SHRI RAMDEOBABA COLLEGE OF ENGINEERING AND MANAGEMENT, NAGPUR

An Autonomous College of Rashtrasant Tukadoji Maharaj
Nagpur University, Nagpur, Maharashtra, India

TEACHING SCHEME & SYLLABUS
2014-15

B. E. ELECTRONICS & COMMUNICATION ENGINEERING

Published by
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ISO 9001 : 2008 CERTIFIED ORGANISATION

About the Department:

The Department was established in the year 2001and has been accredited by National Board of Accreditation in the year 2008 for three years.

The department has Well-equipped laboratories with advanced equipments worth more than Rs. 1 crore along with advanced softwares. MODROB proposal of Rs.15 Lacs was sanctioned by AICTE for the year 2011-12 for the "Up-gradation of Digital Communication Networking facilities in the field of Communication Engineering".

A forum called 'Communique' has been set up by the department which provides a platform to the students and staff to showcase their talent through various technical, curricular and co-curricular activities.

Salient Features of The Department:

1. The department is the first choice of the students in Central India.
2. Highest placement amongst private institutes in the region.
3. Excellent academic results with many university rankers/ highest CGPA.
4. Students have undergone Academic/Industry training in foreign Universities.
5. Students excel in Professional Examinations.
6. Students outshine in various sports activities of University / State level.
7. Alumni have achieved higher position in Multi-National Companies.
8. Students and the faculty from the Department honoured as "Best Student" and "Best Teacher" by RTM Nagpur University.
9. State-of-Art infrastructure.
10. Young, enthusiastic & dedicated staff with research aptitude.

No of Ph. D.s	:	05
Ph.D. (Submitted)	:	01
Ph.D. (Pursuing)	:	10

11. Faculty members have to their credit around 124 research publications.
12. Department has research projects with IIT Bombay, under Government of India's NUP program and FOSSEE project.
13. Patent has been published on "Remote Monitoring of Energy Meter using Telephone Lines".

Department Vision:

To establish the department as a center of excellence in academics and research with advances in the rapidly changing field of Electronics and Communication.

Department Mission: To create stimulating environment for learning and imparting quality technical education to fulfill the needs of industry and society.

Programme Educational Objectives

The programme aims to:

1. Create graduates with basic knowledge of sciences, mathematics and technical expertise with ability to excel in professional career and/or higher education.

2. Develop competent and self motivated professionals with ethical responsibilities.
3. Develop engineers with capability to apply knowledge and evaluate results based on facts, tests, experimentations and research.
4. Inculcate multidisciplinary skills along with leadership and managerial qualities for life-long learning and development.

Programme Outcomes

After successful completion of program students will attain:

a. Ability to apply the knowledge of mathematics, science and engineering fundamentals, to solve the engineering problems.

b. Ability to Identify, formulate, and analyze engineering problems using principles of mathematics and engineering sciences.

c. Ability to develop solutions for complex engineering problems and design system components or processes to meet the needs of the society.

d. Ability to use engineering knowledge to design experiments, analyze, interpret data, and synthesize the information to provide valid conclusions.

e. Ability to create, select, and apply appropriate techniques, resources, and modern engineering and simulation tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

f. Ability to assess and analyze the impact of engineering practices on societal issues.

g. Ability to assess and analyze the impact of engineering practices on environmental issues.

h. Ability to apply ethical principles and commit to professional ethics and responsibilities in engineering practices.

i. Ability to function effectively as an individual or as a leader in diverse teams, and in multidisciplinary field.

j. Ability to communicate effectively, write precise reports, design documentation, make effective presentations for engineering activities

k. Ability to analyze financial aspects involved in Engineering projects with managerial skills

l. Ability to prepare and engage in independent and life-long learning in the context of technological change.

DEPARTMENT OF B. E. ELECTRONICS AND COMMUNICATION ENGINEERING

Teaching Scheme for First Year (Semester I and II) Bachelor of Engineering

GROUP 1: SEMESTER I / GROUP 2: SEMESTER II

Sr. No.	Code	Course	L	T	P	Credits	Maximum Marks			Exam Duration
							Internal Assessment	End Sem Exam	Total	
1	MAT101/ MAT102	Engineering Mathematics-I/II	4	1	0	9	40	60	100	3 Hrs.
2	CHT101	Engineering Chemistry	4	1	0	9	40	60	100	3 Hrs.
3	CHP101	Engineering Chemistry lab	0	0	3	3	25	25	50	-
4	EET101	Electrical Engineering	3	1	0	7	40	60	100	3 Hrs.
5	EEP101	Electrical Engineering lab	0	0	2	2	25	25	50	-
6	CST101	Computer Programming	2	0	0	4	40	60	100	3 Hrs.
7	CSP101	Computer Programming lab	0	0	2	2	25	25	50	-
8	HUT101	Communication Skills	2	0	0	4	40	60	100	3 Hrs.
9	HUP101	Communication Skills lab	0	0	2	2	25	25	50	-
10	PEP101	Sports/Yoga	0	0	2	0	-	-	-	-
		TOTAL	**15**	**3**	**11**	**42**	**300**	**400**	**700**	

Teaching Scheme for First Year (Semester I and II) Bachelor of Engineering

GROUP 1 : SEMESTER II / GROUP 2 : SEMESTER I

Sr. No.	Code	Course	L	T	P	Credits	Maximum Marks			Exam Duration
							Internal Assessment	End Sem Exam	Total	
1	MAT102/ MAT101	Engineering Mathematics-II/I	4	1	0	9	40	60	100	3 Hrs.
2	PHT101	Engineering Physics	4	1	0	9	40	60	100	3 Hrs.
3	PHP101	Engineering Physics lab	0	0	3	3	25	25	50	-
4	CET101	Engineering Mechanics	3	1	0	7	40	60	100	3 Hrs.
5	CEP101	Engineering Mechanics lab	0	0	2	2	25	25	50	-
6	INT101	Engineering Drawing	3	0	0	6	40	60	100	4 Hrs.
7	INP101	Engineering Drawing lab	0	0	3	3	25	25	50	-
8	HUT102	Social Skills	2	0	0	4	40	60	100	3 Hrs.
9	INP102	Workshop	0	0	2	2	25	25	50	-
		TOTAL	**16**	**3**	**10**	**45**	**300**	**400**		

Scheme of Examination of Bachelor of Engineering (Electronics and Communication Engineering) Semester Pattern - III Semester B. E. (Electronics and Communication Engineering)

Sr. No.	Code	Course	L	T	P	Credits	Maximum Marks			Exam Duration
							Internal Assessment	End Sem Exam	Total	
1	MAT203	Mathematics - III	3	1	0	7	40	60	100	3 Hrs.
2	EET205	Network Theory	3	1	0	7	40	60	100	3 Hrs.
3	ECT201	Electronic Devices	4	1	0	9	40	60	100	3 Hrs.
4	ECP201	Electronic Devices Lab.	0	0	2	2	25	25	50	-
5	ECT202	Digital Logic Design	4	1	0	9	40	60	100	3 Hrs.
6	ECP202	Digital Logic Design Lab	0	0	2	2	25	25	50	-
7	PHT201	Electronic Engineering Materials and IC Fabrication	3	1	0	7	40	60	100	3 Hrs.
8	CSP211	Object Oriented Data Structure	0	0	2	2	25	25	50	-
9	CHT201	Environmental Studies - I	2	0	0	00	-	-	-	-
		Total	**19**	**5**	**6**	**45**				

Scheme of Examination of Bachelor of Engineering (Electronics and Communication Engineering) Semester Pattern - IV Semester B. E. (Electronics and Communication Engineering)

Sr. No.	Code	Course	L	T	P	Credits	Maximum Marks			Exam Duration
							Internal Assessment	End Sem Exam	Total	
1	MAT243	Mathematics - IV	3	1	0	7	40	60	100	3 Hrs.
2	ECT203	Electromagnectic Fields	4	1	0	9	40	60	100	3 Hrs.
3	ECT204	Analog Circuits	4	1	0	9	40	60	100	3 Hrs.
4	ECP204	Analog Circuits Lab	0	0	2	2	25	25	50	-
5	ECT205	Electronic Circuits	3	1	0	7	40	60	100	3 Hrs.
6	ECP205	Electronic Circuits Lab.	0	0	2	2	25	25	50	-
7	ECT206	Electronic Measurement and Instrumentation	3	1	0	7	40	60	100	3 Hrs.
8	ECP206	Electronic Measurement and Instrumentation Lab.	0	0	2	2	25	25	50	-
9	CHT202	Environmental Studies- II	2	0	0	00	-	-	-	
		Total	**19**	**5**	**6**	**45**				

Scheme of Examination of Bachelor of Engineering (Electronics and Communication Engineering) Semester Pattern - V Semester B. E. (Electronics and Communication Engineering)

Sr. No.	Code	Course	L	T	P	Credits	Maximum Marks			Exam Duration
							Internal Assessment	End Sem Exam	Total	
1	HUT301	Principles of Economics and Management	3	1	0	7	40	60	100	3 Hrs.
2	EET314	Control System Engineering	4	1	0	9	40	60	100	3 Hrs.
3	ECT301	Fundamentals of Communication Engineering	4	1	0	9	40	60	100	3 Hrs.
4	ECP301	Fundamentals of Communication Engineering Lab.	0	0	2	2	25	25	50	-
5	ECT302	Microprocessor and Interfacing	4	1	0	9	40	60	100	3 Hrs.
6	ECP302	Microprocessor and Interfacing Lab.	0	0	2	2	25	25	50	-
7	ECT303	Computer Organization	3	1	0	7	40	60	100	3 Hrs.
8	ECP304	System Simulation	0	0	2	00	-	-	-	-
		Total	**18**	**5**	**6**	**45**				

Scheme of Examination of Bachelor of Engineering (Electronics and Communication Engineering) Semester Pattern - VI Semester B. E. (Electronics and Communication Engineering)

Sr. No.	Code	Course	L	T	P	Credits	Maximum Marks			Exam Duration
							Internal Assessment	End Sem Exam	Total	
1	ECT305	Departmental Elective - I	3	1	0	7	40	60	100	3 Hrs.
2	ECT306	Waves and Radiating Systems	4	1	0	9	40	60	100	3 Hrs.
3	ECT307	Statistical Signal Analysis	4	1	0	9	40	60	100	3 Hrs.
4	ECT308	Embedded Systems	4	1	0	9	40	60	100	3 Hrs
5	ECP308	Embedded Systems Lab.	0	0	2	2	25	25	50	-
6	ECT309	Open Elective	3	1	0	7	40	60	100	3 Hrs
7	ECP310	Electronics Workshop	0	0	2	2	25	25	50	-
		Total	**18**	**5**	**4**	**45**				

Course Code	Elective - I	Course Code	Open Elective
ECT305 - 1	Switching Theory and Finite Automata	ECT309 - 1	Telecommunication Engineering
ECT305 - 2	Television Engineering	ECT309 - 2	Introduction to Instrumentation System and Transducers

Scheme of Examination of Bachelor of Engineering (Electronics and Communication Engineering) Semester Pattern - VII Semester B. E. (Electronics and Communication Engineering)

Sr. No.	Code	Course	L	T	P	Credits	Maximum Marks			Exam Duration
							Internal Assessment	End Sem Exam	Total	
1	ECT401	Digital Communication	3	1	0	7	40	60	100	3 Hrs.
2	ECT402	Computer Communication Networks	4	0	0	8	40	60	100	3 Hrs.
3	ECT403	Digital Signal Processing	4	1	0	9	40	60	100	3 Hrs.
4	ECP403	Digital Signal Processing Lab.	0	0	2	2	25	25	50	-
5	ECT404	Digital System Design with HDL	3	1	0	7	40	60	100	3 Hrs.
6	ECP404	Digital System Design with HDL Lab.	0	0	2	2	25	25	50	-
7	ECT405	Departmental Elective - II	4	0	0	8	40	60	100	3 Hrs.
8	ECP406	Project Phase - I	0	0	4	8*	50	50	100	-
		Total	**18**	**3**	**8**	**51**				

Course Code	Elective – II
ECT405 – 1	Pattern Recognition
ECT405 – 2	Advanced Microprocessor
ECT405 – 3	Advanced Microcontrollers

Scheme of Examination of Bachelor of Engineering (Electronics and Communication Engineering) Semester Pattern - VIII Semester B. E. (Electronics and Communication Engineering)

Sr. No.	Code	Course	L	T	P	Credits	Maximum Marks			Exam Duration
							Internal Assessment	End Sem Exam	Total	
1	ECT407	Wireless Communication	3	1	0	7	40	60	100	3 Hrs.
2	ECT408	Microwave Engineering	4	1	0	9	40	60	100	3 Hrs.
3	ECP408	Microwave Engineering Lab	0	0	2	2	25	25	50	-
4	ECT409	Departmental Elective - III	4	0	0	8	40	60	100	3 Hrs.
5	ECT410	Departmental Elective - IV	4	0	0	8	40	60	100	3 Hrs.
6	ECP411	Communication and Networking Lab	0	0	2	2	25	25	50	-
7	ECP412	Project Phase - II	0	0	4	8*	50	50	100	-
		Total	**15**	**2**	**8**	**44**				

Course Code	Elective - III	Course Code	Elective - IV
ECT409 - 1	Optical and Satellite Communication	ECT410 - 1	Digital Image Processing
ECT409 - 2	CMOS VLSI Design	ECT410 - 2	RF Circuit Design

*For Project Phase – I and II, credits are assigned as: 1 Contact Hour = 2 Credits.

Syllabus of Group 1 - Semester I and Group 2 - Semester I, Bachelor of Engineering

Course Code : MAT101 **Course : Engineering Mathematics-I**
L: 4 Hrs., T: 1 Hrs., P: 0 Hrs., Per week **Total Credits : 09**

Course Outcomes

Upon successful completion of the course, the student should be familiar with and be able to

1. Formulate and analyze mathematical problems, precisely define the key terms, and draw clear and reasonable conclusions.
2. Read, understand, and construct correct mathematical model for simple electrical circuits, mechanical systems and other related engineering problems.
3. Apply techniques of differential calculus to obtain the solution of mathematical models of physical systems and use optimization technique.
4. Continue to acquire mathematical knowledge and skills appropriate to professional activities and demonstrate highest standards of ethical issues in mathematics

Syllabus

Unit - I:

Ordinary Differential Calculus: Successive differentiation, Taylor's and Maclaurin's series for function of one variable, indeterminate forms, curvature, radius of curvature and circle of curvature.

Unit - II:

Partial Differentiation: Functions of several variables, first and higher order derivative, Euler's Theorem, Chain rule and Total differential coefficient, Jacobians. Taylor's and Maclaurin's series for function of two variables, Maxima and minima for function of two variables, Lagrange's method of undetermined multipliers.

Unit - III:

Infinite Series: Convergence, divergence and oscillation of series, General properties, Tests of convergence, Alternating series.

Unit - IV:

First Order Differential Equation: First order first degree differential equations: Linear, reducible to linear, exact and reducible to exact differential equations; Non-linear differential equations.

Unit - V:

Higher Order Differential Equation: Higher order differential equations with constant coefficient, method of variation of parameters, Cauchy's and Legendre's homogeneous differential equations, simultaneous differential equations, differential equation of the type $d^2y/dx^2 = f(x)$ and $d^2y/dx^2 = f(y)$.

Unit - VI:

Applications of Differential Equation: Applications of first order first degree differential equations: Simple electrical circuits in series. Application of higher order differential equations: Mechanical and electrical

Oscillatory circuits (free, damped free, forced oscillations)

Text Books:

1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, Delhi.
2. A text book of Applied Mathematics Volume I & II, by P. N. Wartikar and J. N. Wartikar, Pune VidhyarthiGrihaPrakashan, Pune-411030 (India)
3. Advanced Engineering Mathematics, 2 ed , Jain ,Iynger , Narosa publication

Reference Books:

1. Advanced Engineering Mathematics by Erwin Kreyszig, 8th edition, Neekunj print process, Delhi.
2. Schaum's Outline of Differential Equations, Richard Bronson , TMH, 3ed, New Delhi
3. Engineering Mathematics by Srimanta, Paul
4. A text book of Applied Mathematics I, T.Singh, K.L. Sarda, Professional Publishing House Pvt.Ltd., Nagpur.

