVA	100	30	70	A	9	4	4	36
4	A60205218004	Mr DEVASHISH PATIL	100	30	70	A	9	4	4	36
5	A60205218008	Mr AKSHAT MISHRA	100	30	70	A	9	4	4	36
6	A60205218007	Ms PRIYANSHI GUPTA	100	30	70	A-	8	4	4	32
7	A60205218014	Mr KRATIK JAIN	100	30	70	A-	8	4	4	32
8	A60205218010	Mr AMAN BHATNAGAR	100	30	70	B	6	4	4	24
9	A60205218003	Mr ANURAG KOTNALA	100	30	70	A-	8	4	4	32
10	A60205218009	Ms ADITI LIKHAR	100	30	70	A	9	4	4	36
11	A60205218016	Mr SWAPNIL RAI	100	30	70	A	9	4	4	36
12	A60205218015	Mr SHUBHAM JAIN	100	30	70	A-	8	4	4	32
13	A60205218012	Mr SOURABH SINGH TOMAR	100	30	70	B	6	4	4	24
14	A60205218017	Mr ILAPANDA SUHASH	100	30	70	B+	7	4	4	28
15	A60205218018	Mr ANUBHAV KADAM	100	30	70	A	9	4	4	36
16	A60205218011	Ms TAMANNAKUMARI MANOJKUMAR	100	30	70	A-	8	4	4	32
17	A60205218020	Mr AMAN GUPTA	100	30	70	A-	8	4	4	32
18	A60205218005	Mr SAKSHAM CHATURVEDI	100	30	70	B-	5	4	4	20
19	A60205218025	Mr ARPIT SAXENA	100	30	70	A-	8	4	4	32
20	A60205218026	Mr ABHISHEK PANCHOLI	100	30	70	B	6	4	4	24
21	A60205218028	Mr VARUN VIKRAM	100	30	70	B+	7	4	4	28
22	A60205218033	Ms PRIYANSHI SHARMA	100	30	70	A-	8	4	4	32
23	A60205218034	Mr V. SAMARTH CHANDRA	100	30	70	B	6	4	4	24
24	A60205218013	Mr PRANAY GUPTA	100	30	70	B	6	4	4	24
25	A60205218037	Ms NEHA VERMA	100	30	70	A-	8	4	4	32
26	A60205218022	Mr DEEPESH KUSHWAH	100	30	70	A-	8	4	4	32
27	A60205218024	Mr ASHISH TARKESHWAR SINGH	100	30	70	B-	5	4	4	20
28	A60205218030	Ms AEIKNOR KAUR VIRK	100	30	70	B+	7	4	4	28
29	A60205218023	Ms ADITI SHARMA	100	30	70	A	9	4	4	36
30	A60205218019	Mr PRAYAG DUBEY	100	30	70	A+	10	4	4	40
31	A60205218032	Mr AYUSH SHARMA	100	30	70	A-	8	4	4	32
32	A60205218031	Mr KETANDEEP SHARMA	100	30	70	A-	8	4	4	32
33	A60205218027	Mr AYUSH CHANDRA	100	30	70	B	6	4	4	24
34	A60205218043	Mr ANMOL SAXENA	100	30	70	A-	8	4	4	32

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35	A60205218044	Ms NIHARIKA SINGH	100	30	70	B-	5	4	4	20
36	A60205218040	Mr ASHIRWAD VERMA	100	30	70	B	6	4	4	24
37	A60205218046	Mr KETAN AGRAWAL	100	30	70	A-	8	4	4	32
38	A60205218036	Mr AYUSH SHARMA	100	30	70	A	9	4	4	36
39	A60205218021	Mr YOGENDRA BHADORIA	100	30	70	B+	7	4	4	28
40	A60205218029	Ms PRAGATI TIWARI	100	30	70	B+	7	4	4	28
41	A60205218039	Mr SIDDHANT SINGH KAURAV	100	30	70	B+	7	4	4	28
42	A60205218041	Mr ABHISHEK SINGH	100	30	70	B	6	4	4	24
43	A60205218038	Ms MANYA SINGH	100	30	70	B+	7	4	4	28
44	A60205218051	Mr SHIVAM SHARMA	100	30	70	A	9	4	4	36
45	A60205218053	Mr SWAPNIL PALIYA	100	30	70	A-	8	4	4	32
46	A60205218055	Mr SURAJ NEEKHARA	100	30	70	B+	7	4	4	28
47	A60205218063	Mr MILKY SHRIVASTAVA	100	30	70	A-	8	4	4	32
48	A60205218064	Ms ANVI TOMAR	100	30	70	A	9	4	4	36
49	A60205218049	Mr YOGESH SINGH	100	30	70	B+	7	4	4	28
50	A60205218045	Mr VAIBHAV BANERJEE	100	30	70	B+	7	4	4	28
51	A60205218066	Mr PRATEEK SAHGAL	100	30	70	B+	7	4	4	28
52	A60205218060	Mr PRABHANSHOO SHRIVASTAVA	100	30	70	B-	5	4	4	20
53	A60205218054	Mr ABHISHEK DWIVEDI	100	30	70	A	9	4	4	36
54	A60205218048	Ms VAISHNAVI RAWAT	100	30	70	A	9	4	4	36
55	A60205218065	Mr SATYAM SHARMA	100	30	70	B	6	4	4	24
56	A60205218050	Mr DEEPAK SHARMA	100	30	70	B-	5	4	4	20
57	A60205218059	Mr KARAN TAMBAT	100	30	70	A-	8	4	4	32
58	A60205218047	Ms RIMJHIM CHHAYA	100	30	70	A	9	4	4	36
59	A60205218062	Ms ANKITA SHUKLA	100	30	70	A-	8	4	4	32
60	A60205218072	Mr SARTHAK GUPTA	100	30	70	B+	7	4	4	28
61	A60205218073	Mr HRITUJ AGRAHARI	100	30	70	B+	7	4	4	28
62	A60205218071	Mr MUKUL AGARWAL	100	30	70	A-	8	4	4	32
63	A60205218075	Mr PRADYUMN SHARMA	100	30	70	B	6	4	4	24
64	A60205218058	Mr BHUPENDRA UPADHYAY	100	30	70	C+	4	4	4	16
65	A60205218070	Ms ANSHITA CHANDEL	100	30	70	B+	7	4	4	28
66	A60205218068	Mr RISHABH SHRIVASTAVA	100	30	70	B+	7	4	4	28
67	A60205218079	Mr RISHABH JAIN	100	30	70	B+	7	4	4	28
68	A60205218074	Ms APOORVA GOSAIN	100	30	70	B	6	4	4	24
69	A60205218078	Mr SHEIKH ABDUL ANAS	100	30	70	A-	8	4	4	32
70	A60205218067	Mr RISHABH KULSHRESTHA	100	30	70	A	9	4	4	36
71	A60205218077	Mr PRIYANSH JAISWAL	100	30	70	A	9	4	4	36

Average Grade Point = 526/71 (Total Grade point/Total no of students) = 7.4
No of students getting greater than average (7.4) marks = 37 students = 52.1%

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Total No. of Students	=	**71**
Level 2	>50% average marks and < 60% average marks	**52.1%**
Attainment Level		**Level 2**

Note: Attainment Level

Level 1	<50% - Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course : INTRODUCTION OF ANDROID APPLICATION DEVELOPMENT
Course Code : CSE-503, Crédits : 03, Session : 2020-21(Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Dinesh Sharma

A. Introduction: The objective of this course is to course provides students with the knowledge of fundamentals of Android application; Android Application Development is a hands-on course which is designed for providing essential skills and experiences to the students in developing applications on mobile platform. The hands-on training is effective for beginners and experienced developers for practical Android Code Application

B. Course Outcomes: At the end of the course, students will be able to:

CSE503.1. Understand Android app development it's Installation and configuration.

CSE503.2. Design and develop User Interfaces for the Android platform.

CSE503.3. Implement advanced UI component and exception handling.

CSE503.4. Apply Java concepts to implement event driven programming in Android app development.

CSE503.5. Apply Database concepts to Android app development to manage connection with Mysql and SQLite databases.

C. Programme Outcomes:

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modernengineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

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[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage inindependent and life-long learning in the broadest context of technological change

D. Programme Specific Outcomes:

PSO 1: Will be able to design, develop and implement efficient software for a given real life problem.

PSO 2: Will be able to apply knowledge of AI, Machine Learning and Data Mining in analyzing big data for extracting useful information from it and for performing predictive analysis.

PSO 3: Will be able to design, manage and secure wired/ wireless computer networks for transfer and sharing ofinformation.

E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Quiz		
	Seminar/Viva-Voce/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester	A	5%

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	examination. The allowance of 25% includes all types of leaves including medical leaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Introduction of Android
Introduction to Android -Overview of Android, What does Android run On – Android Internals, Android for mobile apps development, Environment setup for Android apps Development, Framework - Android- SDK, Eclipse, Emulators – What is an Emulator / Android AVD?

Module II: Activities and GUI Components
Android activities and GUI design concepts- Design criteria for Android Application: Hardware Design Consideration, Design Demands for Android application, Intent, Activity, Activity Lifecycle and Manifest, Creating Application and new Activities, Simple UI - Layouts and Layout, Properties: Introduction to android UI design, Introducing Layouts, GUI objects, Layout design concepts.

Module III: Advance UI Programming with Exception Handling
Advanced UI Programming: Event driven Programming in Android (Text Edit, Button clicked etc.) Activity Lifecycle of Android, Exception handling

Module IV: Advance Concepts with Databases
Menu: Basics, Custom v/s System Menus, Create and Use Handset menu Button (Hardware) Dialog : Creating and Altering Dialogs Toast : List & Adapters Demo Application Development and Launching Basic operation of SQLite Database Android Application Priorities.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Application Development, Reto Meier.
- Beginning Android, Mark L Murphy.
- Pro Android, S.Y Hashimi & Satya Komatineni.
- Android Studio Development Essentials, Neil Smyth.
- The Definitive Guide to SQL Lite, Michael Owen
- Building Android Apps, IN EASY STEP

I. Lecture Plan

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Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Overview of Android	Lecture	CSE503.1	Mid Term-1 & End Sem Exam
2	What does Android run On - Android Internals	Lecture	CSE503.1	Mid Term-1 & End Sem Exam
3	Android for mobile apps development	Lecture	CSE503.1	Mid Term-1 & End Sem Exam
4	Environment setup for Android apps Development	Lecture	CSE503.1	Mid Term-1 & End Sem Exam
5	Framework-Android	Lecture	CSE503.1	Mid Term-1 & End Sem Exam
6	Emulator	Lecture	CSE503.1	Mid Term-1 & End Sem Exam
7	What is an Emulator / Android AVD?	Lecture	CSE503.1	Mid Term-1 & End Sem Exam
8	Design criteria for Android Application	Lecture	CSE503.2	Mid Term-1 & End Sem Exam
9	Hardware Design Consideration, Design Demands for Android application	Lecture	CSE503.2	Mid Term-1 & End Sem Exam
10	Intent	Lecture	CSE503.2	Mid Term-1 & End Sem Exam
11	Activity	Lecture	CSE503.2	Mid Term-1 & End Sem Exam
12	Activity Lifecycle and Manifest	Lecture	CSE503.2	Mid Term-1 & End Sem Exam
13	Creating Application and new Activities	Lecture	CSE503.2	Mid Term-1 & End Sem Exam
14	Simple UI -Layouts and Layout	Lecture	CSE503.2	Mid Term-1 & End Sem Exam
15	Properties: Introduction to android UI design	Lecture	CSE503.2	Mid Term-1 & End Sem Exam

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16	Introducing Layouts	Lecture	CSE503.2	Mid Term-1

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				& End Sem Exam
17	GUI Object	Lecture	CSE503.3	Mid Term-1 & End Sem Exam
18	Layout design concepts	Lecture	CSE503.3	Mid Term-1 & End Sem Exam
19	Event driven Programming in Android	Lecture	CSE503.3	Mid Term-1 & End Sem Exam
20	Text Edit, Button clicked etc	Lecture	CSE503.3	Mid Term-1 & End Sem Exam
21	Activity Lifecycle of Android	Lecture	CSE503.3	Mid Term-1 & End Sem Exam
22	Activity Lifecycle of Android	Lecture	CSE503.3	Mid Term-1 & End Sem Exam
23	Exception handling	Lecture	CSE503.3	Mid Term-1 & End Sem Exam
24	Basic Menu	Lecture	CSE503.3	Mid Term-1 & End Sem Exam
25	Custom v/s System Menus	Lecture	CSE503.4	Quiz & End Sem Exam
26	Create and Use Handset menu Button	Lecture	CSE503.4	Quiz & End Sem Exam
27	Dialog : Creating and Altering Dialogs Toa	Lecture	CSE503.4	Quiz & End Sem Exam
28	List & Adapters Demo Application Development	Lecture	CSE503.4	Quiz & End Sem Exam
29	List & Adapters Demo Application Development	Lecture	CSE503.4	Quiz & End Sem Exam
30	Launching Basic operation of SQLite	Lecture	CSE503.5	Quiz & End Sem Exam
31	SQLite Database Android Application Priorities	Lecture	CSE503.5	Quiz & End Sem Exam
32	MySql	Lecture	CSE503.5	Quiz & End Sem Exam
33	Revision	Lecture	Revision	
34	Revision	Lecture	Revision	
35	Revision	Lecture	Revision	
36	Revision	Lecture	Revision	

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J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE503.1	Understand Android app development it's Installation and configuration.															
CSE503.2	Design and develop User Interfaces for the Android platform.	3	2	2										1		
CSE503.3	Implement advanced UI component and exception handling.	3	2	1												
CSE503.4	Apply Java concepts to implement event driven programming in Android app development.	3														
CSE503.5	Apply Database concepts to Android app development to manage connection with Mysql and SQLite databases.	3														

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ESE MARKS CSE503

S. No.	Enrollment.No.	Student's Name	CSE503							
			INTRODUCTION TO ANDROID APPLICATION DEVELOPMENT							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U23G23
1	A60205218006	Mr UDAY SINGH RAJAWAT	100	30	70	A	9	3	3	27
2	A60205218002	Mr DHRUV KUMAR AGARWAL	100	30	70	A-	8	3	3	24
3	A60205218001	Ms MANASI SRIVASTAVA	100	30	70	A	9	3	3	27
4	A60205218004	Mr DEVASHISH PATIL	100	30	70	A-	8	3	3	24
5	A60205218008	Mr AKSHAT MISHRA	100	30	70	A	9	3	3	27
6	A60205218007	Ms PRIYANSHI GUPTA	100	30	70	A-	8	3	3	24
7	A60205218014	Mr KRATIK JAIN	100	30	70	A-	8	3	3	24
8	A60205218010	Mr AMAN BHATNAGAR	100	30	70	B	6	3	3	18
9	A60205218003	Mr ANURAG KOTNALA	100	30	70	B+	7	3	3	21
10	A60205218009	Ms ADITI LIKHAR	100	30	70	A-	8	3	3	24
11	A60205218016	Mr SWAPNIL RAI	100	30	70	B+	7	3	3	21
12	A60205218015	Mr SHUBHAM JAIN	100	30	70	A	9	3	3	27
13	A60205218012	Mr SOURABH SINGH TOMAR	100	30	70	B	6	3	3	18
14	A60205218017	Mr ILAPANDA SUHASH	100	30	70	B	6	3	3	18
15	A60205218018	Mr ANUBHAV KADAM	100	30	70	B-	5	3	3	15
16	A60205218011	Ms TAMANNAKUMARI MANOJKUMAR	100	30	70	A-	8	3	3	24
17	A60205218020	Mr AMAN GUPTA	100	30	70	A-	8	3	3	24
18	A60205218005	Mr SAKSHAM CHATURVEDI	100	30	70	B	6	3	3	18
19	A60205218025	Mr ARPIT SAXENA	100	30	70	B	6	3	3	18
20	A60205218026	Mr ABHISHEK PANCHOLI	100	30	70	B+	7	3	3	21
21	A60205218028	Mr VARUN VIKRAM	100	30	70	B	6	3	3	18
22	A60205218033	Ms PRIYANSHI SHARMA	100	30	70	A	9	3	3	27
23	A60205218034	Mr V. SAMARTH CHANDRA	100	30	70	B	6	3	3	18
24	A60205218013	Mr PRANAY GUPTA	100	30	70	B	6	3	3	18
25	A60205218037	Ms NEHA VERMA	100	30	70	B+	7	3	3	21
26	A60205218022	Mr DEEPESH KUSHWAH	100	30	70	B+	7	3	3	21
27	A60205218024	Mr ASHISH TARKESHWAR SINGH	100	30	70	B	6	3	3	18
28	A60205218030	Ms AEIKNOR KAUR VIRK	100	30	70	A+	10	3	3	30
29	A60205218023	Ms ADITI SHARMA	100	30	70	A+	10	3	3	30
30	A60205218019	Mr PRAYAG DUBEY	100	30	70	A-	8	3	3	24
31	A60205218032	Mr AYUSH SHARMA	100	30	70	B+	7	3	3	21
32	A60205218031	Mr KETANDEEP SHARMA	100	30	70	A	9	3	3	27
33	A60205218027	Mr AYUSH CHANDRA	100	30	70	B	6	3	3	18
34	A60205218043	Mr ANMOL SAXENA	100	30	70	B	6	3	3	18
35	A60205218044	Ms NIHARIKA SINGH	100	30	70	A-	8	3	3	24

