AMITY UNIVERSITY

RAJASTHAN

Amity School of Engineering and Technology

Minutes of Board of Studies

2017-2018

AMITY UNIVERSITY RAJASTHAN, JAIPUR
AMITY SCHOOL OF ENGINEERING & TECHNOLOGY

BOARD OF STUDIES (BOS) of ASET

Minutes of the meeting of the ASET, Board of Studies held on 24th April, 2018 in the office of Director-ASET.

Present Members:

1. **Prof. (Dr.) D.D. Shukla** : Chairman
   (Director – ASET)
2. **Prof. (Dr.) G. K. Aseri** : Member
   (Dy. Dean Academics)
3. **Prof. (Dr.) G.D. Agarwal** : Member
   (Associate Professor, MNIT, Jaipur)
4. **Er. Sukhjeet Singh** : Member
   Head, Mfg. Plastic paint Shop
   Eicher Polaris Pvt. Ltd. Kukas, Jaipur
5. **Dr.Pankaj k Pandey** : Member
   (Associate Professor)
6. **Mr. Pankaj Sharma** : Member
   (Assistant Professor)
7. **Dr. Tarun Kumar Sharma** : Member
   (Associate Professor)
8. **Mr. Mangal Singh Sisodiya** : Member
   (Assistant Professor)
9. **Dr. Ashutosh Tripathi** : Member
   (Assistant Professor)

AMITY UNIVERSITY RAJASTHAN, JAIPUR

AMITY SCHOOL OF ENGINEERING & TECHNOLOGY

Date: 24/04/2018

Subject: BOS Meeting Tuesday, 24th April 2018 at AMITY School of Engineering & Technology

The agenda items were taken up and after considerable deliberations amongst the BOS members, the following decisions were taken:

1. The Boarsd of studies meeting, for all department of Amity school of Engineering & Technology is convened on **Tuesday, 24th April 2018** to consider the following agenda items.

2. To consider the necessary amendments in Program structure of all Programes.

3. To consider the revision in the credit structure and curriculum of aal the programmes.

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Proff. (Dr.) D.D. Shukla
Director, ASET

Proceeding of the meeting-

1. The members approved the necessary amendments in Program structure of All Progrmaes (Batch 2015-19 & batch 2016-20).

2. The members approved the credit structure for all programme.

The meeting ended with thanks to the chair and also thanks to external subject/industry experts.

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ATTENDANCE SHEET FOR BOS MEETING DATED 24/04/2018

S.NO.	NAME	DESIGNATION	DETAILS	SIGNATURE
1	Prof.(Dr.) D.D. Shukla	Director – ASET	Chairperson	
2	Prof.(Dr.) G.K. Aseri	Dy. Dean, Academics	Member	
3	Prof. (Dr.) G.D. Agarwal	Associate Professor, MNIT, Jaipur	Member	
4	Dr.Pankaj k Pandey	Associate Professor - ASET	Member	
5	Mr. Mangal Singh Sisodiya	Assistant Professor - ASET	Member	
6	Dr Ashutosh Tripathi	Assistant Professor - ASET	Member	
7	Dr Tarun Kumar Sharma	Associate Professor - ASET	Member	
8	Mr. Pankaj Sharma	Assistant Professor - ASET	Member	

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AUR/Reg./

Date: - Feb 15, 2018

NOTE-SHEET

Ref: Credit Review Committee: AUR/REG/Committee/2249 dt. 06.02.18
Sub.:- Committee Recommendation – Guidelines to Initiate Credit Restructuring

The committee reviewed the structures of leading academic institutions in India like IITs, IIMs, etc. and the revised structures received from AUH, Manesar. The committee proposes the following credit range for different programs:

Program	Core / Domain Electives	Value Added Courses	Open Elective / Minor Track	Min. Total credits	Credits in AUH
UG – 3 year	CC: 76-106 DE: 12-36	20	12-18	150	150
UG – 4 year	CC: 115-133 DE: 18-42	28	15-21	200	195
UG – 5 year	CC: 153-183 DE: 24-48	28	15-21	250	260
PG – 2 year	CC: 53-56 DE: 36	12	6-9	110	100
PG – 3 year	CC: 93-120 DE: 12-36	12	6-9	150	150
PG – 1 year	CC/DE: 49-52	8	0-3	60	-

Salient features to be kept while restructuring the credits:

- Minimum Total credit in a semester is to be 21
- Taught course must be of 3 credits only
- Term Paper course cannot be of more than 3 credits
- Dissertation should not exceed 9 credits
- Credits for Internship/Research Project can be within 6-21 credits depending upon tenure

Other Key parameters

- No Value added courses in last semester of each program, except one year programs.
- One credit unit is equivalent to minimum 12 hours of classroom contact.
- All MT and OE courses have to be of 3 credits each. No Minor track or Open Elective is to be offered in last semester. Minor Tracks and Open Electives to be offered as follows:
    - UG 4 and 5 year: II Semester to VI Semester

- UG 3 year: II Semester to V Semester
- PG 2 year: II Semester to III Semester
- PG 3 year: II Semester to IV Semester
- PG 1 year: Only in II Semester, if offered

Proposed Timelines:

- The draft Program Structures are to be presented during March 12-15, 2018 for approval of relevant authorities.
- The approved Program Structures are to be submitted to 23rd Academic Council after recommendation of Board of Studies

Submitted for approval

Prof. Jitendra Singh

Prof. A. N. Pathak

Mr. Ashish Kumar

Prof. Madhu Shastri

Recommended
16/2/18
Prof. G K Aseri

Pro President 16/2

Dy. President 19-2-2018

President 19/2/2018

Program Learning Outcomes - PLO

- Students will be able to apply knowledge of mathematics, science and engineering fundamentals to the solution of intricate engineering problems.
- Students will be able to identify, formulate and analyse complex engineering problems reaching substantiated conclusions using engineering methodology.
- Student will be able to design solutions for complex engineering problems and design systems, components, or processes that meet specified needs with appropriate consideration for societal, and environmental considerations.
- Students will be able to work effectively, as an individual or in a team effectively to solve any existing problem or working in team/individual for new innovations.
- Students will be able to demonstrate management skills and apply engineering principles, as a member and/or leader in a team to manage venture.

Credits Summary

B.Tech-M.E. (Bachelor of Technology) (04 Years/ 08 Semesters)						
Semester	Core Course (CC+PC)	Domain Electives (DE)	Value Added Course (VAC)	Open Electives (OE)	Non-Teaching Credit Courses (NTCC)	Total
I	24	-	4	-	-	28
II	23	-	4	3	-	30
III	19	3	4	3		29
IV	18	3	4	3		28
V	11	3	4	3	5	26
VI	19	3	4	3		29
VII	09	3	4	-	6	22
VIII	15	3	-	-		18
Total	**138**	**18**	**28**	**15**	**11**	**210**

CC = Core Course

DE = Domain Elective

OE = Open Elective

VA = Value Added Course

NTCC = Non - Teaching Credit Courses (NTCC)

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ANALOG ELECTRONICS – I

Course Name	Course Code	LTP	Credit	Semester
ANALOG ELECTRONICS – I	BEC 302	2:1:0	3	3

Course Objective:

This course builds from basic knowledge of Semiconductor Physics to an understanding of basic devices and their models. This course builds a foundation for courses on VLSI design and analog CMOS IC Design.

Course Contents:

Module I: Semiconductor Diode and Diode Circuits

Drift, Diffusion, Poisson's equation, Solution for E and V and their plots for pn junction, Different types of diodes: Zener, Schottky, LED. Zener as voltage regulator, Diffusion capacitance, Drift capacitance, the load line concept, half wave, full wave rectifiers, clipping and clamping circuits.

Module II: Bipolar Junction Transistor

Bipolar junction transistor: Introduction, Transistor, construction, transistor operations, BJT characteristics, load line, operating point, leakage currents, saturation and cut off mode of operations.
Bias stabilization: Need for stabilization, fixed Bias, emitter bias, self bias, bias stability with respect to variations in I_{co}, V_{BE} &β, Stabilization factors, thermal stability.

Module III: Small signal Analysis of transistor and Multistage Amplifier

Hybrid model for transistors at low frequencies, Analysis of transistor amplifier using h parameters, emitter follower, Miller's theorem, THE CE amplifier with an emitter resistance, Hybrid π model, Hybrid π Conducatnces and Capacitances, CE short circuit current gain, CE short circuit current gain with R_L
Multistage amplifier: Cascading of Amplifiers, Coupling schemes(RC coupling and Transformer coupling)

Module IV: Field Effect Transistors

Field effect transistor (JFET, MOSFET): volt-ampere characteristics, small signal model –common drain, common source, common gate, operating point, MOSFET, enhancement and -depletion mode, Common source amplifier, Source follower

Module V: Feedback Amplifiers

Feedback concept, Classification of Feedback amplifiers, Properties of negative Feedback amplifiers, Impedance considerations in different Configurations, Examples of analysis of feedback Amplifiers.