Syllabus of Group 1 - Semester I and Group 2 - Semester II, Bachelor of Engineering

Course No. CHT101 | **Course : Engineering Chemistry**

L: 4 Hrs., T: 1 Hrs., P: 0 Hrs., Per week | **Total Credits : 09**

Course Outcomes :

Upon successful completion of the course, the student should be familiar with and be able to gain

1. Knowledge of water analysis, waste water analysis, boiler water chemistry and desalination of water enable the students to overcome the difficulties, to a larger extent; that often come across in the field of i) Civil engineering, ii) Public health and environmental engineering iii) Ocean engineering iv) thermal and electrical power generation sectors and process engineering.
2. Better understanding to surmount over the difficulties faced in the selection of proper and economical constructional materials to be used; the impact of change in the physicochemical and mechanical properties of the concrete type composites due to variation in their chemical composition.
3. There are many different ways in which the abundant energy around us can be harnessed converted and exploited for our use. The ability to harness and its use for constructive purposes as economically as possible is a challenge before mankind. Under these circumstances it is imperative that sustainable energy sources with less attardent problems are developed to meet the ever increasing energy demand. The course content related to energy recourses incorporated in the syllabus fulfills the basic requirement for having acquaintance with the field. Application of knowledge of conventional sources of energy used in thermal, electrical, nuclear power, generations; harnessing new vistas to upgrade and uplift unconventional sources of energy.
4. To apply the knowledge of 'Principles of Tribology' for reduction of friction and wear in the process engineering, manufacturing and production engineering and automotive engineering fields.
5. Shall help to judiciously select and design proper engineering materials having better corrosion resistance and sustainability and implement the effective measures to minimize the corrosion wherever possible.
6. Better insight in the selection of materials for modern technologies which demand with unusual combination of properties that cannot met by any of the conventional metal alloys, ceramics and polymeric materials viz in aerospace applications, military warfare materials, nuclear installations, electrical electronic components devices, nanotechnology materials process engineering field etc.
7. Air acquaintance with all kinds of pollution hazards, combating measures to minimize these in the day to day working; to adopt / to develop better skill to assess the environmental impact on the surroundings and its result oriented management to off load the pollution emissions in almost all walks of various engineering disciplines.

Syllabus

Water Treatment :

Water Treatment for Industrial Applications: Brief introduction regarding sources, impurities in water, hardness of water and their types. Softening of water using lime-soda process: principles in hot and cold lime-soda process. Zeolite softener, demineralization by synthetic ion exchange resins. Boiler troubles: Carryover, Priming and Foaming, Scales and Sludges, Caustic Embrittlement, Boiler Corrosion-causes and effects on

boiler operation and methods of prevention. External and Internal conditioning : Phosphate, Carbonate and Calgon conditioning.

Water Treatment for Domestic Water:

Domestic water treatment: brief discussion and Chemistry involved in the process of sedimentation, coagulation, filtration and sterilization by UV, Ozone, Chlorination including Break point chlorination. Desalination of water using reverse osmosis and electro dialysis.

Numericals Based on Water Softening: Numericals based on (1) lime-soda (2) zeolite / ion-exchange water treatment processes.

Cement :

Process parameters involved in the manufacturing of portland cement, manufacture of portland cement, microscopic constituents of cement and their effects on strength; setting and hardening of cement.

Types and uses of cement: Pozzolonic; Rapid hardening, Low heat and High alumina cements. Additives and admixtures used in cement: Accelerators, Retarders, Air entrainment agents, Water repellants.

Chemical approach to Nanomaterials :

General introduction to nanotechnology, timeline and milestone, overview of different nanomaterials available, potential use of nanomaterials in electronics, sensors, medical applications, catalysis, environment and cosmetics.

Physical chemistry related to nanoparticles such as colloids and clusters: conductivity and enhanced catalytic activity compared to the same materials in the macroscopic state.

Synthesis of nanomaterials: ' Top-Down'- photolithography and 'Bottom-Up'- sol-gel method .

Carbon nanotubes: single-walled and multi-walled carbon nanotubes, their structures, properties and applications.

Potential risks of nanomaterials- health and environmental impact.

Fuels and combustion :

Introduction, calorific value, higher and lower calorific value, flame temperature and flame intensity , determination of calorific value by Bomb calorimeter and Boy's calorimeter, numericals based on the determination of calorific value by Bomb and Boy's Calorimater.

Solid Fuels:

Types of coals, proximate and ultimate analysis of coal, its significance, Carbonization of Coal.

Liquid and Gaseous Fuels:

Liquid fuels: mining & fractional distillation of crude petroleum, use of gasoline in internal combustion engine, octane number, cetane number, flash point of combustible liquid fuel, knocking. Fisher-Tropsch's process for manufacture of synthetic gasoline, thermal and catalytic cracking: fixed bed and fluid bed catalytic cracking, aviation gasoline.

Gaseous fuels:

CNG and Significance of flue gas analysis by Orsat apparatus.

Numericals based on Combustion Calculations:

Numericals based on combustion calculations for solid fuels. Numericals based on combustion calculations for liquid and gaseous fuels.

Friction, Wear and Lubricants :

Introduction, lubrication mechanism, hydrodynamic, boundary and extreme pressure lubrication. Classification of lubricants- Solid, Semisolid and Liquid lubricants, Blended oils using different additives viz.:- Anti-oxidants, E. P. additive, corrosion inhibitor, viscosity index improver, etc.), synthetic lubricants viz.:- Dibasic acid esters, Polyglycol ethers and Silicones, Lubricating Emulsions. Properties of Greases, Drop point and consistency test, Properties of liquid lubricants: Viscosity and Viscosity Index, Aniline point, Cloud & Pour point and Decomposition stability. Criteria for selection of lubricants under different conditions of load and speeds.

Corrosion :

Electrochemistry and Theories of Corrosion :

Introduction to corrosion, Cause and Consequences of corrosion, Measurement of corrosion rate, Galvanic series, Dry and Wet corrosion, Pilling-Bedworth rule, factors affecting the rate of corrosion.

Types of corrosion and Preventive Methods: Different types of corrosion (Pitting, Stress, Intergranular and Galvanic), protection against corrosion, design and selection of engineering materials, cathodic and anodic protection, Brief discussion about Protective Coatings: Metallic, Inorganic, Organic coatings, Corrosion inhibitors

Text Books :

1. Text Book of Engineering Chemistry, S. S. Dara, S. Chand and Company Ltd., New Delhi.
2. Textbook of Engineering Chemistry, P. C. Jain and Monica Jain, Dhanpat Rai and Sons, New Delhi.
3. Text Book of Environmental Chemistry and Pollution Control, S. S. Dara; S. Chand and Company Ltd., New Delhi.
4. Textbook of Engineering Chemistry, S. N. Narkhede, R. T. Jadhav, A. B. Bhake, A. U. Zadgaonkar, Das Ganu Prakashan, Nagpur.
5. Applied Chemistry, A. V. Bharati and Walekar, Tech Max Publications, Pune.
6. Engineering Chemistry, Arty Dixit, Dr. Kirtiwardhan Dixit, Harivansh Prakashan, Chandrapur.

Reference Books :

1. Engineering Chemistry by Gyngell, McGraw Hill Publishing Company, New Delhi.
2. Engineering Chemistry (Vol I), Rajaram and Curiacose, Tata McGraw Hill Publishing Company, New Delhi.
3. Engineering Chemistry (Vol II), Rajaram and Curiacose, Tata McGraw Hill Publishing Company, New Delhi.
4. Engineering Chemistry, Saraswat and Thakur, Vikas Publication, New Delhi.
5. Engineering Chemistry, B. S. Sivasankar, Tata Mcgraw Hill Publishing Company, New Delhi.
6. Engineering Chemistry, O. G. Palan, Tata Mcgraw Hill Publishing Company, New Delhi.
7. Engineering Chemistry, R. Shivakumar, Tata Mcgraw Hill Publishing Company, New Delhi.
8. Chemistry of Cement, J. D. Lee, Mcgraw Hill Publishing Company, New Delhi.
9. Nanomaterials Chemistry, C. N. R. Rao, A. Muller, A. K. Cheetam, Wiley VCH verlag GmbH and Company, Weinheim.

Syllabus of Group 1 - Semester I and Group 2 - Semester II, Bachelor of Engineering

Course Code :CHP101	**Course: Engineering Chemistry Lab**
L:0 Hr., T:0Hrs., P:3 Hrs., Per week	**Total Credits : 03**

Minimum of **Eight** practicals will be performed based on the theory.

Text Books :

1. Text Book on Experiments and Calculations in Engineering Chemistry: S. S. Dara; S. Chand and Company Ltd., New Delhi.
2. Practical Engineering Chemistry: S. N. Narkhede, R. T. Jadhav, A. B. Bhake, A. U. Zadgaonkar, Das Ganu Prakashan, Nagpur.

Reference Books :

1. Concise Laboratory Manual in Engineering Chemistry: R. Shivakumarand J. Prakasan, Tata McGraw Hill Publishing Company, New Delhi.

Syllabus of Group 1 - Semester I and Group 2 - Semester II, Bachelor of Engineering

Course Code : EET101 | **Course : Electrical Engineering**

L:3 Hr., T:1 Hrs., P:0 Hrs., Per week | **Total Credits : 07**

Course Outcomes :

Upon successful completion of the course, the student should be familiar with and be able to

1. understand the different laws of electric and magnetic circuits.
2. Students will understand the vector representation of electrical quantities, power factor and its improvement.
3. Understand the concept generation, transmission and distribution.
4. Learn and understand the necessity of electrical earthling, safety and protecting devices.
5. Learn and understand construction, principle, applications and performance evaluation methods of transformer, D.C. Machine, Induction Motor.
6. Learn about the illumination sources and their selections.
7. Understand the basic philosophy of energy tariff.

Unit-I:

DC Electric Circuits: Definition of EMF, Current, Power, Energy Resistance, Variation of resistance with physical parameters viz. length, area, specific resistivity and temperature. Ohm's law, resistances in series and parallel, current and voltage division rules, KVL & KCL, star delta transformation and related numerical. Measurement of DC electrical quantities.

Magnetic Circuit: Concept of MMF, Flux, reluctance, analogy with electric circuits, B-H curve, simple numerical on series magnetic circuits.

Unit-II:

AC Circuits: Generation of single phase and three phase alternating EMF. Average and RMS values for sinusoidal waveform. Phasor representation of sinusoidal electrical quantities, Steady state behavior of RLC circuits with sinusoidal excitation. Reactance, impedance, Power & Energy in AC Circuits. Simple numerical on series and parallel AC circuits. Concept & importance of power factor & its improvement (with simple numerical).

Simple analysis of balanced three phase AC circuits, Star-delta resistive networks. Measurement of AC electrical quantities.

Unit-III:

Introduction to Electrical Power System :

Introduction to Power Generation (Thermal, Hydro, Nuclear, Wind and Solar) with block schematic representation only. Single line diagram for Generation, Transmission & Distribution through different voltage levels; Low voltage radial distribution system (Over head & underground, single phase and three phase). Necessity of equipment earthings, Fuses (Rewirable and HRC), MCB, ELCB.Basic operation of UPS and Inverters (Block schematic representation).

Unit-IV:

Single phase Transformer :

Principle of operation, Construction Transformer ratings, No load and On load operation with leakage reluctance, losses, efficiency, Definition & formula for voltage regulation, OC/ SC test, equivalent circuit referred to primary side of transformer.

Unit-V:

Rotating Electric Machines :

DC Machines: DC Generator-Principle of working, construction (without details of armature winding), classification of DC generators. DC Motors-Back EMF, necessity of starters, speed and torque equations, characteristics of motors, speed control of DC motors (without numerical), Application of DC motors.

Three Phase Induction Motors: Working principles, types and construction of three phase Induction Motor, synchronous speed, torque, sleep, torque speed characteristics, applications of three phase Induction motor.

Single Phase Induction Motors: operating principle of capacitor start and run single phase induction motor and its applications.

Unit-VI:

Utilization of Electrical Energy :

Illumination: Definition of luminous flux, luminous intensity, Candle power, illumination, Luminance, Luminous efficiency (lumens/watt) of different types of lamps, working principle of Fluorescent/Sodium Vapour/ Mercury vapor & CFL Lamps. Simple numerical to determine number of lamps to attain a given average lux level in an area.

Electric Heating: Advantages of Electrically produced heat, types and applications of Electric heating equipment, transfer of heat (conduction, convection, radiation); Resistance ovens, Induction heating (Core & coreless type), Dielectric heating. (Note. Numerical excluded)

Tariff: One part (KWH based) tariff with simple numerical: To calculate the domestic electricity charges.

Text Books :

1. Elements of Electrical sciences: P. Mukhopadhyay, N. Chand & Bros Roorkee (1989).
2. Electrical Technology: B. L. Thareja, S. Chand Publications.
3. Basic Electrical Engineering: S. B. Bodkhe, N. M. Deshkar, P. P. H. Pvt. Ltd.

Reference Books :

1. Basic Electrical Engineering: T.K. Nagasarkar& M. S. Sukhija, Oxford Univ. Press.
2. Utilization of Electrical Energy: H. Pratab, Dhanpatrai& Sons.
3. Utilization of Electrical Energy: E. Openshaw Taylor, Orient Longman.
4. Websites: www.powermin.nic.in, www.mnes.nic.in, www.mahaurja.com.

Syllabus of Group 1 - Semester I and Group 2 - Semester II, Bachelor of Engineering

Course Code :EEP101 **Course: Electrical Engineering Lab**

L:0 Hr., T:0Hrs., P:2 Hrs., Per week **Total Credits : 02**

Course Outcomes :

Upon successful completion of the course, the student should be familiar with and be able to

1. Understand the different laws of electric and magnetic circuits.
2. Understand the vector representation of electrical quantities, power factor and its improvement.
3. Understand the concept generation, transmission and distribution.
4. Learn and understand the necessity of electrical earthling, safety and protecting devices.
5. Learn and understand construction, principle, applications and performance evaluation methods of transformer, D.C. Machine, Induction Motor.
6. Learn about the illumination sources and their selections.
7. Understand the basic philosophy of energy tariff.

List of Experiments :

1. To verify Kirchoff's voltage and current law using D.C. source.
2. To plot the magnetization curve (B-H) for magnetic material of transformer
3. To study the R-L-C series circuit with AC source
4. To study R-L-C parallel circuit with AC source
5. To perform direct load test on 1-phase transformer for finding regulation and efficiency
6. To perform open circuit and short circuit tests on 1-phase transformer
7. To study 3-phase star delta connections and verify different relations
8. To study the speed control techniques for DC shunt motor

Syllabus of Group 1 - Semester I and Group 2 - Semester II, Bachelor of Engineering

Course Code: CST101 **Courses: Computer Programming**

L: 2 Hrs. T: 0 Hrs. P: 0 Hrs. Per week **Total Credits: 4**

Course Outcomes

On successful completion of the course, students will be able to

1. Design and code well-structured C programs, flowcharts, algorithms etc.
2. Write program on the basis of decision control structures and loop control structures.
3. Perform sorting and various other operations on 1-D and 2-D array.
4. Perform operations on structures, functions and pointers.

Syllabus

Unit-I:

Computer Fundamentals: Basic Structure of a computer, Input/output devices and memories and types of computer. Introduction to DOS and Windows OS, Number Systems: Decimal, Binary, Octal, Hexadecimal and conversion from one to another. Algorithm – Conventions used in writing algorithm, Software Life Cycle, Program and Programming Language System Software- Translator, Compiler, Interpreter, Linker, Loader. Languages – Procedural, Object oriented, High level, assembly, Machine Language and Flowchart

Unit-II:

C Programming Language: Keyword, Constant, Variable, Data types, Operators, Types of Statements, Preprocessor Directives, Decision Control Statement-if, if-else, Nested if-else statement, Switch case.

Unit-III:

Loop Control Structure: go to, while, for, do while, break, continueStorage class, Enumerated Data types, Renaming Data types with typedef(), Type Casting, Bitwise Operators.

Unit-IV:

Array: Introduction, array Declaration, Single and multidimensional array Pointers: Introduction, Definition and use of pointer, Pointer arithmetic, pointer operators, pointer and array, pointer to pointer

Unit-V:

Structures and Union: Declaring and using structure, Structure initialization, Structure within structure, array of structure, pointer to structure.

