Bachelor of Technology – Civil Engineering

FLEXILEARN

-Freedom to design your degree

Programme Structure

Curriculum & Scheme of Examination

2014

AMITY UNIVERSITY CHHATTISGARH

RAIPUR

B.Tech-Civil Engineering

Programme Structure

FIRST SEMESTER

Course Code	Course Title	Lecture (L) Hours Per week	Tutorial (T) Hours Per week	Practical (P) Hours Per week	Total Credits
CIV2101	Applied Mathematics – I	3	1	-	4
CIV2102	Applied Physics - I – Fields & Waves	2	1	-	3
CIV2103	Applied Chemistry	2	1	-	3
CIV2104	Elements of Mechanical Engineering	2	-	-	2
CIV2105	Introduction to Computers & Programming in C	2	1	-	3
CIV2106	Electrical Science	2	1	-	3
CIV2107	Applied Physics– I Lab	-	-	2	1
CIV2108	Applied Chemistry Lab	-	-	2	1
CIV2109	Elements of Mechanical Engineering Lab	-	-	2	1
CIV2110	Programming in C Lab	-	-	2	1
CIV2111	Electrical Science Lab	-	-	2	1
CIV2112	Engineering Graphics Lab	-	-	2	1
Open Electives					**5***
CSS2152	English I *	1	-	-	1
BEH2151	Understanding Self for Effectiveness*	1	-	-	1
	Foreign Language – I*	3	-	-	3
LAN2151	French-I				
LAN2152	German-I				
LAN2153	Spanish-I				
LAN2154	Russian-I				
LAN2155	Chinese-I				
LAN2156	Portuguese-I				
LAN2157	Korean-I				
LAN2158	Japanese-I				
	TOTAL				**29**

*Compulsory

Syllabus – First Semester

APPLIED MATHEMATICS - I

Course Code: CIV2101   **Credit Units: 04**

Course Objective:
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.

Course Contents:

Module I: Differential Calculus
Successive differentiation, Leibnitz‟s theorem (without proof), Mean value theorem, Taylor‟s theorem (proof), Remainder terms, Asymptote & Curvature, Partial derivatives, Chain rule, Differentiation of Implicit functions, Exact differentials, Tangents & Normals, Maxima, Approximations, Differentiation under integral sign, Jacobians & transformations of coordinates.

Module II: Integral Calculus
Fundamental theorems, Reduction formulae, Properties of definite integrals, Applications to length, area, volume, surface of revolution, improper integrals, Multiple Integrals-Double integrals, Applications to areas, volumes.

Module III: Ordinary Differential Equations
Formation of ODEs, Definition of order, degree & solutions, ODE of first order: Method of separation of variables, homogeneous & non homogeneous equations, Exactness & integrating factors, Linear equations & Bernoulli equations, General linear ODE of nth order, Solution of homogeneous equations, Operator method, Method of undetermined coefficients, Solution of simple simultaneous ODE.

Module IV: Vector Calculus
Scalar & Vector Field, Derivative of a Vector, Gradient, Directional Derivative, Divergence and Curl and their Physical Significance, Arc Length, Tangent, Directional Derivative, Evaluation of Line Integral, Green‟s Theorem in Plane (without proof), Representation of Surfaces, Tangent Plane and Surface Normal, Surface Integral, Stoke‟s Theorem (without proof), Gauss Divergence Theorem (without proof).

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

Text & References:
Text:
- Differential Calculus by Shanti Narain
- Integral Calculus by Shanti Narain

References:
- Differential Equation by A.R. Forsyth
- Higher Engineering Mathematics by H.K. Dass

APPLIED PHYSICS - I - FIELDS AND WAVES

Course Code: CIV2102   **Credit Units: 03**

Course Objective:
Aim of this course is to introduce the students to fundamentals of graduate level physics, which form the basis of all applied science & engineering

Course Contents:

Module I: Oscillations & Waves
Oscillations: Introduction to S.H.M. Damped Oscillations: Differential Equation & its solution, logarithmic decrement, Quality Factor, Different conditions of damping of harmonic oscillations. Forced oscillations: Amplitude & Frequency Response, Resonance, Sharpness of Resonance
Plane Progressive Waves: Differential Equation & Solution, Superposition of Progressive Waves stationary waves.
Ultrasonics: Generation & application of ultrasonicwaves.