Module VI: Power amplifiers

Power dissipation in transistors, difference with voltage amplifiers, Amplifier classification (Class A, Class B, Class C, Class AB) class AB push pull amplifier, collector efficiency of each, cross over distortion.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

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

Text & References:

Text

- Boylestad: Electronic Devices and Circuits

References

- Robert F. Pierret: Semiconductor Device Fundamentals
- Millman and Halkias: Electronic Devices and circuits

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Course Name	Course Code	LTP	Credit	Semester
VLSI DESIGN	BEC 601	3:0:0	3	6

Course Objective:

In the recent years, IC manufacturing technology has gone through dramatic evolution and changes, continuously scaling to ever smatter dimensions. This scaling has a double impact on the design of ICs. First, the complexity of the designs that can be put on a single die has increased dramatically which led to new design methodologies. At the same time, this plunge into deep submicron space causes devices to behave differently and brings challenging issues to forefront. This course along with the course of Digital Circuits and Systems II and Analog CMOS IC design will give you many of the basic essentials to work in the area of Circuit Design. Since this course takes the latest trends in the industry into account, you will find yourself at a definite edge.

Course Contents:

Module I: Devices and the wire

Diode, Dynamic and transient behavior of Diode, Diffusion capacitance, SPICE Diode model, MOSFET basic, depletion and enhancement device.MOSFET static behavior, Threshold voltage and its dependence on V_{SB} MOSFET Operation in resistive and saturation region, channel length modulation, Velocity saturation and its impact on sub micron devices, sub threshold conduction, Model for manual analysis, Equivalent resistance for MOSFET in (velocity) saturated region, comparison of equations for PMOS and NMOS.DYNAMIC behavior, Channel capacitance in different regions of operation, junction capacitance, Level 1 SPICE models for MOS transistors. The Wire, Interconnect parameters: resistance, capacitance and Inductance, Lumped RC model, Elmore Delay

Module II: CMOS Inverter

VTC of an ideal inverter, Switching Model of the CMOS inverter: NMOS /PMOS discharge and charge, VTC of CMOS inverter : PMOS and NMOS operation in various regions including velocity saturation, Switching threshold, (W/L)p/(W/L)n ratio for setting desired V_M with and without velocity saturation, Noise Margins, buffer.Ratioed logic: Pseudo NMOS inverter and PMOS to NMOS ratio for performance, tri-state inverter, Resistive load inverter.Load Capacitance calculations: fan out capacitance, self capacitance calculations: Miller effect, wire capacitance; Improving delay calculation with input slope, Propagation delay: first order analysis, analysis from a design perspective, sizing a chain of inverters for minimum delay, choosing optimum number of stages, Power, Energy and Energy Delay: Dynamic power consumption, Static power, Glitches and power dissipation due to direct path currents, power and delay trade off, Transistor sizing for energy minimization

Module III: Combinational circuits

CMOS LOGIC: Good 0 and Poor 0, series and parallel N and P switches, Two and Higher input NAND and NOR gates, Functions of the type (AB+C(D+E)) and their complements, XOR and XNOR gates, 2 input Multiplexer, Full Adder; Transistor sizing in CMOS logic for optimal delay, Pseudo NMOS NAND NOR and other gates and the transistor sizing, Introduction to DSVCL logic, CPL AND/NAND, OR/NOR, XOR/XNOR gates, Logical effort, Electrical Effort, Branching effort, Examples of sizing Combinational logic chains for minimum delay, Pass-transistor logic, pass gate configurations for NMOS and PMOS, 2 input and 4 input MUX, XOR, XNOR and implementation of general functions like AB+AB*C+A*C*, Robust and Efficient PTL Design, Delay of Transmission Gate chain.Dynamic CMOS design: Pre-charge and Evaluation, charge leakage, bootstrapping, charge sharing, Cascading Dynamic Gates, DOMINO Logic, Optimization of Domino Logic Gates, simple example circuit implementations of DOMINO logic.

Module IV: Sequential Logic circuits

Principle of Bistability, NAND and NOR based SR latch, and clocked SR Latch, JK latch, example of master slave flip flop, CMOS D latch, MUX based Latches, master slave edge triggered register, Static timing, Analysis setup, hold time, clock skew, clock period, non ideal clocks, clock overlap, C2MOS register, TSPCR Register, Schmitt Trigger, Pipelining and NORA CMOS

Module V: Layout Design Rules
Introduction to CMOS Process technology, Latch up and its prevention Layout of CMOS inverter, CMOS NAND and NOR gates, Concept of Euler path, and stick diagrams for functions like (AB+E+CD)*,

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

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

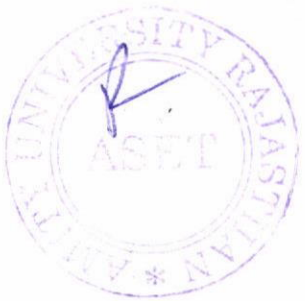
Text & References:

Text

- Jan M Rabaey: Digital Integrated Circuits
- David Hodges et al: Analysis and Design of Digital ICs
- Kang: CMOS Digital ICs

Reference

- Weste and Harris: CMOS VLSI design
- Weste and Eshragian: Principles of CMOS VLSI Design



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EMBEDDED SYSTEM DESIGN AND DEVICE DRIVER DEVELOPMENT	BEC 802	3:0:0	3	8

Course Objective:

The syllabus is divided into two parts, the first one deals with the basic embedded system and it's design and in second part deals with device driver development .The syllabus makes student perfect in assembly language programming, addressing modes etc apart from it input-output programming is discussed in detail.

Course Contents:

Module I:An introduction to embedded systems:
An Embedded system, processor in the system, other hardware units, software embedded into a system, exemplary embedded systems, embedded system – on – chip (SOC) and in VLSI circuit.

Module II: Processor and memory organization :
Structural Units in a Processor, Processor selection for an embedded system, memory devices, memory selection for an embedded systems, allocation of memory to program cache and memory management links, segments and blocks and memory map of a system, DMA, interfacing processors, memories and Input Output Devices.

Module III: Devices and buses for device networks:
I/O devices, timer and counting devices, serial communication using the "I2 C" CAN, profibus foundation field bus. and advanced I/O buses between the network multiple devices, host systems or computer parallel communication between the networked I/O multiple devices using the ISA, PCI, PCI-X and advanced buses.

Module IV: Device drivers and interrupts servicing mechanism :
Device drivers, parallel port and serial port device drivers in a system, device drivers for internal programmable timing devices, interrupt servicing mechanism.

Module V: Hardware:
software co-design in an embedded system, embedded system project management, embedded system design and co-design issues in system development process, design cycle in the development phase for an embedded system, use of target systems, use of software tools for development of an embedded system, use of scopes and logic analysis for system, hardware tests. Issues in embedded system design.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

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

Text & References:

Text

- M.A. Mazidi and J. G. Mazidi, 2004 "The 8051 Microcontroller and Embedded Systems", PHI.
- Dr. Prasad, 2004, "Embedded Real Time System", Wiley Dreamtech.
- P.Raghavan , "Embedded linux system design and development", auerbach publication.

Reference

- Michael barr, "Programming embedded system" oreilly publication.
- Raj Kamal, 2004, "Embedded Systems", TMH.
- Embedded systems design: Real world design be Steve Heath; Butter worth Heinenann, Newton mass USA 2002

9. Single phase parallel inverter.

10. Speed control of universal motor.

- **Examination Scheme:**

IA				EE	
A	PR	LR	V	PR	V
5	20	20	5	25	25

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

- **Reference/Suggested Books**
- 1. O. P. Arora: Power Electronics Laboratory-Experiments and Organization, Narosa Pub.
- 2. P. B. Zbar: Industrial Electronics- A Text-Lab Manual, MGH.

Course Name	Course Code	LTP	Credit	Semester
Power system protection	**BEE 703**	2:1:0	3	7

Course Objective:

The basic objective of the course is to impart knowledge to the students on power system protection

Course Contents:

Module I: Neutral Earthing

Introduction, Terms and definition, Disadvantages of ungrounded Systems, Advantages of neutral grounding, Types of grounding, Ungrounded system, Connection of arc suppression coil, Neutral point earthing of transformer LV circuits, Neutral grounding practice, Earthing transformer, Station earthing system, Resonant grounding - Methods of neutral grounding.