Unit-VI:

Function Programming: Introduction, User Defined and Library Function, Parameter passing, Return value, Recursion, pointer and function

Text Books:

1. Mastering C: K. R. Venugopal and S. R. Prasad, Tata McGraw Hill
2. Programming in ANSI C,5th ed. : E. Balguruswami McGraw Hill

Reference Books:

1. Let Us C.9thed: Yashwant Kanetkar, BPB Publication
2. Programming with C: Byron Gottfried, Schaums Outline Series.

Syllabus of Group 1 - Semester I and Group 2 - Semester II, Bachelor of Engineering

Course Code: CSP 101 **Course: Computer ProgrammingLab**

L: 0 Hrs., T: 0 Hrs., P:2 Hrs. Per week **Total Credits: 2**

Course Outcomes :

On successful completion of the course, students will be able to

1. Implement programs based on if-else, switch and loop structure.
2. Implement programs based on 1-D and 2-D numeric and character arrays.
3. Perform operation on structure and pointer.
4. Design programs based on functions.

CSP101practicals based on above CST 101 syllabus

Syllabus of Group 1- Semester I and Group 2-Semester II, Bachelor of Engineering

Course Code : HUT101 **Course:-Communication Skills**
L:2 Hrs.,T:0Hrs.,P:0Hrs.,Per week **Total Credits:4**

Course Objectives:

The main objective of the subject is to enhance the employability skills of engineering students as well as communication skills at work place. The sub-objectives are:

1. To develop students' reading skills and pronunciation.
2. To develop technical communication skills through drafting, letter writing, and précis writing.
3. To develop literary skills through essay writing.
4. To develop public speaking skills of the students.
5. To expose the students to the ethics of English language by teaching grammar

Course Outcomes :

1. Students have better reading comprehension, pronunciation, and functional English grammar.
2. Students are able to write letters and resumes
3. Students are able to organize their thoughts for effective presentation and writing.
4. Students are able to learn skills to present themselves well in an interview, and handle a Group Discussion

Syllabus

Unit-I :

Communication:

What is Communication, the Media of Communication, Channels of Communication, Barriers to Effective Communication, Role of Communication Skills in Society.

Unit-II :

Reading Comprehension :

The Process of Reading, Reading Strategies Central idea, Tone and Intention, Comprehension Passages for practice.

Unit-III :

Professional Speaking:

Components of an effective talk, Idea of space and time in public speaking, Tone of voice, Body language, Timing and duration of speech, Audio-Visual Aids in speech. Presentation Skills, Group Discussion and Job Interviews

Unit IV :

Orientation to Literary and Scholarly Articles:

Preferably two fictional and two non-fictional texts (Selected by the teachers and the Head). The art of writing articles on social, cultural, scientific and technical issues (Paragraph Writing), Exercises.

Unit V :

Business Correspondence:

Types and Formats of Business letters, Routine Business Letters (Inquiry, Order, Instruction, Complaint, Adjustment), Sales Letters, Resumes and Job applications, Business Memos, Emails.

Unit VI:

Grammar:

Synonym and Antonym, Give one word for, Voice, Narration and Comparison of Adjectives and Adverbs, Transformation of sentences and Common Errors, Idioms and Phrases, Note Making, Précis writing.

Text Book :

1. M. Ashraf. Rizvi. Effective Technical Communication. Tata Mc Graw-Hill Publishing Company Limited.2009

Reference Books :

1. Sanjay Kumar and Pushp Lata. Communication Skills. Oxford Publication
2. Meenakshi Raman and Sangeeta Sharma. Technical Communication. Second Edition Oxford Publication.2011
3. Anne Nicholls. Mastering Public Speaking. Jaico Publishing House.2003
4. Dr Asudani .V. H An easy approach to English. Astha Publication Nagpur. 2009 , 3rd Edition.

Syllabus of Group 1- Semester I and Group 2-Semester II, Bachelor of Engineering

Course Code :-HUP101 **Course:-Communication Skills Practical**

L:0Hrs.,T:0Hrs.,P:2Hrs.,Per week **Total Credits:2**

Course Outcomes

On successful completion of the course, students will be able to

1. Learn presentation skills
2. Understand effective strategies for Personal Interview and Group Discussions
3. Learn and apply effective language skills – listening, speaking, reading and writing

Sr. No	Name of the Practical	Activities Taken	Medium of Practical
1	Speaking Skills	1. Introduction to effective ways of speaking 2. Oral presentations Extempore / Debate / JAM/Self-introduction	PPT Based, Activity Based
2	Presentation Skills	1. Preparing visual aids/PPTs on given topics	PPT Based, Activity Based, English Edge software
3	Group Discussion-Orientation	1. GD types 2. GD techniques/rules - videos 3. General/familiar topics for discussion	English Edge software Oxford Publication CD, PPT based Activity based
4	Group Discussion-Practice session	1. Divide in group of 6 2. Classification of topics 3. Feedback	PPT Based, Activity Based
5	Group Discussion-Mock	1. Divide in group of 6 2. Mock GDs - types 3. Feedback	Activity Based
6	Interview Techniques-Orientation	1. Various types of interviews 2. Types of interviews 3. Self-analysis 4. KYC sheet 5. Self-introduction	English Edge software Oxford Publication CD Activity Based
7	Interview Techniques Practice Sessions	1. Video 2. Non-verbal communication 3. Types of interview questions	Oxford Publication CD, Activity Based
8	Interview Techniques-Mock Interviews	1. Mock Interviews (One to One)	Activity Based
	Optional Practicals	**Teacher can decide any other Practical apart from the ones mentioned below**	
9	Listening Skills	1. Listening Barriers	PPT Based, Activity Based
10	Non Verbal Communication	1. Kinesics in com/interviews 2. Activities/Role play	English Edge software based, PPT based
11	Use Figurative Language	1. Intro phrases/ Idioms/proverbs/ pronunciation	PPT Based, Activity Based

Syllabus of Group 1 - Semester I and Group 2 - Semester II, Bachelor of Engineering

Course Code :PEP101 **Course: Sports/Yoga**

L:0 Hr., T:0Hrs., P:2 Hrs., Per week **Total Credits : 00**

Course Outcomes

On successful completion of the course, students will be able to

1. More number of students are participating in sports activities.
2. Students interest toward physical fitness has been increased.
3. Students are getting basic knowledge of yoga & sports.

BRIEF OBJECTIVES OF SPORTS/YOGA PRACTICAL CLASSES

It has long been proven that a healthy body leads to a healthy mind. With a strong belief in this, Physical Education department at RCOEM will conduct sports/yoga classes with the objective of maintaining health, fitness and wellness of students as well as create awareness about need for good health and physical fitness. The objective would also be todevelop team spirit, social skills as well as identify and develop leadership qualities in students through various sports group activities. Training of students to understand the rules of various national and international games would also be an important objective. Sport activities would also be conducted with the objective to provide recreation to the students which is an important neutralizer for stress. Additionally, the objective would be to evaluate fitness of students so as to recommend and conduct specific Yoga and Sport activities.

PROGRAMME OUTLINE

1. Sports

1. Introduction to sports i.e. volleyball, cricket, football, basketball, badminton, T.T., Athletics.
2. Health and safety issues related to sports; Knowledge, recognition and ability to deal with injuries and illnesses associated with sports.
3. Awareness about sports skills, techniques and tactics.
4. Rules, regulations and scoring systems of different games (Indoor & Outdoor).
5. Organizing intramurals ie. Fresher's cup- volleyball(G& B), Cricket (G& B), Sadbhavana volleyball(mix team of B& G), Sadbhavana cricket (mix team of B& G).
6. Trials of students to participate in inter-collegiate/University level games.

2. Yoga: Includes asanas like sitting, standing and lying, Surayanamaskar, Pranayam.

3. Physical fitness test: this would include speed, Cardiovascular Endurance, strength, skill & flexibility, body composition (fat weight & lean body weight).

Syllabus of Group 1 - Semester II and Group 2 – Semester II, Bachelor of Engineering

Course Code: MAT102 **Course: Engineering Mathematics-II**

L: 4 Hrs., T: 1 Hrs., P: 0 Hrs., Per week **Total Credits: 09**

Course Outcomes

On successful completion of the course, students will be able to

1. Identify, formulate and analyze statistical problems, precisely define the key terms, and draw clear and reasonable conclusions.
2. Read, understand and analyze problems in Fluid dynamics, Electromagnetic fields and related topics using techniques of vector algebra and calculus.
3. To use the knowledge of multiple integrals in finding the area and volume of any region bounded by the given curves.
4. Continue to acquire mathematical and statistical knowledge and skills appropriate to professional activities and demonstrate highest standards of ethical issues in mathematics.

Syllabus

Unit-I:

Integral Calculus I: Beta and Gamma functions, Differentiation of definite integrals, Mean value and root mean square values.

Unit-II:

Integral Calculus II: Tracing of curves (Cartesian, polar and parametric curves), rectification of simple curve, quadrature, volumes and surface of solids of revolutions(Cartesian, polar and parametric forms).Theorem of Pappus and Guldin.

Unit-III:

Multiple Integrals and their Applications: Elementary double integrals, change of variable (simple transformation), change of order of integration (Cartesian and polar), application to mass, area, volume and centre of gravity (Cartesian and polar forms), elementary triple integrals.

Unit-IV:

Vector Calculus I: Scalar point function, Vector point function, vector differentiation, gradient, divergence and curl, directional derivatives with their physical interpretations, solenoidal and irrotational motions, Scalar potential function.

Unit-V:

Vector Calculus II: Vector integration: Line integrals, work done, conservative fields, surface integrals and volume integrals, Stoke's theorem, Gauss divergence theorem, Green's theorem and their simple applications.

Unit VI:

Statistics: Fitting of straight line, $y = a + bx$, parabola $y = a + bx + cx^2$ and the exponential curves by method of least squares, Coefficient of linear correlation, lines of regression , rank correlation, multiple regression and regression plane of the type $z = a + bx + cy$, coefficient determination.

Text Books:

1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, Delhi
2. A text book of Applied Mathematics Volume I & II, by P. N. Wartikar and J. N. Wartikar, Pune VidhyarthiGrihaPrakashan, Pune-411030 (India)
3. Advanced Engineering Mathematics, 2 ed , Jain ,Iynger , Narosa publication

Reference Books:

1. Advanced Engineering Mathematics by Erwin Kreyszig, 8th edition, Neekunj print process, Delhi.
2. Engineering Mathematics: Principal and Applications Srimanta, Paul, Oxford Univ Press,(2011)
3. Higher Engineering Mathematics: B.V. Ramana, TMH

Syllabus of Group 1 - Semester II and Group 2 – Semester I, Bachelor of Engineering

Course Code : PHT101 **Course : Engineering Physics**

L: 4 Hrs, T: 1 Hr, P : 0 Hr., Per week **Total Credits : 09**

Course Objectives :

1. To develop the ability to apply concepts in elementary physics to understanding of engineering applications;
2. To introduce more advanced physics concepts, which form the basis of modern engineering;
3. To provide a sound foundation in mathematical formulation of concepts learnt and their applications;
4. To elaborate the general nature of concepts learnt and of possibility of their cross-disciplinary application;
5. To develop skills for numerical problem solving in areas covered

Course Outcomes :

1. Develop a better understanding of physics as a fundamental discipline;
2. Gain understanding of the type of questions addressed by theories in and methods of physics in different fields of engineering;
3. Develop a deeper appreciation of the notion of applying knowledge of physical laws;
4. Deepen understanding of certain basic tools, such as state of a system, system response, resonance, coherence, superposition and interference, in thinking about and analyzing physical systems;
5. Gain an understanding of developing areas in physics and their possible engineering applications;
6. Develop ability to choose a physical approach to understanding of advanced areas in engineering;
7. Be comfortable with fundamental ideas in areas like semiconductor, electronic devices, fibre optic communication and quantum mechanics;
8. Gain familiarity with the language, fundamental concerns, techniques and applications of nanoscience and nanotechnology

Unit-I:

Optics:

Interference in thin films, division of amplitude and wavefront, wedge-shaped films, Newton's rings, antireflection coatings; Diffraction, single slit, double slit, grating; Bragg's law of crystal diffraction, Different types of polarization of light, Malus' law, Optically anisotropic materials, double refraction, wave-plates and compensators, production and analysis of polarized light.

Unit-II:

Quantum Physics:

Wave-particle duality, wave packets, Heisenberg uncertainty relations; Wave function, probability and probability current, Schrodinger's equation, time dependent equation and its separation; Infinite potential and finite potential wells, phenomenon of tunneling, application to tunneling diode.

Unit-III:

LASERs and Optical Fibres:

Interaction of matter and radiation, LASER, spontaneous and stimulated emission, population inversion; Common types of lasers and their applications; Optical fibres, structure, types, propagation in a fibre, modes of propagation, signal attenuation, signal distortion.

Unit-IV:

Elements of Crystal Structure, Mass Spectrograph and Particle Accelerators:

Lattice and basis, crystal systems, centering, Bravais lattices, cubic system, principles of electron optics, cathode ray oscilloscope, mass spectrographs, particle accelerators.

Unit-V:

Semiconductors:

Band structure of solids, band diagrams of insulators, semiconductors and conductors, Fermi level in conductors and semiconductors, carrier concentration, conductivity, effective mass; Junction diode and its band diagram, depletion region and barrier potential, bipolar junction transistor, band diagrams of pnp and npn transistors, transistor action.

Unit-VI:

Nanophysics:

What is Nanotechnology? Fullerenes and nanoparticles; Outline of methods of preparation; Elements of electron microscopy; Outline of properties – physical, thermal, optical, electrical, magnetic; Quantum size-effects; CNTs and molecular electronics; Applications.

Text Books:

1. Fundamentals of Physics: D. Halliday, R. Resnik and J. Walker, John Wiley.
2. Engineering Physics: S. Jain and G.G. Sahasrabudhe, Universities Press (2010).
3. Introduction to Nanoscience and Nanotechnology: K.K. Chattopadhyay and A.N. Banerjee, PHI Learning (2009)

Reference Books:

1. Electronic Engineering Materials and Devices: J. Allison, TMH.
2. Engineering Physics: P.K. Palaniswamy, Scietech (2005).
3. Engineering Physics: H. Malik and A.K. Singh, TMH (2010).
4. Engineering Physics: D.K. Bhattacharya and A.Bhaskaran, Oxford University Press (2010)
5. Materials Science and Engineering – A First Course, 5th Ed., V. Raghvan, PHI Learning.

Syllabus of Group 1 - Semester II and Group 2 – Semester I, Bachelor of Engineering

Course Code: PHP101 **Course: Engineering Physics Laboratory**

L: 0 Hrs., T: 0 Hrs., P: 3 Hrs., Per week **Total Credits: 03**

Course Outcomes :

1. Students should be able to perform tasks like leveling, alignment, reading vernier scales, do specific measurements, systematically record observations, do calculations from data collected and draw conclusions.
2. Students gain working familiarity with instruments like simple spectrometer, travelling microscope, lenses, prisms, ammeter, voltmeter, the CRO, power supplies etc.;
3. Students gain better understanding of concepts like interference, diffraction, polarization, energy band gap in semiconductor etc.
4. Students gain a working knowledge of estimating errors in an experiment for which background theory is known;
5. Students should be able to subject data collected to statistical and error analysis.

A minimum of 8 experiments to be performed from the following list of experiments.

List of Experiments :

1. Study of interference in thin films: Formation of Newton's rings
2. Study of diffraction: Transmission diffraction grating
3. Study of diode rectifier equation: Ordinary p-n junction and Zener diode characteristics
4. Study of transistor action: Transistor characteristics in common emitter configuration
5. Study of Hall effect: Determination of Hall coefficient of an extrinsic semiconductor
6. Study of energy bandgap in semiconductor: NTC thermistor bandgap determination
7. Study of rectifiers: Determination of ripple factor for half, full and bridge rectifiers
8. Linear least squares fit on a PC: Fitting a straight line to measured (x,y) sets
9. Study of double refraction: Quartz prism
10. Interference in wedge-shaped thin films: Refractive index of liquids, diameter of a wire
11. Use of CRO: Frequency and phase difference determination

Demo experiments: Laser kit to demonstrate diffraction, optical fibre to demonstrate signal attenuation, Interactive Mathematica demonstrations on polarization, wave packets, tunneling, charge particle dynamics and semiconductor devices

Reference Books:

1. Physics LabManual written by the Teaching Faculty of Physics Department, RCOEM

Syllabus of Group 1 - Semester II and Group 2 - Semester I, Bachelor of Engineering

Course Code: CET101 **Course: Engineering Mechanics**

L:3 Hr., T:1 Hrs., P:0 Hrs., Per week **Total Credits : 07**

Course Outcomes

On successful completion of the course, the subject knowldge will be able to

1. Develop students to acquire knowledge of static and dynamic behavior of the bodies.
2. Develop students to acquire the knowledge, so that they can understand physical phenomenon with the help of various theories.
3. Develop students, who will be able to explain the physical phenomenon with help of diagrams.
4. Develop students with a broad vision with the skills of visualizing and developing their own ideas, and to convert those ideas in to engineering problems and solving those problems with the acquired knowledge of the Engineering Mechanics.