Module II: Wave Nature of Light
Interference: Coherent Sources, Conditions of interference, Interference due to division of wavefront, Fresnels biprism Interference due to division of amplitude, Newton"s rings, Interference due to thin films,
Diffraction: Fresnel & Fraunhofer diffraction, Fraunhofer diffraction at a single slit, double slit, N Slits, Transmission grating, Rayleigh criterion & Resolving power of grating.
Polarization: Birefringence, Nicol prism, Production & analysis of plane, circularly & elliptically polarized light, Half & quarter wave plates, Optical rotation, Polarimeter.

Module III: Electromagnetics
Scalar & vector fields, gradient of a scalar field, physical significance of gradient, equipotential surface. Line, surface & volume integrals, Divergence & curl of vector field & mathematical analysis physical significance, Electric flux, Gauss" law, Proof & Applications, Gauss divergence & 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.

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

Text & References:

- Waves & oscillation, A. P. French
- Physics of waves, W. C. Elmore & M. A. Heald
- Introduction to Electrodynamics, D. J. Griffith
- Electrodynamics, Gupta, Kumar & Singh
- Optics, A. K. Ghatak
- Engineering Physics, Satya Prakash

APPLIED CHEMISTRY

Course Code: CIV2103   **Credit Units: 03**

Course Objective:
Four basic sciences, Physics, Chemistry, Mathematics & Biology are the building blocks in engineering & technology. Chemistry is essential to develop analytical capabilities of students, so that they can characterize, transform & use materials in engineering & apply knowledge in their field. All engineering fields have unique bonds with chemistry whether it is Aerospace, Mechanical, Environmental & other fields the makeup of substances is always a key factor, which must be known. For electronics & computer science engineering, apart from the material, computer modeling & simulation knowledge can be inherited from the molecule designing. The upcoming field of technology like Nanotechnology & 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.

Course Contents:

Module I: Water Technology
Introduction & specifications of water Hardness & its determination (EDTA method only), Alkalinity, Boiler feed water, boiler problems – scale, sludge, priming & foaming: causes & prevention, Boiler problems – caustic embrittlement & corrosion: causes & prevention, Carbonate & phosphate conditioning, colloidal conditioning & calgon treatment Water softening processes: Lime – soda process, Ion exchange method,
Water for domestic use.

Module II: Fuels

Classification, calorific value of fuel, (gross & net),
Determination of calorific value of fuels, bomb calorimeter,
Solid fuels - Proximate & ultimate analysis,
Octane & Cetane No. & its significance
Numericals on combustion

Module III: Instrumental Methods of analysis
Introduction; Principles of spectroscopy; Laws of absorbance
IR: Principle, Instrumentation, Application
UV: Principle, Instrumentation, Application
NMR: Principle, Instrumentation, Application

Module IV: Lubricants
Introduction; Mechanism of Lubrication;
Types of Lubricants; Chemical structure related to Lubrication;
Properties of lubricants; Viscosity & Viscosity Index; Iodine Value; Aniline Point; Emulsion number; Flash Point; Fire Point; Drop Point; Cloud Point; Pour Point.
Selection of Lubricants.

Module VI: Corrosion
Introduction, Mechanism of dry & wet corrosion,
Types of corrosion-Galvanic, Concentration cell, soil, pitting, intergranular, waterline. Passivity.
Factors influencing corrosion.
Corrosion control.

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

Text & References:

*Text***:**
- ☐ Engineering Chemistry - Jain & Jain
- ☐ Engineering Chemistry - Sunita Rattan
- ☐ Engineering Chemistry - Shashi Chawla

*References***:**
- Engineering Chemistry –Dara & Dara
- ☐ Spectroscopy - Y.R Sharma
- Corrosion Engineering – Fontenna & Greene

ELEMENTS OF MECHANICAL ENGINEERING

Course Code: CIV2104   **Credit Units: 02**

Course Objective:
The objective of this course is to impart the basic knowledge of thermodynamics, stress - strain, materials & their properties and various manufacturing processes to the students of all engineering discipline.