Module II: Protective Relaying

Introduction, Importance, Protective zones, primary and backup protection, desirable quantities of protective relaying, Some terms in protective relaying, Basic operation of relay, Classification of relays, Buchholz's relay, Induction relays, Directional relays, Distance relays- impedance relay, admittance relay, classification of distance relays and distance protection, Differential relays

Module III: Static Relays

Introduction, Static relay techniques using semi conductors,: Phase and amplitude comparators, Duality between phase and amplitude comparators, general equation for comparators, Basic elements of a static relay, over-current relays, differential protection, static distance protection

Module IV: Apparatus Protection

Alternator protection- types of faults, Stator protection, differential protection, rotor protection, over load protection, loss of excitation protection, un balanced loading protection, prime mover protection, over speed protection, over voltage protection, Transformer protection-, nature, faults in auxiliary equipment, winding faults, over load and external short circuits, differential protection of transformers, over current and earth fault protection, tank leakage protection, restricted earth fault protection, gas relays, transformer feeder protection, Induction Motor Protection: Abnormal operating conditions, Contactors and circuit breakers for motors, Under voltage protection, phase and Earth fault protection, Overload protection, Unbalanced voltage protection, Single phasing preventer, Phase reversal protection.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

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

Text & References:

- Electric Power System: By – C.L.Wadhwa
- Electric Power System: By - Asfaq Husain
- Elements of Power System Analysis: By – William D.Stevenson
- Power System Analysis & Design: By – B.R.Gupta
- HVDC Transmission: By K.R. Padiyar

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Course Name	Course Code	L T P	Credit	Semester
Basic Electrical Engineering	BEE 106	2 1 0	3	I

Course Contents:

Module I: Basic Electrical Quantities

Basic Electrical definitions-Energy, Power, Charge, Current, Voltage, Electric Field Strength, Magnetic Flux Density, etc., Resistance, Inductance and Capacitance. Ideal Source, Independent Source and 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 and Reciprocity theorem.

Module III: Alternating Current Circuits

Peak, Average and 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.

Evaluation:

Components	Internal Assessment	Attendance	MTE	ESE
Weightage (%)	30	5	15	50

Text & References:

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

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Course Name	Course Code	L T P	Credit	Semester
MANUFACTURING PROCESS	BME 304	3 0 0	3	III

Course contents:

Module I: Introduction to Machine Tools
Classification of machine tools, kinds of motion in machine tool operations, definition of cutting speed, feed and depth of cut

Module II: Lathe
Classification and various parts of Lathe, specification, Description of important mechanism viz. apron, tail stock, head stock, work holding, devices and operations, e.g. taper, turning, eccentric turning and screw-cutting, Geometry of a single point cutting tool. Capstan and turret lathe, cutting speed, feed, depth of cut and calculation machining time in lathe machine

Module III: Drilling Machine
Geometry and nomenclature of a twist drill, specification and classification of drilling machines, tool holding devices, work holding devices, different types of operations performed on a drilling machine, cutting speed, feed, depth of cut and calculation machining time in drilling

Module IV: Milling Machine
Working principle, milling methods, classification of milling machines, different types of operations e.g. slab, face, Angular, form, straddle, gang, end, T-slot, saw milling operations, Dividing Head e.g. Plain, universal and optical, Indexing methods e.g. simple, compound and differential indexing

Module V: Shaper, Slotter & Planer
Principal part of a shaper, classification, Quick Return mechanism, table feed mechanism of a shaper, Operations, e.g. horizontal, vertical and inclined shaping, Principal part of a Planer, Types of planer, Planer Operations, Principal part of a Slotter, Types of slotter, Difference between a shaper, planer and slotter.

Module VI: Grinding Machines
Abrasive machining, surface finishing parameters, grinding wheels selection parameters, wheel turning and dressing, Types of grinding machines e.g. Rough grinders, Cylindrical grinders, Internal grinders, surface grinder, Tool and cutter grinder, special purpose grinding machines.

Module VII: Special Machines
Introduction of NC, DNC and CNC machines, Broaching machines, Gear hobbing machine, Lapping, honing and super finishing processes.

EXAMINATION SCHEME:

Components	Other Components	Attendance	MTE	ESE
Weightage (%)	30	5	15	50

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Course Name	Course Code	L T P	Credit	Semester
MATERIAL SCIENCE AND METALLURGY	BME 405	2 0 0	2	IV

Course Contents:

Module I

Crystal Atoms of Solid: Structure of atom binding in solids metallic, Vander walls, ionic and covalent, Space lattice and crystal system arrangement of atoms in BCC, FCC and HCP crystal. Manufacture of Refractory and Ferrous Metals: Properties uses and selection of acid, basic and natural refractory, metallurgical coke, Properties, types, uses and brief description of the manufacturing processes for iron and steel making.

Module II

Plastic deformation of Metals: Point and line defects in crystals, their relation to mechanical properties, deformation of metal by slip and twinning stress strain curves of poly crystalline materials viz. mild steel cast iron and brass yield point phenomenon. Cold and hot working of metals and their effect on mechanical properties, annealing of cold worked metals, principles of re-crystallization and grain growth phenomenon, fracture in metal and alloys, ductile and brittle fracture, fatigue failure

Module III

Alloy Formation and Binary Diagram: Phase in metal system solution and inter-metallic compounds. Hume-Rottery's rules, solidification of pure metals and alloy equilibrium diagrams of isomorphous, eutectic peritectic and eutectoid system, non-equilibrium cooling and coring iron, iron carbon equilibrium diagram.

Module IV

Principles and applications of heat treatment processes viz. annealing, normalizing hardening, tempering; harden ability & its measurement, surface hardening processes. Defects in heat treatment and their remedies; effects produced by alloying elements on the structures and properties of steel. Distribution of alloying elements (Si, Mn. Ni. Cr. Mo. TL. Al) in steel

EXAMINATION SCHEME:

Components	Other Components	Attendance	MTE	ESE
Weightage (%)	30	5	15	50

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Text & References:

Text:

- V. Raghavan, "Material Science & Engineering", Prentice Hall India Ltd., 2001.
- Shackelford, J.F. and Muralidhara, M.K., Introduction to Material Science for Engineers (6/e), Pearson Education,
  2007
- S.K. Hazra Chaudhuri, "Material Science & Processes", Indian Book Publishers, Calcutta, 1983.
- R.B. Gupta, "Material Science Processes", Satya Prakashan, New Delhi, 2000.

References:

- Degarmo E. Paul et.al, "Materials & Processes in Manufacture", Prentice Hall India, New Delhi, 2001.
- Raymond A Higgim., "Engineering Metallurgy Part 1", Prentice Hall India, New Delhi, 1998.
- L. Krishna Reddi, "Principles of Engineering Metallurgy", New Age Publication, New Delhi, 2001.
- Buduisky et al, "Engineering Materials & Properties", Prentice Hall India, New Delhi, 2004.
- Peter Haasten, "Physical Metallurgy", Cambridge Univ. Press, 1996.

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Course Name	Course Code	L T P	Credit	Semester
Disaster Management	BME-706	3 0 0	3	VII

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A. **Syllabus:**

Module I: Introduction to Disaster Management

Importance and Significance, Types of Disaster- Natural Disaster: such as Flood, Cyclone, Earthquakes, Landslides etc. Man-made Disaster-such as Fire, Industrial Pollution, Nuclear Disaster, Biological Disasters, Accidents (Air, Sea, Rail & Road), Structural failures(Building and Bridge), War & Terrorism etc. Causes, effects and practical examples for all disasters.

Module II: Risk Management

Risk-Its concept and analysis, Risk Reduction, Vulnerability-Its concept and analysis, Strategic Development for Vulnerability Reduction, Disaster Preparedness and Response

Module III: Disaster Management(DM)

Phases, Cycle of Disaster Management, Institutional Framework, Incident Command System, DM Plan, Community Based DM. Community health and safety. Early Warning and Disaster Monitoring, Disaster Communication. Role of GIS and Remote Sensing, Do's and Don'ts in various disasters.

Module IV: Disaster Management Policy & Practice

Disaster Management Act 2005, Disaster Management Pol icy, National Guidelines and Plans, Role of Government, Non-Government and Private Agencies.

Module V: Role of an Engineer

Challenges and solutions for Disaster Management, Disaster Safe Designs and Constructions, Structural and Non-Structural Mitigation of Disasters

C.**Evaluation:**

Components	Internal Assessment	Attendance	MTE	ESE

Weightage (%)	30	5	15	50

D.Text Books:

1. Disaster Management Guidelines, GOI-UND Disaster Risk Program (2009-2012)
2. Damon, P. Copola, (2006) Introduction to International Disaster Management, Butterworth Heineman.
3. Gupta A.K., Niar S.S and Chatterjee S. (2013) Disaster management and Risk Reduction, Role of Environmental Knowledge, Narosa Publishing House, Delhi.
4. Murthy D.B.N. (2012) Disaster Management, Deep and Deep Publication PVT. Ltd. New Delhi.
5. Modh S. (2010) Managing Natural Disasters, Mac Millan publishers India LTD.

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Course Name	Course Code	L T P	Credit	Semester
Lean Manufacturing	BME-805	3 0 0	3	VIII

Syllabus:-

Module-1: PRINCIPLES OF LEAN MANUFACTURING: Review of manufacturing paradigm; Objectives of lean manufacturing, key principles and implications of lean manufacturing, traditional versus lean manufacturing characteristics; Value creation and waste elimination-major kinds of manufacturing waste, concept of takt time, continuous flow , continuous improvement, single piece flow.

Module-2: LEAN MANUFACTURING TOOLS AND METHODOLOGIES: Values stream mapping**:** Current state and future state value stream mapping; Standard work: Communication of standard work to employees, visual controls; Quality at the source, 5S principles, Total Productive Maintenance, Changeover and setup time reduction; Production leveling-Failure mode and effect analysis, line balancing, mistake proofing, case studies.