Syllabus

Unit-I:

Fundamental of Engineering Mechanics:

Fundamentals of Engineering Mechanics, axiom's of mechanics, resultant of concurrent force system. Moment of a force, couples, resultant of non-concurrent force system

Unit-II:

Equilibrium of Force System :

Equilibrium of concurrent force system, Equilibrium of non-concurrent force system Friction: Law's of friction, simple application, wedge friction, belt friction.

Unit-III:

3-D Force system & Analysis of trusses :

Moment of a force about a point and about an axis, resultant of spatial concurrent & Non concurrent force system, wrench, equilibrium of concurrent and non-concurrent force system. Analysis of simple trusses (Joint & Section Method)

Unit-IV:

Centroids and moment of inertia :

Centroids locating by first principle, centroid of composite areas, Second moment and product of inertia of plane areas. Moment of Inertia of composite areas. Transfer theorems for moment of Inertia and Product of Inertia.

Virtual work method

Virtual work principle, application of virtual work principle.

Unit-V

Kinematics & Kinetics of Particles :

Rectilinear motion of a particle with variable acceleration, Projectile motion, normal and tangential components of acceleration, kinetics of particle and several interconnected particles. D'Alembert's principle, problems on connected system of particles.

Unit-VI:

Collision of elastic bodies:

Principle of conservation of momentum, Impulse momentum equation, work energy equation, coefficient of restitution, impact of elastic bodies.

Text Books:

1. Engineering Mechanics: F. L. Singer Harper & Row Publications.
2. Fundamentals of Engineering Mechanics : A.K. Sharma, Sai Publications.
3. Engineering Mechanics :A.K.Tayal, Umesh Publications, New Delhi.
4. Engineering Mechanics : P.B. Kulkarni, Professional Publications.

Reference Books:

1. Engineering Mechanics: Timoshenko & Young, Tata McGraw Hill Publications, New Delhi.
2. Engineering Mechanics: Bear and Johnston, Tata McGraw Hill Publications, New Delhi.
3. Engineering Mechanics: I. H. Shames, Phi Pvt. Ltd., India.

Syllabus of Group 1 - Semester II and Group 2 - Semester I, Bachelor of Engineering

Course Code : CEP101 **Course : Engineering Mechanics Lab**

L:0 Hr., T:0Hrs., P:2 Hrs., Per week **Total Credits : 02**

Minimum of Eight Practical will be performed based on the theory

List of Experiment

1. Simple Lifting machines
2. Law of machine for Differential Axle and Wheel
3. Law of machine for Single Purchase Crab
4. Law of machine for Double Purchase Crab
5. Equilibrium of force systems
6. Jib Crane (Equilibrium of concurrent Forces)
7. Simple Beam (Equilibrium of Non-concurrent Forces)
8. Friction & Flywheel
9. Inclined Plane (Coefficient of friction using Inclined Plane)
10. Belt Friction(Coefficient of friction using coil friction set-up)
11. Fly-Wheel (Mass moment of Inertia of fly-wheel)
12. Resultant of concurrent force systems
13. Resultant of Non-concurrent force system
14. Reactions for simply supported beams
15. Forces in members of simple Trusses
16. Mohr's circle method.

Syllabus of Group 1- Semester I & Group 2- Semester II, Bachelor of Engineering

Course Code: INT101 **Course : Engineering Drawing**

L: 3 Hrs. T: 0 Hrs. P: 0 Hrs. Per week **Total Credits: 06**

Course Outcomes :

1. Ability to draw & read technical drawings.
2. Ability to prepare the sheet layout for the given drawing.
3. Ability to convert 2-D drawing to 3-D drawing & vice-versa.
4. Ability to understand the various positions of planes, solids in the different orientations.
5. Ability to develop the solid surface for sheet metal working.
6. Ability to use drafting package (AutoCAD).

Syllabus(Only First Angle Method of Projection)

UNIT 1

Drawing Instruments.Lines, Lettering & Dimensioning.

Scales - Plain Scale & Diagonal Scale.Vernier Scale.

Engineering Curves - Ellipse, Parabola & Hyperbola.

Methods to be covered:

Ellipse: Directrix Focus, Concentric Circles & Rectangle Method.

Parabola: Directrix Focus, Oblong- Rectangle & Parallelogram Method.

Hyperbola: Directrix Focus & Asymptote Method.

UNIT 2

Theory of Projections - Concept of Projection, First & Third angle projection methods. Projections of Points.

Projections of Lines: Oblique Lines, Traces.Applications of Projection of Lines.

UNIT 3

Projections of Planes - Polygonal Lamina, Circular Lamina.

Projections of Solids- Cube, Prism, Pyramid, Cylinder, Cone. Suspended Solids.

UNIT 4

Sections of Solids & Development- Cube, Prism, Pyramid, Cylinder, Cone.

UNIT 5

Isometric Projections: Isometric Scale, Conversion of given 2 dimensional views to Isometric Projection/View.

Orthographic Projections: Conversion of given 3 dimensional View to 2 dimensional representation.

UNIT 6

Introduction to AutoCAD: Drafting Basics, Drawing Commands, Modify Commands, Dimensioning.

Text Books:-

1. Engineering Drawing by N.D. Bhatt, Charothar Publishing.
2. Engineering Drawing by D. A. Jolhe, TMH
3. Engineering Drawing by K.L. Narayana& P. Kannaiah, SciTech Publication.

Refrences:

1. Engineering Drawing by Dhawan
2. AutoCAD 14 for Engineering Drawing by P. NageshwaraRao, TMH

Syllabus of Group 1- Semester I & Group 2- Semester II, Bachelor of Engineering

Course Code: INP101 **Course: Engineering Drawing**

L: 0 Hrs. T: 0 Hrs. P: 3 Hrs. Per week **Total Credits: 03**

Course Outcomes

1. Ability to draw & read technical drawings.
2. Ability to prepare the sheet layout for the given drawing.
3. Ability to convert 2-D drawing to 3-D drawing & vice-versa.
4. Ability to understand the various positions of planes, solids in the different orientations.
5. Ability to develop the solid surface for sheet metal working.
6. Ability to use drafting package (AutoCAD).

Syllabus

Sheet No.1: Scales & Curves (5 Problems)
Sheet No.2: Projection of Lines (4 Problems)
Sheet No.3: Application of Lines (4 Problems)
Sheet No.4: Projection of Planes (4 Problems)
Sheet No.5: Projection of Solids (4 Problems)
Sheet No.6: Projection of Section of Solids & Development of Surfaces (3 Problems)
Sheet No.7: Isometric Projections (3 Problems)
Sheet No.8: Orthographic Projections (3 Problems)
Any TWO of the above sheets should be solved by using AutoCAD.

Text Books:-

1. Engineering Drawing by N.D. Bhatt, Charothar Publishing.
2. Engineering Drawing by D. A. Jolhe, TMH
3. Engineering Drawing by K.L. Narayana& P. Kannaiah, SciTech Publication.

Refrences:

1. Engineering Drawing by Dhawan
2. AutoCAD 14 for Engineering Drawing by P. NageshwaraRao, TMH

Syllabus of Group 1- Semester I and Group 2-Semester II, Bachelor of Engineering

Course Code:-HUT102 **Course:-Social Skills**

L:2 Hrs.,T:0Hrs.,P:0Hrs.,Per week **Total Credits:4**

Course Outcomes

On successful completion of the course, students will be able to

1. Learn the basic concepts of personnel management or manpower planning and the process of recruitment and selection that they will go through as engineers.
2. Learn leadership skills, industrial relations, work organizations, and impact of industry on society.
3. Learn about the political systems and institutions working in India, laws and legislations affecting industry and the application of political principles like democracy in industry.
4. Learn the importance and application of Economics in Engineering.
5. Learn about culture/civilization and develop cross cultural capacity.
6. Learn about Personal, Professional and social ethics.

Syllabus

Unit-I:

Industrial Sociology:-

- Meaning and scope of Industrial Sociology
- Work Organization and its types.
- Concept of Leadership: Meaning, changing roles and its types.
- Concept of Power and Authority: Meaning, Importance, sources and Delegation
- Industrial Culture in India: Effects of Industrialization and Urbanization on Indian Society.

Unit-II:

Industrial Psychology:-

- Meaning and scope of Industrial Psychology
- Recruitment, Selection and Training
- Industrial fatigue
- Motivation, Theories of motivation: Maslow's Need Priority Theory, Macgregor's X And Y Theory, McClelland's Needs Theory
- Dealing with Self: Stress, health, and coping; interpersonal relationships; gender roles; environmental adjustments.

Unit-III:

Political Orientation:-

- Indian Constitution, features and federal structure.
- Fundamental rights
- Directive principles of state policy
- Industrial Democracy.
- Role of Bureaucracy in Modern Democratic states.

Unit-IV:

Economics:-

- Development of Indian Economy
- Human resources and Economic Development: Size and growth, sex composition, age composition, density of population and urbanization growth, population as retarding factor and population policy in India.
- Infrastructure in the Indian Economy: Energy, power, transport system, road transport system, Rail-Road co ordination, water transport, Civil aviation, communication system, urban infrastructure, science and technology, private investment in infrastructure.
- Role of Public and Private sector in Indian Economy.
- Challenges before Indian Economy in 21st Century.

  Poverty, Unemployment, Corruption, Regional Imbalance, Growth of educational sector.

Unit-V:

Culture and Civilization:-

- Concept of Culture and Civilization.
- Study of engineering skills with special reference to Egyptian and Indus Valley Civilization.
- Role of Engineers as agent of change with specific reference to change in Indian Society during 20th and 21st century.
- Multiculturalism: Meaning, scope and significance especially in Indian context.

Unit-VI:

Ethics and social responsibility:-

- Personal and professional ethics
- Corporate social responsibility
- Social capital, social audit.
- Role of entrepreneurship in nation building.
- Developing scientific and humanitarian outlook for the welfare of nation and society.

Text Books :

1. S. Shabbir, A.M. Sheikh, and J. Dwadashiwar (2010 reprint) A New Look Into Social Sciences, (5th edition, 2008), S. Chand and Co. Ltd., New Delhi
2. RuddarDatt and K.P.M.Sundharam, (67th Revised edition-2013), Indian Economy, S .Chand and Company Ltd, New Delhi.
3. Edmund G. Seebauer and Robert L Barry (2010 reprint) Fundamental of Ethics for Scientists and Engineers, Oxford University Press,

Reference Books:

1. P.C. Tripathi and P.N. Reddy, Principles of Management, (4th edition, 2008), Tata MacGraw Hill Publishing Co. Ltd., New Delhi
2. Martand.T. Telsang, Industrial and Business Management, (2001), S.Chand and Co. Ltd. New Delhi
3. Dr. V.H. Asudani: An Easy Approach To Social Science, (3rd edition, 2008), Aastha Publications, Nagpur
4. Tariq Modood, Multiculturalism (Themes for 21st Century Series)(1st Publication 2007), Polity Press, Cambridge, U.K. ISBN-13:97807456-3288-9.

Syllabus of Groups 1- Semester II and Group 2 – Semester I, Bachelor of Engineering

Course Code : INP102 **Course: Workshop**

L: 0 Hr., T: 0 Hrs., Per week **Total Credits : 02**

List of Experiments

(A) Carpentry shop

1) Introduction of carpentry tools, equipments, machine, material & process.
2) Manufacturing of Carpentry joints.
3) Turning practice on wood working lathe.
4) Demonstration and practice on universal wood working machine.

(B) Fitting shop

1) Introduction of fitting tools, equipments, machine, material & process.
2) Manufacturing & fitting practice for various joints & assembly.
3) Drilling, tapping and pipe threading operations.

(C) Welding shop

1) Introduction of welding tools, equipments, machine, material & process.
2) Fabrication of joints like Lap, Butt, Corner, 'T' etc.
3) Fabrication of Lap joint by spot welding process.

(D) Smithy shop

1) Introduction of smithy tools, equipments, machine, material & process.
2) Forging of combined circular/square/hexagonal cross section.

Text Books:

1. Elements of Workshop Technology Vol -I by HajraChoudhari
2. A course in Workshop Technology Vol -I by B.S. Raghuwanshi
3. Production Technology (Manufacturing process) by P.C Sharma

Reference Book:

1. Workshop Manuals
2. Manufacturing Technology by P.C Sharma
3. Workshop Manual by Kannaiah Narayanan

III SEMESTER

Syllabus for Semester III, B. E. (Electronics and Communication Engineering)

Course Code: MAT203 **Course: Engineering Mathematics-III**

L:3Hr., T:1 Hrs., P:0 Hrs., Per week **Total Credits : 07**

Course outcomes

1. Student can form mathematical modal corresponding to engineering problems by using Matrices and Differential Equations.
2. They can solve these problems and analyze their physical and graphical interpretation by using Laplace and Fourier Transforms.

Unit I

Laplace Transforms: Laplace transforms and their properties, Application for Laplace Transform to solve ordinary differential equations including simultaneous Differential Equations. Solution of one dimensional Partial differential equations by Laplace Transform method.

Unit II

Functions of a Complex Variable: Function of a complex variable, Analytic functions, Cauchy-Riemann conditions, Conjugate functions, singularities, Cauchy's integral theorem and integral formula, Taylor's and Laurent's theorem, Residue theorem, contour integration.

Unit III

Fourier Series: Periodic Function and their Fourier series expansion, Fourier Series for even and odd function, Change of interval, half range expansions. Practical Harmonic Analysis.

Unit IV

Fourier Transform: Definition, Fourier Integral Theorem, Fourier Sine and Cosine Integrals, Finite Fourier Sine and Cosine Transform.

Unit V

Partial Differential equations: Partial differential equation of first order first degree i.e. Lagrange's form. Linear homogeneous PDE of nth order with constant coefficient method of separation of variables. Application to transmission lines.

Unit VI

Matrices: Rank of matrix, consistency of system of equations, Linear dependence, linear and orthogonal transformations. Characteristics equations, eigen values and eigen vectors. Reduction to diagonal form, Cayley Hamilton theorem, Sylvester's theorem, determination of largest eigen values and eigen vector by iteration method.

Text Book

1. Higher Engineering Mathematics: B. S. Grewal, Khanna Publishers, Delhi (India).
2. A text book of Applied Mathematics Volume I & II: P. N. Wartikar& J. N. Wartikar, Pune VidhyarthiGrihaPrakashan, Pune-411030 (India).

Reference Books:

1. Advanced Engineering Mathematics,8thed: Erwin KreyszigNeekunj print process, Delhi.
2. Schaum's Outline of Complex Variables, 2nded:Murray R Spiegel, Seymour Lipschutz, John J. Schiller, Dennis Spellman, TMH, New Delhi.
3. Advanced Engineering Mathematics, 2nded :Jain, Iyengar , Narosa publication.
4. Advanced Engineering Mathematics: H K Dass, S. Chand Publications.

Syllabus for Semester III, B. E. (Electronics and Communication Engineering)

Course Code: EET205 **Course: Network Theory**

L: 3 Hrs, T: 1 Hr, P: 0 Hrs. Per week **Total Credits: 07**

Course outcomes

1. The students should be able to write the equilibrium equation on mesh and nodal basis and apply the matrix approach.
2. The students should be able to implement the source transformation and find the exact solution for circuits and networks of all type.
3. The students should able to understand and apply the principle of duality.
4. The students should be able to understand various network theorems and use them for getting exact solution of circuits and networks of all type.
5. The students should be able to understand the trignomotric and exponontial Fourier series and find out the Fourier transform and spectrum of a given circuit.
6. The students should be able to find out the initial and final conditions of a network for solving the circuit using Laplace transformation.
7. The students should be able to draw the s-planes for a circuit and study the pole zero location to understand the working controls of it. He/she should be able to find out the time domain response using s-plane.
8. The students should be able to study the symmetry and reciprocity properties of a circuit by drawing the two port network of it
9. The students should have understanding of application of Milliman's theorem for finding the voltage between the generator and load neutral for unbalanced AC circuits and thereby find different parameters of electrical circuits.