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36	A60205218040	Mr ASHIRWAD VERMA	100	30	70	A-	8	3	3	24
37	A60205218046	Mr KETAN AGRAWAL	100	30	70	B-	5	3	3	15
38	A60205218036	Mr AYUSH SHARMA	100	30	70	A-	8	3	3	24
39	A60205218021	Mr YOGENDRA BHADORIA	100	30	70	B	6	3	3	18
40	A60205218029	Ms PRAGATI TIWARI	100	30	70	A-	8	3	3	24
41	A60205218039	Mr SIDDHANT SINGH KAURAV	100	30	70	B+	7	3	3	21
42	A60205218041	Mr ABHISHEK SINGH	100	30	70	B+	7	3	3	21
43	A60205218038	Ms MANYA SINGH	100	30	70	B+	7	3	3	21
44	A60205218051	Mr SHIVAM SHARMA	100	30	70	A	9	3	3	27
45	A60205218053	Mr SWAPNIL PALIYA	100	30	70	B+	7	3	3	21
46	A60205218055	Mr SURAJ NEEKHARA	100	30	70	A	9	3	3	27
47	A60205218063	Mr MILKY SHRIVASTAVA	100	30	70	B	6	3	3	18
48	A60205218064	Ms ANVI TOMAR	100	30	70	A	9	3	3	27
49	A60205218049	Mr YOGESH SINGH	100	30	70	B	6	3	3	18
50	A60205218045	Mr VAIBHAV BANERJEE	100	30	70	A-	8	3	3	24
51	A60205218066	Mr PRATEEK SAHGAL	100	30	70	B	6	3	3	18
52	A60205218060	Mr PRABHANSHOO SHRIVASTAVA	100	30	70	B+	7	3	3	21
53	A60205218054	Mr ABHISHEK DWIVEDI	100	30	70	A-	8	3	3	24
54	A60205218048	Ms VAISHNAVI RAWAT	100	30	70	A-	8	3	3	24
55	A60205218065	Mr SATYAM SHARMA	100	30	70	A-	8	3	3	24
56	A60205218050	Mr DEEPAK SHARMA	100	30	70	A-	8	3	3	24
57	A60205218059	Mr KARAN TAMBAT	100	30	70	A	9	3	3	27
58	A60205218047	Ms RIMJHIM CHHAYA	100	30	70	A+	10	3	3	30
59	A60205218062	Ms ANKITA SHUKLA	100	30	70	A-	8	3	3	24
60	A60205218072	Mr SARTHAK GUPTA	100	30	70	B	6	3	3	18
61	A60205218073	Mr HRITUJ AGRAHARI	100	30	70	B+	7	3	3	21
62	A60205218071	Mr MUKUL AGARWAL	100	30	70	B+	7	3	3	21
63	A60205218075	Mr PRADYUMN SHARMA	100	30	70	A	9	3	3	27
64	A60205218058	Mr BHUPENDRA UPADHYAY	100	30	70	B+	7	3	3	21
65	A60205218070	Ms ANSHITA CHANDEL	100	30	70	B+	7	3	3	21
66	A60205218068	Mr RISHABH SHRIVASTAVA	100	30	70	B	6	3	3	18
67	A60205218079	Mr RISHABH JAIN	100	30	70	B-	5	3	3	15
68	A60205218074	Ms APOORVA GOSAIN	100	30	70	B-	5	3	3	15
69	A60205218078	Mr SHEIKH ABDUL ANAS	100	30	70	A-	8	3	3	24
70	A60205218067	Mr RISHABH KULSHRESTHA	100	30	70	B	6	3	3	18
71	A60205218077	Mr PRIYANSH JAISWAL	100	30	70	B+	7	3	3	21

Average Grade Point = 521/71 (Total Grade point/Total no of students) = 7.3
No of students getting greater than average(7.3) marks = 33 students = 46.4%

Total No. of Students	=	71
Level 1	<50% - Average marks	46.4%
Attainment Level		Level 1

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Note: Attainment Level

Level 1	<50% - Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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Gwalior
Madhya Pradesh

AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course : ADVANCED JAVA PROGRAMMING
Course Code : CSE504, Crédits : 03, Session :2020-21(Odd Sem.), Class : B.Tech. IIIrd Year
Faculty Name : Dr. Pratiksha Gautam

A. Introduction: The objective is to equip the students with the advanced feature of contemporary java which would enable them to handle complex programs relating to managing data and processes over the Enterprise network. The major objective of this course is to provide a sound foundation to the students on the concepts, precepts and practices, in a field that is of immense concern to the industry and business

B. Course Outcomes: At the end of the course, students will be able to:

CSE504.1. Implement and develop Java Applets, Beans programming.

CSE504.2. Understand Advanced Java Networking concepts and develop server side application.

CSE504.3. Study Server Side Programming Concepts and create Dynamic web Application.

CSE504.4. Implement JDBC Principles and can interact with back end database with java programming.

CSE504.5. Analyze application server and enterprise level applications.

C. Program Outcomes:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

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PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

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PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Program Specific Outcomes:

PSO1. Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO3. Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur and a zest for higher studies.

E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Presentation		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves Including medical leaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

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F. Syllabus

Module I: Introduction to Java:

Introduction to Java RMI, RMI services, RMI client, Running client and server, Introduction of swing, swing components, Introduction to Multimedia Programming

Module II: JDBC:

Database Connectivity using JDBC- Understanding JDBC, Define the layers in JDBC architecture, various types of JDBC drivers, manipulating various SQL Queries, Manage transactions and perform batch updates in JDBC, Creating Database Connectivity Applications, Connection to Database with the java.sql Package

Module III: Server Side Programming:

Introduction to sever side programming, Introduction to Servlets, Web Container, Servlet Life Cycle, Servlet based Applications, Servlet and HTML. Web.xml file. Session tracking

Module IV: JSP:

JSP: Introduction to JSP, JSP architecture, JSP syntax Basics, JSP implicit objects, JSP based Applications. The Model-View-Controller Architecture. Session management

Module V: Enterprise Java Beans:

Enterprise Java Beans:-EJB roles—EJB Client-Object -container-Transaction Management—implementing a Basic EJB Object-Implementing session Beans-Implementing Entity Beans-Deploying an enterprise Java Beans Object-Changes in EJB1.1 specification

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- Java 2 Unleashed (Techmedia – SAMS) By Jamie Jaworski
- Professional Java Server Programming (a Press) By Allamaraju
- Developing Java Servlets (Techmedia – SAMS) By James Goodwill
- Using Java 1.2 Special Edition (PHI) By Webber

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction to Java	Lecture	CSE504.1	Mid Term-1, Quiz & End Sem Exam
2	RMI, RMI services	Lecture	CSE504.1	Mid Term-1, Quiz & End Sem Exam
3	RMI client	Lecture	CSE504.1	Mid Term-1, Quiz & End Sem Exam

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4	Running client and server	Lecture	CSE504.1	Mid Term-1, Quiz & End Sem Exam
5	Introduction of swing	Lecture	CSE504.1	Mid Term-1, Quiz & End Sem Exam
6	swing components	Lecture	CSE504.1	Mid Term-1, Quiz & End Sem Exam
7	Introduction to Multimedia Programming	Lecture	CSE504.1	Mid Term-1, Quiz & End Sem Exam
8	Database Connectivity using JDBC- Understanding JDBC	Lecture	CSE504.2	Mid Term-1, Quiz & End Sem Exam
9	Define the layers in JDBC architecture	Lecture	CSE504.2	Mid Term-1, Quiz & End Sem Exam
10	various types of JDBC drivers,	Lecture	CSE504.2	Mid Term-1, Quiz & End Sem Exam
11	manipulating various SQL Queries	Lecture	CSE504.2	Mid Term-1, Quiz & End Sem Exam
12	Manage transactions and perform batch updates in JDBC	Lecture	CSE504.2	Mid Term-1, Quiz & End Sem Exam
13	Creating Database Connectivity Applications	Lecture	CSE504.2	Mid Term-1, Quiz & End Sem Exam
14	Connection to Database with the java.sql Package.	Lecture	CSE504.2	Mid Term-1, Quiz & End Sem Exam
15	Introduction to sever side programming	Lecture	CSE504.3	Mid Term-1, Quiz & End Sem Exam
16	Introduction to Servlets	Lecture	CSE504.3	Mid Term-1, Quiz & End Sem Exam
17	Web Container	Lecture	CSE504.3	Mid Term-1, Quiz & End Sem Exam
18	Servlet Life Cycle,	Lecture	CSE504.3	Mid Term-1, Quiz & End Sem Exam
19	Servlet based Applications	Lecture	CSE504.3	Mid Term-1, Quiz & End Sem Exam

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20	Servlet and HTML	Lecture	CSE504.3	Mid Term-1, Quiz & End Sem Exam
21	Web.xml file.	Lecture	CSE504.3	Assignment , Quiz & End Sem Exam
22	Session tracking	Lecture	CSE504.3	Assignment, Quiz & End Sem Exam
23	JSP: Introduction to JSP	Lecture	CSE504.4	Assignment, Quiz & End Sem Exam
24	JSP architecture	Lecture	CSE504.4	Assignment, Quiz & End Sem Exam
25	JSP syntax Basics	Lecture	CSE504.4	Assignment, Quiz & End Sem Exam
26	JSP implicit objects	Lecture	CSE504.4	Assignment, Quiz & End Sem Exam
27	JSP based Applications	Lecture	CSE504.4	Assignment, Quiz & End Sem Exam
28	The Model-View-Controller Architecture	Lecture	CSE504.4	Assignment, Quiz & End Sem Exam
29	Session management	Lecture	CSE504.4	Assignment, Quiz & End Sem Exam
30	Enterprise Java Beans	Lecture	CSE504.5	Presentation, Quiz & End Sem Exam
31	EJB roles	Lecture	CSE504.5	Presentation, Quiz & End Sem Exam
32	EJB Client-Object -container-Transaction Management	Lecture	CSE504.5	Presentation, Quiz & End Sem Exam
33	Management—implementing a Basic EJB	Lecture	CSE504.5	Presentation, Quiz & End Sem Exam
34	Object-Implementing session Beans-Implementing Entity Beans	Lecture	CSE504.5	Presentation, Quiz & End Sem Exam
35	Beans-Deploying an enterprise Java Beans Object	Lecture	CSE504.5	Presentation, Quiz & End Sem Exam

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36	Changes in EJB1.1 specification	Lecture	CSE504.5	Presentation, Quiz & End Sem Exam

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J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE504.1	Implement and develop Java Applets, Beans programming.	3												1		
CSE504.2	Understand Advanced Java Networking concepts and develop server side application.															
CSE504.3	Study Server Side Programming Concepts and create Dynamic web Application.	3	2													
CSE504.4	Implement JDBC Principles and can interact with back end database with java programming.	3	2	2												
CSE504.5	Analyze application server and enterprise level applications.	3	2													

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ESE Marks – CSE504

S. No.	Enrolment No.	Student's Name	CSE504 ADVANCED JAVA PROGRAMMING							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U15G15
1	A60205218006	Mr UDAY SINGH RAJAWAT	100	30	70	B+	7	3	3	21
2	A60205218002	Mr DHRUV KUMAR AGARWAL	100	30	70	A	9	3	3	27
3	A60205218001	Ms MANASI SRIVASTAVA	100	30	70	A+	10	3	3	30
4	A60205218004	Mr DEVASHISH PATIL	100	30	70	A+	10	3	3	30
5	A60205218008	Mr AKSHAT MISHRA	100	30	70	A	9	3	3	27
6	A60205218007	Ms PRIYANSHI GUPTA	100	30	70	A-	8	3	3	24
7	A60205218014	Mr KRATIK JAIN	100	30	70	A-	8	3	3	24
8	A60205218010	Mr AMAN BHATNAGAR	100	30	70	B+	7	3	3	21
9	A60205218003	Mr ANURAG KOTNALA	100	30	70	A-	8	3	3	24
10	A60205218009	Ms ADITI LIKHAR	100	30	70	B+	7	3	3	21
11	A60205218016	Mr SWAPNIL RAI	100	30	70	B	6	3	3	18
12	A60205218015	Mr SHUBHAM JAIN	100	30	70	A+	10	3	3	30
13	A60205218012	Mr SOURABH SINGH TOMAR	100	30	70	B-	5	3	3	15
14	A60205218017	Mr ILAPANDA SUHASH	100	30	70	B	6	3	3	18
15	A60205218018	Mr ANUBHAV KADAM	100	30	70	B	6	3	3	18
16	A60205218011	Ms TAMANNAKUMARI MANOJKUMAR	100	30	70	A	9	3	3	27
17	A60205218020	Mr AMAN GUPTA	100	30	70	B+	7	3	3	21
18	A60205218005	Mr SAKSHAM CHATURVEDI	100	30	70	A-	8	3	3	24
19	A60205218025	Mr ARPIT SAXENA	100	30	70	A-	8	3	3	24
20	A60205218026	Mr ABHISHEK PANCHOLI	100	30	70	A-	8	3	3	24
21	A60205218028	Mr VARUN VIKRAM	100	30	70	B	6	3	3	18
22	A60205218033	Ms PRIYANSHI SHARMA	100	30	70	A-	8	3	3	24
23	A60205218034	Mr V. SAMARTH CHANDRA	100	30	70	B	6	3	3	18
24	A60205218013	Mr PRANAY GUPTA	100	30	70	B+	7	3	3	21
25	A60205218037	Ms NEHA VERMA	100	30	70	B+	7	3	3	21
26	A60205218022	Mr DEEPESH KUSHWAH	100	30	70	B	6	3	3	18
27	A60205218024	Mr ASHISH TARKESHWAR SINGH	100	30	70	A-	8	3	3	24
28	A60205218030	Ms AEIKNOR KAUR VIRK	100	30	70	A-	8	3	3	24
29	A60205218023	Ms ADITI SHARMA	100	30	70	A	9	3	3	27
30	A60205218019	Mr PRAYAG DUBEY	100	30	70	A	9	3	3	27
31	A60205218032	Mr AYUSH SHARMA	100	30	70	A-	8	3	3	24
32	A60205218031	Mr KETANDEEP SHARMA	100	30	70	B-	5	3	3	15
33	A60205218027	Mr AYUSH CHANDRA	100	30	70	A	9	3	3	27
34	A60205218043	Mr ANMOL SAXENA	100	30	70	B+	7	3	3	21
35	A60205218044	Ms NIHARIKA SINGH	100	30	70	B-	5	3	3	15
36	A60205218040	Mr ASHIRWAD VERMA	100	30	70	A	9	3	3	27
37	A60205218046	Mr KETAN AGRAWAL	100	30	70	B-	5	3	3	15