Course Contents:

Module I: Fundamental Concepts
Definition of thermodynamics, system, surrounding & universe, phase, concept of continuum, macroscopic & microscopic point of view, Thermodynamic equilibrium, property, state, path, process, cyclic process, Zeroth, first & second law of thermodynamics, Carnot Cycle, Introduction to I.C. Engines-two &four stoke S.I. and C.I. engines. Otto cycle. Diesel cycle.

Module II: Stress & Strain Analysis
Simple stress & strain: introduction, normal shear, and stresses-strain diagrams for ductile & brittle materials. Elastic constants, one-dimensional loadings of members of varying cross-section, Strain Energy, Properties of material-strength, elasticity, stiffness, malleability, ductility, brittleness, hardness & plasticity etc; Concept of stress & strain stress strain diagram, tensile test, impact test & hardness test.

Module III: Casting & Forging
Introduction of casting, pattern, mould making procedures, sand mould casting, casting defects, allowances of pattern. Forging-introduction, upsetting & drawing out, drop forging, press forging & m/c forging

Module IV: Welding & Sheet metal working
Introduction of welding processes, classification, gas welding, arc welding, resistance welding. Introduction to sheet metal shop, Shearing, trimming, blanking, piercing, shaving, notching, stretch forming, nibbling coining, embossing & drawing.

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

Text & References:

☐ Engineering thermodynamics, by P.K. Nag, Tata McGraw Hill.
☐ Thermal Engineering, by D.S. Kumar. S.K. Kataria & Sons.
☐ Thermal Engineering by PL Ballaney; Khanna Publishers, Delhi.
☐ Engineering Thermodynamics: Work & Heat Transfer, by Rogers & Mayhew, ELBS Publications
☐ Heine, R.W. C.R. Loper and P.C. Rosenthal, Principles of metal casting McGraw Hill
☐ Welding Technology by R.S. Parmar, Khanna Publishers.
☐ Thermodynamics & Heat Engines Volume-I, by R. Yadav: Central Publications.
☐ Ganesan, V. Internal Combustion Engine, Tata McGraw-Hill.
☐ Mathur, M.L. & Sharma, R.P. Internal Combustion Engine. Dhanpat Rai Publication

INTRODUCTION TO COMPUTERS AND PROGRAMMING IN C

Course Code: CIV2105   **Credit Units: 03**

Course Objective:
The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer & to get them familiar with various important features of procedure oriented programming language i.e. C.

Course Contents:

Module I: Introduction
Introduction to computer, history, von-Neumann architecture, memory system (hierarchy, characteristics & types), H/W concepts (I/O Devices), S/W concepts (System S/W & Application S/W, utilities). Data Representation: Number systems, character representation codes, Binary, octal, hexadecimal & their interconversions. Binary arithmetic, floating point arithmetic, signed & unsigned numbers, Memory storage unit.

Module II: Programming in C
History of C, Introduction of C, Basic structure of C program, Concept of variables, constants & data types in C, Operators & expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment & decrement operator, Conditional, bitwise operators, Expressions, Operator precedence & associativity. Managing Input & output Operation, formatting I/O.

Module III: Fundamental Features in C
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 IV: Arrays and Functions
One dimensional arrays & 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.

Module V: Advanced features in C
Pointers, relationship between arrays & pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments.
Strings & C string library.
Structure & Union. Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments.
File Handling.

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

Text & References:

Text:
- "ANSI C" by E Balagurusamy
- Yashwant Kanetkar, "Let us C", BPB Publications, 2nd Edition, 2001.
- Herbert Schildt, "C: The complete reference", Osbourne Mcgraw Hill, 4th Edition, 2002.
- V. Raja Raman, "Computer Programming in C", Prentice Hall of India, 1995.

References*:*
- Kernighan & Ritchie, "C Programming Language", The (Ansi C Version), PHI, 2nd Edition.
- J. B Dixit, "Fundamentals of Computers & Programming in „C‟.
- P.K. Sinha & Priti Sinha, "Computer Fundamentals", BPB publication.