Unit I

Nodal and mesh-basis equilibrium equation, matrix approach for complicated network containing voltage current sources and reactance's, source transformations, duality, Mesh basis equation for coupled circuits.

Unit II

Network Theorems : Superposition, Reciprocity, Thevenin's Norton's Maximum Power transfer, Compensation, Tellegen's theorem as applied to AC circuits.

Unit III

Three phase unbalanced circuit and power calculations, Duality, Behavior of series and parallel resonant circuit. Introduction to band pass, high pass, low pass and band reject filters.

Unit IV

Laplace transforms and properties, partial fractions, singularity functions, waveform synthesis, analysis of RC, RL, and RLC networks with and without initial conditions with Laplace transforms, Evaluation of initial conditions.

Unit V

Transient behavior, concept of complex frequency, Driving points and transfer functions, poles and zeros of Immitance function, their properties, sinusoidal response from pole-zero locations, convolution Theorem and integral solutions.

Unit VI

Two port Network Parameters and inter-connections, Symmetrical and reciprocal conditions, Problems on all parameters and control sources.

Text Book:

1) Network Analysis: *Van Valkenburg*
2) Linear Network theory : *Kelkar, Pandit.*

Reference Books:

1. Network and Systems: *D P Roy and Choudhary*
2. Network Analysis: *G K Mittal*
3. Modern Network Analysis: *Reza and seely, Tata McGraw Hill Publication*

Syllabus for Semester III, B. E. (Electronics and Communication Engineering)

Course Code: ECT201 **Course: Electronic Devices**

L: 4 Hrs, T: 1 Hr, P: 0 Hrs. Per week **Total Credits: 09**

Course outcomes

On completion of this course students will be able:

1. To understand the construction, working and operation of different electronic devices such as Different Diodes, Bipolar Junction Transistor, Field Effect Transistor and Thyristor Family.
2. To know and analyze different amplifier configurations.
3. To understand low frequency analysis of BJT.
4. To know the fundamentals of Power Electronic and Optical Semiconductor Devices.

Unit I

Diode Theory: P N Junction diode, Zener diode, Tunnel, Schottky diode – operation, characteristics and applications such as Rectifiers.

Unit II

Bipolar Junction Transistor: - Operation, characteristics, Ebers-Moll model, biasing, Load line concept, Bias stabilization, Stabilization Techniques.

Unit III

Low frequency analysis of BJT:- Hybrid model, Determination of h-parameters from characteristics, Analysis of BJT amplifier circuit using h-parameters, simplified Hybrid model, Miller's theorem.

Unit IV

Field effect Transistor: - JFET and MOSFET – Classification, construction, Operation, Characteristics, Biasing, CMOS inverter circuit.

Unit V

Power Electronic devices - SCR, DIAC, TRIAC and UJT

Unit VI

Optical Semiconductor devices – LED, Photo diode, photo transistor, recent trends/developments.

Text Books:

1. Integrated Electronics: *Millman, Halkias,Parikh TMH, 2nd Edition*

Reference Books:

1. Electronic devices and Circuit Theory: *R. Boylestad, Pearson Education 9th edition*
2. Foundation of Electronics Circuits and Devices: *Meade Thompson, 4th Edition*
3. Electronic Devices and Circuits: *David A. Bell, PHI. 4th Edition*
4. Power Electronics: *P.C. Sen, Tata-McGraw Hill*
5. Optical semiconductor devices: *Mitsuo Fukuda, Wiley*
6. An Introduction to semiconductor Devices: *Donald Nemen, Tata-McGraw Hill*

Syllabus for Semester III, B. E. (Electronics and Communication Engineering)

Course Code: ECP201 **Course: Electronic Devices Lab**

L: 0 Hrs, T: 0 Hr, P: 2 Hrs. Per week **Total Credits: 02**

Course outcomes

1. The students will be able to verify the characteristics of PN junction Diode, BJT and FET.
2. The students will be able to use the different electronic devices to design a system.
3. The students will be able to find the h-parameters from the characteristics of BJT.
4. The students will be able to use the simulation software – ORCAD for analysis of different electronic circuits and compare it with the hardware results

Experiments based on following topics:

- PN Junction Diode Characteristics
- Zener as Voltage Regulator
- Rectifier
- Input/Output Characteristics and Biasing of BJT
- Characteristics of JFET/MOSFET
- Circuit Simulation using ORCAD

Syllabus for Semester III, B. E. (Electronics and Communication Engineering)

Course Code: ECT202 **Course: Digital Logic Design**

L: 4 Hrs, T: 1 Hr, P: 0 Hrs. Per week **Total Credits: 09**

Course outcomes

On completion of this course students will be able:

1. To solve and find out the numerical conversions and logic implementation.
2. To design different types of arithmetic circuits, encoder, decoder, MUX, DEMUX etc.
3. To analyze sequential logic circuits using flipflop and represent system by characteristic equation and excitation table.
4. To understand various kinds of digital ICs and Finite State Machines.

Unit I

Number Systems and Codes: Analog V/s Digital systems, Number Systems, Boolean algebra, Boolean identities, Digital Codes – Binary, Gray, Hex, ASCII, BCD, Self Complimentary, Conversion, D Morgan's laws, SOP, POS, representation of signed numbers.

Unit II

Logic Families: Transistor as a switch, Logic families (TTL, ECL) and their characteristics – Fan-In, Fan-Out, Propagation Delay, Power dissipation, Noise Margin, Timing issues. Comparison of different logic Families.

Unit III

Combinational circuits – Basic and Universal, Implementation of Boolean expression using logic gates, Karnaugh Map, simplification using K-Maps, Decoders, Encoders, Multiplexers, Demultiplexers.

Unit IV

Sequential Elements: Latches, Flip Flops – RS, D, JK, Master Slave JK, T flip flop, their excitation and truth tables, Conversion of one Flip Flop to another, Timing and Clocking issues: setup and hold time, Rise time, fall time, metastability, clock skew & jitter.

Unit V

FSM Design: Introduction to finite state machine, synchronous/asynchronous counter, Shift Registers.

Unit VI

Arithmetic Circuits: Adders and Subtractors, Comparators, Multipliers, Recent trends/developments.

Text Books:

1. Digital Logic and Computer Design: *Morris Mano, PHI, 3rd Edition.*
2. Modern Digital Electronics: *RP Jain, Tata McGraw Hill, 3rd Edition.*

Reference Books:

1. Introduction to Digital Systems: *James E.Palmer, David E.Perlman, Tata McGraw Hill Publishing company Ltd, 2nd Edition 2003.*
2. Digital Integrated Electronics: *H.Taub & D.Shilling, Mc Graw Hill.*
3. Digital Electronics: *Ryan ,Tata Mc Graw Hill.*
4. Fundamentals of digital circuits: *A. Anand Kumar, Prentice-Hall of India*
5. Digital Electronic Principles: *Malvino, PHI,3rd Edition.*

Syllabus for Semester III, B. E. (Electronics and Communication Engineering)

Course Code: ECP202 **Course: Digital Logic Design Lab**

L: 0 Hrs, T: 0 Hr, P: 2 Hrs. Per week **Total Credits: 02**

Course outcomes

On completion of this laboratory students will be able:

1. To make use of digital ICs to design logical circuits.
2. To design different types of combinational circuits such as Adder, Subtractor, MUX, DEMUX, Encoder, Decoder etc.
3. To evaluate performance of various Flip-Flop based systems.
4. To design synchronous and asynchronous systems such as up/down counter, ring counter, shift register.

Experiments based on following topics:

- Testing and verification of IC
- Universal Gates
- Combinational Circuits
- Sequential Circuits

Syllabus for Semester III, B. E. (Electronics and Communication Engineering)

Course Code: PHT201 **Course: Electronic Engineering Material and IC Fabrication**

L: 3 Hrs, T: 1 Hr, P: 0 Hrs. Per week **Total Credits: 07**

Course outcomes

1. The student will understand concepts such as polarizability, susceptibility, dielectric constant, superconductivity, magnetic permeability magnetization and hysteresis as applicable to materials.
2. The student will have some understanding of why materials show electrical properties like conduction, Joule losses, magnetic properties like ferromagnetism, antiferromgnetism, ferrimagnetism and optical properties of emission and absorption.
3. The student will understand the behaviour of dielectric under external static and electric fields.
4. The student will understand the classification of magnetic materials and their importance in electric devices;
5. The student will know about processes used in fabrication of resistors, inductors, capacitors and relays;
6. The student will understand choice of materials for and working of LEDs, semiconductor LASERs, semiconductor heterostructures and solar cells;
7. The student will know about the different stages in IC fabrication and some details of processes used in each stage.

Unit I

Dielectric properties of insulators in static fields: Polarisation, dielectric constant; Dielectric behavior of mono-atomic and polyatomic gases, liquids and solids, polar and non-polar dielectrics, Clausius-Mosotti equation; Elementary ideas of ferroelectric, piezoelectric and pyroelectric materials.

Dielectric properties of insulators in alternating fields: Complex dielectric constant, dipolar relaxation, dielectric loss, loss tangent, dielectric breakdown.

Unit II

Conductivity of pure metals and alloys;

Ohm's law and the relaxation time of electrons, Relaxation time, collision time, and mean free path, Electron scattering and the resistivity of metals, The heat developed in a current-carrying conductor, The thermal conductivity of metals, Super- conductivity

Unit III

Classification of Magnetic Materials: Origin of permanent magnetic moment, spin and orbital magnetic moment of electron; Dia, para, ferro, ferri, and anti-ferromagnetism, soft and hard magnetic materials, ferrites.

Unit IV

Materials for electronic components

Resistors: Carbon-composition resistors, insulated resistors, moulded resistors, film type resistors, alloy resistors, metallic oxide film resistors, wire-wound resistors, nonlinear resistors, variable resistors; **Capacitors:**

Paper capacitors, impregnated paper capacitors metallized paper capacitors, ceramic dielectric capacitors, plastic dielectric capacitors, electrolytic capacitor, variable capacitors; **Inductors:** Air cored coils, cored coils, ferrite core coils; **Relays:** Electromagnetic relays, Reed type, induction type, thermal type, general purpose relays, electronic relays.

Unit V

Opto-electronic Devices: Double hetero-structures: General characteristics, materials used, discussion in the context of LED, LASER, solar cells; Photovoltaic effect, Applications.

Unit VI

IC Fabrication: Integrated circuits, IC elements, fabrication of epitaxial diffused ICs; Doping of semiconductor: Epitaxial doping, doping by diffusion, ion implantation; Etching: Wet chemical, Plasma Etching.

Text Books:

1. Electrical Engineering Materials: *A. J. Dekker, Prentice Hall of India.*
2. Semiconductor physics and devices: *S. S. ISLAM, OXFORD University Press.*
3. VLSI Technology, 2nd ed.: *S. M. Sze (Ed), McGraw Hill*

Reference Books:

1. Electrical Engineering Materials: *C. S. Indulkar and S. Thruvengadam, S. Chand and Company.*
2. Introduction to Semiconductor Materials and Devices : *M. S. Tyagi, John Willey and Sons.*
3. Principles of Electronic ceramics : *L. L. Hench and J. K. West, John Wiley and Sons*
4. Semiconductor devices: Basic Principles: *Jasprit Singh, Wiley Student Edition.*
5. Materials Science and Engineering: *V. Raghavan, Prentice-Hall of India.*

Syllabus for Semester III, B. E. (Electronics and Communication Engineering)

Course Code: CSP211 **Course: Object Oriented Data Structure**

L: 0 Hrs, T: 0 Hr, P: 2 Hrs. Per week **Total Credits: 02**

Course outcomes

On completion of this course, the student will be able to:

1. Perform file operations in C Language.
2. Handle memory statically and dynamically.
3. Create classes, instantiate objects and invoke methods.
4. Demonstrate the concepts of function overloading and operator overloading in C++
5. Reuse the existing code using inheritance

Practicals based on the following topics using C language.

1. File Handling
2. Linked List
3. Structures

Practicals based on the following topics using C++ Language

1. Simple programmes in C++
2. Inline Functions – Friend and Virtual Functions
3. Classes, Objects, Constructor and Destructor
4. Operator Overloading
5. Inheritance
6. Polymorphism

Text Books:

1. Let Us C: *Yashwant Kanetkar, BPB Publications, B-14, Cannought Place, New Delhi.*
2. Programming in ANSI C: *E Balgurusamy, Mc Graw Hill Publication.*
3. Object Oriented Programming with C++: *E Balgurusamy, Mc Graw Hill Publication.*

Reference Books:

1. Data Structures using C/C++: *Tannenbaum, TMH Publication.*
2. An Introduction to Data Structures with Applications: *J.P. Tremblay and Sorenson.*

Syllabus for Semester III, B. E. (Electronics and Communication Engineering)

Course Code: CHT201 **Course: Environmental Studies-I**

L:2 Hr., T:0 Hrs., P:0 Hrs., Per week **Total Credits : 00**

Course Objectives:

1) Main objective of the course is to make the students aware of environmental issues which often come across.
2) It is envisaged to provide the students' with basic scientific background which is needed to understand how the Earth works, how we, as human beings, fit into it, prerequisites to understand environmental issues.
3) To adopt multidisciplinary approach which encompasses chemical sciences, biological sciences, environmental engineering and sciences to protect the mother earth and environment.
4) Course is to develop concern for our own environment which will lead us to act at our own level to surmount over the environment problems we face.
5) One of the objectives of the course is to make the students aware about importance of natural resources, ecosystems, biodiversity and its conservation, environmental pollution, social issues and environment, human population and environment.

Course Outcomes:

a) Students will get the sufficient information that will clarify modern environmental concepts like equitable use of natural resources, more sustainable life styles etc.
b) Students will realize the need to change their approach so as to perceive our own environmental issues correctly, using practical approach based on observation and self learning.
c) Students become conversant with the fact that there is a need to create a concern for our environment that will trigger pro-environmental action; including simple activities we can do in our daily life to protect it.
d) By studying environmental sciences, students is exposed to the environment that enables one to find out solution of various environmental problems encountered on and often.
e) At the end of the course, it is expected that students will be able to identify and analyze environmental problems as well as the risks associated with these problems and efforts to be taken to protect the environment from getting polluted. This will enable every human being to live in a more sustainable manner.

Unit I

Multidisciplinary Nature of Environmental Studies: Definition, scope and importance; Need for public awareness.

Unit II

Natural Resources Renewable and Non-renewable Resources: Natural resources and associated problems. (a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. (b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. (c) Mineral resources: Use and

exploitation, environmental effects of extracting and using mineral resources, case studies. (d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. (e) Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies. (f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.Role of an individual in conservation of natural resources.Equitable use of resources for sustainable lifestyles.

Unit III

Ecosystems: Concept of an ecosystem; Structure and function of an ecosystem; Producers, consumers, and decomposers; Energy flow in the ecosystem; Ecological succession; Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem (Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems i. e. ponds, streams, lakes, rivers, oceans, estuaries)

Unit IV

Biodiversity and its Conservation: Introduction – Definition: genetic, species and ecosystem diversity; Biogeographical classification of India; Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values; Biodiversity at global, National and local levels; India as a mega-diversity nation; Hot-sports of biodiversity; Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; Endangered and endemic species of India; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Text Books:

1. Environmental Chemistry and Pollution Control: *N. W. Ingole, D. M. Dharmadhikari, S. S. Patil, Das GanuPrakashan, Nagpur.*
2. Environmental Chemistry: *K. Bhute, A. Dhamani, A. Lonkar, S. Bakare, Celebration Infomedia, India.*

Reference Books:

1. Text Book of Environmental Chemistry and Pollution Control:*S. S. Dara; S. Chand and Company Ltd., New Delhi.*
2. Environmental Studies-From Crisis to Cure, Second Edition:*R. Rajagopalan, Oxford University Press, New Delhi.*
3. Text Book of Environmental Studies:*E. Bharucha, University Press (India) Private Ltd., Hyderabad, India.*

IV SEMESTER

Syllabus for Semester IV, B.E. Electronics and Communication Engineering

Course Code: MAT243 **Course: Engineering Mathematics–IV**

L:3Hr., T:1 Hrs., P:0 Hrs., Per week **Total Credits : 07**

Course outcomes

1. Student can formed mathematical modal corresponding to engineering problems.
2. Students will develop confidence to formulate engineering problem using mathematical models, analyze it and solve the problem by using basic mathematical tools and numerical computational techniques. They will also analyze outcomes of digital signals

Unit I

Numerical Methods: Error analysis, solution of algebraic and transcendental equations. False position method, Newton Raphson method and their convergence. Solution of system of linear equations, Gauss elimination method, Gauss Seidal method, Crout's method. Numerical solution of ordinary differential equation by Taylor's series method, Euler modified method, RungeKutta method, Milne's Predictor Corrector method.