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38	A60205218036	Mr AYUSH SHARMA	100	30	70	B-	5	3	3	15
39	A60205218021	Mr YOGENDRA BHADORIA	100	30	70	A-	8	3	3	24
40	A60205218029	Ms PRAGATI TIWARI	100	30	70	B	6	3	3	18
41	A60205218039	Mr SIDDHANT SINGH KAURAV	100	30	70	B+	7	3	3	21
42	A60205218041	Mr ABHISHEK SINGH	100	30	70	B+	7	3	3	21
43	A60205218038	Ms MANYA SINGH	100	30	70	B+	7	3	3	21
44	A60205218051	Mr SHIVAM SHARMA	100	30	70	A-	8	3	3	24
45	A60205218053	Mr SWAPNIL PALIYA	100	30	70	B	6	3	3	18
46	A60205218055	Mr SURAJ NEEKHARA	100	30	70	B	6	3	3	18
47	A60205218063	Mr MILKY SHRIVASTAVA	100	30	70	B-	5	3	3	15
48	A60205218064	Ms ANVI TOMAR	100	30	70	A-	8	3	3	24
49	A60205218049	Mr YOGESH SINGH	100	30	70	B+	7	3	3	21
50	A60205218045	Mr VAIBHAV BANERJEE	100	30	70	B-	5	3	3	15
51	A60205218066	Mr PRATEEK SAHGAL	100	30	70	A-	8	3	3	24
52	A60205218060	Mr PRABHANSHOO SHRIVASTAVA	100	30	70	B-	5	3	3	15
53	A60205218054	Mr ABHISHEK DWIVEDI	100	30	70	B	6	3	3	18
54	A60205218048	Ms VAISHNAVI RAWAT	100	30	70	B+	7	3	3	21
55	A60205218065	Mr SATYAM SHARMA	100	30	70	A	9	3	3	27
56	A60205218050	Mr DEEPAK SHARMA	100	30	70	A	9	3	3	27
57	A60205218059	Mr KARAN TAMBAT	100	30	70	B+	7	3	3	21
58	A60205218047	Ms RIMJHIM CHHAYA	100	30	70	B+	7	3	3	21
59	A60205218062	Ms ANKITA SHUKLA	100	30	70	B+	7	3	3	21
60	A60205218072	Mr SARTHAK GUPTA	100	30	70	B+	7	3	3	21
61	A60205218073	Mr HRITUJ AGRAHARI	100	30	70	A-	8	3	3	24
62	A60205218071	Mr MUKUL AGARWAL	100	30	70	A-	8	3	3	24
63	A60205218075	Mr PRADYUMN SHARMA	100	30	70	B+	7	3	3	21
64	A60205218058	Mr BHUPENDRA UPADHYAY	100	30	70	B+	7	3	3	21
65	A60205218070	Ms ANSHITA CHANDEL	100	30	70	A-	8	3	3	24
66	A60205218068	Mr RISHABH SHRIVASTAVA	100	30	70	B	6	3	3	18
67	A60205218079	Mr RISHABH JAIN	100	30	70	B+	7	3	3	21
68	A60205218074	Ms APOORVA GOSAIN	100	30	70	B-	5	3	3	15
69	A60205218078	Mr SHEIKH ABDUL ANAS	100	30	70	A-	8	3	3	24
70	A60205218067	Mr RISHABH KULSHRESTHA	100	30	70	B+	7	3	3	21
71	A60205218077	Mr PRIYANSH JAISWAL	100	30	70	A-	8	3	3	24

Average Grade Point = 526/71 (Total Grade point/Total no of students) = 7.2
No of students getting greater than average (7.2) marks = 31 students = 43.7%

Total No. of Students	=	**71**
Level 1	<50% - Average marks	**43.7%**
Attainment Level		**Level 1**

Note: Attainment Level

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Level 1	<50% - Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course: INTRODUCTION TO ANDROID APPLICATION DEVELOPMENT LAB
Course Code : **CSE 523**, Crédits : 01, Session :2020-21(Odd Sem.), Class : B.Tech. 3rdYear
Faculty Name: Dr. Dinesh Sharma

A. **Introduction:** This course provides students with the knowledge of fundamentals of Android application; Android Application Development is a hands-on course which is designed for providing essential skills and experiences to the students in developing applications on mobile platform. The hands-on training is effective for beginners and experienced developers for practical Android Code Application.

B. **Course Outcomes:** At the end of the course, students will be able to:

CSE523.1. Study and setup Android app development it's Installation and configuration.

CSE523.2. Design and develop User Interfaces for the Android platform.

CSE523.3. Apply Java concepts to implement event driven programming in Android app development.

CSE523.4. Implement advanced UI component and exception handling.

CSE523.5. Apply Database concepts to Android app development to manage connection with Mysql and SQLite databases.

C. Program Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

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PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

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PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Program Specific Outcomes:

PSO1. Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO3. Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur and a zest for higher studies.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term Viva	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves Including medical leaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. List of experiments/demonstrations

1. Installation and setup of java development kit(JDK),setup android SDK,setup eclipse IDE,setup android development tools (ADT) plugins, create android virtual device.
2. Create "Hello World" application. That will display "Hello World" in the middle of the screen using

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TextView Widget in the red color.

3. Create application for demonstration of android activity life cycle.
4. Create Registration page to demonstration of Basic widgets available in android.

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5. Create sample application with login module. (Check username and password) On successful login, Change TextView “Login Successful”. And on failing login, alert user using Toast “Login fail”.
6. Create login application where you will have to validate usename and passwords till the username and password is not validated, login button should remain disabled.
7. Create and Login application as above. Validate login data and display Error to user using setError() method.
8. Create an application for demonstration of Relative and Table Layout in android.
9. Create an application for demonstration of Scroll view in android.
10. Create an application that will pass two number using Text View to the next screen, and on the next screen display sum of that number.
11. Create an application that will pass two number using Text View to the next screen, and on the next screen display sum of that number.
12. Create spinner with strings taken from resource folder (res >> value folder). On changing spinner value, change background of screen.

Examination Scheme:

IA			EE			
A	PR	Practical Based Test	Major Experiment	Minor Experiment	LR	Viva
5	10	15	35	15	10	10

Note: IA- Internal Assessment, EE- External Exam, A-Attendance, PR- Performance, LR- Lab Record, V-Viva.

Text & References:

Text:

- Professional Android
- Application Development, Reto Meier
- Beginning Android, Mark L Murphy
- Pro Android, S.Y Hashimi & Satya Komatineni

References:

- Android Studio Development Essentials, Neil Smyth
- The Definitive Guide to SQL Lite, Michael Owens
- Building Android Apps, IN EASY STEPS

1. **Lab Plan**

Practical	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Installation and setup of java development kit(JDK),setup android SDK,setup eclipse IDE,setup android development tools (ADT) plugins, create android virtual device.	Practical	CSE523.1	Mid Term-1, Quiz & End Sem Exam

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2	Create "Hello World" application. That will display "Hello World" in the middle of the screen using TextView Widget in the red color.	Practical	CSE523.1	Mid Term-1, Quiz & End Sem Exam
3	Create application for demonstration of android activity life cycle.	Practical	CSE523.1	Mid Term-1, Quiz & End Sem Exam
4	Create Registration page to demonstration of Basic widgets available in android.	Practical	CSE523.1	Mid Term-1, Quiz & End Sem Exam
5	Create sample application with login module. (Check username and password) On successful login, Change TextView "Login Successful". And on failing login, alert user using Toast "Login fail".	Practical	CSE523.1	Mid Term-1, Quiz & End Sem Exam
6	Create login application where you will have to validate usename and passwords till the username and password is not validated, login button should remain disabled.	Practical	CSE523.2	Mid Term-1, Quiz & End Sem Exam
7	Create and Login application as above. Validate login data and display Error to user using setError() method.	Practical	CSE523.2	Mid Term-1, Quiz & End Sem Exam
8	Create an application for demonstration of Relative and Table Layout in android.	Practical	CSE523.3	Mid Term-1, Quiz & End Sem Exam
9	Create an application for demonstration of Scroll view in android.	Practical	CSE523.3	Mid Term-1, Quiz & End Sem Exam
10	Create an application that will pass two number using Text View to the next screen, and on the next screen display sum of that number.	Practical	CSE523.4	Mid Term-1, Quiz & End Sem Exam

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11	Create an application that will pass two number using Text View to the next screen, and on the next screen display sum of that number.	Practical	CSE523.5	Mid Term-1, Quiz & End Sem Exam
12	Create spinner with strings taken from resource folder (res >> value folder). On changing spinner value, change background of screen.	Practical	CSE523.5	Mid Term-1, Quiz & End Sem Exam

2. **Course Articulation Matrix (Mapping of COs with POs)**

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME-SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE523.1	Study and setup Android app development it's Installation and configuration.															
CSE523.2	Design and develop User Interfaces for the Android platform.	3		1										1		
CSE523.3	Apply Java concepts to implement event driven programming in Android app development.	2														
CSE523.4	Implement advanced UI component and exception handling.	3		1										1		

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CSE523.5	Apply Database concepts to Android app development to manage connection with Mysql and SQLite databases.	2		1										1		

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ESE MARKS CSE523

S. No.	Enrollment.No.	Student's Name	CSE523 INTRODUCTION TO ANDROID APPLICATION DEVELOPMENT LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U24G24
1	A60205218006	Mr UDAY SINGH RAJAWAT	100	30	70	A-	8	1	1	8
2	A60205218002	Mr DHRUV KUMAR AGARWAL	100	30	70	A+	10	1	1	10
3	A60205218001	Ms MANASI SRIVASTAVA	100	30	70	A	9	1	1	9
4	A60205218004	Mr DEVASHISH PATIL	100	30	70	B+	7	1	1	7
5	A60205218008	Mr AKSHAT MISHRA	100	30	70	A+	10	1	1	10
6	A60205218007	Ms PRIYANSHI GUPTA	100	30	70	B+	7	1	1	7
7	A60205218014	Mr KRATIK JAIN	100	30	70	A	9	1	1	9
8	A60205218010	Mr AMAN BHATNAGAR	100	30	70	B+	7	1	1	7
9	A60205218003	Mr ANURAG KOTNALA	100	30	70	B+	7	1	1	7
10	A60205218009	Ms ADITI LIKHAR	100	30	70	A+	10	1	1	10
11	A60205218016	Mr SWAPNIL RAI	100	30	70	B-	5	1	1	5
12	A60205218015	Mr SHUBHAM JAIN	100	30	70	A+	10	1	1	10
13	A60205218012	Mr SOURABH SINGH TOMAR	100	30	70	B	6	1	1	6
14	A60205218017	Mr ILAPANDA SUHASH	100	30	70	B-	5	1	1	5
15	A60205218018	Mr ANUBHAV KADAM	100	30	70	B	6	1	1	6
16	A60205218011	Ms TAMANNAKUMARI MANOJKUMAR	100	30	70	B+	7	1	1	7
17	A60205218020	Mr AMAN GUPTA	100	30	70	B+	7	1	1	7
18	A60205218005	Mr SAKSHAM CHATURVEDI	100	30	70	B	6	1	1	6
19	A60205218025	Mr ARPIT SAXENA	100	30	70	A-	8	1	1	8
20	A60205218026	Mr ABHISHEK PANCHOLI	100	30	70	A	9	1	1	9
21	A60205218028	Mr VARUN VIKRAM	100	30	70	B	6	1	1	6
22	A60205218033	Ms PRIYANSHI SHARMA	100	30	70	A-	8	1	1	8
23	A60205218034	Mr V. SAMARTH CHANDRA	100	30	70	B+	7	1	1	7
24	A60205218013	Mr PRANAY GUPTA	100	30	70	B	6	1	1	6
25	A60205218037	Ms NEHA VERMA	100	30	70	B+	7	1	1	7
26	A60205218022	Mr DEEPESH KUSHWAH	100	30	70	B+	7	1	1	7
27	A60205218024	Mr ASHISH TARKESHWAR SINGH	100	30	70	B	6	1	1	6
28	A60205218030	Ms AEIKNOR KAUR VIRK	100	30	70	A+	10	1	1	10
29	A60205218023	Ms ADITI SHARMA	100	30	70	A+	10	1	1	10
30	A60205218019	Mr PRAYAG DUBEY	100	30	70	B+	7	1	1	7
31	A60205218032	Mr AYUSH SHARMA	100	30	70	B+	7	1	1	7
32	A60205218031	Mr KETANDEEP SHARMA	100	30	70	A-	8	1	1	8
33	A60205218027	Mr AYUSH CHANDRA	100	30	70	B+	7	1	1	7
34	A60205218043	Mr ANMOL SAXENA	100	30	70	B+	7	1	1	7
35	A60205218044	Ms NIHARIKA SINGH	100	30	70	B+	7	1	1	7
36	A60205218040	Mr ASHIRWAD VERMA	100	30	70	A+	10	1	1	10

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37	A60205218046	Mr KETAN AGRAWAL	100	30	70	B+	7	1	1	7
38	A60205218036	Mr AYUSH SHARMA	100	30	70	B+	7	1	1	7
39	A60205218021	Mr YOGENDRA BHADORIA	100	30	70	B	6	1	1	6
40	A60205218029	Ms PRAGATI TIWARI	100	30	70	B+	7	1	1	7
41	A60205218039	Mr SIDDHANT SINGH KAURAV	100	30	70	B+	7	1	1	7
42	A60205218041	Mr ABHISHEK SINGH	100	30	70	B+	7	1	1	7
43	A60205218038	Ms MANYA SINGH	100	30	70	A	9	1	1	9
44	A60205218051	Mr SHIVAM SHARMA	100	30	70	A	9	1	1	9
45	A60205218053	Mr SWAPNIL PALIYA	100	30	70	B	6	1	1	6
46	A60205218055	Mr SURAJ NEEKHARA	100	30	70	A-	8	1	1	8
47	A60205218063	Mr MILKY SHRIVASTAVA	100	30	70	B-	5	1	1	5
48	A60205218064	Ms ANVI TOMAR	100	30	70	A	9	1	1	9
49	A60205218049	Mr YOGESH SINGH	100	30	70	B	6	1	1	6
50	A60205218045	Mr VAIBHAV BANERJEE	100	30	70	A	9	1	1	9
51	A60205218066	Mr PRATEEK SAHGAL	100	30	70	A-	8	1	1	8
52	A60205218060	Mr PRABHANSHOO SHRIVASTAVA	100	30	70	A	9	1	1	9
53	A60205218054	Mr ABHISHEK DWIVEDI	100	30	70	A-	8	1	1	8
54	A60205218048	Ms VAISHNAVI RAWAT	100	30	70	B+	7	1	1	7
55	A60205218065	Mr SATYAM SHARMA	100	30	70	A-	8	1	1	8
56	A60205218050	Mr DEEPAK SHARMA	100	30	70	A-	8	1	1	8
57	A60205218059	Mr KARAN TAMBAT	100	30	70	A-	8	1	1	8
58	A60205218047	Ms RIMJHIM CHHAYA	100	30	70	A-	8	1	1	8
59	A60205218062	Ms ANKITA SHUKLA	100	30	70	A	9	1	1	9
60	A60205218072	Mr SARTHAK GUPTA	100	30	70	B	6	1	1	6
61	A60205218073	Mr HRITUJ AGRAHARI	100	30	70	B-	5	1	1	5
62	A60205218071	Mr MUKUL AGARWAL	100	30	70	B	6	1	1	6
63	A60205218075	Mr PRADYUMN SHARMA	100	30	70	A-	8	1	1	8
64	A60205218058	Mr BHUPENDRA UPADHYAY	100	30	70	A-	8	1	1	8
65	A60205218070	Ms ANSHITA CHANDEL	100	30	70	B+	7	1	1	7
66	A60205218068	Mr RISHABH SHRIVASTAVA	100	30	70	B+	7	1	1	7
67	A60205218079	Mr RISHABH JAIN	100	30	70	B	6	1	1	6
68	A60205218074	Ms APOORVA GOSAIN	100	30	70	B	6	1	1	6
69	A60205218078	Mr SHEIKH ABDUL ANAS	100	30	70	B+	7	1	1	7
70	A60205218067	Mr RISHABH KULSHRESTHA	100	30	70	A-	8	1	1	8
71	A60205218077	Mr PRIYANSH JAISWAL	100	30	70	B+	7	1	1	7

Average Grade Point = 529/71 (Total Grade point/Total no of students) = 7.45
No of students getting greater than average(7.45) marks = 30 students = 42.25%

Total No. of Students	=	**71**
Level 1	<50% - Average marks	**42.25%**

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Attainment Level		Level 1

Note: Attainment Level

Level 1	<50% - Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course : ADVANCED JAVA PROGRAMMING LAB
Course Code : CSE524, Crédits : 01, Session :2020-21(Odd Sem.), Class : B.Tech. IIIrd Year
Faculty Name : Ms. Anchal Bhatt

A. Introduction: The objective is to equip the students with the advanced feature of contemporary java which would enable them to handle complex programs relating to managing data and processes over the Enterprise network. The major objective of this course is to provide a sound foundation to the students on the concepts, precepts and practices, in a field that is of immense concern to the industry and business

B. Course Outcomes: At the end of the course, students will be able to:

CSE524.1. Design and develop Java Applets, Beans programming.

CSE524.2. Design and structure the Server Side Programming Concepts.

CSE524.3. Create and design Dynamic web Application.

CSE524.4. Implement the structured code for JDBC (back end database).

CSE504.5. Develop and design the enterprise level applications.