ELECTRICAL SCIENCE

Course Code: CIV2106   **Credit Units: 03**

Course Objective:
The objective of the course is to provide a brief knowledge of Electrical Engineering to students of all disciplines. This Course includes some theorems related to electrical, some law"s related to flow of current, voltages, basic knowledge of Transformer, basic knowledge of electromagnetism, basic knowledge of electrical network.

Course Contents:

Module I: Basic Electrical Quantities
Basic Electrical definitions-Energy, Power, Charge, Current, Voltage, Electric Field Strength, Magnetic Flux Density, etc., Resistance, Inductance & Capacitance. Ideal Source, Independent Source & Controlled Source

Module II: Network Analysis Techniques & Theorems
Circuit Principles: Ohm"s Law, Kirchoff"s Current Law, Kirchoff"s Voltage Law Network Reduction: Star–Delta Transformation, Source Transformation, Nodal Analysis, Loop analysis. Superposition theorem, Thevenin"s Theorem, Norton"s theorem & Reciprocity theorem.

Module III: Alternating Current Circuits
Peak, Average & RMS values for alternating currents, Power calculation:
reactive power, active power, Complex power, power factor, impedance, reactance, conductance, susceptance Resonance: series Resonance, parallel resonance, basic definition of Q factor & Band-width.

Module IV: Transformers
Basic Transformer Operation principle, Construction, Voltage relations, current relations, Linear circuit models, open circuit test, short circuit test, Transformer Efficiency.

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

Text & References:

- ☐ R.J. Smith, R.C. Dorf: Circuits, devices & Systems
- ☐ B.L. Thareja: Electrical Technology: Part -1 & 2
- ☐ V. Deltoro: Electrical Engineering fundamentals
- • Schaum"s Series: Electrical Circuits

APPLIED PHYSICS LAB - I

Course Code: CIV2107   **Credit Units: 01**

List of Experiments:

1.   To determine the wavelength of sodium light by Newton"s rings method.

2.   To determine the dispersive power of the material of prism with the help of a spectrometer.

3.   To determine the specific rotation of sugar by Bi-quartz or Laurent half shade polarimeter.

4.   To determine the speed of ultrasonic waves in liquid by diffraction method.

5.   To determine the width of a narrow slit using diffraction phenomena.

6.   To determine the temperature coefficient of platinum wire, using a platinum resistance thermometer & a Callender & Griffth"s bridge.

7.   To determine the value of specific charge (ratio of e/m) of an electron by Thomson method.

8.   To determine the internal resistance of Leclanche cell with the help of Potentiometer.

9.   To determine the resistance per unit length of a Carey Foster"s bridge wire & also to find out the specific resistance of a given wire.

10.   To plot graph showing the variation of magnetic field with distance along the aixs of a circular coil carrying current, & hence estimate the radius of the coil.

11.   To determine the value of acceleration due to gravity ("g") in the laboratory using bar pendulum.

12.   To determine the moment of inertia of a flywheel about its own axis of rotation.

13.   To determine the density of material of the given wire with the help of sonometer.

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.

APPLIED CHEMISTRY LAB

Course Code: CIV2108   **Credit Units: 01**

Course Contents:

List of Experiments:

(Any 10 Experiments)

1. To determine the ion exchange capacity of a given cation exchanger.

2. To determine the temporary, permanent & total hardness of a sample of water by complexometric titration method.

3. To determine the type & extent of alkalinity of given water sample.

4. To determine the number of water molecules of crystallization in Mohr's salt (ferrous ammonium sulphate) provided standard potassium dichromate solution (0.1N) using diphenylamine as internal indicator.

5. To determine the ferrous content in the supplied sample of iron ore by titrimetric analysis against standard $K_2Cr_2O_7$ solution using potassium ferricyanide $[K_3Fe (CN)_6]$ as external indicator.

6.   (a) To determine the surface tension of a given liquid by drop number method.
     (b) To determine the composition of a liquid mixture A and B (acetic acid & water) by surface tension method.