Unit II

Z Transform: Definition and properties of Z- Transform, inverse Z-Transform, relation with Laplace transform and Fourier transform, application of z-transform to solve difference equations with constant coefficient.

Unit III

Random Variable and Probability distribution: Random Variables: Discrete and continuous, Probability density function, probability distribution function for Discrete and continuous random variables, joint distributions.

Unit IV

Mathematical expectations: Mathematical expectations, functions of random variables, the variance and standard deviation, Moment generating function, other measures of central tendency and dispersion, Skewness and kurtosis.

Unit V

Probability distribution: Bernoulli distribution, Poisson distribution, relation between binomial and Poisson distribution, Normal distribution, relation between binomial and normal distribution. The central limit theorem, exponential distribution.

Unit VI

Special functions and series solution: Series solution of differential equations by Frobenius method, Bessel's functions, Legendre's polynomials, recurrence relations, Rodrigue's formula, generating function, orthogonal properties of Bessel's and Legendre's functions.

Text Books

1. Higher Engineering Mathematics: *B. S. Grewal, Khanna Publishers, Delhi.*
2. Theory and Problems of probability and statistics: *J. R. Spiegal (Schaum series).*

ReferenceBooks

1. Introductory method of numerical analysis: *S. S. Sastry, 4ed, PHI, New Delhi.*
2. Advanced Engineering Mathematics , 8th ed: *Erwin Kreyszig, , Wiley, India, Delhi.*
3. Advanced Engineering Mathematics, 2nd ed : *Jain, Iyengar, Narosa publications.*

Syllabus for Semester IV, B. E. (Electronics and Communication Engineering)

Course Code: ECT203 **Course: Electromagnetic Fields**

L: 4 Hrs, T: 1 Hr, P: 0 Hrs. Per week **Total Credits: 09**

Course outcomes

On completion of this course students will be able:

1. To understand the underlying concepts of vector algebra
2. To have Basic understanding of Maxwell's equations and its application in static and time-varying fields.
3. To understand uniform plane wave propagation in different media.
4. To understand the electric and magnetic field theory.

Unit – I

Vector Algebra & Co-ordinate Geometry: Cartesian, Cylindrical and Spherical co-ordinate systems, differential lengths, surfaces and volumes. Gradient, divergence & curl of a vector & their physical interpretation, Irrotational and Solenoidal fields.

Unit – II

Electric Fields: Electrostatic fields, Coulumb's law, Electric field for different charge distributions. Gauss law & its applications. Electric potentials for different charge distributions. Poisson's & Laplace equations.

Unit – III

Magnetic fields: Lorentz law, Biot-savert law, Magnetic field due to different current distributions. Gauss law & Ampere's law. Magnetic vector potential & magnetic flux, Lenz's law, Faraday's law.

Unit – IV

Maxwell's Equations: Electric scalar potential, displacement current, Maxwell's equations for time varying fields & their physical significance.

Unit – V

Uniform Plane Wave: Poynting vectors theorem & its proof, Maxwell's equations in phasor form, Transformation of time varying quantity into phasor, Transformation of phasor into time varying quantity, Uniform plane wave, Wave equation, Propagation constant, attenuation constant, phase constant.

Unit – VI

Wave Motion: Solution of wave equation in free space, relation between E & H vectors, intrinsic impedance, frequency, wavelength, velocity, wave equations & their solutions in conducting & dielectric media, Skin effect, Depth of Penetration.

Text Books:

1. "Engineering Electromagnetics": *William Hyat, John Buck ; Tata McGraw Hill.*
2. Electromagnetic Waves & Radiating Systems: *Advard C. Jordan, Keith G. Balman, Second Edition, Prentice-Hall of India Pvt. Ltd.*

Reference Books:

1. Problems and Solutions in Electromagnetics: *W. H. Hyat, J. A. Buck, Tata McGraw Hill Education Private Limited, New Delhi.*
2. Theory and Problems of Electromagnetics: *Joseph A. Edminister, Schaum's outline series in Engineering, McGraw Hill Book Company.*
3. Electromagnetic Fields: *K. B. Madhu Sahu, 2nd Edition, Scitech Publications Pvt ltd.*

Syllabus for Semester IV, B. E. (Electronics and Communication Engineering)

Course Code: ECT204 **Course: Analog Circuits**

L: 4 Hrs, T: 1 Hr, P: 0 Hrs. Per week **Total Credits: 09**

Course outcomes

On completion of this course students will be able:

1. To understand the details of OP-AMP and its performance parameters.
2. To understand linear and non linear applications of OP-AMP
3. To generate sine, cosine, square and triangular wave using OP-AMP.
4. To understand IC based multivibrators, timers, PLL, Voltage regulators etc.

Unit I:

Differential amplifier, DC and AC analysis, Constant current Bias circuits, Level shifting techniques, cascaded differential amplifier stages,

Unit II:

Characteristics of an operational amplifiers, Open loop and closed loop Op-amp Configuration, Op-amp Parameters & their analysis.

Unit III:

Simple Op-amp Circuits: inverting, non-inverting amplifiers, summers, integrators and differentiators, log, antilog circuits. Differential amplifier configurations, instrumentation amplifiers. Current to voltage and voltage to current converter

Unit IV:

Precision rectifiers, sinusoidal oscillators:RC phase shift, Wein bridge, Quadrature oscillator, with frequency and amplitude stabilization, elementary idea of active filter, First /second order Low pass and High pass Butterworth filters, Band pass and Band reject filters.

Unit V:

Op-amp's non-Linear application: Clipper, clamper, comparator, zero crossing detector , Schmitt trigger circuits, Triangular wave generator , Monostable, astable multivibrator circuits using op-amps, sample/hold circuits, D/A converter: Binary weighted resistor type and R-2R ladder, A/D converter: The parallel comparator (Flash) type, Successive approximation converter.

Unit VI:

Timer IC LM-555: Internal block schematic, astable, monostable configurations and its application, PLL IC 565: Operating principle lock range and capture range, PLL application: frequency multiplier and FSK demodulator, Recent trends/developments.

Text Books:

1. Linear Integrated Circuits: D. *Roy Choudhary, Shail Jain, New Age International*.
2. Operational Amplifiers Design & Applications: *Tobey Graeme, Huelsman, McGraw hill*

Reference Books:

1. Design with Operational Amplifiers and Analog Integrated Circuits: *Sergio Franco, TMH, 3rd Edition*
2. Operational Amplifiers: *G. B. Clayton, International Edition*
3. Operational Amplifiers and Linear Integrated Circuits: *Coughlin Driscoll, PHI, 4th Edition*.
4. Analog Filter Design: *M. E. Van Valkenburg , PHI*.
5. Operational Amplifier: *Ramakant Gaikwad*.
6. Op-Amps and linear ICs*: Fiore J. M, Thomson Delmar learning*.

Syllabus for Semester IV, B. E. (Electronics and Communication Engineering)

Course Code: ECP204 **Course: Analog Circuits Lab**

L: 0 Hrs, T: 0 Hr, P: 2 Hrs. Per week **Total Credits: 02**

Course outcomes

On completion of this Laboratory students will be able:

1. To learn parameters affecting the performance of the amplifier such as CMRR, Slew rate, offset voltage, etc.
2. To implement circuits to perform various mathematical operations such as adder, subtractor, integrator, oscillator, filters, etc.
3. To know the use of operational amplifier in nonlinear applications such as rectifier, clipper, etc.
4. To design Astable and Monostable multivibrator using IC 555.
5. To simulate the circuits on simulating software MULTISIM.

Experiments based on following topics:

- Linear Applications of OPAMP
- Non Linear Applications of OPAMP
- IC – 555
- Circuit simulation using MULTISIM

Syllabus for Semester IV, B. E. (Electronics and Communication Engineering)

Course Code: ECT205 **Course: Electronic Circuits**

L: 3 Hrs, T: 1 Hr, P: 0 Hrs. Per week **Total Credits: 07**

Course outcomes

Upon completion of this course students will be able:

1. To design Zener shunt regulator and series voltage regulator with Darlington pair.
2. To design the feedback amplifier circuits using different feedback topologies.
3. To understand and design different types of oscillator.
4. To design low voltage power supplies.
5. To understand Low frequency Analysis of MOSFET.

Unit I:

Regulated Power Supply: - Design of Zener shunt regulator, emitter follower, series voltage regulator with Darlington pair. Design factors to consider – output peak to peak ripple, over voltage and over load protection.

Unit II:

Power amplifiers: Class A, B, AB, C amplifiers, Operation and Analysis. Push-pull amplifier configurations.

Unit III:

Multistage Amplifiers: Calculation of Gain, Methods of Coupling – RC Coupling, Transformer Coupling, Direct Coupling, Techniques of improving input impedance – Darlington transistors, Frequency response of RC Coupled transistor amplifier.

Unit IV:

Feedback amplifiers: Feedback Topologies, analysis and design, effect of feedback on bandwidth, gain, stability.

Unit V:

Oscillators: Barkhausen Criterion, LC-RC Oscillators, Crystal oscillator, frequency stability analysis, design of Hartley oscillator/Collpit oscillator.

Unit VI:

Low frequency Analysis of MOSFET**:** MOS small signal model, analysis of MOS amplifier circuits using MOS models.

High frequency Analysis of MOSFET**:** MOS capacitances, analysis of MOS amplifier at high frequencies.

Text Books:

1. Integrated Electronics: *Millman, Halkias,Parikh TMH, 2nd Edition*
2. Microelectronic Circuits: Adel S. Sedra, Kenneth C. Smith*, Arun N. Chandorkar, Oxford University Press*

Reference Books:

1. Electronic Devices and Circuit Theory: *R. Boylestad, Pearson Education, 9th Edition*
2. Foundation of Electronics Circuits and Devices: *Meade, Thompson, 4th Edition*
3. Electronic Devices and Circuits: *David A. Bell, PHI. 4th Edition*
4. Microelectronics Circuit Analysis and Design: *Donald Nemen, Tata-McGraw Hill*

Syllabus for Semester IV, B. E. (Electronics and Communication Engineering)

Course Code: ECP205 **Course: Electronic Circuits Lab**

L: 0 Hrs, T: 0 Hr, P: 2 Hrs. Per week **Total Credits: 02**

Course outcomes

1. The students will be able to determine the frequency response of an amplifier.
2. The students will be able to design Emmiter Follower type Series Voltage Regulator.
3. The students will be able to select the different feedback topologies for the different amplifier configuration.
4. The students will be able to design LC and RC Oscillator for determination of frequency of oscillation.
5. The students will be able to use the simulation software – ORCAD for analysis of different electronic circuits and compare it with the hardware results

Experiments based on following topics:

- Emmiter Follower type Series Voltage Regulator
- Series Voltage Regulator with Darlington Pair
- Single Stage and Two stage RC coupled amplifier using BJT
- Oscillator
- Feedback Amplifier
- Circuit simulation using ORCAD

Syllabus for Semester IV, B. E. (Electronics and Communication Engineering)

Course Code: ECT206 **Course: Electronic Measurement and Instrumentation**

L: 3 Hrs, T: 1 Hr, P: 0 Hrs. Per week **Total Credits: 07**

Course outcomes

On completion of this course students will be able:

1. To identify various errors in measurement system and correct them.
2. To understand different indicating types of instruments and its advantages.
3. To measure the electrical parameters with the help of measuring instruments.
4. To analyze the importance and advantages of electronic instruments.

Unit – I:

Indicating Instruments - purpose of instrumentation, Basic elements of instrumentation, Statistical analysis and measurement of errors, Static and dynamic characteristics, methods of producing deflecting, controlling and damping torques. Principle and operation of ammeters, voltmeters and wattmeters, moving iron and moving coil, dynamometer. Extension of instrument range.

Unit – II:

Detectors: PMMC galvanometer, dc & ac voltmeter, ammeter, multimeter, watt-hour meter, three phase wattmeter, power factor meter, instrument transformers. Measurement of low, medium and high resistance. Sensors – pressure, temperature, light. Transducer – thermocouple, RTD(resistance temperature detector).

Unit – III:

Bridges : General Balance Equation; Circuit diagram; Phasor diagram and Advantages as well as Disadvantages and Applications of Wheat stone, Kelvin, Max-well, Hay, Schering, Wein bridge Potentiometers, Measurement of Inductance, capacitance using AC bridges like Anderson, Ownens; De-Sauty's. Shielding and earthing.

Unit – IV:

Analog/Digital Meters: signal conditioning measurement meters, AC voltmeter using rectifiers, True RMS voltmeter, Electronic multimeter, Digital voltmeter, Q-meter, RF power and voltage measurements. Measurement of Energy- A.C. single phase and poly-phase induction type energy meters.

Unit – V:

Oscilloscope: Digital storage oscilloscope – 2 and 4 channel, delay line, multiple trace, triggering, delayed sweep.

Unit – VI:

Frequency and Power Measurement: Frequency, and Time measurement, signal analysis. frequency counters – measurement of frequency and time interval – extension of frequency range. Function generators – RF signal generators – Sweep generators – Frequency synthesizer – wave analyzer – Harmonic distortion analyzer – spectrum analyzer, Recent trends/developments.

Text Book:

1. Electrical Measurement: *A.K.Sawhney, Dhanpat Rai & Sons Publication*
2. Electronic Measurement Systems: *2nd revised edition, 2009, U. A. Bakshi, A. V. Bakshi, K. A. Bakshi, Technical Publications Pune.*

Reference Books:

1. Electronic Instrumentation & Measurement Technique: *W.D. Cooper & A.D. Helfrick.*

Syllabus for Semester IV, B. E. (Electronics and Communication Engineering)

Course Code: ECP206 **Course: Electronic Measurement and Instrumentation Lab**

L: 0 Hrs, T: 0 Hr, P: 2 Hrs. Per week **Total Credits: 02**

Course outcomes

On completion of this Laboratory students will be able:

1. To know the various techniques for the measurement of resistance.
2. To use various ac bridges for the measurement of inductance and capacitance.
3. To measure active and reactive power using Wattmeter.
4. To operate CRO for measurement of various parameters.

Experiments based on following topics:

- Measurement of Low ,Medium and High resistance
- Measurement of inductance
- Measurement of capacitance
- Measurement of active and reactive power
- Measurement of frequency and phase shift using CRO

Syllabus for Semester IV, B. E. (Electronics and Communication Engineering)

Course Code: CHT202 **Course: Environmental Studies-II**

L:2 Hr., T:0 Hrs., P:0 Hrs., Per week **Total Credits : 00**

Course Objectives:

1) Main objective of the course is to make the students aware of environmental issues which often come across.
2) It is envisaged to provide the students' with basic scientific background which is needed to understand how the Earth works, how we, as human beings, fit into it, prerequisites to understand environmental issues.
3) To adopt multidisciplinary approach which encompasses chemical sciences, biological sciences, environmental engineering and sciences to protect the mother earth and environment.
4) Course is to develop concern for our own environment which will lead us to act at our own level to surmount over the environment problems we face.
5) One of the objectives of the course is to make the students aware about importance of natural resources, ecosystems, biodiversity and its conservation, environmental pollution, social issues and environment, human population and environment.

Course Outcomes:

a) Students will get the sufficient information that will clarify modern environmental concepts like equitable use of natural resources, more sustainable life styles etc.
b) Students will realize the need to change their approach so as to perceive our own environmental issues correctly, using practical approach based on observation and self learning.
c) Students become conversant with the fact that there is a need to create a concern for our environment that will trigger pro-environmental action; including simple activities we can do in our daily life to protect it.
d) By studying environmental sciences, students is exposed to the environment that enables one to find out solution of various environmental problems encountered on and often.
e) At the end of the course, it is expected that students will be able to identify and analyze environmental problems as well as the risks associated with these problems and efforts to be taken to protect the environment from getting polluted. This will enable every human being to live in a more sustainable manner.

Unit I

Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, and Nuclear hazards. Solid waste Management : Causes, effects and control measures of urban and industrial wastes; Role of an individual in prevention of pollution, Pollution case studies; Diaster management: floods, earthquake, cyclone and landslides.