Program Outcomes:

[PO.1].Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration forthepublichealthandsafety,andthecultural,societal,andenvironmentalconsiderations

[PO.4]. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5].Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

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[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader

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in diverse teams, and in multidisciplinary settings

[PO.10].Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11].Projectmanagementandfinance:Demonstrateknowledgeandunderstandingoftheengineering andmanagementprinciplesandapplythesetoone'sownwork,asamemberandleaderinateam,tomanageprojectsandinmultidisciplinaryenvironments

[PO.12].Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

C. Program Specific Outcomes:

PSO1. Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO3. Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

D. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Presentation		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25%includesalltypesofleaves Including medical leaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

E. Syllabus

List of experiments/demonstrations:

1. Implement two services that should be run on a given network host. You should use Java RMI. Develop a basic arithmetic calculator with the help of java RMI. (2 Hours)
2. Write a Java program that can create an employee form for inserting the detail of employee in an

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organization by using Applets create a JFrame which have labels, text box, Radio button, Check Box, button etc. (2 Hours)

3. For the above form write a programme to handle the events for checking the data input by user. (2 Hours)
4. WAP that implement a JApplet and display the following frame. (2 Hours)

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a. Customer name
b. Customer number
c. Age
d. Address

5. Write a Java program to access a table Employees for Oracle Sample database in HR Schema using Java code. (1 Hour)
6. Write a Java program to manipulate a table Employees for Oracle Sample database in HR Schema using Java code. (1 Hour)
7. Write a Java program that implement a simple servlet program. (2 Hours)
8. Write a Java program for authentication. (2 Hours)
    a. Create the Web Page for User-Name and Password
    b. Validate the login-id and password by the servlet code.
    c. Connecting a database using user-id and password.
9. Write a Java program to product selling web site. (2 Hours)
    a. Read data send by the client (HTML page)
    b. Insert data into the database using the prepared statement.
    c. Display the output to client for item purchased or not.
10. Write a Java program to include a HTML page into a JSP page to product purchasing. (2 Hours)
    a. Read data send by the client (HTML page)
    b. Insert data into the database using the prepared statement.
    c. Display the output to client for item purchased or not.
11. Write a Java program using Enterprise Java Beans for creating an application. (2 Hours)
    d. Adding a Session EJB component to handle the business logic of the J2EE Application.
    a. Integrating the DAO into the Session EJB.
    b. Adding an Entity EJB
    c. Integrating the Entity EJB into the Session EJB.
    d. Interfacing the Web Tier with the Session EJB.

A. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

B. Suggested Text/Reference Books:

- Java 2 Unleashed (Techmedia – SAMS) By Jamie Jaworski
- Professional Java Server Programming (a Press) By Allamaraju
- Developing Java Servlets (Techmedia – SAMS) By James Goodwill
- Using Java 1.2 Special Edition (PHI) By Webber

C. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO

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1	Implement two services that should be run on a given network host. You should use Java RMI. Develop a basic arithmetic calculator with the help of java RMI.	Practical	CSE524.1	Mid Term-1, Quiz & End Sem Exam
2	Write a Java program that can create an employee	Practical	CSE524.2	Mid Term-1, Quiz &
	form for inserting the detail of employee in an organization by using Applets create a JFrame which have labels, text box, Radio button, Check Box, button etc.			End Sem Exam
3	For the above form write a programme to handle the events for checking the data input by user	Practical	CSE524.2	Mid Term-1, Quiz & End Sem Exam
4	WAP that implement a JApplet and display the following frame. a. Customer name b. Customer number c. Age d. Address	Practical	CSE524.2	Mid Term-1, Quiz & End Sem Exam
5	Write a Java program to access a table Employees for Oracle Sample database in HR Schema using Java code.	Practical	CSE524.2	Mid Term-1, Quiz & End Sem Exam
6	Write a Java program to manipulate a table Employees for Oracle Sample database in HR Schema using Java code	Practical	CSE524.2	Mid Term-1, Quiz & End Sem Exam
7	Write a Java program that implement a simple servlet program.	Practical	CSE524.3	Mid Term-1, Quiz & End Sem Exam

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8	Write a Java program for authentication. a). Create the Web Page for User-Name and Password b). Validate the login-id and password by the servlet code. c). Connecting a database using user-id and password	Practical	CSE524.3	Mid Term-1, Quiz & End Sem Exam
9	Write a Java program to product selling web site. a) Read data send by the client (HTML page) b) Insert data into the database using the prepared statement. c) Display the output to client for item purchased or not.	Practical	CSE524.	Mid Term-1, Quiz & End Sem Exam
10	Write a Java program to include a HTML page into a JSP page to product purchasing. (2 Hours) a) Read data send by the client (HTML page) b) Insert data into the database using the prepared statement. c) Display the output to client for item purchased or not	Practical	CSE524.4	Mid Term-1, Quiz & End Sem Exam
11	Write a Java program using Enterprise Java Beans for creating an application. a) Adding a Session EJB component to handle the business logic of the J2EE Application. b) Integrating the DAO into the Session EJB. c) Adding an Entity EJB	Practical	CSE524.5	Mid Term-1, Quiz & End Sem Exam
12	Write a Java program using Enterprise Java Beans for creating an application. d) Integrating the Entity EJB into the Session EJB. e) Interfacing the Web Tier with the Session EJB.	Practical	CSE524.5	Mid Term-1, Quiz & End Sem Exam

D. Course Articulation Matrix (Mapping of COs with POs)

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CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE524.1	Design and develop Java Applets, Beans programming.	3	3	2										1		
CSE524.2	Design and structure the Server Side Programming Concepts.	3		2										1		
CSE524.3	Create and design Dynamic web Application.			2		1								1		
CSE524.4	Implement the structured code for JDBC (back end database).	3		2												
CSE524.5	Develop and design the enterprise level applications.			2										1		

ESE MARKS CSE524

S. No.	Enrollment.No.	Student's Name	CSE524 ADVANCED JAVA PROGRAMMING LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U18G18
1	A60205218006	Mr UDAY SINGH RAJAWAT	100	30	70	A-	8	1	1	8
2	A60205218002	Mr DHRUV KUMAR AGARWAL	100	30	70	A+	10	1	1	10
3	A60205218001	Ms MANASI SRIVASTAVA	100	30	70	A-	8	1	1	8
4	A60205218004	Mr DEVASHISH PATIL	100	30	70	A	9	1	1	9
5	A60205218008	Mr AKSHAT MISHRA	100	30	70	A-	8	1	1	8
6	A60205218007	Ms PRIYANSHI GUPTA	100	30	70	A	9	1	1	9
7	A60205218014	Mr KRATIK JAIN	100	30	70	B+	7	1	1	7
8	A60205218010	Mr AMAN BHATNAGAR	100	30	70	A-	8	1	1	8
9	A60205218003	Mr ANURAG KOTNALA	100	30	70	B+	7	1	1	7
10	A60205218009	Ms ADITI LIKHAR	100	30	70	A	9	1	1	9

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11	A60205218016	Mr SWAPNIL RAI	100	30	70	B	6	1	1	6
12	A60205218015	Mr SHUBHAM JAIN	100	30	70	A+	10	1	1	10
13	A60205218012	Mr SOURABH SINGH TOMAR	100	30	70	B+	7	1	1	7
14	A60205218017	Mr ILAPANDA SUHASH	100	30	70	B+	7	1	1	7
15	A60205218018	Mr ANUBHAV KADAM	100	30	70	B	6	1	1	6
16	A60205218011	Ms TAMANNAKUMARI MANOJKUMAR	100	30	70	A	9	1	1	9
17	A60205218020	Mr AMAN GUPTA	100	30	70	A-	8	1	1	8
18	A60205218005	Mr SAKSHAM CHATURVEDI	100	30	70	B+	7	1	1	7
19	A60205218025	Mr ARPIT SAXENA	100	30	70	B+	7	1	1	7
20	A60205218026	Mr ABHISHEK PANCHOLI	100	30	70	A-	8	1	1	8
21	A60205218028	Mr VARUN VIKRAM	100	30	70	B-	5	1	1	5
22	A60205218033	Ms PRIYANSHI SHARMA	100	30	70	A+	10	1	1	10
23	A60205218034	Mr V. SAMARTH CHANDRA	100	30	70	B+	7	1	1	7
24	A60205218013	Mr PRANAY GUPTA	100	30	70	A-	8	1	1	8
25	A60205218037	Ms NEHA VERMA	100	30	70	A-	8	1	1	8
26	A60205218022	Mr DEEPESH KUSHWAH	100	30	70	B+	7	1	1	7
27	A60205218024	Mr ASHISH TARKESHWAR SINGH	100	30	70	B+	7	1	1	7
28	A60205218030	Ms AEIKNOR KAUR VIRK	100	30	70	A-	8	1	1	8
29	A60205218023	Ms ADITI SHARMA	100	30	70	A	9	1	1	9
30	A60205218019	Mr PRAYAG DUBEY	100	30	70	B+	7	1	1	7
31	A60205218032	Mr AYUSH SHARMA	100	30	70	A-	8	1	1	8
32	A60205218031	Mr KETANDEEP SHARMA	100	30	70	B+	7	1	1	7
33	A60205218027	Mr AYUSH CHANDRA	100	30	70	B+	7	1	1	7
34	A60205218043	Mr ANMOL SAXENA	100	30	70	B-	5	1	1	5
35	A60205218044	Ms NIHARIKA SINGH	100	30	70	A-	8	1	1	8
36	A60205218040	Mr ASHIRWAD VERMA	100	30	70	B+	7	1	1	7
37	A60205218046	Mr KETAN AGRAWAL	100	30	70	A-	8	1	1	8
38	A60205218036	Mr AYUSH SHARMA	100	30	70	B	6	1	1	6
39	A60205218021	Mr YOGENDRA BHADORIA	100	30	70	B+	7	1	1	7
40	A60205218029	Ms PRAGATI TIWARI	100	30	70	B+	7	1	1	7
41	A60205218039	Mr SIDDHANT SINGH KAURAV	100	30	70	B+	7	1	1	7
42	A60205218041	Mr ABHISHEK SINGH	100	30	70	B	6	1	1	6
43	A60205218038	Ms MANYA SINGH	100	30	70	B	6	1	1	6
44	A60205218051	Mr SHIVAM SHARMA	100	30	70	A+	10	1	1	10
45	A60205218053	Mr SWAPNIL PALIYA	100	30	70	B	6	1	1	6
46	A60205218055	Mr SURAJ NEEKHARA	100	30	70	B	6	1	1	6
47	A60205218063	Mr MILKY SHRIVASTAVA	100	30	70	B+	7	1	1	7
48	A60205218064	Ms ANVI TOMAR	100	30	70	B	6	1	1	6
49	A60205218049	Mr YOGESH SINGH	100	30	70	B	6	1	1	6
50	A60205218045	Mr VAIBHAV BANERJEE	100	30	70	B	6	1	1	6
51	A60205218066	Mr PRATEEK SAHGAL	100	30	70	A-	8	1	1	8
52	A60205218060	Mr PRABHANSHOO SHRIVASTAVA	100	30	70	B	6	1	1	6
53	A60205218054	Mr ABHISHEK DWIVEDI	100	30	70	B-	5	1	1	5
54	A60205218048	Ms VAISHNAVI RAWAT	100	30	70	A-	8	1	1	8

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55	A60205218065	Mr SATYAM SHARMA	100	30	70	A	9	1	1	9
56	A60205218050	Mr DEEPAK SHARMA	100	30	70	A-	8	1	1	8
57	A60205218059	Mr KARAN TAMBAT	100	30	70	B	6	1	1	6
58	A60205218047	Ms RIMJHIM CHHAYA	100	30	70	B+	7	1	1	7
59	A60205218062	Ms ANKITA SHUKLA	100	30	70	A-	8	1	1	8
60	A60205218072	Mr SARTHAK GUPTA	100	30	70	B+	7	1	1	7
61	A60205218073	Mr HRITUJ AGRAHARI	100	30	70	B+	7	1	1	7
62	A60205218071	Mr MUKUL AGARWAL	100	30	70	B+	7	1	1	7
63	A60205218075	Mr PRADYUMN SHARMA	100	30	70	A+	10	1	1	10
64	A60205218058	Mr BHUPENDRA UPADHYAY	100	30	70	A	9	1	1	9
65	A60205218070	Ms ANSHITA CHANDEL	100	30	70	A-	8	1	1	8
66	A60205218068	Mr RISHABH SHRIVASTAVA	100	30	70	B	6	1	1	6
67	A60205218079	Mr RISHABH JAIN	100	30	70	B-	5	1	1	5
68	A60205218074	Ms APOORVA GOSAIN	100	30	70	B-	5	1	1	5
69	A60205218078	Mr SHEIKH ABDUL ANAS	100	30	70	B+	7	1	1	7
70	A60205218067	Mr RISHABH KULSHRESTHA	100	30	70	A-	8	1	1	8
71	A60205218077	Mr PRIYANSH JAISWAL	100	30	70	B+	7	1	1	7

Average Grade Point = 521/71 (Total Grade point/Total no of students) = 7.3
No of students getting greater than average(7.3) marks = 30 students = 46.4%

Total No. of Students	=	**71**
Level 1	<50% - Average marks	**42.25%**
Attainment Level		**Level 1**

Note: Attainment Level

Level 1	<50% - Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course : DATA COMMUNICATION AND COMPUTER NETWORKS
Course Code : CSE601, Crédits : 03, Session :2020-21(Even Sem.), Class : B.Tech. 3rdYear
Faculty Name : Dr. Subhrendu Guha Neogi

A. **Introduction:**The objective of the course is to provide knowledge of various topologies, network models, network devices, applications using client-server model, routing and switching algorithms, multiplexing techniques and communication medias for transmission of data, to learn how hardware and software of computer networks operate, investigate the fundamental issues driving network design, to learn about dominant network technologies , collision and congestion issues, various protocols and their working.

B. Course Outcomes: At the end of the course, students will be able to:

CSE601.1. Understand the Data Communication methods, Networks protocols and Layered architecture with it protocols.

CSE601.2. Studydifferent Transmission, communication and modulation techniques.

CSE601.3. Analyze various data link layer functionalities like Framing, Error Detection & Correction, Flow, Error Control Methods.

CSE601.4.Design small networkusing basic networking devices and understand Routing.

CSE601.5.Analyze End-to-End Delivery, Congestion control algorithmsand techniques to improve QoS.

C. Program Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an

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understanding of the limitations.

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PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Program Specific Outcomes:

PSO1. Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO3. Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur and a zest for higher studies.

E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%

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Attendance	A minimum of 75% Attendance is requiredto be maintainedby astudent to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of	A	5%

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	leavesincluding medical leaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Introduction

Introduction to Data Communication, Networks-protocols, advantages, disadvantages & applications, Line Configuration, topology, Transmission mode, Classification of networks. OSI & TCP/IP reference models, with functionality and design issues of all layers presented in the models, LAN, MAN, WAN.

Parallel & Serial Transmissions, Analog & Digital Signals, Periodic & Aperiodic Signals, Modulation-Amplitude Modulation, Frequency Modulation, Phase Modulation, Pulse Amplitude Modulation, Pulse Code Modulation.

Module II: Physical Layer

TDM, FDM, WDM; Circuit switching time division & space division switch. Transmission Media-Twisted Pair Cable, Coaxial Cable, Fiber-Optics Cable, Radio frequency Allocation, Terrestrial Microwave, Infrared rays, Satellite Communication, Cellular Telephony.

Module III: Data Link Layer

Framing, Line Discipline, Types of Errors, Error Detection & Correction (VRC, LRC, CRC, Checksum, Hamming Code), Flow Control, Error Control, CSMA/CD, Project 802, IEEE Standards-802.3, Token Bus (802.4), Token Ring (802.5).

Module IV: Network Layer

Internetworking & devices: Repeaters, Hubs, Bridges, Switches, Router, Gateway; Internet address, classful address, subnetting; Static vs. dynamic routing, Routing algorithms: shortest path algorithm, flooding, distance vector routing, link state routing; Protocols: ARP,RARP, IP, ICMP and IPv6.

Module V: Transport Layer

Process to process delivery; UDP; TCP; Congestion control algorithm: Leaky bucket algorithm, Token bucket algorithm, choke packets; Quality of service: techniques to improve QoS.

Module VI: Application Layer

DNS; SMTP, SNMP, FTP, HTTP & WWW; Security: Cryptography, user authentication, security protocols in internet, Firewalls.

ISDN services & ATM; DSL technology, Wireless LAN: IEEE 802.11; Bluetooth, VLAN's, Cellular telephony & Satellite network.

Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

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G. Suggested Text/Reference Books:

- Behrouz., Forouzan., “Data Communication and Networking”, TMH
- W. Stallings, "Data and Computer Communication" PHI
- A.S. Tanenbaum, "Computer Networks", PHI
- Kennedy, “Electronics Communication System”, TMH
- Kurose and Rose, "Computer Networking -A top-down approach featuring the internet”, Pearson Education
- Leon, Garica, Widjaja, “Communication Networks”, TMH
- Walrand, “Communication Networks”, TMH

H. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction to Data Communication, Networks-protocols, advantages, disadvantages & Network applications	Lecture	CSE601.1	Mid Term, Quiz & End Sem Exam
2	Different types of topologies, Transmission mode, Classification of networks	Lecture	CSE601.1	Mid Term, Quiz & End Sem Exam
3	OSI & TCP/IP reference models with functionality and design issues of all layers	Lecture	CSE601.1	Mid Term, Quiz & End Sem Exam
4	Use of physical layer functionalities	Lecture	CSE601.1	Mid Term, Quiz & End Sem Exam
5	Channel Multiplexing (TDM, FDM, WDM)	Lecture	CSE601.2	Mid Term, Quiz & End Sem Exam
6	Switching, Transmission Media	Lecture	CSE601.2	Mid Term, Quiz & End Sem Exam
7	Types of Cables in Wired Connection	Lecture	CSE601.2	Mid Term, Quiz & End Sem Exam
8	Wireless Communication, Radio frequency Allocation, Satellite Communication, Cellular Telephony	Lecture	CSE601.2	Mid Term, Quiz & End Sem Exam

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9	Framing, Line Discipline	Lecture	CSE601.3	Mid Term, Quiz & End

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				Sem Exam
10	Types of Errors, Error Detection & Correction	Lecture	CSE601.3	Mid Term, Quiz & End Sem Exam
11	Error Detection & Correction Methods	Lecture	CSE601.3	Mid Term, Quiz & End Sem Exam
12	Flow & Error Control	Lecture	CSE601.3	Mid Term, Quiz & End Sem Exam
13	ARQ in Flow & Error Control	Lecture	CSE601.3	Mid Term, Quiz & End Sem Exam
14	IEEE Standards, CSMA/CD and CA	Lecture	CSE601.3	Mid Term, Quiz & End Sem Exam
15	Internetworking & devices	Lecture	CSE601.4	Mid Term, Quiz & End Sem Exam
16	Network Layer Devices(L3 Switches, Router, Gateways); Internet address	Lecture	CSE601.4	Mid Term, Quiz & End Sem Exam
17	Classless & classful addressing, subnetting & VLSM, CIDR	Lecture	CSE601.4	Assignment, Presentation , Quiz & End Sem Exam
18	Static vs. dynamic routing, Routing algorithms	Lecture	CSE601.4	Assignment, Presentation , Quiz & End Sem Exam
19	shortest path algorithm, flooding, distance vector routing, link state routing	Lecture	CSE601.4	Assignment, Presentation , Quiz & End Sem Exam
20	Protocols: ARP,RARP, IPv4 vs IPv6, ICMP and IGMP	Lecture	CSE601.4	Assignment, Presentation , Quiz & End Sem Exam
21	Transport Layer Protocols: TCP, UDP	Lecture	CSE601.4	Assignment, Presentation , Quiz & End Sem Exam
22	Process to process delivery	Lecture	CSE601.4	Assignment, Presentation , Quiz & End Sem Exam

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23	Congestion control algorithms	Lecture	CSE601.4	Assignment, Presentation, Quiz & End Sem Exam

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24	Leaky bucket vs Token bucket algorithm	Lecture	CSE601.4	Assignment, Presentation , Quiz & End Sem Exam
25	Quality of service: techniques to improve QoS	Lecture	CSE601.5	Assignment, Presentation , Quiz & End Sem Exam
26	Application Layer Protocols	Lecture	CSE601.5	Assignment, Presentation , Quiz & End Sem Exam
27	DNS; SMTP, SNMP, FTP, HTTP & WWW	Lecture	CSE601.5	Assignment, Presentation , Quiz & End Sem Exam
28	DNS; SMTP, SNMP, FTP, HTTP & WWW	Lecture	CSE601.5	Assignment, Presentation , Quiz & End Sem Exam
29	DNS; SMTP, SNMP, FTP, HTTP & WWW	Lecture	CSE601.5	Assignment, Presentation , Quiz & End Sem Exam
30	DNS; SMTP, SNMP, FTP, HTTP & WWW	Lecture	CSE601.5	Assignment, Presentation , Quiz & End Sem Exam
31	Security: Cryptography, user authentication, security protocols in internet, Firewalls	Lecture	CSE601.5	Assignment, Presentation , Quiz & End Sem Exam
32	Security: Cryptography, user authentication, security protocols in internet, Firewalls	Lecture	CSE601.5	Assignment, Presentation , Quiz & End Sem Exam
33	Security: Cryptography, user authentication, security protocols in internet, Firewalls	Lecture	CSE601.5	Assignment, Presentation , Quiz & End Sem Exam
34	ISDN services & ATM; DSL technology, Wireless LAN	Lecture	CSE601.5	Assignment, Presentation , Quiz & End Sem Exam
35	IEEE 802.11; Bluetooth	Lecture	CSE601.5	Assignment, Presentation , Quiz & End Sem Exam

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36	Cellular telephony & Satellite network	Lecture	CSE601.5	Assignment, Presentation , Quiz & End

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				Sem Exam

I. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE601.1	Understand the Data Communication methods, Networks protocols and Layered architecture with it protocols.															
CSE601.2	Study different Transmission, communication and modulation techniques.															
CSE601.3	Analyze various data link layer functionalities like Framing, Error Detection & Correction, Flow, Error Control Methods.	3														
CSE601.4	Design small networkusing basic networking devices and understand Routing.	3	2	1											1	

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CSE601.5	Analyze End-to-End Delivery, Congestion control algorithms and	3	2														

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	techniques to improve QoS.															

S. No.	Enrollment.No.	Student's Name	CSE601							
			DATA COMMUNICATION AND COMPUTER NETWORKS							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U9G9
1	A60205218008	Mr AKSHAT MISHRA	100	30	70	A+	10	3	3	30
2	A60205218016	Mr SWAPNIL RAI	100	30	70	B	6	3	3	18
3	A60205218024	Mr ASHISH TARKESHWAR SINGH	100	30	70	A-	8	3	3	24
4	A60205218032	Mr AYUSH SHARMA	100	30	70	B	6	3	3	18
5	A60205218041	Mr ABHISHEK SINGH	100	30	70	B-	5	3	3	15
6	A60205218007	Ms PRIYANSHI GUPTA	100	30	70	A-	8	3	3	24
7	A60205218015	Mr SHUBHAM JAIN	100	30	70	A	9	3	3	27
8	A60205218023	Ms ADITI SHARMA	100	30	70	A	9	3	3	27
9	A60205218031	Mr KETANDEEP SHARMA	100	30	70	B+	7	3	3	21
10	A60205218040	Mr ASHIRWAD VERMA	100	30	70	A-	8	3	3	24
11	A60205218003	Mr ANURAG KOTNALA	100	30	70	A-	8	3	3	24
12	A60205218011	Ms TAMANNAKUMARI MANOJKUMAR	100	30	70	A-	8	3	3	24
13	A60205218019	Mr PRAYAG DUBEY	100	30	70	A	9	3	3	27
14	A60205218027	Mr AYUSH CHANDRA	100	30	70	A-	8	3	3	24
15	A60205218036	Mr AYUSH SHARMA	100	30	70	B+	7	3	3	21
16	A60205218001	Ms MANASI SRIVASTAVA	100	30	70	A-	8	3	3	24
17	A60205218009	Ms ADITI LIKHAR	100	30	70	A	9	3	3	27
18	A60205218017	Mr ILAPANDA SUHASH	100	30	70	B	6	3	3	18
19	A60205218025	Mr ARPIT SAXENA	100	30	70	B	6	3	3	18
20	A60205218033	Ms PRIYANSHI SHARMA	100	30	70	A	9	3	3	27
21	A60205218002	Mr DHRUV KUMAR AGARWAL	100	30	70	A-	8	3	3	24
22	A60205218010	Mr AMAN BHATNAGAR	100	30	70	C+	4	3	3	12
23	A60205218018	Mr ANUBHAV KADAM	100	30	70	B	6	3	3	18
24	A60205218026	Mr ABHISHEK PANCHOLI	100	30	70	A-	8	3	3	24
25	A60205218034	Mr V. SAMARTH CHANDRA	100	30	70	A	9	3	3	27
26	A60205218006	Mr UDAY SINGH RAJAWAT	100	30	70	A	9	3	3	27
27	A60205218014	Mr KRATIK JAIN	100	30	70	B+	7	3	3	21
28	A60205218022	Mr DEEPESH KUSHWAH	100	30	70	B+	7	3	3	21
29	A60205218030	Ms AEIKNOR KAUR VIRK	100	30	70	B	6	3	3	18
30	A60205218039	Mr SIDDHANT SINGH KAURAV	100	30	70	A-	8	3	3	24
31	A60205218050	Mr DEEPAK SHARMA	100	30	70	A	9	3	3	27
32	A60205218062	Ms ANKITA SHUKLA	100	30	70	B+	7	3	3	21
33	A60205218071	Mr MUKUL AGARWAL	100	30	70	A-	8	3	3	24

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34	A60205218005	Mr SAKSHAM CHATURVEDI	100	30	70	B+	7	3	3	21

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35	A60205218013	Mr PRANAY GUPTA	100	30	70	A-	8	3	3	24
36	A60205218021	Mr YOGENDRA BHADORIA	100	30	70	B-	5	3	3	15
37	A60205218029	Ms PRAGATI TIWARI	100	30	70	B+	7	3	3	21
38	A60205218038	Ms MANYA SINGH	100	30	70	B+	7	3	3	21
39	A60205218004	Mr DEVASHISH PATIL	100	30	70	A	9	3	3	27
40	A60205218012	Mr SOURABH SINGH TOMAR	100	30	70	A-	8	3	3	24
41	A60205218020	Mr AMAN GUPTA	100	30	70	A	9	3	3	27
42	A60205218028	Mr VARUN VIKRAM	100	30	70	A-	8	3	3	24
43	A60205218037	Ms NEHA VERMA	100	30	70	A-	8	3	3	24
44	A60205218049	Mr YOGESH SINGH	100	30	70	A-	8	3	3	24
45	A60205218060	Mr PRABHANSHOO SHRIVASTAVA	100	30	70	B-	5	3	3	15
46	A60205218070	Ms ANSHITA CHANDEL	100	30	70	B+	7	3	3	21
47	A60205218079	Mr RISHABH JAIN	100	30	70	B-	5	3	3	15
48	A60205218045	Mr VAIBHAV BANERJEE	100	30	70	A-	8	3	3	24
49	A60205218054	Mr ABHISHEK DWIVEDI	100	30	70	A-	8	3	3	24
50	A60205218065	Mr SATYAM SHARMA	100	30	70	A-	8	3	3	24
51	A60205218074	Ms APOORVA GOSAIN	100	30	70	B-	5	3	3	15
52	A60205218043	Mr ANMOL SAXENA	100	30	70	B	6	3	3	18
53	A60205218051	Mr SHIVAM SHARMA	100	30	70	A	9	3	3	27
54	A60205218063	Mr MILKY SHRIVASTAVA	100	30	70	B+	7	3	3	21
55	A60205218072	Mr SARTHAK GUPTA	100	30	70	A-	8	3	3	24
56	A60205218044	Ms NIHARIKA SINGH	100	30	70	A-	8	3	3	24
57	A60205218053	Mr SWAPNIL PALIYA	100	30	70	B+	7	3	3	21
58	A60205218064	Ms ANVI TOMAR	100	30	70	A-	8	3	3	24
59	A60205218073	Mr HRITUJ AGRAHARI	100	30	70	B-	5	3	3	15
60	A60205218048	Ms VAISHNAVI RAWAT	100	30	70	A	9	3	3	27
61	A60205218059	Mr KARAN TAMBAT	100	30	70	A-	8	3	3	24
62	A60205218068	Mr RISHABH SHRIVASTAVA	100	30	70	A-	8	3	3	24
63	A60205218078	Mr SHEIKH ABDUL ANAS	100	30	70	A-	8	3	3	24
64	A60205218047	Ms RIMJHIM CHHAYA	100	30	70	A	9	3	3	27
65	A60205218058	Mr BHUPENDRA UPADHYAY	100	30	70	B-	5	3	3	15
66	A60205218067	Mr RISHABH KULSHRESTHA	100	30	70	A-	8	3	3	24
67	A60205218077	Mr PRIYANSH JAISWAL	100	30	70	A-	8	3	3	24
68	A60205218046	Mr KETAN AGRAWAL	100	30	70	B	6	3	3	18
69	A60205218055	Mr SURAJ NEEKHARA	100	30	70	A-	8	3	3	24
70	A60205218066	Mr PRATEEK SAHGAL	100	30	70	A-	8	3	3	24
71	A60205218075	Mr PRADYUMN SHARMA	100	30	70	B+	7	3	3	21

Average Grade Point = 530/71 (Total Grade point/Total no of students) = 7.4
No of students getting greater than average (7.4) marks = 43 students = 60.5%

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Total No. of Students	=	**71**
Level 3	> 60% Average marks	**60.5%**
Attainment Level		**Level 3**

Note: Attainment Level

Level 1	<50% - Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course : INTERNET OF THINGS (IOT)
Course Code : CSE603, Crédits : 02, Session :2020-21(Even Sem.), Class : B.Tech. 3rdYear
Faculty Name : Dr Harish Kumar Shakya

A. **Introduction:**The objective of the course is to Introduction of IOT, Understand IOT Market perspective, Data and Knowledge Management and use of Devices in IOT Technology, Understand State of the Art – IOT Architecture. Real World IOT Design Constraints, Industrial Automation and Commercial Building Automation in IOT.

B. **Course Outcomes:**At the end of the course, students will be able to:
CSE603.1.Understand the fundamental concept of Python in Eclipse Study, Install and Demonstrate basic operations.
CSE603.2.Implement the different types of Arduino, Install IDE and perform basic LED programs.
CSE603.3.Demonstrate RFID,NFC and MQTT.
CSE603.4.Analyzethe differencesbetween Arduino and Raspberry Pi and Demonstrate Raspberry Pi basic LED programs and Zigbee Protocol.
CSE603.5. Design basic solutions using Arduino/Rasberry Pi and sensors.

C. Program Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

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PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Program Specific Outcomes:

PSO1. Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO3. Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur and a zest for higher studies.

E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%

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Attenda	A minimum of 75% Attendance	A	5%

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nce	isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleavesincludingm edicalleaves.		
End Semeste r Examina tion	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module 1: Introduction to the Internet of Things-Key Features, advantages, disadvantages,Wearable electronics, The Basics of Sensors & Actuators, Introduction to Cloud Computing, IOTSoftware.
Module 2: IoT-An Architectural Overview– Building an architecture, Main design principles andneeded capabilities, An IoT architecture outline, standards considerations. IoT TechnologyFundamentals- Devices and gateways, Local and wide area networking, Data management,Business processes in IoT, Everything as a Service (XaaS), M2M and IoT Analytics, KnowledgeManagement.
Module 3: The Arduino Platform – What is Arduino, Why Arduino, Driver installation,programming &Burning, Coding in wiring language, Compiling in Arduino, The Arduino Open-Microcontroller Platform, Arduino Basics, Arduino Board Layout & Architecture, Reading fromSensors.
Module 4: Arduino Programming & Interface of Sensors– LED display, PUSH button to array ofLED, Communicating to and from computer, GSM, GPS and Zigbee interfacing, Interface sensorwith Arduino, Programming Arduino, reading from sensor, Connecting Arduino with MobileDevice. The Android Mobile OS, Using the Bluetooth Module.
Module 5: Projects:1. Creating own Android App using MIT App Inventor & controlling Arduinoconnected devices. 2. Use Arduino to Upload free data from Environmental Sensors to CloudServer. 3. Receive Automatic Call Notification on Mobile Phone for Burglar Alarm using IoTPlatform4.Control Electronic Devices from anywhere across the world using Internet & MobileApp.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

Textbook:

- Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, 1st Edition, Academic Press, 2014.

Reference Books:

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Vijay Madisetti and ArshdeepBahga, “Internet of Things (A Hands-on-Approach)”, 1stEdition, VPT, 2014.

- Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to ConnectingEverything”, 1st Edition, Apress Publications, 2013

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspondin g CO	Mode of Assessing CO
1	Introduction to the Internet of Things	Lecture	CSE603.1	Mid Term-1, Quiz & End Sem Exam
2	Write a Program for arithmetic operation in Python.	Lecture	CSE603.1	Mid Term-1, Quiz & End Sem Exam
3	Key Features, advantages, disadvantages	Lecture	CSE603.1	Mid Term-1, Quiz & End Sem Exam
4	Wearable electronics	Lecture	CSE603.1	Mid Term-1, Quiz & End Sem Exam
5	The Basics of Sensors & Actuators	Lecture	CSE603.1	Mid Term-1, Quiz & End Sem Exam
6	The Basics of Actuators	Lecture	CSE603.1	Mid Term-1, Quiz & End Sem Exam
7	Introduction to Cloud Computing	Lecture	CSE603.1	Mid Term-1, Quiz & End Sem Exam
8	IOT Softwares	Lecture	CSE603.2	Mid Term-1, Quiz & End Sem Exam
9	IoT-An Architectural Overview	Lecture	CSE603.2	Mid Term-1, Quiz & End Sem Exam

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10	Building an architecture	Lecture	CSE603.2	Mid Term-1, Quiz & End Sem Exam
11	Main design principles and needed capabilities	Lecture	CSE603.2	Mid Term-1, Quiz & End Sem Exam
12	An IoT architecture outline	Lecture	CSE603.2	Mid Term-1, Quiz & End Sem Exam
13	standards considerations	Lecture	CSE603.2	Mid Term-1, Quiz & End Sem Exam
14	IoT Technology Fundamentals	Lecture	CSE603.2	Mid Term-1, Quiz & End Sem Exam
15	Devices and gateways	Lecture	CSE603.2	Mid Term-1, Quiz & End Sem Exam
16	Local and wide area networking	Lecture	CSE603.2	Mid Term-1, Quiz & End Sem Exam
17	Data management	Lecture	CSE603.2	Mid Term-1, Quiz & End Sem Exam
18	Business processes in IoT	Lecture	CSE603.2	Mid Term-1, Quiz & End Sem Exam
19	Everything as a Service (XaaS)	Lecture	CSE603.2	Mid Term-1, Quiz & End Sem Exam
20	M2M and IoT Analytics	Lecture	CSE603.2	Mid Term-1, Quiz & End Sem Exam
21	Knowledge Management	Lecture	CSE603.2	Mid Term Viva/Quiz & End Sem Practical Exam

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22	The Arduino Platform	Lecture	CSE603.3	Mid Term-1, Quiz & End Sem Exam
23	What is Arduino, Why Arduino?	Lecture	CSE603.3	Mid Term-1, Quiz & End Sem Exam
24	Driver installation	Lecture	CSE603.3	Mid Term-1, Quiz & End Sem Exam
25	programming &burning	Lecture	CSE603.3	Mid Term-1, Quiz & End Sem Exam
26	Compiling in Arduino	Lecture	CSE603.3	Mid Term-1, Quiz & End Sem Exam
27	The Arduino Open-Microcontroller Platform	Lecture	CSE603.3	Mid Term-1, Quiz & End Sem Exam
28	Arduino Board Layout & Architecture	Lecture	CSE603.3	Mid Term-1, Quiz & End Sem Exam
29	Reading fromSensors	Lecture	CSE603.3	Mid Term-1, Quiz & End Sem Exam
30	Arduino Programming & Interface of Sensors	Lecture	CSE603.4	Mid Term-1, Quiz & End Sem Exam
31	LED display, PUSH button to array ofLED	Lecture	CSE603.4	Mid Term-1, Quiz & End Sem Exam
32	Communicating to and from computer	Lecture	CSE603.4	Mid Term-1, Quiz & End Sem Exam
33	GSM, GPS and Zigbeeinterfacing	Lecture	CSE603.4	Mid Term-1, Quiz & End Sem Exam

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34	Interface sensorwith Arduino, Programming Arduino,	Lecture	CSE603.4	Mid Term-1, Quiz & End Sem Exam
35	The Android Mobile OS, Using the Bluetooth Module	Lecture	CSE603.4	Mid Term-1, Quiz & End Sem Exam
36	**Projects:1.** Creating own Android App using MIT App Inventor & controlling Arduino	Lecture	CSE603.5	Mid Term-1, Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE603.1	Understand the fundamental concept of Python in Eclipse Study, Install and Demonstrate basic operations.															
CSE603.2	Implement the different types of Arduino, Install IDE and perform basic LED programs.	3	2	1										1		
CSE603.3	Demonstrate RFID, NFC and MQTT.	2														
CSE603.4	Analyzethe differencesbetween Arduino and Raspberry Pi and Demonstrate Raspberry Pi basic LED programs and Zigbee Protocol.	3	2													
CSE603.5	Design basic solutions using Arduino/Rasberry Pi and sensors.	2		1										1		

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S. No.	Enrollment.No.	Student's Name	CSE603							
			INTERNET OF THINGS (IOT)							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U10G10
1	A60205218008	Mr AKSHAT MISHRA	100	30	70	A-	8	2	2	16
2	A60205218016	Mr SWAPNIL RAI	100	30	70	B-	5	2	2	10
3	A60205218024	Mr ASHISH TARKESHWAR SINGH	100	30	70	A	9	2	2	18
4	A60205218032	Mr AYUSH SHARMA	100	30	70	B	6	2	2	12
5	A60205218041	Mr ABHISHEK SINGH	100	30	70	B+	7	2	2	14
6	A60205218007	Ms PRIYANSHI GUPTA	100	30	70	A	9	2	2	18
7	A60205218015	Mr SHUBHAM JAIN	100	30	70	A-	8	2	2	16
8	A60205218023	Ms ADITI SHARMA	100	30	70	A+	10	2	2	20
9	A60205218031	Mr KETANDEEP SHARMA	100	30	70	A-	8	2	2	16
10	A60205218040	Mr ASHIRWAD VERMA	100	30	70	A-	8	2	2	16
11	A60205218003	Mr ANURAG KOTNALA	100	30	70	A-	8	2	2	16
12	A60205218011	Ms TAMANNAKUMARI MANOJKUMAR	100	30	70	A+	10	2	2	20
13	A60205218019	Mr PRAYAG DUBEY	100	30	70	A+	10	2	2	20
14	A60205218027	Mr AYUSH CHANDRA	100	30	70	B+	7	2	2	14
15	A60205218036	Mr AYUSH SHARMA	100	30	70	B-	5	2	2	10
16	A60205218001	Ms MANASI SRIVASTAVA	100	30	70	A	9	2	2	18
17	A60205218009	Ms ADITI LIKHAR	100	30	70	A	9	2	2	18
18	A60205218017	Mr ILAPANDA SUHASH	100	30	70	B	6	2	2	12
19	A60205218025	Mr ARPIT SAXENA	100	30	70	A	9	2	2	18
20	A60205218033	Ms PRIYANSHI SHARMA	100	30	70	A	9	2	2	18
21	A60205218002	Mr DHRUV KUMAR AGARWAL	100	30	70	B+	7	2	2	14
22	A60205218010	Mr AMAN BHATNAGAR	100	30	70	B	6	2	2	12
23	A60205218018	Mr ANUBHAV KADAM	100	30	70	B	6	2	2	12
24	A60205218026	Mr ABHISHEK PANCHOLI	100	30	70	A-	8	2	2	16
25	A60205218034	Mr V. SAMARTH CHANDRA	100	30	70	A-	8	2	2	16
26	A60205218006	Mr UDAY SINGH RAJAWAT	100	30	70	A	9	2	2	18
27	A60205218014	Mr KRATIK JAIN	100	30	70	B+	7	2	2	14
28	A60205218022	Mr DEEPESH KUSHWAH	100	30	70	B-	5	2	2	10
29	A60205218030	Ms AEIKNOR KAUR VIRK	100	30	70	A	9	2	2	18
30	A60205218039	Mr SIDDHANT SINGH KAURAV	100	30	70	B	6	2	2	12
31	A60205218050	Mr DEEPAK SHARMA	100	30	70	B+	7	2	2	14
32	A60205218062	Ms ANKITA SHUKLA	100	30	70	A-	8	2	2	16
33	A60205218071	Mr MUKUL AGARWAL	100	30	70	B	6	2	2	12
34	A60205218005	Mr SAKSHAM CHATURVEDI	100	30	70	B+	7	2	2	14
35	A60205218013	Mr PRANAY GUPTA	100	30	70	A-	8	2	2	16
36	A60205218021	Mr YOGENDRA BHADORIA	100	30	70	B-	5	2	2	10
37	A60205218029	Ms PRAGATI TIWARI	100	30	70	B-	5	2	2	10
38	A60205218038	Ms MANYA SINGH	100	30	70	B+	7	2	2	14

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39	A60205218004	Mr DEVASHISH PATIL	100	30	70	A-	8	2	2	16

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40	A60205218012	Mr SOURABH SINGH TOMAR	100	30	70	B	6	2	2	12
41	A60205218020	Mr AMAN GUPTA	100	30	70	A-	8	2	2	16
42	A60205218028	Mr VARUN VIKRAM	100	30	70	A+	10	2	2	20
43	A60205218037	Ms NEHA VERMA	100	30	70	A-	8	2	2	16
44	A60205218049	Mr YOGESH SINGH	100	30	70	A-	8	2	2	16
45	A60205218060	Mr PRABHANSHOO SHRIVASTAVA	100	30	70	B+	7	2	2	14
46	A60205218070	Ms ANSHITA CHANDEL	100	30	70	B	6	2	2	12
47	A60205218079	Mr RISHABH JAIN	100	30	70	B	6	2	2	12
48	A60205218045	Mr VAIBHAV BANERJEE	100	30	70	B	6	2	2	12
49	A60205218054	Mr ABHISHEK DWIVEDI	100	30	70	A	9	2	2	18
50	A60205218065	Mr SATYAM SHARMA	100	30	70	B+	7	2	2	14
51	A60205218074	Ms APOORVA GOSAIN	100	30	70	B-	5	2	2	10
52	A60205218043	Mr ANMOL SAXENA	100	30	70	A-	8	2	2	16
53	A60205218051	Mr SHIVAM SHARMA	100	30	70	A-	8	2	2	16
54	A60205218063	Mr MILKY SHRIVASTAVA	100	30	70	B+	7	2	2	14
55	A60205218072	Mr SARTHAK GUPTA	100	30	70	B	6	2	2	12
56	A60205218044	Ms NIHARIKA SINGH	100	30	70	B+	7	2	2	14
57	A60205218053	Mr SWAPNIL PALIYA	100	30	70	A-	8	2	2	16
58	A60205218064	Ms ANVI TOMAR	100	30	70	A+	10	2	2	20
59	A60205218073	Mr HRITUJ AGRAHARI	100	30	70	B	6	2	2	12
60	A60205218048	Ms VAISHNAVI RAWAT	100	30	70	A-	8	2	2	16
61	A60205218059	Mr KARAN TAMBAT	100	30	70	B+	7	2	2	14
62	A60205218068	Mr RISHABH SHRIVASTAVA	100	30	70	B+	7	2	2	14
63	A60205218078	Mr SHEIKH ABDUL ANAS	100	30	70	B	6	2	2	12
64	A60205218047	Ms RIMJHIM CHHAYA	100	30	70	A-	8	2	2	16
65	A60205218058	Mr BHUPENDRA UPADHYAY	100	30	70	A-	8	2	2	16
66	A60205218067	Mr RISHABH KULSHRESTHA	100	30	70	B	6	2	2	12
67	A60205218077	Mr PRIYANSH JAISWAL	100	30	70	B+	7	2	2	14
68	A60205218046	Mr KETAN AGRAWAL	100	30	70	B	6	2	2	12
69	A60205218055	Mr SURAJ NEEKHARA	100	30	70	B-	5	2	2	10
70	A60205218066	Mr PRATEEK SAHGAL	100	30	70	B+	7	2	2	14
71	A60205218075	Mr PRADYUMN SHARMA	100	30	70	A-	8	2	2	16

Average Grade Point = 521/71 (Total Grade point/Total no of students) = 7.3
No of students getting greater than average (7.3) marks = 34 students = 47.8%

Total No. of Students	=	**71**
Level 3	<50% - Average marks	**47.8**
Attainment Level		**Level 1**

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Note: Attainment Level

Level 1	<50% - Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

Course Handout
Course : Mathematical Foundations for Data Science
Course Code : CSD201, Crédits : 03, Session: 2021-22 (Even Sem.), Class : B.Tech. 1st Year
Faculty Name : Dr. Girraj Kumar Verma

A. Introduction: The objective of this course is to familiarize the prospective engineers with basic concepts of mathematics as a foundation for data science. It also defines the methods of advanced numerical linear algebra for data scientists. Besides, the optimization is also introduced as a basic tool for data science.

B. Course Outcomes: At the end of the course, students will be able to:

CSD201.1. To learn the relation of data science with respect to numerical linear algebra and optimization concepts.
CSD201.2. Apply the concept of Linear algebra and matrices to the Data Science.
CSD201.3. Formulate scalable and accurate implementations of the most important optimization algorithms for data science.
CSD201.4. Characterize trade-offs between time, data and accuracy for optimization technique.

C. Programme Outcomes:

[PO.1]. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
[PO.6]. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. Environment and sustainability: Understand the impact of the professional

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engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

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[PO.9]. Individual and teamwork: Function effectively as an individual, and as a member or leader indiverse teams, and in multidisciplinary settings

[PO.10]. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

D. Programme Specific Outcomes:

PSO 1: Will be able to design, develop and implement efficient software for a given real life problem.

PSO 2: Will be able to apply knowledge of AI, Machine Learning and Data Mining in analyzing big data forextracting useful information from it and for performing predictive analysis.

PSO 3: Will be able to design, manage and secure wired/ wireless computer networks for transfer and sharing ofinformation.

E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a studentto be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Basics of Data Science

Data science; Basic terminology of data science; Types of data: Structured and unstructured data, quantitative and qualitative data, deterministic and random data; The four levels of data: The nominal level, the ordinal level, the interval level, the ratio level; Importance of linear algebra and optimization from a data science perspective.

Module II: Linear Algebra

Inner product; norm and distance (vector norm, distance, matrix norm etc.); singular values of a matrix;

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Matrix factorizations: LU, Cholesky method, QR, Singular Value Decomposition; Gram-Schmidt orthogonalization; iterative methods for large linear systems; least squares and least norm solutions of linear systems; approximating eigenvalues and eigenvectors.

Module III: Optimization I

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Introduction: Mathematical optimization, least squares and linear programming; convex optimization; non-linear optimization; Theory: convex sets (affine and convex sets, operations that preserve convexity etc.); convex functions (basic properties and examples, the conjugate functions, quasi convex functions etc.); Optimization Problems: convex optimization problems, linear optimization problems, quadratic optimization problems.

Module IV: Optimization II

Fundamentals of Unconstrained Optimization; Necessary and sufficiency conditions for optima; Numerical properties of modified Newton, quasi-Newton, steepest descent for unconstrained optimization; theory of Constrained Optimization, KKT conditions

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- G. Strang (2016). Introduction to Linear Algebra, Wellesley-Cambridge Press, Fifth edition, USA.
- S. Boyd and L. Vandenberghe(2009). Convex Optimization, Cambridge University Press.
- Numerical Optimization, J. Nocedal and S. Wright, Springer Series in Operations Research and Financial Engineering, 2006
- Lloyd N. Trefethen and David Bau, III. Numerical linear algebra, SIAM, 1997.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresp on ding CO	Mode of Assessing CO
1	Basic terminology of data science; Types of data	Lecture	CSD201.1	Mid Term-1, Quiz & End Sem Exam
2	Structured and unstructured data	Lecture	CSD201.1	Mid Term-1, Quiz & End Sem Exam
3	quantitative and qualitative data	Lecture	CSD201.1	Mid Term-1, Quiz & End Sem Exam
4	deterministic and random data; The four levels of data	Lecture	CSD201.1	Mid Term-1, Quiz & End Sem Exam
5	The nominal level, the ordinal level, the interval level, the ratio level	Lecture	CSD201.1	Mid Term-1, Quiz & End Sem Exam
6	Importance of linear algebra and optimization from a data science perspective	Lecture	CSD201.1	Mid Term-1, Quiz & End Sem Exam