7. To prepare & describe a titration curve for phosphoric acid – sodium hydroxide titration using pH-meter.

8. (a) To find the cell constant of conductivity cell.
    (b) Determine the strength of hydrochloric acid solution by titrating it against standard sodium hydroxide solution conduct metrically

9. Determination of Dissolved oxygen in the given water sample.

10 To determine the total residual chlorine in water.

11 Determination of amount of oxalic acid and H_2SO_4 in 1 L of solution using N/10 NaOH and N/10 $KMnO_4$ solution.

12 Determination of viscosity of given oil by means of Redwood viscometer I.

13 To determine flash point & fire point of an oil by Pensky Martin's Apparatus

14 To determine the Iodine value of the oil.

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.

ELEMENT OF MECHANICAL ENGINEERING LAB

Course Code: CIV2109   **Credit Units: 01**

Course Contents:

1.   Welding

	(a)	Arc Welding	-	Butt Joint

    (a)   Arc Welding   -   Butt Joint
                          -    Lap Joint
                          -    T Joint
    (b)   Gas Welding   -   Butt Joint
                          -    Lap Joint
                          -    Brazing of Broken pieces
 2.   Foundry   -   Sand mould casting by single piece pattern&
                               Split pattern bracket with cores

 3.   Sheet Metal   -   Dust Bin
                          -     Mug
                          -    Funnel
                          -    Cylindrical Mug with handle-Rectangular

4. Fitting Shop   - Male – Female Joint
                          -    Rectangular piece
                          -    Filing the job

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.

PROGRAMMING IN C LAB

Course Code: CIV2110   **Credit Units: 01**

Software Required: Turbo C

Course Contents:

☐ C program involving problems like finding the nth value of cosine series, Fibonacci series. Etc.
☐ C programs including user defined function calls
☐ C programs involving pointers, & solving various problems with the help of those.
☐ File handling

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.

ELECTRICAL SCIENCE LAB

Course Code: CIV2111   **Credit Units: 01**

List of Experiments:

1. To verify KVL & KCL in the given network.
2. To verify Superposition Theorem.
3. To verify Maximum Power Transfer Theorem.
4. To verify Reciprocity Theorem.
5. To determine & verify RTh, VTh, RN, IN in a given network.
6. To perform open circuit & short circuit test on a single-phase transformer.
7. To study transient response of a given RLC Circuit.
8. To perform regulation, ratio & polarity test on a single-phase transformer.
9. To measure power & power factor in a three phase circuit by two wattmeter method.
10. To measure power & power factor in a three phase load using three ammeter & three voltmeter method.

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.

ENGINEERING GRAPHICS LAB

Course Code: CIV2112   **Credit Units: 01**

Course Objective:
This course will provide students concepts on the drawings of different curves like straight line, parabola, ellipse etc. After completion of this course, students will be able to draw different figures manually & will be capable of using various instruments involved in drawings.

Course Contents:

Module I: General
Importance, Significance & scope of engineering drawing, Lettering, Dimensioning, Scales, Sense of proportioning, Different types of projections, Orthographic Projection, B.I.S. Specifications.

Module II: Projections of Point & Lines
Introduction of planes of projection, Reference & auxiliary planes, projections of points & Lines in different quadrants, traces, inclinations, & true lengths of the lines, projections on Auxiliary planes, shortest distance, intersecting & non-intersecting lines.

Module III: Planes other than the Reference Planes
Introduction of other planes (perpendicular & oblique), their traces, inclinations etc., Projections of points & lines lying in the planes, conversion of oblique plane into auxiliary Plane & solution of related problems.

Module IV: Projections of Plane Figures
Different cases of plane figures (of different shapes) making different angles with one or both reference planes & lines lying in the plane figures making different given angles (with one of both reference planes). Obtaining true shape of the plane figure by projection.

Module V: Projection of Solids
Simple cases when solid is placed in different positions, Axis faces & lines lying in the faces of the solid making given angles.

Module VI: Development of Surface
Development of simple objects with & without sectioning. Isometric Projection

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.

Text & References:

- ☐ M.B. Shah & B.C. Rana, Engineering Drawing, Pearson Education, 2007
- ☐ PS Gill, Engineering Drawing, Kataria Publication
- ☐ ND Bhatt, Engineering Drawing, Charotar publications
- ☐ N. Sidheshwar, Engineering Drawing, Tata McGraw Hill
- • CL Tanta, Mechanical Drawing, "Dhanpat Rai"