Unit II

Social Issues and the Environment: From Unsustainable to Sustainable development; Urban problems related to energy; Water conservation, rain water harvesting, watershed management; Resettlement and rehabilitation of people; its problems and concerns, Case Studies; Environmental ethics: Issues and possible solutions;

Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Case Studies; Wasteland reclamation; Consumerism and waste products; Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation; Public awareness.

Unit III

Human Population and the Environment: Population growth, variation among nations, Population explosion – Family Welfare Programme; Environment and human health; Human Rights; Value Education; HIV/AIDS; Women and Child Welfare; Role of Information Technology in Environment and human health,Case Studies.

Field work

Visit to a local area to document environmental assetsriver/forest/grassland/hill/mountain; Visit to a local polluted site-Urban/Rural/Industrial/Agricultural; Study of common plants, insects, birds; Study of simple ecosystems-pond, river, hill slopes, etc.

Text Books:

1. Environmental Chemistry and Pollution Control: *N. W. Ingole, D. M. Dharmadhikari, S. S. Patil, Das GanuPrakashan, Nagpur.*
2. Environmental Chemistry: *K. Bhute, A. Dhamani, A. Lonkar, S. Bakare, Celebration Infomedia, India.*

Reference Books:

1. Text Book of Environmental Chemistry and Pollution Control:*S. S. Dara; S. Chand and Company Ltd., New Delhi.*
2. Environmental Studies-From Crisis to Cure, Second Edition:*R. Rajagopalan, Oxford University Press, New Delhi.*
3. Text Book of Environmental Studies:*E. Bharucha, University Press (India) Private Ltd., Hyderabad, India.*

V SEMESTER

Syllabus for Semester V, B. E. (Electronics and Communication Engineering)

Course Code: HUT301 **Course: Principles of Economics and Management**

L: 3Hrs. T: 1Hr. P: 0 Hrs. Per week **Total Credits: 7**

Course Outcomes:

1. Students will understand the basic concepts of economics.
2. Students will develop understanding of micro economics with reference to various laws.
3. Students will develop the understanding of operation of economy.
4. Students will be familiar with basic principles of management.
5. Students will be familiar with concept of marketing.
6. Students will be familiar with finance.

Unit I

Introduction to Economics: Meaning and Scope; Basic Economic concepts: Goods, Utility, Value, Wealth, Income, Saving, Investment, Equilibrium, Static, Dynamics; Types of Business Organizations: Individual, Partnership, Joint-stock, Cooperative Enterprise, Public Enterprises.

Unit II

Micro-Economics: Law of Diminishing Marginal Utility; Concept of Demand; Law of Demand; Elasticity of Demand; Concept of Supply; Law of Supply; Elasticity of supply; Indifference Curve; Types of Market (Perfect and Imperfect Competition) and Price-output determination

Unit III

Macro-Economics: Concepts of Inflation and Deflation; Business cycles; Functions of Central Bank and Commercial banks; Monetary and Fiscal Policies; Direct and indirect taxes; Evolution of Indian Economy: Mixed Economy and LPG.

Unit IV

Introduction to Management: Definition, nature and scope of Management; Functions of Management – Planning, Organizing, Directing and Controlling

Unit V

Human Resource Management: Human resource planning; Analyzing work and Designing Job; Incentives and Performance Based Payments; Job safety, and health; Work Stress

Unit VI

Financial Management: Meaning, nature and scope of financial management; Profit and loss account; Balance sheet; Budgets; Ratio analysis; Depreciation and its methods.

TEXT BOOKS:

1. Modern Economic Theory, (43rd edition): *K.K. Dewett, S. Chand and Co. Ltd, New Delhi*
2. Indian Economy (45th revised edition): *Rudradutt and K.P.M. Sundaram, S. Chand and Co. Ltd., New Delhi*
3. Principles of Management: *P.C. Tripathi and P.N. Reddy, Tata MacGraw Hill Publishing Co. Ltd.; New Delhi*
4. Human Resource Management: *K. Aswathappa, Tata-McGraw-Hill Publishing Co. Ltd. New Delhi*
5. Financial Management: *Ravi M. Kishore, Taxman Allied Services (P) Ltd., New Delhi.*

REFERENCE BOOKS

1. Elementary Economic Theory (28th edition): *K.K. Dewett and J. D. Verma, S. Chand and Co. Ltd. New Delhi*
2. Industrial and Business Management: *Martand. T. Telsang, S.Chand and Co. Ltd. New Delhi.*
3. Principles of Management: *T. Ramasamy, Himalaya Publishing House, (10th edition) Mumbai*

Syllabus for Semester V, B. E. (Electronics and Communication Engineering)

Course Code: EET314 **Course: Control System Engineering**

L: 4 Hrs, T: 1 Hr, P: 0 Hrs. Per week **Total Credits: 09**

Course outcomes

On completion of this course students will be able:

1. To find the transfer function of the system using block diagrams reduction Technique, signal flow graphs and mathematical models for physical systems.
2. To understand the feedback characteristics of the control systems
3. To understand various time response specifications, time response analysis and techniques of compensation for improving the system response.
4. To apply various tools such as Routh's Criterion etc. to determine the stability of the systems.
5. To apply classical method of Root Locus Technique for stability analysis of systems.
6. To study frequency response using Polar Plots, Bode Plots and Log Magnitude vs. phase plots for stability analysis.
7. To understand State Variable method of Analysis for control system.

Unit I

Introduction to need for automation and automatic control. Use of feedback, Board spectrum of system application. Mathematical modeling, Diff. equations, transfer functions, block diagram, signal flow graphs, Application to parameter variation, disturbance signal servomechanisms and regulators. Control system components, Electrical, Electro-mechanical and other components. Their functional analysis and input output representation.

Unit II

Time response of system, First order and second order system, (Standard inputs) concept of gain and time constants, Steady State error, type of control system, approximate methods for higher order system.

Unit III

Stability of control systems, conditions of stability, characteristic equation, Routh's – Hurwitz criterion, special cases for determining relative stability.

Unit IV

Root location and its effect on time response, Elementary idea of Root Locus, effect of adding pole and zero and proximity of imaginary axis.

Unit V

Frequency response method of analyzing linear system. Nyquist and Bode plot, Stability and accuracy analysis from frequency response, open loop and close loop frequency response Nyquist criterion, Effect of variation of gain and addition of pole and zero on response plot, stability margins in frequency response.

Unit VI

State variable method of analysis: characteristic of system state, choice of state representation of vector matrix different equation, standard form, relation between transfer function and state variable, Recent Trends/Developments.

Text Books:

1) Control systems Engineering: *I. J. Nagrath and M. Gopal, 5th Edition, New Age International Limited, Publishers (Formerly Wiley Eastern Limited)*
2) Modern Control Engineering: *Katsihiko Ogata -3e - Prentice -Hall of India*

Reference Books:

1) Introduction to Feedback Control: *Li Qui and Kemin Zhou, Pearson Education.*
2) Control Systems – Principles and Design: *M. Gopal, 3rd Edition, Tata McGraw Hill Education Private Limited, New Delhi.*

Syllabus for Semester V, B. E. (Electronics and Communication Engineering)

Course Code: ECT301 **Course: Fundamentals of Communication Engineering**

L: 4 Hrs, T: 1 Hr, P: 0 Hrs. Per week **Total Credits: 09**

Course outcomes

On completion of this course students will be able:

1. To understand noise calculations and effect of various atmospheric layers on wave propogation.
2. To understand basic modulation techniques such as AM, FM and PM with circuits to realize them.
3. To learn the working of Superheterodyne and TRF receiver.
4. To understand Multiple access techniques.

Unit – I

Electromagnetic Wave Propagation: Ground Wave Propagation, Sky Wave Propagation, Space Wave Propagation, Properties of EM Waves : Power Density, Attenuation, Maximum usable Frequency, skip distance, Range of Electromagnetic Waves.

Noise: Concept of Noise, Sources of noise, Noise Calculations.

Unit – II

Need of modulation, AM modulation, Power & Current relation in AM, DSB-SC & SSB modulation, AM Modulator circuits, DSB-SC & SSB Generation, AM demodulators – Linear Diode Detector & Square law detector, Forms of AM.

Unit – III

Angle Modulation, Frequency modulation, spectrum of FM wave, Types of FM, Pre-emphasis & De-emphasis, FM Reactance tube and FET modulators, Stabilized Reactance Modulator, Armstrong Method, Phase Modulation, FM demodulators – Slope detectors, Foster–Seely Discriminator, Ratio detector

Unit – IV

Sampling Theorem, Pulse modulation, Generation & Demodulation of pulse amplitude modulation (PAM), pulse width modulation (PWM), pulse position Modulation (PPM), Pulse code Modulation (PCM), Delta modulation (DM), Adaptive Delta Modulation.

Unit – V

Radio Receiver and its measurements, TRF receiver, superhetrodyne receiver, detailed study of block Schematic, Characteristics of Radio receivers, Quality factor (Q), Sensitivity, selectivity, fidelity, image frequency rejection etc. Study of AGC, Communication receiver, Block schematic and its special features.

Unit – VI

Multiple Access Techniques – TDMA, FDMA, CDMA, Access Performance comparison, Introduction to OFDM technology, Recent Trends / Developments

Text Book:

1) Electronic Communication Systems: *George Kennedy, McGraw-Hill*.
2) Communication Systems: Simon Haykin, 4th Edition, Wiley Publication

Reference Books:

1) Electronic Communication Systems, Fundamentals through Advance: Tomasi, Pearson Education
2) Communication Systems, Analog & Digital: *R. P. Singh & S. D. Sapre, McGraw Hill*.
3) Electronic Communication Systems: 2dn edition, Blake, IE, Cenage Learning

Syllabus for Semester V, B. E. (Electronics and Communication Engineering)

Course Code: ECP301 **Course: Fundamentals of Communication Engineering Lab**

L: 0 Hrs, T: 0 Hr, P: 2 Hrs. Per week **Total Credits: 02**

Course outcomes

On completion of this Lab students will be able:

1. To observe and interpret the performance of AM modulator and demodulator under various changing parameters.
2. To understand FM Modulation and Demodulation.
3. To closely observe the effect of change of sampling frequency, duty cycle and order of filter in sampling and reconstruction.
4. To get the experience of working on software packages like MATLAB.

Experiments based on the following topics

- Amplitude Modulation
- Frequency Modulation
- Pulse Amplitude Modulation
- Pulse Width Modulation
- Pulse Position Modulation
- Pulse Code Mudulation
- Delta Modualtion
- Adaptipe Delta Modualation
- TDM
- Communication Receiver
- Communication Software Study

Syllabus for Semester V, B. E. (Electronics and Communication Engineering)

Course Code: ECT302 **Course: Microprocessor and Interfacing**

L: 4 Hrs, T: 1 Hr, P: 0 Hrs. Per week **Total Credits: 09**

Course Outcomes:

On completion of this course students will be able:

1. To discriminate amongst different microprocessors based on the architecture and application parameters.
2. To understand the organization of microprocessors in a microcomputer system.
3. To develop algorithms and their flow chart model further writing its assembly language code.
4. To understand the hardware concepts of input- output devices needed to interface with microprocessor.
5. To understand various time constraints while handling slow memory/IO devices.
6. To configure I/O chips like 8255PPI and 8253PIT.
7. To apply the knowledge of programming to interfacing memory (RAM/EPROM), I/O modules like ADC, DAC, Displays and Keyboards.
8. To determine efficiency and stability of microcomputer system.
9. To understand the applications suitable for microprocessor.

Unit – I

Introduction to Intel's 8085 Architecture and its description along with functional pin diagram, organization of Memory in microcomputer system. Flag structure, Addressing Modes.

Unit – II

Instruction set of 8085, Assembly Programming (with concept of hand coding), Program development tools, Assemblers & Dissemblers with Pseudo opcodes, Timing diagrams of instructions.

Unit – III

Concept of Interrupts and its structure in 8085. Interrupt service routines, Memory (RAM/ROM/EPROM) interface/mapping with 8085. Simple hardware interface to 8085 of standard Latches/Buffers/Keys/ Display devices as I/O ports.

Unit – IV

Concept of memory mapped and I/O mapped I/O devices, Methods of data transfer-serial, parallel, synchronous & asynchronous, Handshaking concepts. Architecture and interface of 8255PPI with 8085, Description of Modes of 8255.

Unit – V

Interfacing of I/O devices like ADC, DAC, Stepper Motor, LEDs, 7-segment LED Displays using 8255. Architecture and interface of 8253/8254 PIT with 8085. Description of Modes of 8253.

Unit – VI

Architecture description of 8259 PIC along with its interfacing with 8085 microprocessor, programming examples to initialize 8259 for its various modes.

Architecture description of 8237/8257 DMA controller along with its interfacing with 8085 microprocessor, programming examples to initialize 8237/8257 for its various data transfer modes, Recent Trends/Developments.

Text Books:

1) Microprocessor Architecture Programming & Applications with the 8085: *Ramesh Gaonkar, PHI.*
2) Understanding 8085/8086 Microprocessor and Peripheral ICs: *S. K. Sen, New Age International Pvt. Limited.*

Reference Books:

1) Advanced Microprocessors & Peripherals: *A.K. Ray, K. M. Bhurchandi, Tata McGraw Hill Publication.*
2) Programming & Interfacing of 8086/8088: *D.V. Hall, Tata McGraw Hill Publication.*

Syllabus for Semester V, B. E. (Electronics and Communication Engineering)

Course Code : ECP302 **Course : Microprocessor and Interfacing Lab**

L: 0 Hrs, T: 0 Hr, P : 2 Hrs. Per week **Total Credits : 02**

Course Outcomes:

On completion of this Laboratory students will be able:

1. To use simulator software on computer for assembly programming.
2. To debug the program and correct the algorithm steps accordingly.
3. To apply interfacing knowledge to improve the design, specific to any application.
4. To explore the possibilities of use in different applications/ systems.

- Basic Assembly programs based on arithmetic, data transfer and logical instruction including subroutine.
- Programmes based on interfacing of peripheral devices like ADC, DAC, Keyboard, LEDs, Stepper motor.

Syllabus for Semester V, B. E. (Electronics and Communication Engineering)

Course Code: ECT303 **Course: Computer Organization**

L: 3 Hrs, T: 1 Hr, P: 0 Hrs. Per week **Total Credits: 07**

Course outcomes

On completion of this course students will be able:

1. To understand evolution of Computers, computer design methodology, various computer design levels and performance evaluation methods.
2. To know about various instruction sets, their limitations and how the computer data is represented in various formats.
3. To have the knowledge regarding the various types of memory, their general characteristics and design methods.
4. To know about various interconnection structures for short and long distance communication, their usage and the devices used for communication.

Unit – I

Register level design- general characteristics, Register Level combinational and sequential components, design methods. Processor level design- components, design techniques.

Unit – II

Processor design- processor organization, information representation, number formats. Instruction sets- instruction formats, instruction types, multiplication and division: Algorithm & Circuit design, ALU design, IEEE 754 floating point formats, floating point arithmetic.

Unit – III

Control design- instruction sequencing, interpretation, Hardwired Control- design methods, multiplier and CPU control unit. Micro programmed control- basic concepts, minimizing micro instruction size, multiplier control unit.

Unit – IV

Memory organization: device characteristics, RAM, serial access memories, virtual memory, concept of cache and associative memories.

Unit – V

System organization: Local and long distance communication, input/output systems, interrupt and DMA.

Unit – VI

Introduction to parallel processing, Concept of parallel processing, pipelining, introduction to RISC & CISC architectures, Recent Trends/Developments.

Text BOOKS:

1) Computer Architecture & Organization: *J.P. Hays, 2e, Tata McGraw Hill.*
2) Computer Architecture & Organization: *Hamacher, Tata McGraw Hill.*

Reference Books:

1) Computer Architecture and Organization: *Design Principles and Applications – Govindrajalu, Tata McGraw-Hill Education, 2004.*
2) Computer Organization & Architecture: *Stallings, Pearson Education India, 2008 7th Edition*
3) Computer Architecture: Concepts And Evolution: *Blaauw, Pearson Education India, 1997*
4) Computer Systems Organization & Architecture: *Carpinelli, Pearson Education India, 2001.*

Syllabus for Semester V, B.E. (Electronics and Communication Engineering)

Course Code: ECP304 **Course: System Simulation**

L: 0 Hrs, T: 0 Hr, P: 2 Hrs. Per week **Total Credits: 00**

Course Outcomes:

1. Students will be familiar with the software packages like Matlab, Scilab and Multisim.
2. This course will strengthen the programming skills.
3. Students will learn the circuit simulation using Multisim

- Practical exercises using Computational Tool (MATLAB – Simulink/ SCILAB – Xcos/ Maple/ MULTISIM)

Reference Books:

1) MATLAB – an Introduction with Applications: *Amos Gilat, John Wiley Student Edition*.
2) Maple – Programming Physical and Engineering Problems: *V. Z. Aladjev, M. A. Bogdevicius*.