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7	Inner product; norm and distance (vector norm, distance, matrix norm etc.)	Lecture	CSD201.2	Mid Term-1, Quiz & End Sem Exam
8	singular values of a matrix	Lecture	CSD201.2	Mid Term-1, Quiz & End Sem Exam
9	LU, Cholesky method	Lecture	CSD201.2	Mid Term-1, Quiz
				& End Sem Exam
10	QR Factorization	Lecture	CSD201.2	Mid Term-1, Quiz & End Sem Exam
11	Singular Value Decomposition	Lecture	CSD201.2	Mid Term-1, Quiz & End Sem Exam
12	Gram-Schmidt orthogonalization	Lecture	CSD201.2	Mid Term-1, Quiz & End Sem Exam
13	iterative methods for large linear systems	Lecture	CSD201.2	Mid Term-1, Quiz & End Sem Exam
14	least squares and least norm	Lecture	CSD201.2	Mid Term-1, Quiz & End Sem Exam
15	solutions of linear systems	Lecture	CSD201.2	Mid Term-1, Quiz & End Sem Exam
16	approximating eigen values and eigenvectors	Lecture	CSD201.2	Mid Term-1, Quiz & End Sem Exam
17	Mathematical optimization	Lecture	CSD201.3	Quiz & End Sem Exam
18	least squares and linear programming	Lecture	CSD201.3	Quiz & End Sem Exam
19	convex optimization; non-linear optimization	Lecture	CSD201.3	Quiz & End Sem Exam
20	convex sets (affine and convex sets, operations that preserve convexity etc.)	Lecture	CSD201.3	Quiz & End Sem Exam
21	convex functions (basic properties and examples)	Lecture	CSD201.3	Quiz & End Sem Exam
22	the conjugate functions, quasi convex functions etc.	Lecture	CSD201.3	Quiz & End Sem Exam
23	Optimization Problems	Lecture	CSD201.3	Quiz & End Sem Exam
24	convex optimization problems	Lecture	CSD201.3	Quiz & End Sem Exam
25	linear optimization problems	Lecture	CSD201.3	Quiz & End Sem Exam
26	quadratic optimization problems	Lecture	CSD201.3	Quiz & End Sem Exam
27	Fundamentals of Unconstrained Optimization	Lecture	CSD201.4	Quiz & End Sem Exam
28	Necessary and sufficiency conditions for optimality	Lecture	CSD201.4	Quiz & End Sem Exam

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29	Necessary and sufficiency conditions for optima	Lecture	CSD201.4	Quiz & End Sem Exam
30	Numerical properties of modified Newton	Lecture	CSD201.4	Quiz & End Sem Exam
31	Numerical properties of modified Newton	Lecture	CSD201.4	Quiz & End Sem Exam
32	quasi-Newton method	Lecture	CSD201.4	Quiz & End Sem Exam
33	quasi-Newton method	Lecture	CSD201.4	Quiz & End Sem Exam
34	steepest descent for unconstrained optimization	Lecture	CSD201.4	Quiz & End Sem Exam
35	theory of Constrained Optimization	Lecture	CSD201.4	Quiz & End Sem Exam
36	KKT conditions	Lecture	CSD201.4	Quiz & End Sem Exam

J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSD201.1	To learn the relation of data science with respect to numerical linear algebra and optimization concepts.	3	2	3	3	3						3		**3**	**2**	**1**
CSD201.2	Apply the concept of Linear algebra and matrices to the Data Science.	3	2	3	3	3						2		**3**	**2**	**1**

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CSD201.3	Formulate scalable and accurate implementations of the most important optimization algorithms for data science.	3	2	2	2	2						2		**3**	**2**	**1**
CSD201.4	Characterize trade-offs between time, data and accuracy for optimization technique.	3	3	2	3	2						3		**3**	**2**	**1**

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ESE Mark - CSD201

S. No.	Enrollment.No.	Student's Name	CSD201							
			MATHEMATICAL FOUNDATIONS FOR DATA SCIENCE							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U1G1
1	A60205220173	Mr VAIBHAV ARYA								
2	A60205220037	Mr SATYAM SHARMA								
3	A60205220130	Mr MUKUL BINDAL	100	30	70	B	6	3	3	18
4	A60205220103	Mr VIVEK SINGH								
5	A60205220050	Mr ADITYA SINGH BHADOURIA								
6	A60205220198	Mr KARTIK KHARE								
7	A60205220001	Mr RAJDEEP CHOWDHURY	100	30	70	B-	5	3	3	15
8	A60205220007	Mr HARSH DUBEY								
9	A60205220003	Mr SUSEEM VIKRAM								
10	A60205220167	Ms KHUSHI GUPTA								
11	A60205220089	Mr YASH BANSAL	100	30	70	B-	5	3	3	15
12	A60205220006	Mr HARSHVARDHAN RATHOD	100	30	70	B+	7	3	3	21
13	A60205220171	Mr NAMAN MISHRA	100	30	70	A	9	3	3	27
14	A60205220002	Mr SATNAM SINGH								
15	A60205220029	Mr RAHUL CHOUBEY								
16	A60205220020	Ms DIVYANSHI SIKARWAR	100	30	70	B+	7	3	3	21
17	A60205220019	Mr HARSHIT SHARMA								
18	A60205220013	Mr PARLA CHARANTEJA REDDY								
19	A60205220005	Mr AYUSH SINGH GAUR								
20	A60205220011	Mr MOHIT RATHORE								
21	A60205220193	Mr SAFIR AFJAL ZAFIR	100	30	70	B-	5	3	3	15
22	A60205220008	Ms SHRUTI DUBEY								
23	A60205220033	Ms KAJAL JAIN	100	30	70	A	9	3	3	27
24	A60205220027	Mr OJASWA CHATURVEDI								
25	A60205220023	Mr ANURAG AJEET								
26	A60205220016	Mr SHUBH PACHORI								
27	A60205220010	Ms ANUSHKA SHARMA	100	30	70	A	9	3	3	27
28	A60205220031	Mr JASPREET SINGH								
29	A60205220012	Mr HARSH RAJPUT								
30	A60205220009	Mr KOTIREDDY RANJITH KUMAR REDDY								
31	A60205220045	Mr SHIVAM RATHORE	100	30	70	A-	8	3	3	24
32	A60205220035	Mr AMAN DIXIT								

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33	A60205220036	Mr ADITHYA S KUMAR									
34	A60205220018	Mr ADITYA NARAYAN UPADHYAY	100	30	70	A	9	3	3	27
35	A60205220030	Mr HARSH KUMAR GUPTA									
36	A60205220046	Mr SAJAL KUMAR									
37	A60205220014	Mr MUKUL KHANDELWAL	100	30	70	A	9	3	3	27
38	A60205220032	Mr RISHABH CHAUHAN	100	30	70	B+	7	3	3	21
39	A60205220058	Mr NIKHIL TOMAR									
40	A60205220066	Mr VIVEK SHARMA									
41	A60205220038	Ms HARSHITA SHARMA									
42	A60205220024	Mr ADITYA TOMAR									
43	A60205220047	Ms AKANKSHA SRIVASTAVA	100	30	70	A	9	3	3	27
44	A60205220049	Mr ANURAG SHARMA									
45	A60205220017	Mr ANIRUDH NAIR									
46	A60205220034	Mr AMAN VERMA	100	30	70	B-	5	3	3	15
47	A60205220061	Mr P.SRI HARI									
48	A60205220068	Mr DEVDEEP SINGH SIKARWAR									
49	A60205220041	Mr VINEET TOMAR									
50	A60205220039	Ms PALAK TOMAR									
51	A60205220065	Mr YUVRAJ SINGH	100	30	70	A-	8	3	3	24
52	A60205220062	Mr NIKHIL SINGH DHAKAD									
53	A60205220021	Ms PURVA CHAUHAN									
54	A60205220042	Mr HARIOM SHARMA									
55	A60205220083	Mr PRIYANSHU SENGAR									
56	A60205220075	Ms AKSHITA TRIPATHI	100	30	70	B	6	3	3	18
57	A60205220052	Ms RISHITA AGARWAL									
58	A60205220040	Ms PRIYAL GUPTA									
59	A60205220072	Ms NETRA KULSHRESTHA									
60	A60205220063	Mr AKHAND PRATAP SIKARWAR	100	30	70	A	9	3	3	27
61	A60205220057	Mr SHRAVAN SHARMA									
62	A60205220044	Mr GAURAV SHARMA									
63	A60205220088	Mr RAJAT GUPTA									
64	A60205220094	Ms DISHA BHADORIA									
65	A60205220054	Mr PRASHANT GOSWAMI	100	30	70	B	6	3	3	18
66	A60205220051	Mr YADVENDRA SINGH DHAKAD	100	30	70	B+	7	3	3	21
67	A60205220099	Mr PRADHUMN MITTAL	100	30	70	A-	8	3	3	24
68	A60205220070	Ms DEEPANJALI UPADHYAY									
69	A60205220069	Mr ABSAAR MALIK									
70	A60205220055	Mr CHITRANSHU SINGH TOMAR									
71	A60205220100	Mr ABHISHEK PANDEY									

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72	A60205220119	Mr ANURAJ SINGH TOMAR									
73	A60205220056	Ms RADHIKA BEGWANI									
74	A60205220073	Ms SUNAINA ARORA	100	30	70	A	9	3	3	27
75	A60205220101	Mr ISHANT SAXENA									
76	A60205220071	Mr MOHIT ARGADE	100	30	70	A-	8	3	3	24
77	A60205220074	Mr ANKIT RAJ									
78	A60205220060	Mr MOHIT SHARMA	100	30	70	B+	7	3	3	21
79	A60205220105	Mr GAURAV PANWAR									
80	A60205220121	Mr SHIVAM PANDEY									
81	A60205220079	Mr ARYAN SONI									
82	A60205220078	Mr ARPIT SHUKLA	100	30	70	B+	7	3	3	21
83	A60205220104	Mr ABHISHEK CHOUHAN									
84	A60205220087	Mr MOHD ADNAN KHAN	100	30	70	B+	7	3	3	21
85	A60205220076	Ms JYOTIKA DALAL									
86	A60205220084	Ms NIDHI KUSHWAH	100	30	70	B+	7	3	3	21
87	A60205220115	Mr KRISHNA GOYAL									
88	A60205220138	Mr PRIYANSHU SAMAL									
89	A60205220091	Mr AMBROSE JUDE PREMINGER									
90	A60205220080	Ms GUN GUPTA									
91	A60205220112	Mr PRABHAT GUPTA									
92	A60205220098	Mr KINSHUK DAYAL SARASWAT	100	30	70	A-	8	3	3	24
93	A60205220077	Mr AMAN RUHELA									
94	A60205220092	Mr DEVASHISH SHARMA									
95	A60205220155	Ms MANSI BHARTI	100	30	70	B	6	3	3	18
96	A60205220141	Mr ABHISHEK MISHRA	100	30	70	A	9	3	3	27
97	A60205220093	Mr RAMAN SHARMA									
98	A60205220082	Mr KARTHIKEYA MARINGANTI									
99	A60205220117	Mr ROHAN SHUKLA									
100	A60205220102	Mr GAURAV SINGHAL	100	30	70	B	6	3	3	18
101	A60205220095	Mr SHASHANK DIXIT									
102	A60205220139	Ms MALIKA TRIPATHI									
103	A60205220160	Mr ANIRUDDH JHA									
104	A60205220146	Mr RAHUL SHARMA									
105	A60205220110	Mr MD AZAM									
106	A60205220090	Mr DEEPAK THAKUR									
107	A60205220118	Mr ALPESH TOMAR									
108	A60205220106	Mr YASH JHA									
109	A60205220097	Mr SURYANSH MISHRA	100	30	70	B+	7	3	3	21
110	A60205220140	Mr RAJ SINGH									
111	A60205220165	Ms SEJAL GUPTA									
112	A60205220153	Mr SUYASH TRIPATHI									
113	A60205220122	Mr KALEPU PRASHANT SAI									
114	A60205220096	Mr UTKARSH SHARMA									
115	A60205220127	Ms AASTHA BHADORIA									

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116	A60205220107	Mr ADARSH SHARMA									
117	A60205220114	Mr AKSHAT JAIN									
118	A60205220142	Mr YUVRAJ RAJPUT									
119	A60205220179	Mr RAJ PRAJAPATI									
120	A60205220158	Mr BHANU PRATAP SINGH YADAV	100	30	70	B	6	3	3	18
121	A60205220124	Mr VIRAT SINGH KUSHWAH									
122	A60205220111	Ms AASTHA SINGH									
123	A60205220133	Mr JATIN JHA									
124	A60205220116	Mr ARUN SINGH TOMAR									
125	A60205220120	Mr SATISH PAL									
126	A60205220147	Mr UJJWAL SHRIVASTAVA									
127	A60205220185	Mr ROHIT JAIN	100	30	70	B+	7	3	3	21
128	A60205220162	Ms AJITA MISHRA									
129	A60205220145	Ms ANKITA UPADHYAY									
130	A60205220123	Ms BHOOMIKA SINGHAL									
131	A60205220134	Mr ABHAY PRATAP SINGH									
132	A60205220126	Mr HASMATULLAH KHAN									
133	A60205220159	Mr SOJAL MEHRA	100	30	70	A	9	3	3	27
134	A60205220152	Ms ABHA TIWARI									
135	A60205220187	Mr AMAN DIXIT	100	30	70	A-	8	3	3	24
136	A60205220172	Mr NEELESH GOUR									
137	A60205220151	Mr ATUL SINGH TOMAR									
138	A60205220125	Mr SATYAM CHAUDHARY									
139	A60205220136	Mr ABHINAV AGARWAL									
140	A60205220129	Mr PRADEEP RAWAT									
141	A60205220188	Mr AYUSH KUMAR									
142	A60205220154	Ms MANSI TRIPATHI									
143	A60205220195	Mr HARSHVARDHAN SINGH PARIHAR	100	30	70	A	9	3	3	27
144	A60205220182	Mr RANDIP SINGH SIKARWAR	100	30	70	A	9	3	3	27
145	A60205220175	Mr AKSHAT GOYAL									
146	A60205220150	Mr YAMAN JAIN									
147	A60205220148	Mr KESHAV BAJPAI									
148	A60205220132	Ms SHRUTI TRIPATHI									
149	A60205220191	Mr VIVEK YADAV	100	30	70	B	6	3	3	18
150	A60205220174	Ms SUNEHA GOYAL									
151	A61613320005	Mr SHIVAM KATARE	100	30	70	B	6	3	3	18
152	A60205220189	Mr VANSH GOYAL	100	30	70	B+	7	3	3	21
153	A60205220025	Ms KHUSHI YADAV									
154	A60205220169	Mr VIVEK MISHRA									
155	A60205220157	Ms VANSHITA AGRAWAL									
156	A60205220137	Mr PRIYANSH SHARMA									
157	A60205220161	Mr ANURAG GAJENDRA DIXIT	100	30	70	A-	8	3	3	24
158	A60205220184	Mr AMAN SINGH	100	30	70	B	6	3	3	18
159	A60205220178	Ms VAISHNAVI JAISWAL	100	30	70	A-	8	3	3	24

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160	A60205220192	Mr ANSH SHARMA	100	30	70	A-	8	3	3	24
161	A60205220180	Mr ABHAY SINGH TOMAR	100	30	70	B+	7	3	3	21
162	A60205220170	Mr SATYAM SINGH GURJAR								
163	A60205220181	Mr ADARSH RATHORE								
164	A60205220156	Mr ASHISH SINGH TOMAR								
165	A60205220194	Mr AMIT SHARMA	100	30	70	B+	7	3	3	21
166	A60205220163	Mr JEWAL SHARMA								
167	A60205220176	Mr DEVANSH PARASHAR								
168	A60205220186	Ms AYUSHI BAIJAL	100	30	70	A	9	3	3	27
169	A60205220190	Mr RAHUL SHARMA	100	30	70	B+	7	3	3	21
170	A60205220149	Mr BHUPENDRA JADON								
171	A60205220004	Ms T.J .PRAKRUTHI								

Average Grade Point = 361/50 (Total Grade point/Total no of students) = 7.22
No of students getting greater than average (7.36) marks = 22 students = 44%

Total No. of Students	=	50
Level 2	< 50% Average marks	44%
Attainment Level		Level 1

Level 1	< 50% Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course : WIRELESS SENSOR NETWORKS AND IOT STANDARDS
Course Code: CSI301, Crédits : 03, Session2021-22 (Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr Harish Kumar Shakya

A. Introduction*:* The objective of this course is to familiarize the prospective engineers with the fundamental of Wireless sensor networks and Techniques, the limitations of the existing solutions for WSN, how cloud computing is useful for the WSN. Routing challenges in WSN & categories of different routing protocols, IOT datalink and network layer protocols.

B. Course Outcomes: At the end of the course, students will be able to:

CSI301.1 Identify the basics of Sensor networks, Wireless Sensor nodes, TOSSIM Simulator.

CSI301.2 Understand different architectures, Wireless Transmission Technology and systems & Basics of time synchronization.

CSI301.3 Apply the concepts of routing in designing various routing protocols.

CSI301.4 Analyze the design Issues in WSN routing, routing algorithms.

CSI301.5 Evaluate various protocols and algorithms with necessary parameters like packet loss, mean time to packet transfer, IOT Data Link Layer & Network Layer Protocols.

C. Programme Outcomes:

[PO.1]. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

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[PO.6]. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the

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professional engineering practice

[PO.7]. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

D. Programme Specific Outcomes:

PSO 1: Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and Wireless sensor networking for efficient design of computer-based systems of varying complexity.