Module-3: GROUP TECHNOLOGY AND JUST IN TIME MANUFACTURING: Group technology philosophy: Part family, Machine cell design and analysis; JIT-Elements of JIT, Kanban, case studies.

Module-4: LEAN MANUFACTURING IMPLEMENTATION: Road map for lean manufacturing implementation; Reconciling lean with other systems-Lean six sigma, integrating lean principles in ERP and PLM; Lean production in Industry 4.0: Impact of industry 4.0 on lean production system, case studies.

A. Evaluation:-

Components	Other Components	Attendance	MTE	ESE
Weightage (%)	30	5	15	50

D. Text & Reference books:

1. Askin R G, Goldberg J B, "Design and Analysis of Lean Production Systems", John Wiley and Sons Inc., 2003.
2. S. R. Devadasan, V. Sivakumar, "Lean and Agile Manufacturing: Theoretical, Practical and Research futurities", PHI, 2012.

3. Micheal Wader, "Lean Tools: A Pocket Guide to Implementing Lean Practices", Productivity and Quality Pub, 2002.
4. Kenichi Sekine, "One-Piece Flow", Productivity Press, Portland, Oregon, 1992.
5. Alan Robinson, "Continuous Improvement in Operations", Productivity Press, Portland, Oregon, 1991.
6. Beata Mrugalska, Magdalena K. Wyrwicka, "Towards Lean Production in Industry 4.0", Procedia Engineering, 182, 2017.

AMITY UNIVERSITY
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AMITY SCHOOL OF ENGINEERING & TECHNOLOGY (ASET)

DEPARTMENT OF CIVIL ENGINEERING

Course Name	Course Code	LTP	Credit	Semester
Mechanics Of Solids	BCE 302	3:0:0	3	3

SYLLABUS

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. Volumetric Strain, elastic constants. Modulus of rigidity and bulk modulus and relations between them with derivation. Temperature stress and strain calculations due to applications of axial loads and variation of temperature in single and compound walls. Strain energy for gradually applied, suddenly applied and impact loads

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.

Module III: Bending Moment and Shear Force

Types of loads, Types of supports, Types of beams. Beams and support conditions; Types of supports and loads; determinate and indeterminate structures; Shear force and bending moment diagrams for cantilever, simply supported and overhanging beams.

Module IV: Bending Stress and Shear Stress

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 V: Torsion

Derivation of torsion equation and its assumptions. Applications of the equation of the hollow and solid circular shafts torsional rigidity, Modulus Power. 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 VI: Thin cylinders and spheres

Derivation of formulae and calculation of hoop stress, longitudinal stress in a cylinder and sphere subjected to internal pressure.

Module VII: Columns

Short and long columns, slenderness ratio, crushing and buckling of column, short column subjected to axial and eccentric loads; Euler's formulas, theory and its limitation.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

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

Text & References:

Text:

- 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.
- Mechanics of Materials –B.C.Punmia Laxmi Publications
- S. B. Junarkar and Dr. H. J. Shah, Mechanics of Structures, 27th Revised and Enlarged, Charotar, Publishing House, 2008.

References:

- 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.
- Popov Eger P., "Engg. Mechanics of solids", Prentice Hall, New Delhi, 1998.
- Srinath L.S. et.al., "Strength of Materials", McMillan, New Delhi,2001

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Course Name	Course Code	LTP	Credit	Semester
Mechanics Of Fluids	BCE 303	3:0:0	3	3

SYLLABUS

Module I: Fluid Properties and Fluid Statics

Introduction, Properties of fluids-mass density, weight density, specific volume, specific gravity, viscosity, surface tension, capillarity, vapour pressure, compressibility and bulk modulus. Newtonian and Non-Newtonian Fluids; Viscosity; Incompressible and compressible fluids, compressibility. Forces on plane surfaces, forces on curved surfaces, buoyant forces, and stability of floating bodies, metacentre and metacentre height.

Module II: Kinematics of Fluid Motion

Steady and unsteady flow; uniform and non-uniform flow; Laminar and turbulent flow; streamline, path line and streak line; continuity equation, irrotational and rotational flow, velocity potential and stream function, vortex flow, free and forced vortex.

Module III: Dynamics of Fluid Flow

Forces acting on fluid in motion. Euler's equation of motion and its integration to yield Bernoulli's equation, Forces acting on fluid in motion. Bernoulli's practical applications – Pilot tube, Venturi meter; steady flow momentum equation, force exerted on a pipe bend. Introduction to Navier-Stokes equation.

Module IV: Dimensional Analysis and Principles of Similarity

Buckingham π-Theorem and its applications, Geometric, Kinematics and Dynamic similarity; Dimensionless numbers-Reynolds, Froude, Euler, Mach, Weber Number and their significance.

Module V: Laminar and Turbulent Flow

Reynold's experiment, critical velocity, steady laminar flow through a circular tube, flow between parallel plates, measurement of viscosity. Transition from laminar to turbulent flow, courses of turbulence, velocity distribution law near a solid boundary, velocity distribution in rough pipes, Hazen – Williams's formula.

Module VI: Analysis of Pipe Flow

Energy losses, minor losses in pipe lines, concept of equivalent length, flow between two reservoirs, and multiple pipe systems – in series and parallel, siphon.

Text & References:

Text:

- 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.

References:

- F. M. White, Introduction to Fluid Mechanics, McGraw Hill
- I.H. Shames, "Mechanics of Fluids", Tata McGraw Hill
- Douglas, J. F., Gasiorek, J.M. and Swaffield, J., Fluid Mechanics, Pearson Education, 4/e, 2006
- V.L. Streeter and E.B. Wylie, "Fluid Mechanics", Tata McGraw Hill Massey B S, Mechanics of Fluids, Van Nostrand Reinhold Co

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Course Name	Course Code	LTP	Credit	Semester
BUILDING TECHNOLOGY	BCE 304	3:0:0	3	3

SYLLABUS

Course Content:

Module I: Building Materials:

Stones: Classification of rocks, technical terms, lifting appliances, joints, types – random (un-coursed) rubble, coursed rubble, dry rubble masonry, Ashlar masonry- Ashlar fine, chamfered fine. Timber: Defects, Seasoning, Decay and Preservation. Clay products: Bricks – Manufacture, IS classification, Properties, Tests and Types. Bonds in brick work- English bond, single & double Flemish bond, garden wall bond, raking bond, Dutch bond. Tiles: Manufacture, properties, uses and Types. Lime: Classification, Manufacture, properties, Test and uses. Sand – Properties & Uses. Admixture: Types & Properties.

Module II: Cement:

Raw materials, constituents of cement and their role, Manufacturing Process, Types, Properties, Tests and Uses; Mortar: Properties, Types, and uses; Concrete: Properties & Uses. Iron and steel: Properties and uses. Miscellaneous materials: Glass – Plastics - A.C. Sheets. Industrial Waste Products: Fly-ash, Slag, Silica Fumes.

Module III: Sub-Structure

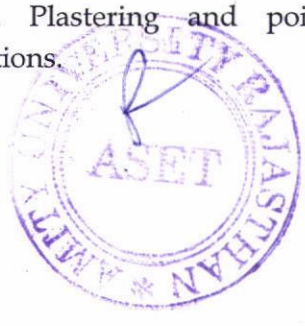
Foundations: Purpose, types, depth of footing, foundation for black cotton soil, causes of failure of foundation & remedial measure. Introduction to Shuttering, Scaffolding & Underpinning. Expansion and construction joints.

Module IV: Floorings, Doors and Windows, Vertical Transportation

Types of floors: Introduction, essential requirements of a floor, factors affecting selection of flooring material, Doors and windows: Types, Sizes and Material. Vertical Transportation: Types of Stairs and materials. Lifts and escalators.

Module V:

Cavity & Partition walls, Lintels and arches. Types of roofs and roof covering. requirements of good roofing material and technical terms, White Washing, Colour Washing, Painting, Distempering. Damp proofing materials. Sound and fire proofing construction, Fire load & Fire resisting properties of building materials. Plastering and pointing. Introduction to Prefabrication – Slip form and lift slab constructions.



Module VI:

Green Building: Principles, Concepts and Case study

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

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

Text & References:

- 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).
- Building Construction, Arora, S.P., Bindra, S.P. Dhanpat Rai and Sons. Delhi.

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Course Name	Course Code	LTP	Credit	Semester
Fluid Mechanics and Hydraulic Machines	BCE 406	2:0:0	2	4

SYLLABUS

Module-I

Ideal fluid flow- Uniform flow- source - sink- doublet - combination of flow patterns - uniform flow and source- flow around cylinder - flow with circulation - lift. Boundary layer - displacement and momentum thickness - development of flow in circular pipes - Von Karman momentum equation.

Module-II

Laminar and turbulent boundary layers on flat plates - Drag in flat plates, cylinders and spheres - Drag coefficients - Boundary layer control.

Module-III

Open Channel Flow - difference between pipe and open channel flow. Classification - Terminology - velocity distribution in open channels - Chezy, Manning and other formulae - Best hydraulic section - specific energy - specific force, Condition for maximum discharge & minimum specific energy. Hydraulic jump and its characteristics - Gradually varied flow – Rapid varied flow- computation of surface profiles.