PSO 2: Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO 3: Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%

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Attendance	A minimum of 75% Attendance is required to be maintained by a studentto be qualified for taking up the End Semester examination.	A	5%
	The allowance of 25% includes all types of leaves including medical leaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Fundamentals Of Sensor Networks: (8 Hours)

Introduction to computer and wireless sensor networks and Overview of the syllabus Motivation for a network of Wireless Sensor nodes- Sensing and sensors-challenges and constraints - node architecture-sensing subsystem, processor subsystem communication interfaces- prototypes, Application of Wireless sensors- Introduction of Tiny OS Programming and TOSSIM Simulator.

Module II: Communication Characteristics and Deployment Mechanisms: (6 Hours)

Wireless Transmission Technology and systems-Radio Technology Primer-Available Wireless Technologies - Hardware- Telosb, Micaz motes- Time Synchronization Clock and the Synchronization Problem - Basics of time synchronization-Time synchronization protocols - Localization- Ranging Techniques- Range based Localization- Range Free Localization- Event driven Localization.

Module III: Routing In Wireless Sensor Networks: (8 Hours)

Design Issues in WSN routing- Data Dissemination and Gathering-Routing Challenges in WSN - Flooding-Flat Based Routing – SAR, Directed Diffusion, Hierarchical Routing- LEACH, PEGASIS - Query Based Routing- Negotiation Based Routing Geographical Based Routing- Transport layer- Transport protocol Design issues Performance of Transport Control Protocols. Case study- Implementation and analysis of Routing protocol or transport layer protocol in Tiny OS.

Module IV: IOT Data Link Layer & Network Layer Protocols: (8 Hours)

PHY/MAC Layern (3GPP MTC, IEEE 802.11, IEEE 802.15), WirelessHART,Z-Wave,Bluetooth Low Energy, Zigbee Smart Energy, DASH7 - Network Layer-IPv4, IPv6, 6LoWPAN, 6TiSCH,ND, DHCP, ICMP, RPL, CORPL, CARP.

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

H. Suggested Text/Reference Books:

- IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things by David hans.
- IoT Fundamentals - Networking Technologies, Protocols and Use Cases for the Internet of Things (English,
- Paperback, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton, Jerome Henry, Rowan rollope)
- "Internet of things for architect" by Perry Lea

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- R. Buyya, A. V. Dastjerdi, Internet of Things: Principles and Paradigms, Cambridge, MA, 2016 CARP.

I. Lecture Plan

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Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction to computer and wireless sensor networks	Lecture	CSI301.1	Mid Term-1, Quiz & End Sem Exam
2	Wireless Sensor nodes- Sensing and sensors-challenges and constraints	Lecture	CSI301.1	Mid Term-1, Quiz & End Sem Exam
3	processor subsystem communication interfaces	Lecture	CSI301.1	Mid Term-1, Quiz & End Sem Exam
4	Introduction of Tiny OS Programming and TOSSIM Simulator.	Lecture	CSI301.1	Mid Term-1, Quiz & End Sem Exam
5	Wireless Transmission Technology and systems	Lecture	CSI301.1	Mid Term-1, Quiz & End Sem Exam
6	Wireless Technologies - Hardware	Lecture	CSI301.1	Mid Term-1, Quiz & End Sem Exam
7	Time Synchronization Clock and the Synchronization Problem	Lecture	CSI301.2	Mid Term-1, Quiz & End Sem Exam
8	Time synchronization protocols	Lecture	CSI301.2	Mid Term-1, Quiz & End Sem Exam
9	Ranging Techniques	Lecture	CSI301.2	Mid Term-1, Quiz & End Sem Exam
10	Ranging Techniques	Lecture	CSI301.2	Mid Term-1, Quiz & End Sem Exam
11	Design Issues in WSN routing	Lecture	CSI301.2	Mid Term-1, Quiz & End Sem Exam
12	Routing Challenges in WSN	Lecture	CSI301.2	Mid Term-1, Quiz & End Sem Exam
13	Flooding-Flat Based Routing	Lecture	CSI301.3	Mid Term-1, Quiz & End Sem Exam
14	SAR, Directed Diffusion	Lecture	CSI301.3	Mid Term-1, Quiz & End Sem Exam
15	Hierarchical Routing	Lecture	CSI301.3	Mid Term-1, Quiz & End Sem Exam
16	PEGASIS - Query Based Routing	Lecture	CSI301.3	Mid Term-1, Quiz & End Sem Exam
17	Negotiation Based Routing	Lecture	CSI301.3	Mid Term-1, Quiz & End Sem Exam

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18	Geographical Based Routing	Lecture	CSI301.3	Quiz & End Sem Exam
19	Transport protocol Design issues	Lecture	CSI301.3	Quiz & End Sem Exam
20	Performance of Transport Control Protocols	Lecture	CSI301.3	Quiz & End Sem Exam
21	Case study- Implementation and analysis of Routing protocol	Lecture	CSI301.3	Quiz & End Sem Exam
22	transport layer protocol in Tiny OS	Lecture	CSI301.3	Quiz & End Sem Exam
23	PHY/MAC Layers	Lecture	CSI301.4	Quiz & End Sem Exam
24	3GPP MTC	Lecture	CSI301.4	Quiz & End Sem Exam
25	IEEE 802.11	Lecture	CSI301.4	Quiz & End Sem Exam
26	IEEE 802.15	Lecture	CSI301.4	Quiz & End Sem Exam
27	Wireless HART	Lecture	CSI301.4	Quiz & End Sem Exam
28	Z-Wave	Lecture	CSI301.4	Quiz & End Sem Exam
29	Bluetooth Low Energy	Lecture	CSI301.4	Quiz & End Sem Exam
30	Zigbee Smart Energy	Lecture	CSI301.4	Quiz & End Sem Exam
31	DASH7 - Network Layer	Lecture	CSI301.5	Quiz & End Sem Exam
32	IPv4	Lecture	CSI301.5	Quiz & End Sem Exam
33	IPv6	Lecture	CSI301.5	Quiz & End Sem Exam
34	6LoWPAN	Lecture	CSI301.5	Quiz & End Sem Exam
35	6TiSCH, ND, DHCP,	Lecture	CSI301.5	Quiz & End Sem Exam
36	RPL, CORPL, ICMP	Lecture	CSI301.5	Quiz & End Sem Exam

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J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO 3
CSD3 0 1.1	Identify the basics of Sensor networks, Wireless Sensor nodes, TOSSIM Simulator.	1	2	1	2	1										
CSD30 1.2	Understand different architectures, Wireless Transmission Technology and systems & Basics of time synchronization.	3	2	3	1	2										
CSD3 0 1.3	Apply the concepts of routing in designing various routing protocols.	3	2	1	3	2										
CSD3 0 1.4	Analyze the design Issues in WSN routing, routing algorithms.	1	3	2	1	3										

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CSD3 0 1.5	Evaluate various protocols and algorithms with necessary parameters like packet loss, mean time to packet transfer, IOT Data Link Layer & Network Layer Protocols.	1	2	3	1	2										

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ESE Marks CSI 301

S. No.	Enrollment.No.	Student's Name	CSI301 WIRELESS SENSOR NETWORKS AND IOT STANDARDS							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U6G6
1	A60205219043	Ms PRANJALI AGRAWAL	100	30	70	A+	10	3	3	30
2	A60205219054	Ms PRIYAL BANSAL	100	30	70	A+	10	3	3	30
3	A60205219077	Mr LOHAN P NAIDU	100	30	70	A+	10	3	3	30
4	A60205219086	Mr YASH TRIPATHI	100	30	70	A+	10	3	3	30
5	A60205219060	Mr MOHAK AGRAWAL	100	30	70	A+	10	3	3	30
6	A60205219065	Ms NIKITA SINGH	100	30	70	A+	10	3	3	30
7	A60205219073	Mr RONAK PRAJAPATI	100	30	70	A+	10	3	3	30
8	A60205219079	Mr RISHABH BANSAL	100	30	70	A+	10	3	3	30
9	A60205219067	Mr VIPIN SHARMA	100	30	70	A+	10	3	3	30
10	A60205219128	Ms SMRITI BAM	100	30	70	A+	10	3	3	30
11	A60205219122	Mr VINAYAK SHARMA	100	30	70	A+	10	3	3	30
12	A60205219106	Mr RISHI RAJPUT	100	30	70	A+	10	3	3	30
13	A60205219115	Mr SANIDHYA DAVE	100	30	70	A+	10	3	3	30
14	A60205219094	Mr VIKAS NARWARIYA	100	30	70	A+	10	3	3	30
15	A60205219113	Ms POOJA GUPTA	100	30	70	A+	10	3	3	30
16	A60205219100	Ms SEJAL J TIRKEY	100	30	70	A+	10	3	3	30
17	A60205219129	Mr SHARAD PRATAP SONI	100	30	70	A+	10	3	3	30
							170			

Average Grade Point = 170/17 (Total Grade point/Total no of students) = 10

No of students getting greater than average (10) marks = 17 students = 100%

Total No. of Students	=	**17**
Level 3	> 60% Average marks	**100%**
Attainment Level		**Level 3**

Note: Attainment Level

Level 1	< 50% Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
Course Handout
Course : WIRELESS SENSOR NETWORK AND IOT STANDARD LAB
Course Code: CSI321, Crédits : 01, Session: 2021-22 (Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr Harish Kumar Shakya

A. **Introduction:** The objective of this course is to provide an overview on IoT tools and applications wireless sensor network. To introduce hands-on IoT concepts including sensing, actuation, and communication through lab exercises with IoT development kits.

B. **Course Outcomes:** At the end of the course, students will be able to:

CSI321.1 Identify the basic concepts of IOT and WSN with their relation.

CSI321.2 Understand the practical implementation of sensor nodes with the help pf small network.

CSI321.3 Analyze the complexity of data routing within the networks.

CSI321.4 Implement the various IOT devices.

CSI321.5 Develop the small-scale projects using Arduino board configuration.

C. **Programme Outcomes:**

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex real-life problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and computer sciences.

PO3. Design/Development of Solutions: Design solutions for complex problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and IT tools including prediction and modeling to complex activities with an understanding of the limi-

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PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the software engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1.Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO3. Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term Viva	CT	15%

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	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/ Q/HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a studentto be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	A	5%
End Semester Examination	End Semester Practical Examination	EE	70%
Total			**100%**

E. Assessment Plan:

F. Syllabus

Program List:

1. Basics of IoT programming using the Arduino Platform.
2. Write a program for Arduino board which takes input from infrared sensor and display count on 16 X 2 LED screen.
3. Write a program to send SMS on a mobile phone from Arduino board using GSM module:
4. Write a program to receive call from any mobile using Android board and GSM module: (2 Hours)
5. Write a program to sense temperature at remote location using Arduino board and temperature sensor: (2 Hours)
6. Write a program for Arduino board to sense moisture at some remote location using moisture sensor: (2 Hours)
7. Write a program for Arduino board to create smart burglar alarm using suitable sensors: (2 Hours)
8. Design a circuit board to receive voice input and generate amplified output using suitable microcontroller and sensors: (2 Hours)
9. Design a circuit board to On/Off electrical appliances using suitable sensors using suitable microcontroller and sensors: (2 Hours)
10. Write a program for Raspberry Pi board to On/Off electrical appliances using suitable sensors
11. Write a program for Arduino board to receive voice input and generate amplified output.
12. Write a program for Arduino board to detect the presence of harmful gas using gas sensor

G. Examination Scheme:

IA			EE			
A	PR	Practical Based Test	Major Experiment	Minor Experiment	LR	Viva
5	10	15	35	15	10	10

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Note: IA – Internal Assessment, EE   External Exam, A   Attendance, PR- Performance, LR – Lab Record, V – Viva.

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H. Suggested Text/Reference Books:

- IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things by David hans.
- IoT Fundamentals - Networking Technologies, Protocols and Use Cases for the Internet of Things (English, Paperback, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton, Jerome Henry, Rowan Trollope)
- "Internet of things for architect" by Perry Lea R. Buyya, A. V. Dastjerdi, Internet of Things: Principles and Paradigms, Cambridge, MA, 2016.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Basics of IoT programming using the Arduino Platform.	Practical	CSI321.1	Mid Term Viva/Quiz & End Sem Practical Exam
2	Write a program for Arduino board which takes input from infrared sensor and display count on 16 X 2 LED screen.	Practical	CSI321.2	Mid Term Viva/Quiz & End Sem Practical Exam
3	Write a program to send SMS on a mobile phone from Arduino board using GSM module:	Practical	CSI321.2	Mid Term Viva/Quiz & End Sem Practical Exam
4	Write a program to receive call from any mobile using Android board and GSM module:	Practical	CSI321.2	Mid Term Viva/Quiz & End Sem Practical Exam
5	Write a program to sense temperature at remote location using Arduino board and temperature sensor:	Practical	CSI321.2	Mid Term Viva/Quiz & End Sem Practical Exam
6	Write a program for Arduino board to sense moisture at some remote location using moisture sensor:	Practical	CSI321.3	Mid Term Viva/Quiz & End Sem Practical Exam
7	Write a program for Arduino board to create smart burglar alarm using suitable sensors:	Practical	CSI321.3	Mid Term Viva/Quiz & End Sem Practical Exam
8	Design a circuit board to receive voice input and generate amplified output using suitable microcontroller and sensors:	Practical	CSI321.3	Mid Term Viva/Quiz & End Sem Practical Exam
9	Design a circuit board to On/Off electrical appliances using suitable sensors using suitable microcontroller and sensors:	Practical	CSI321.4	Mid Term Viva/Quiz & End Sem Practical Exam

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10	Write a program for Raspberry Pi board to On/Off electrical appliances using suitable sensors:	Practi-cal	CSI321.4	Mid Term Viva/Quiz & End Sem Practical Exam
11	Write a program for Arduino board to re-ceive voice input and generate amplified output:	Practi-cal	CSI321.5	Mid Term Viva/Quiz & End Sem Practical Exam
12	Write a program for Arduino board to de-tect the presence of harmful gas using gas sensor	Practi-cal	CSI321.5	Mid Term Viva/Quiz & End Sem Practical Exam

J. **Course Articulation Matrix (Mapping of COs with POs)**

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PRO-GRAMME SPECIFIC OUT-COMES		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO 11	PO 12	PS O1	PS O2	PS O3
CSI32 1.1	Identify the basic con-cepts of IOT and WSN with their relation	1	2	1	2	2									1	
CSI32 1.2	Understand the practical implementa-tion of sensor nodes with the help pf small net-work.	3	2	1	2	3									2	
CSI32 1.3	Analyze the complexity of data routing within the networks	1	2	2	2	1										3
CSI32 1.4	Implement the various IOT devices.	2	1	3	2	1									1	

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CSI32 1.5	Develop the small-scale projects using Arduino board configuration.	3	2	1	2	2									2	

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ESE Marks CSI 321

S.No.	Enroll-ment.No.	Student's Name	CSI321							
			WIRELESS SENSOR NETWORKS AND IOT STANDARDS LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U7G7
1	A60205219043	Ms PRANJALI AGRAWAL	100	30	70	A+	10	1	1	10
2	A60205219054	Ms PRIYAL BANSAL	100	30	70	A	9	1	1	9
3	A60205219077	Mr LOHAN P NAIDU	100	30	70	A	9	1	1	9
4	A60205219086	Mr YASH TRIPATHI	100	30	70	B+	7	1	1	7
5	A60205219060	Mr MOHAK AGRAWAL	100	30	70	A	9	1	1	9
6	A60205219065	Ms NIKITA SINGH	100	30	70	A	9	1	1	9
7	A60205219073	Mr RONAK PRAJAPATI	100	30	70	A+	10	1	1	10
8	A60205219079	Mr RISHABH BANSAL	100	30	70	A	9	1	1	9
9	A60205219067	Mr VIPIN SHARMA	100	30	70	A-	8	1	1	8
10	A60205219128	Ms SMRITI BAM	100	30	70	A	9	1	1	9
11	A60205219122	Mr VINAYAK SHARMA	100	30	70	A	9	1	1	9
12	A60205219106	Mr RISHI RAJPUT	100	30	70	A	9	1	1	9
13	A60205219115	Mr SANIDHYA DAVE	100	30	70	A+	10	1	1	10
14	A60205219094	Mr VIKAS NARWARIYA	100	30	70	A+	10	1	1	10
15	A60205219113	Ms POOJA GUPTA	100	30	70	A	9	1	1	9
16	A60205219100	Ms SEJAL J TIRKEY	100	30	70	A+	10	1	1	10
17	A60205219129	Mr SHARAD PRATAP SONI	100	30	70	A-	8	1	1	8
							154			

Average Grade Point = 154/17 (Total Grade point/Total no of students) = 9.1

No of students getting greater than average (9.1) marks = 05 students = 29.4%

Total No. of Students	=	**17**
Level 1	< 50% Average marks	**29.4%**
Attainment Level		**Level 1**

Note: Attainment Level

Level 1	< 50% Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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