Module-IV

Velocity measurement with Pitot tube, Prandtl Pitot tube and current meter - discharge measurement in pipe flow - venturimeter, mouthpiece, orificemeter, nozzlemeter, bendmeter and rotameter - Discharge measurement in open channel flow - All types of notches and weirs, venturiflume - critical depth meter - basic principles.

Module-V

Introduction to CFD- Dimensional homogeneity - dimensional analysis - Rayleigh`s method - Buckingham Pi theorem - applications – significance

Module-VI: TURBINES & PUMPS

Definition and classification Pelton turbine: Theory, Equation for work done and efficiency, Numerical problems. Francis turbine: Theory, Work done and efficiency, Numerical problems, Specific speed, Unit quantities, Characteristic curves. Kaplan turbine: Working principle

Definition and classification Centrifugal pumps: General principle, Priming, Heads, Work done and efficiency, Numerical problems, Minimum starting speed, Pumps in series and parallel.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

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

Text & References:

- Streeter, V.L. Fluid Mechanics, Tata McGraw Hill, 1998.
- Chow, V.T. Open Channel Hydraulics, Tata McGraw Hill, 1975.
- Nagaratnam, S. Fluid Mechanics, Khanna Publishers, 1989.
- Fluid Mechanics and Hydraulic Machines Modi and Seth

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Course Name	Course Code	LTP	Credit	Semester
GEOTECHNICAL ENGINEERING - I	BCE 503	3:0:0	3	5

SYLLABUS

Module I: Nature of soil and functional relationships

Definition, origin and formation of soil. Agents causing formation of soils. 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 and its importance, Field identification of soils. Numerical problems. 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 Compaction

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, tri axial 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 - $\varphi=0$ analysis and $c=0$ analysis - Friction circle method - Taylor's stability number -Stability charts - Sliding block analysis.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

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

Text & References:

- Gopal Ranjan and Rao, P. Basic and Applied Soil Mechanics, New Age International Pvt. Limited, New Delhi, 2002
- Alam Singh, Soil Engineering-Theory and Practice, Asia Pub, 1967.
- Punmia B.C., Soil Mechanics and Foundations, Saurabh,1992.
- Murthy V.N.S., Soil Mechanics and Foundation Engineering, Dhanpat Rai, 1984
- Khan I.H., Text Book of Geotechnical Engineering, Prentice Hall of India.

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DOMAIN ELECTIVE-I I
CORROSION SCIENCE AND ENGINEERING

Course Code: BTH 405 **Credit Units: 04**

Course Contents:

Module I: Introduction to Corrosion Science and Engineering

Basic aspects introduction, classification, economics and cost of corrosion. Emf series, Galvanic series,corrosion theories derivation of potential- current relationship of activation controlled and diffusion corrosion processes. Potential- pH diagrams Fe-H2O system, application and limitations. Passivation definition, anodic Passivation, theory of Passivation, oxidation laws, effects of oxygen and alloying on oxidation rates.

Module II: Corrosion, Definition and Types

Forms of corrosion-definition, factors and control methods of various forms of corrosion such as pitting, inter granular, crevice, stress corrosion, corrosion fatigue, hydrogen embrittlement, corrosion processes and control methods in fertilizers, petrochemical and petroleum refineries

Module III: Environmental Aspects on Corrosion

Environmental aspects: Atmospheric corrosion- classification, factors influencing atmospheric corrosion,temporary corrosion preventive methods, corrosion in immersed condition, effect of dissolved gases, salts, pH, temperature and flow rates on corrosion, Underground corrosion- corrosion process in the soil, factors influencing soil corrosion.

Module IV: Corrosion Control

Corrosion control aspects: Electrochemical methods of protection-theory of cathodic protection, design of cathodic protection, sacrificial anodes, anodic protection. Corrosion inhibitors for acidic, neutral and alkaline media, cooling water system-boiler water system. Organic coating-surface preparation, natural synthetic resin, paint formulation and applications. Design aspects in corrosion prevention, corrosion resistant materials.

Module V: Corrosion Testing and Monitoring

Corrosion Testing, monitoring and inspection, laboratory corrosion tests, accelerated chemical tests for studying different forms of corrosion. Electrochemical methods of corrosion rate measurements by DC and AC methods, corrosions monitoring methods, chemical and electrochemical removal of corrosion products,

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

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

Text Book:

1. S.N. Banerjee, An Introduction to Corrosion and Corrosion Inhibition,Oxonian Press Ltd., New Delhi.

Reference Books:

1. LL Shrier Corrosion Vol. I & II George Nownons Ltd., Southampton Street London Endn. II
2. M.G. Fontana & N.D. Greene,Corrosion Engineering, McGraw Hill, New York (3/e)
5. Jain & Jain, Engineering Chemistry, Dhanpat Rai & Sons, New Delhi

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DOMAIN ELECTIVE-III
PROCESS INSTRUMENTATION

Course Code: BTH 505 **Credit Units: 03**

Course Contents:

Module I: Introduction of Instruments

Importance of measuring of Instruments in Process Control, Classification of Instruments, Elements of an Instruments, Static & Dynamic Characterization of Instruments, Errors in measurements & Error Analysis, Selection of instrument for a particular Measurement, transducers.

Module II: Temperature sensing devices

Measurement of Temperature: Thermocouples, Resistance Thermometer, Expansion Thermometers, Pyrometers.

Module III: Pressure measuring instruments

Measurement of Pressure & Vacuum, Hydrostatic type, Elastic Element type, Electrical Type and other type of instruments like Neleod Gauge, Thermocouple gauge, Knudson Gauge, Ionization Gauge.

Module IV: Introduction to flow measuring instruments

Instruments for Measurement of Flow rate, level & Viscosity, Variable Area & variable head flow meters, Volumetric and Mass flow rate meters, Linear velocity measurement systems, Anemometers, Pressure type , Resistance & Capacitance type, Sonic & Ultrasonic, Thermal type Level meters. Viscometers: Redwood, Saybolt, Engler, Cup & Cone type, Rheo & other types of viscometers.

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

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

Books

1. Eckman, D.P., Industrial Instrumentation, Wiley Eastern Ltd., New York 1990.

2. Jain, R.K., Mechanical and Industrial Measurements, Khanna Publishers.

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PLANT DESIGN AND ECONOMICS

Course Code: BTH 801 **Credit Units: 04**

Course Contents:
Module I: Process **Development**

Process selection, study of alternative processes, pilot plant, Scale up methods, Flow sheet preparation, sketching techniques, Equipment numbering, Stream designation, Material and energy balances.

Module II: Plant **Design**

Process selection -Selection of equipment, specification and design of equipment's, material of construction, Plant location, Plant layout and installation, Safety, Start up, Shutdown and Operating guidelines.

Module III: Process **Utility & Management**

Various process utilities, their role and importance in chemical plants.Water Sources Sources of water and their characteristics ;Treatment storage and distribution of water; water for use in boilers, cooling purposes, drinking and process; Reuse and conservation of water; Water resource management.

Module IV: Steam Generation and Utilization

Steam generation and its application in chemical process plants, distribution and utilization ;Design of efficient steam heating systems; steam economy, Steam condensers and condensate utilization Expansion joints ,flash tank design, steam traps their characteristics, selection and application, waste heat utilization.; Lagging, selection and
thickness .Selection and sizing of boilers; waste heat boilers.

Module V: Compressors, blowers, Vacuum Pumps

Compressors, blowers and vacuum pumps and their performance characteristics; Methods of developing vacuum and their limitations, material handling under vacuum, Piping systems; Lubrication and oil removal in compressors and pumps. Air filters, Air and gas leakage. Inert gas systems, compressed air for process, Instrument air.
Importance of insulation for meeting the process requirement, insulation materials and their effect on various material of equipment piping, fitting and valves etc. insulation for high intermediate, low and sub zero temperatures, including cryogenic insulation.

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

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

Books Recommended

1.Peters M., Timmerhaus K. & Ronald W., Plant Design & Economics for Chemical Engineers, McGraw Hill
2.James R Couper, Process Engg. Economics (Chemical Industries) CRC Press
3. Aries & Newton, Chemical Engg. Cost Estimation, McGraw Hill

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WEBSITE DESIGN LAB

Course Code: **BCS 423** **Credit Units: 01**

Software Required: Java

List of Assignment:

1. Design a HTML page using all the basic tags.
2. Design a page containing your educational qualification in a table.
3. Design a page containing an ordered list/unordered list.
4. Design a HTML page for your resume.
5. Design a form in HTML to enter different attribute of student information.
6. Design a home page for ASE using Frame.
7. Design another page and connect these to the home page.
8. Write a function in Javascript for input validation.
9. Write a function in Javascript to calculate monthly installation of the loan.
10. Write an input form and save its data in a database using ASP.
11. Display the data stored in database in tabular form on the page.

Examination Scheme:

IA				EE		
A	Practical (Mid-Term)	PR	V	LR	PR (End Term)	V
5	20	10	15	10	25	15

Note: IA –InternalAssessment, EE- ExternalExam, PR- Performance, LR – Lab Record, V – Viva.

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PROGRAMMING WITH ASP .NET

Course Code: **BCS 705** **CreditUnits: 03**

Course Contents:

Module I: Introduction to .NET technologies
Features of .NET, .NET Framework, CLR, MSIL, .NET class library, .NET Languages, CTS, assemblies, manifest, and metadata, What is ASP.NET?, Difference between ASP and ASP.NET.

Module II: Controls in ASP.NET
Overview of Dynamic Web page, Understanding ASP.NET Controls, Applications, Web servers, Installation of IIS. Web forms, web form controls -server controls, client controls. Adding controls to a web form, Buttons, Text Box, Labels, Checkbox, Radio Buttons, List Box. Adding controls at runtime. Running a web Application, creating a multiform web project. Form Validation: Client side validation, server Side validation, validation Controls: Required Field Comparison Range. Calendarcontrol, Ad rotator Control, Internet Explorer Control.

Module III: Overview of ADO.NET and XML
What is ADO.NET, from ADO to ADO.NET. ADO.NET architecture, Accessing Data using Data Adapters and Datasets, using Command & Data Reader, binding data to data bind Controls, displaying data in data grid, XML basics, attributes, fundamental XML classes: Document, text writer, text reader. XML validations, XML in ADO.NET, The XML Data Document.

Module IV: ASP.NET Applications
Creating, tracking, caching, error handling, Securing ASP.NET applications- form based applications, window based application.

Module V: Web services
Introduction, State management- View state, Session state, Application state, Building ASP.NET web services, working with ASP.NET applications, creating custom controls.

Examination Scheme:

Components	CA	A	CT	EE
Weightage (%)	30	5	15	50

CT: Class Test, HA: Home Assignment, CA: Continuous Assessment, EE: End Semester Examination; A Attendance

Text & References:

Text:

- ASP.NET Unleashed by Stephen Walther, SAMS publications

References:

- ASP.NET, Wrox Publications
- ASP.NET and VB.NET, Wrox Publication
- ASP.NET and C#.NET, Wrox publication.

COMPUTING

Course Code: **BCS 706** **Credit Units: 04**

Course Contents:

Module I:Introduction to Personal Communications Services (PCS)
PCS Architecture, Mobility management, Networks signaling.
Global System for Mobile Communication (GSM) system overview: GSM Architecture, Mobility management, Network signaling.

Module II: General Packet Radio Services (GPRS) &Wireless Application Protocol (WAP)
GPRS Architecture, GPRS Network Nodes.
Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP.
Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless mark up Languages (WML).

Module III:Third Generation (3G) Mobile Services
Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G.
Wireless Local Loop(WLL): Introduction to WLL Architecture, wireless Local Loop Technologies.

Module IV: Global Mobile Satellite Systems
Global Mobile Satellite Systems; case studies of the IRIDIUM and GLOBALSTAR systems.
Wireless

Module V:Enterprise Networks
Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols. Advanced techniques in mobile computing.

Examination Scheme:

Components	CA	A	CT	EE
Weightage (%)	30	5	15	50

CT: Class Test, HA: Home Assignment, CA: Continuous Assessment, EE: End Semester Examination; A Attendance

Text & References:

Text:

- "Wireless and Mobile Networks Architectures", by Yi-Bing Lin &ImrichChlamtac, John Wiley & Sons, 2001.
- "Mobile and Personal Communication systems and services", by Raj Pandya, Prentice Hall of India, 2001.

References:

- "Guide to Designing and Implementing wireless LANs", by Mark Ciampa, Thomson learning, Vikas Publishing House, 2001.
- "Wireless Web Development", Ray Rischpater, Springer Publishing, 2000.
- "The Wireless Application Protocol", by Sandeep Singhal, Pearson Education Asia, 2000.
- "Third Generation Mobile Telecommunication systems", by P.Stavronlakis, Springer Publishers, 2001.

PROJECT

Course Code: **BCS 860** **CreditUnits: 15**

GUIDELINES FOR PROJECT FILE

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

A short account of the activities that were undertaken as part of the project;

A statement about the extent to which the project has achieved its stated goals.

A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;

Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;

Any problems that have arisen that may be useful to document for future reference.

➢ **Report Layout**

The report should contain the following components:

➢ **Title or Cover Page**

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

➢ **Acknowledgements** (optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

- **\Abstract**

A good"Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

- **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

- **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in "point" form.

- **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

- **Future prospects**

- **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

- **References / Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, **8** (suppl 1): 116–117.

For book
Kowalski,M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), 7: 63-67

ASSESSMENT OF THE PROJECT FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.
Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.
Project execution is concerned with assessing how much work has been put in.
The File should fulfill the following ***assessment objectives:***

Range of Research Methods used to obtain information

Execution of Research

Data Analysis
Analyse Quantitative/ Qualitative information
Control Quality

Draw Conclusions

Examination Scheme:

Dissertation	50
Viva Voce	50
Total	**100**

AMITY UNIVERSITY
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Course Name	Course Code	LTP	Credit	Semester
MEASUREMENTS & INSTRUMENTATION	**BEC 307**	2:1:0	3	3

Course Objective:

This course dealswith the systematic study of the electrical and electronics measurements, their basic features and types. This also describe the basic fundamental for characterizing all possible types of electrical and electronics measurements.

Module I :Basics of Measurement Systems:
General concepts and terminology of measurement systems, Basic characteristics of measuring devices, standards and calibration, Accuracy, Precision, Sensitivity, Resolution, Linearity & Errors in measurement.

Module II :PMMC Instruments:
PMMC meters- construction, torque equation, ammeter shunts, multirange ammeter, voltmeter multiplier, sensitivity, ohmmeters, multimeters; Construction & general equation of moving iron, electrodynamometer, hot wire instruments,

Module III: Measurement of Resistance, Inductance and Capacitance:
D.C. Bridges: Wheatstone's bridge, Sensitivity & Limitations; Carey Foster Bridge; Kelvin double bridge; Megaohm Bridge. A.C. Bridges: Maxwell's inductance Capacitance Bridge; Andersons Bridge; De Sauty's Bridge; Schering Bridge.

Module IV: Component Measuring Instruments:
Q meter, Vector Impedance meter, RF Power & Voltage Measurements, Introduction to shielding & grounding & Noise problem.

Module V: Cathode Ray Oscillioscope:
CRT Construction, Basic CRO circuits, CRO Probes, Basic functioning, Techniques of Measurement of Voltage, Current, Phase Angle and Frequency, , Multibeam, multi trace, storage & sampling Oscilloscopes.

EXAMINATION SCHEME:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

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

Text &Reference books:

Text:

- A Course In Electrical & Electronic Measurement & Instrumentation, A.K.Sawhney, Dhanpat Rai

Reference

- Introduction To Measurements And Instrumentation, Arun K. Ghosh, PHI
- Electronic Measurements & Instrumentation, Bernard Oliver, John Cage, TMH
- Elements Of Electronic Instrumentation And Measurement, Carr, Pearson
- Electronic Instrumentation, H S Kalsi, TMH

Course Name	Course Code	LTP	Credit	Semester
ELECTROMAGNETIC FIELD THEORY	BEC406	2:1:0	3	4

Course Objective:

This course provides a general introduction to the important physical concepts and mathematical methods used in treating all types of wave phenomena, but stresses electromagnetic signal propagation and issues of central importance in electrical engineering. As a core course in the Electrical Computer and Systems Engineering option of the Engineering Sciences concentration, it provides essential background and basic preparation for more advanced work in device physics, microwave and ultra-fast circuitry, antenna design, optics, optical communication and optoelectronics.

Course Contents:

Module I:

Mathematical Basics and Electrostatics
Coordinate Systems: Spherical and Cylindrical coordinates, Dirac delta function, Coulomb's law, Gauss's law, Poisson's Equation, Laplace's Equation, Electrostatic Boundary conditions, Work and Energy in Electrostatics, Conductors, Surface charge and force on conductors

Module II:

Magneto statics and Magnetic Fields in matter
Magnetic induction and Faraday's law, Magnetic Flux density, Magnetic Field Intensity, Biot Savart Law, steady currents, Ampere's law, Magneto static Boundary conditions, magnetic field inside matter, magnetic susceptibility and permeability, ferromagnetism, energy stored in a Magnetic field, Magnetic Vector Potential

Module III:

Electrodynamics
Faraday's laws, Maxwell's equations, Maxwell's modification of Ampere's law, continuity equation and Poynting

theorem.

Module IV:

Electrodynamic Waves
Wave propagation in unbounded media, Boundary conditions, reflection and transmission, polarization, E.M. waves in vacuum, E. M. waves in matter: reflection and transmission of plane waves.

Module V:

Introduction to Transmission Lines
Transmission Line, Line Parameters, Characteristic Impedance, Image Impedance, HVDC and HVAC Common faults in transmission lines. Skin Effect, Ferranti Effect and Corona.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

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

Text & References:

- Griffiths: Introduction to Electrodynamics
- Fawwaz T. Ulaby:Fundamentals of Applied Electromagnetics
- Hayt, William H., Buck, John A. Hayt, William H., Buck, John A., Engineering Electromagnetics

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Course Name	Course Code	LTP	Credit	Semester
PROCESS CONTROL ENGINEERING	**BEE 507**	2:1:0	3	5

Course Objective:

The basic objective of this course is to provide the students the core knowledge of control systems, when applied to specific process control. The idea is provide knowledge about feedback control systems, its design and computer process interface.

Course Contents:

Module I:

Basic Considerations
Introduction to process control system, control loop study- realization with load-changes at arbitrary points in the loop, offset and its analysis, modelling consideration for control purposes, degree of freedom and process controllers, formulating the scope at modelling for process control. Computer simulation and linearization of non linear system transfer function and input output models, Dynamic behaviour of firstorder lag system, process with variable time constant and gain. Dynamic behaviour of second order and higher order system-multicaplacity process, real time process, inverse response process, Introduction to
Feedback control and effects P, I & D controllers.

Module II:

Designing feed back controller
Outline of the design problems, Selection of type of feedback controller. Time-Integral performanceCriterion, Process Reaction Curve and frequency response characteristic, Ziegler-Nichol Rule, effect of dead
time, dead time compensator and inverse response compensator.

Module III:

Control Systems with Multiple Loops
Cascade, spilt-range feed forward, ratio inferential and adaptive control.

Module IV:

Interaction & De-Coupling of Control Loop
Interaction of control loops, relative gain array and selection of the loops, Design of non-interacting control loop.

Module V:

Computer Process Interface for Data Acquisition & Control

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Introduction to digital computer control of processes. Design of control system for complete plant.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

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

Text & References:

***Text*:**

- Chemical process Control – George Stephanopoulos. Pub. PHI

***References*:**

- Digital Computer Process Control-C.L. Smith Pub: Intext Educational Publisher
- Process Control-F.G. Shinskey, Pub. Mc-Graw Hill
- Advanced Process Control-W.H. Ray, Pub. McGraw Hill
- Process system and analysis and control-D.R. Coushanour, TMH
- Process Instrument & Control handbook-D.M. Considins, Pub: McGraw Hill

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Course Name	Course Code	LTP	Credit	Semester
POWER ELECTRONICS	BEE 601	2:1:0	3	6

Course Objective:

The course aims to introduce them to the theory of operation, analytical and circuit models and basic design concepts of Electric Power components and systems.

Course Contents:

Module I:

Characteristics of semiconductor power devices
Diode, Thyristor, Triac, GTO, MOSFET, IGBT

Module II:

Triggering Devices
Unijunction Transistor, Characteristics and applications of UJT, Programmable Unijunction Transistor, DIAC, Silicon Controlled Switch, Silicon Unilateral Switch, silicon Silicon bilateral Switch, Shockley diode.

Module III:

Thyristor Firing Circuits, Turn on systems
Two transistor model of Thyristor, Method of Triggering a thyristor, Thyristor Types, Requirement for triggering circuits, Thyristor Firing Circuits, Fullwave control of Ac with one thryristor, Light activated SCrs (LASCR), Control Circuit, dv/dt and di/dt protection of Thyristor, Pulse Transformer triggering, Firing SCR by UJT, TRIAC firing circuit, Phase control of SCR by pedestal and Ramp.

Module IV:

Controlled Rectifiers
Types of Converters, effect of inductive load, Commutating diode or free wheeling diode, controlled rectifiers, Bi

phase half wave, single phase full wave phase controlled converter using bridge principle, Issues of line current harmonics, Power factor, Distortion factor of ac to dc converters.

Module V:

Inverters
Types of Inverters, Bridge Inverters, Voltage Source Inverters, Sinusoidal Pulse Width Modulation Inverters, Current source Inverters.

Module VI:

AC Voltage Controllers
Types of AC voltage Controllers, AC Phase Voltage controllers, single Phase Voltage Controller with RL load

Module VII:

DC to DC Converters
DC choppers, Chopper classification, two quadrant chopper, Four quadrant chopper.

Module VIII:

Industrial Applications
One shot Thyristor trigger Circuit, over voltage protection, simple battery charger, battery charging regulator, AC static switches, DC static switch.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

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

Text & References:

Text:

- J. Michael: Power Electronics: Principles and Applications
- M. H. Rashid: Power Electronics circuits

References:

- H. C. Rai, "Power Electronics Devices, Circuits, Systems and Application", Galgotia, 3rd Ed.
- P. S. Bimbhara, "Electrical Machinery, Theory Performance and Applications" Khanna Publications, 7th Ed

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Course Name	Course Code	LTP	Credit	Semester
POWER ELECTRONICS LAB	**BEE 621**	0:0:1	1	6

Course Objective:

The course aims to introduce them to the theory of operation, analytical and circuit models and basic design concepts of Electric Power components and systems.

Course Contents:

1 Study of VI Characteristics of SCR at different gate currents.

2. Study of VI characteristics of DIAC.

3. Static characteristics of IGBT and MOSFET

4. RC and UJT triggering of SCR.

5. Different types of commutation..

6. Single phase half and full controlled wave converter.

7. Step up and step down choppers.

8. a. Single phase series inverter.

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Course Name	Course Code	LTP	Credit	Semester
ANALOG ELECTRONICS – I	BEC 302	4:0:0	4	3

Course Objective:

This course builds from basic knowledge of Semiconductor Physics to an understanding of basic devices and their models. This course builds a foundation for courses on VLSI design and analog CMOS IC Design.

Course Contents:

Module I: Semiconductor Diode and Diode Circuits

Different types of diodes: Zener, Schottky, LED. Zener as voltage regulator, Diffusion capacitance, Drift capacitance, the load line concept, half wave, full wave rectifiers, clipping and clamping circuits.

Module II: Bipolar Junction Transistor

Bipolar junction transistor: Introduction, Transistor, construction, transistor operations, BJT characteristics, load line, operating point, leakage currents, saturation and cut off mode of operations. Bias stabilization: Need for stabilization, fixed Bias, emitter bias, self bias, bias stability with respect to variations in I_{co}, V_{BE} & β, Stabilization factors, thermal stability.

Module III: Small signal Analysis of transistor and Multistage Amplifier

Hybrid model for transistors at low frequencies, Analysis of transistor amplifier using h parameters, emitter follower, Miller's theorem, THE CE amplifier with an emitter resistance, Hybrid π model, Hybrid π Conducatnces and Capacitances, CE short circuit current gain, CE short circuit current gain with R_L Multistage amplifier: Cascading of Amplifiers, Coupling schemes(RC coupling and Transformer coupling)

Module IV: Field Effect Transistors

Field effect transistor (JFET, MOSFET): volt-ampere characteristics, small signal model –common drain, common source, common gate, operating point, MOSFET, enhancement and -depletion mode, Common source amplifier, Source follower

Module V: Feedback Amplifiers

Feedback concept, Classification of Feedback amplifiers, Properties of negative Feedback amplifiers, Impedance considerations in different Configurations, Examples of analysis of feedback Amplifiers.

Module VI: Power amplifiers

Power dissipation in transistors, difference with voltage amplifiers, Amplifier classification (Class A, Class B, Class C, Class AB) class AB push pull amplifier, collector efficiency of each, cross over distortion.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

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

Att: Attendance.

Text & References:

Text

- Robert F. Pierret: Semiconductor Device Fundamentals, Pearson Education.

Reference

- Millman and Halkias: Electronic Devices and circuits, Tata McGraw.
- Boylestad: Electronic Devices and Circuits, Pearson Education.

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Course Name	Course Code	LTP	Credit	Semester
ELECTROMAGNETIC PROPERTIES OF MATERIALS	BEC 306	3:0:0	3	3

Course Objectives: The course aims at to introduce the behaviour of materials in external electric and magnetic field to the students.

Module I: Introduction:
Interaction of free electrons with lattice, Brillouin zones, Nearly free electron model, Tight binding and other electronic structure models.

Module II:Conducting Materials:
Electrical resistivity of metals and alloys, Mattheissen rule, Nordheims Rule, Kondo effect, Ionic and superionic conductors, Properties and their applications.

Module III:Dielectric and Insulating Materials:
Polarization, ClausiusMosotti equation, Dielectric permittivity and loss, Dielectric break down in materials, High K dielectric materials, Non-linear dielectrics, Ferroelectricity, Piezoelectricity, Pyroelectricity, Actuators and Smart materials.

Module IV : Magnetic Materials:
Classification, Ferromagnetism and Exchange interactions, Ferromagnetic domains, Magnetic anisotropy, Magnetic behaviour of polycrystalline materials, Hard and soft magnetic metallic and Intermetallic materials and their characteristics, Their properties and applications, Magnetism and superconductivity, Magnetostriction.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

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

Text & References

Text:

1. Kittel, C, Introduction to Solid State Physics, John Wiley & Sons, Inc., (1996).
2. Ashcroft, N.W., and Mermin, N.D., Solid State Physics, Thomson, (2007).

References:

1. L. Solymar and Walsh, Lectures on Electrical Properties of Materials, Oxford University Press, (2004)
2. Hummel, R.E., Electronic Properties of Materials, Springer Verlag, (2004).

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Course Name	Course Code	LTP	Credit	Semester
ELECTROMAGNETIC FIELD THEORY	BEC 406	3:0:0	3	4

Course Objective:

This course provides a general introduction to the important physical concepts and mathematical methods used in treating all types of wave phenomena, but stresses electromagnetic signal propagation and issues of central importance in electrical engineering. As a core course in the Electrical Computer and Systems Engineering option of the Engineering Sciences concentration, it provides essential background and basic preparation for more advanced work in device physics, microwave and ultra-fast circuitry, antenna design, optics, optical communication and optoelectronics.

Course Contents:

Module I: Mathematical Basics and Electrostatics:
Coordinate Systems: Spherical and Cylindrical coordinates, Dirac delta function, Coulomb's law, Gauss's law, Poisson's Equation, Laplace's Equation, Electrostatic Boundary conditions, Work and Energy in Electrostatics, Conductors, Surface charge and force on conductors

Module II: Magnetostatics and Magnetic Fields in matter:
Magnetic induction and Faraday's law, Magnetic Flux density, Magnetic Field Intensity, Biot Savart Law, steady currents, Ampere's law, Magnetostatic Boundary conditions, magnetic field inside matter, magnetic susceptibility and permeability, ferromagnetism, energy stored in a Magnetic field, Magnetic Vector Potential

Module III: Electrodynamics:
Faraday's laws, Maxwell's equations, Maxwell's modification of Ampere's law, continuity equation and Poynting theorem.

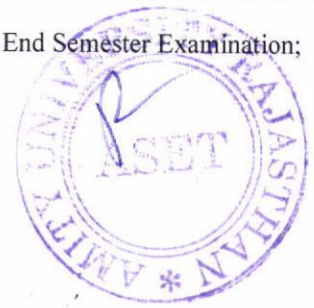
Module IV: Electrodynamic Waves:
Wave propagation in unbounded media, Boundary conditions, reflection and transmission, polarization, E.M. waves in vacuum, E. M. waves in matter: reflection and transmission of plane waves.

Module V: Introduction to Transmission Lines:
Transmission Line, Line Parameters, Characteristic Impedance, Image Impedance, HVDC and HVAC Common faults in transmission lines. Skin Effect, Ferranti Effect and Corona. Standing wave ratio, input impedance and smith chart.Applications

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

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



Att: Attendance.

Text & References:

Text

- Griffiths: Introduction to Electrodynamics
- Fawwaz T. Ulaby: Fundamentals of Applied Electromagnetics

Reference

- Hayt, William H., Buck, John A. Hayt, William H., Buck, John A., Engineering Electromagnetics

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Course Name	Course Code	LTP	Credit	Semester
MICROPROCESSOR AND MICROCONTROLLER SYSTEMS	BEC 501	3:0:0	3	5

Course Objective:

This course deals with the systematic study of the Architecture and programming issues of 8085-microprocessor family. The aim of this course is to give the students basic knowledge of the above microprocessor needed to develop the systems using it.

Course Contents:

Module I: Introduction to Microcomputer Systems

Introduction to Microprocessors and microcomputers, Study of 8 bit Microprocessor, 8085 pin configuration, Internal Architecture and operations, interrupts, Stacks and subroutines, various data transfer schemes.

Module II: ALP and timing diagrams

Introduction to 8085 instruction set, advance 8085 programming, Addressing modes, Counters and time Delays, Instruction cycle, machine cycle, T-states, timing diagram for 8085 instruction.

Module III: Memory System Design & I/O Interfacing

Memory interfacing with 8085. Interfacing with input/output devices (memory mapped, peripheral I/O), Cache memory system. Study of following peripheral devices 8255, 8253, 8257, 8259, 8251.

Module IV: Architecture of 16-Bit Microprocessor

Difference between 8085 and 8086, Block diagram and architecture of 8086 family, pin configuration of 8086, minimum mode & maximum mode Operation, Bus Interface Unit, Register Organization, Instruction Pointer, Stack & Stack pointer, merits of memory segmentation, Execution Unit, Register Organization.

Module V: Pentium Processors

.Internal architecture of 8087, Operational overview of 8087, Introduction to 80186, 80286, 80386 & 80486 processors, Pentium processor (P-II, P-III, P-IV).advanced microprocessor

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

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

Text & References:

Text

- Ramesh. S. Gaonkar, "Microprocessor architecture Programming and Application with 8085" Penram International Publishing, 4th Edition

- B. Ram, "Fundamentals of microprocessors and microcomputer" Dhanpat Rai, 5th Edition.

Reference

- Douglas V Hall.
- M. Rafiquzzaman, "Microprocessor Theory and Application" PHI – 10th Indian Reprint.
- Naresh Grover, "Microprocessor comprehensive studies Architecture, Programming and Interfacing" Dhanpat Rai, 2003.
- Gosh," 0000 to 8085" PHI.

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Course Name	Course Code	LTP	Credit	Semester
POWER ELECTRONICS	BEE 601	3:0:0	3	6

Course Objective:

The course aims to introduce them to the theory of operation, analytical and circuit models and basic design concepts of Electric Power components and systems.

Course Contents:

Module I: Triggering Devices

Triggering devices, Unijunction Transistor, Characteristics and applications of UJT, Programmable Unijunction Transistor, DIAC, Silicon Controlled Switch, Silicon Unilateral Switch, silicon Silicon bilateral Switch, Shockley diode, GTO, MOSFET, Power diodes.

Module II: Thyristor Firing Circuits, Turn on systems

Two transistor model of Thyristor, Method of Triggering a thyristor, Thyristor Types, Requirement for triggering circuits, Thyristor Firing Circuits, Fullwave control of Ac with one thryristor, Light activated SCrs (LASCR), Control Circuit, dv/dt and di/dt protection of Thyristor, Pulse Transformer triggering, Firing SCR by UJT, TRIAC firing circuit, Phase control of SCR by pedestal and Ramp.

Module III: Controlled Rectifiers

Types of Converters, effect of inductive load, Commutating diode or freewheeling diode, controlled rectifiers, Bi phase half wave, single phase full wave phase controlled converter using bridge principle, harmonics.

Module IV: Inverters

Types of Inverters, Bridge Inverters, Voltage Source Inverters, Pulse Width Modulation Inverters, Current source Inverters.

Module V: AC Voltage Controllers

Types of AC voltage Controllers, AC Phase Voltage controllers, single Phase Voltage Controller with RL load, harmonic analysis of single phase full wave controller with RL load.

Module VI: DC to DC Converters

DC choppers, Chopper classification, two quadrant chopper, Four quadrant chopper.

Module VII: Industrial Applications

One shot Thyristor trigger Circuit, over voltage protection, simple battery charger, battery charging regulator, AC static switches, DC static switch

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

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

Att: Attendance.

Text & References:

Text:

- J. Michael: Power Electronics: Principles and Applications
- M. H. Rashid: Power Electronics circuits

References:

- H. C. Rai, "Power Electronics Devices, Circuits, Systems and Application", Galgotia, 3rd Ed.
- P. S. Bimbhara, "Electrical Machinery, Theory Performance and Applications" Khanna Publications, 7th

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Course Name	Course Code	LTP	Credit	Semester
INFORMATION THEORY AND CODING	BEC 607	3:0:0	3	6

Course Objective:

This course introduces what is information and how to deal with information. Role of coding in communication and what type of different codes are used in communication system. It also introduces different entropies, channel capacity and purpose of encoding. It also deals with the basic algebra required for coding the information.

Course Contents:

Module I: Fundamental Limits in Information Theory

Measure of Information, Data Compaction, Discrete Memory less Channels, Relationship among different Entropies, Mutual information, Channel Capacity, Capacity of channel with symmetric noise structure BSC and BEC. Channel Coding Theorem, Differential Entropy and Mutual Information for Continuous Ensembles, Information Capacity Theorem.

Module II: Coding techniques

Source Coding: Instantaneous Codes, Source Coding Theorem, The Kraft Inequality and McMillan's Theorem, Shannon's Noiseless Coding Theorem, Shannon Fanon Coding, Huffman Coding, Arithmetic Coding, Lempel Ziv coding.Channel Coding: Code Rate, Decoding Rules, Hamming Distance, Bounds on M, Maximal Codes and Perfect Codes, Error Probabilities.

Module III: Introduction to Algebra for Information theory systems

Groups, Ring, Vector space and Fields, Linear Spaces, Linear Spaces over Binary Fields, Construction of Galois field GF (2m), Basic Properties of Galois Field GF (2m), Codes Derived from Hadamard Matrices.

Module IV: Error Correcting Codes

Linear Block Codes: Syndrome and Error detection, Minimum distance of block code, error detecting and Error correcting capability a block code.Cyclic Codes: Rings of Polynomials, Description of Cyclic codes, Encoding and Decoding of Cyclic Codes and its Circuits, Hamming Codes.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

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

Text & References:

Text

- F.M. Reza: Information Theory, McGraw Hill
- ShuLin & J Costeib: Error Control Coding, (PHI)

Reference

- Dass, Mullick & Chatterjee : Digital Communication, John Wiley, Ed. 1992