VI SEMESTER

Syllabus for Semester VI, B. E. (Electronics and Communication Engineering)

Course Code: ECT305 – 1 **Course: Switching Theory and Finite Automata (Departmental Elective – I)**

L: 3 Hrs, T: 1 Hr, P: 0 Hrs. Per week **Total Credits: 07**

Course Outcomes:

On the completion of this course, students will be able to:

1. Do analysis of switching algebra for the given circuit.
2. Apply various techniques for logic circuit reduction.
3. Design and troubleshoot the function for combinational and sequential circuit.
4. Design finite state machine.
5. Perform symmetric and cascade threshold function and element.

Unit – I

Switching Algebra and functions, Boolean algebra and functions, Minimization of Boolean functions using Tabulation Method, sets, Relations and Lattices Venn diagram.

Unit – II

Design of combinational Logic circuits, contact networks, Functional decomposition and symmetric functions.

Unit – III

Threshold Logic, threshold elements, capabilities and limitations of threshold logic, elementary properties, seperatibility, unate functions, synthesis of threshold functions, cascading of threshold elements.

Unit – IV

Reliable Design and fault Diagnosis, Fault Detection in combinational circuits, Fault location experiments, Fault Detection by Boolean Differences, Multiple fault detection using map method, failure- Tolerant Design.

Unit – V

Finite state Machines – Mealy and Moore synchronous and asynchronous sequential circuits Design, Capabilities, Minimization and Transformation of sequential Machine.

Unit – V I

Structure of sequential Machines, lattice of closed partitions, state Assignment using partitions, Reduction of output dependency, Input Independence and Autonomous clock. Homing sequence, synchronizing sequence, Adaptive Distinguishing experiment, Recent Trends/Developments.

Text Books:

1) Switching Theory and Finite Automata: *Zvi Kohavi, 2nd edition, Tata McGraw Hill*
2) Switching and Finite Automata Theory: *Zvi Kohavi, Niraj K. Jha, 3rd Edition, Cambridge University Press.*
3) Switching Theory and Logic Design: *V K Jain, PHI*

Reference Books:

1) Digital Logic and Computer Design: *Morris Mano, Pearson Education*
2) Digital Circuits and Logic design: *Samuel Lee, Prentice Hall.*
3) An Engineering Approach to Digital Design: *William I. Fletcher, Prentice Hall.*
4) Digital Design – Principles and Practices: *John F. Wakerly, Pearson Education.*

VI SEMESTER

Syllabus for Semester VI, B. E. (Electronics and Communication Engineering)

Course Code: ECT305 – 2 **Course : Television Engineering**

(Departmental Elective – I)

L: 3 Hrs, T: 1 Hr, P: 0 Hrs. Per week **Total Credits: 07**

Course outcomes

On completion of this course students will be able:

1. To understand various sections of television such as RF, IF, EHT, etc.
2. To understand color vs. monochrome television concepts.
3. To know different signal transmission and reception method such as DSB, SSB, and VSB.
4. To understand the concepts of advanced Television displays such as CCTV, HDTV etc.

Unit – I

Color Signal Generation And Encoding – Color cameras, Color picture tubes , Luminance Signal (Y), Color Difference Signals, Encoding of Color Difference Signals, Chrominance Signal for Color Bar Pattern, TV Transmitter, T.V signal propagation, Television Standards, PAL, NTSC, SECAM Systems

Unit – II

Video Amplifiers And Luminance Channel – Desired Composition of color Video Signal, Video Amplifier, Problems of DC Coupling, Consequences of AC Coupling DC Reinsertion, Contrast and Brightness Control Methods, Video Amplifier Circuits Luminance or Y Channel, Video Amplifier Bandwidth

Unit – III

Color Television Receivers – PAL-D Decoder, Chroma Signal Amplifiers, Separation of U and V Signals Color Burst Separation, Burst Phase Discriminator, ACC Amplifier, Reference Oscillator, Color Killer Circuits, Phase Shift and PAL Switch Circuitry. U and V demodulators, Color Signal Matrixing, PAL Color RGB Drive Amplifiers, Functions of Stages in Chroma, Sync Separation, Noise in Sync Pulses, Separation of Frame (Vertical) and Line (Horizontal) Sync Pulses.

Unit – IV

Cable Television – Cable Signal Sources, Cable Signal Processing, Cable Signal Distribution, I-Directional Networks, Scrambling of TV Signals, Cable Signal Converters.

Unit – V

Digital Television-Transmission And Reception – Digital System Hardware, Signal Quantization and Encoding, Digital Satellite Television, Direct-to-Home Satellite Television, Digital TV Receiver, Merits of Digital TV Receivers,

Unit – VI

Advanced Display Devices – Extended Definition Television (EDTV), High Definition Television (HDTV), LCD Technology, LCD Matrix Types and Operation, LCD Screens for Television, Recent Trends/Developments.

Text books:

1) Modern Television Practice, Principles and Servicing: *R.R. Gulati, 2nd edition, New Age International Publishers, Delhi.*
2) Television and Video Engineering: *A. M. Dhake, 2nd Edition, Tata McGraw-Hill*
3) Monochrome and color Television: R. R. Gulati, 2nd Edition, New Age International Publishers.

Reference books:

1) Basic television and video systems: *Grob B Herndon, 2nd Edition, 1999 Tata McGraw-Hill.*
2) Color Television – Theory and Practice: *S. P. Bali, Tata McGraw Hill*
3) Modern Television Systems: *Jim Slater, Pitman Publishing Longmans*

Syllabus for Semester VI, B. E. (Electronics and Communication Engineering)

Course Code: ECT306 **Course: Waves and Radiating System**

L: 4 Hrs, T: 1 Hr, P: 0 Hrs. Per week **Total Credits: 09**

Course Outcomes:

On completion of this course students will be able to:

1. Understand different types of waves and their characteristics.
2. Analyze the wave propagation in different media.
3. Understand waveguides and transmission lines.
4. Know working of different types of antennas.

Unit – I

Guided waves: Waves between parallel planes, TE, TM, TEM waves and their characteristics, Attenuation in parallel plane guides, wave impedances.

Unit – II

Rectangular waveguides: TM, TE waves in rectangular guides and their characteristics, wave velocity, guide wavelength, wave impedances, field configurations.

Unit – III

Transmission lines: Transmission line equations and their solution. Transmission line parameters, characteristic impedance, propagation constant, attenuation constant and phase constant, waveform distortion, distortion less transmission lines, loading of transmission lines, reflection coefficient and VSWR. Equivalent circuits of transmission lines, transmission lines at radio frequency, open and short circuited lines, smith chart, stub matching.

Unit – IV

Scalar and vector potentials, retarded potentials, field due to a current elements, power radiated and radiation resistance for field due to a dipole, power radiated and radiation resistance, reciprocity theorem applied to antennas gain and aperture of an antenna, radiation intensity, directivity and antenna gain.

Unit – V

Two element arrays and their directional characteristics, linear array analysis, broadside and end-fire arrays, pattern multiplication, binomial arrays, Design of broadcast array for a specific pattern.

Unit – VI

Basic principles of parabolic reflectors, analysis and power pattern, lens antennas, folded dipole, turnstile and yagi-uda antenna, log-periodic antennas, horn antennas, travelling wave antennas, casse-grain antenna, Recent Trends/Developments.

Text Books:

1. Electromagnetic Waves & Radiating Systems: *Edward C. Jordan, Keith G.Balman, Prentice Hall*
2. Modern Antenna Design: *Thomas Milligan, Wiley Interscience , IEEE Press*
3. Antenna Wave Propagation: *K.D. Prasad*

Reference Books:

1. Antenna & radio wave propagation: *R.E. Collin, McGraw Hill,1985*
2. Principles of Antenna theory: *K.F. Lee, Wiley,1984*
3. Electromagnetic Waves: *R. K. Shevgaonkar, McGraw Hill,2006*

Syllabus for Semester VI, B. E. (Electronics and Communication Engineering)

Course Code: ECT307 **Course: Statistical Signal Analysis**

L: 4 Hrs, T: 1 Hr, P: 0 Hrs. Per week **Total Credits: 09**

Course outcomes

On completion of this course students will be able:

1. To understand time and frequency domain analysis of various signals.
2. To use the knowledge of application of Fourier series and Fourier transforms.
3. To understand analog & digital modulation techniques, various coding & decoding schemes.
4. To use information theory and error detecting, correcting techniques for a communication system.
5. To understand the significance of Energy and Power of a signal.

Unit – I

Analysis of Signals:

Spectral analysis, Fourier Series representation of periodic signals, Fourier transform of periodic and non periodic signals, properties of Fourier Transform, Auto correlation and Cross correlation, convolution in time & frequency domain, Transmission of signals through linear systems, Sampling theory of band limited signals.

Unit – II

Probability, Random variables:

Review of probability theory, Optimum receiver Algorithm for binary channel, random variables, probability density and distribution function, Cumulative distribution function, Random processes.

Unit – III

Bandwidth and pulse transmission:

Intersymbol interference, PSD of Digital signals, Line coding, RZ, NRZ, Polar, Manchester coding systems, Nyquist's first & second criterion for zero ISI, Pulse shaping.

Unit – IV

Quatization, Quatization noise, PCM, Delta modulation, ADM, Introduction to DPCM, Study of noise performance for above systems, AWGN.

Unit – V

Digital Modulation techniques:

Salient features of ASK, PSK, FSK & DPSK systems, M-ary communication systems, Matched filter detection, Impulse response of match filter, Probability of error.

Unit – VI

Information Theory and Coding Techniques:

Information theory, channel capacity of discrete & continuous channels, Error control coding, Hamming distance & hamming codes, Linear block codes, CRC, Convolution codes, Syndrome decoding, Recent Trends/Developments.

Text BOOKS:

1) Modern Digital and Analog Communication Systems: *B.P. Lathi, Oxford University Press, USA*.
2) Communication Systems, Analog & Digital: *R. P. Singh & S. D. Sapre, McGraw Hill*.

Reference Books:

1) Electronic Communication Systems: *George Kennedy, McGraw-Hill*.
2) Digital Communication: *J. S. Chitode, Third Edition, Technical Publications*
3) Signals and Systems: *H. P. HSU, Schaum's Outlines, Tata McGraw Hill*.
4) Signal, Systems and Transforms: *Charles L. Phillips, John Parr and Eve Riskin, Pearson Education*.
5) Communication Systems: *B. P. Lathi, B. S. Publishers, New Delhi*.

Syllabus for Semester VI, B. E. (Electronics and Communication Engineering)

Course Code: ECT308 **Course: Embedded Systems**

L: 4 Hrs, T: 1 Hr, P: 0 Hrs. Per week **Total Credits: 09**

Course outcomes

On completion of this course students will be able:

1. To understand 8051 Architecture and its available resources such as memory, flags and register structure etc.
2. To develop the logic of assembly language program for Microcontroller based systems.
3. To work with hardware and software interrupts.
4. To understand interfacing of I/O ports with LED Displays, Keyboards, ADCs, DACs, stepper motors etc. with microcontroller.
5. To learn Concepts and Fundamentals of RTOS

Unit – I

Introduction to microcontroller Intel 8051 architecture, functional pin diagram and its description, Organization of internal RAM, ROM and register banks, organization SFR and flags, Ports functionality.

Unit – II

Addressing modes, Instruction set including all data transfer, arithmetic, logical, branching, bit manipulation, interrupt controlled. Organization of hardware interrupt structure, Vector interrupt table

Unit – III

External memory interface, counters and timers, serial data input/output, basic assembly language programming concepts with examples.

Unit – IV

Applications of microcontroller with Keyboards, LEDs, LCD displays, pulse measurements, D/A and A/D conversions, stepper motor.

Unit – V

Introduction to communication hardware & protocols, RS232, I2C, RS485, Serial Peripheral Interface(SPI), Controller Area Network Bus(CAN), Universal Serial Bus(USB).

Unit – VI

Concept and Fundamentals of RTOS, essential features, RTOS Task and Task state, **Task management and scheduling -** Processes and Threads, Scheduling, **Interrupts –** ISR, DSR, ASR, **Inter Process Communication (IPC) Synchronization –** IPC terminology, Semaphore, Mutex, Spinlock, Read/write lock, barrier, **IPC Data**

exchange – Shared Memory, FIFOs, Messages and Mailboxes, Memory Management, Recent Trends/Developments.

Text BOOKS:

1) The 8051 Microcontroller – Architecture, programming and applications: *Kenneth J. Ayala, Delmar Publishers, Inc. India Reprint Penram.*
2) The 8051 Microcontroller and Embedded Systems: Muhammad Ali *Mazidi & Jenice Gillispie Mazidi, Rolin D. McKinlay, Pearson Education*

Reference Books:

1) Microprocessors & Interfacing – *Programming & hardware: D. V. Hall, TMH*
2) The 8088 AND 8086 microprocessors: *Walter A. Trebel, Avtar Singh, PHI*
3) The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium and Pentium Pro Processor Architecture, programming and interfacing: *Barry B. Brey, PHI*
4) Design with PIC Microcontroller: *John B. Peatman, PHI.*
5) Real Time Systems – Design for distributed Embedded Applications: *Herma K. Kluwer Academic.*
6) Operating Systems – A *Design Oriented approach: Charles Crowley, McGraw Hill.*

Syllabus for Semester VI, B. E. (Electronics and Communication Engineering)

Course Code: ECP308 **Course: Embedded Systems Lab**

L: 0 Hrs, T: 0 Hr, P: 2 Hrs. Per week **Total Credits: 02**

Course outcomes

1. Students will be aware about the memory structures of 8051 through different programs.
2. Students will be able to organize logic for complex programs.
3. Students are able to handle interrupts related to 8051.
4. Students will be able to carry out interfacing of different peripherals.

- Programmes based on timers.
- Programmes based on serial communication.
- Programmes based on memory accessing.
- Programmes based on interrupts.
- Programmes based on interfacing of peripheral devices like ADC, DAC, LCD, Keyboard, LEDs, Stepper motor.

Syllabus for Semester VI, B. E. (Electronics and Communication Engineering)

Course Code: ECT309 – 1 **Course: Telecommunication Engineering (Open Elective)**

L: 3 Hrs, T: 1 Hr, P: 0 Hrs. Per week **Total Credits: 07**

Course Outcomes:

On completion of this course students will be able:

1. To understand the need for modulation in communication.
2. To know Digital modulation techniques.
3. To know multiple access techniques.
4. To understand the applications of Telecommunication Engineering.

Overview of analog Communication: Basic Block Diagram of Generic Communication System. Need of Modulation & its Types, AM, FM, PM, Modulation

Introduction to Digital Communication: Need of Digital Communication, Digital Modulation types- PCM, Delta Modulation, DPCM, Continuous wave Modulation ASK, FSK, and PSK.

Multiple Access Techniques: TDMA, FDMA, CDMA, Access Performance comparison, Introduction to OFDM technology

Radio Receiver and its types, TRF receiver, superhetrodyne receiver, study of block Schematic, Characteristics of Radio receivers, Quality factor (Q), Sensitivity, selectivity, fidelity, image frequency rejection.

Bandwidth and pulse transmission: Concept of sampling, Intersymbol interference, aliasing, Line coding, RZ, NRZ, Unipolar, bipolar, Manchester coding systems,

Applications of Telecommunication Engineering: Mobile Communication overview: GSM, CDMA, Wi Fi & WiMax, Bluetooth, and Introduction to Optical Communication, Recent Trends/Developments.

Text Books:

1) Communication Electronics: *Simon Haykin, 4th Edition, John Wiley Publication.*
2) Digital Commincation: *John G. Proakis, Tata McGraw Hill*

Reference Books:

1) Wireless communication – Principles and Practice: *Theodore S. Rappaport, Pearson Education.*
2) Cognitive Commincations: *Bruce Fette, ebook.*
3) Optical Fiber Communication – Principles and Practice: *John M. Senior, Pearson Education.*

Syllabus for Semester VI, B. E. (Electronics and Communication Engineering)

Course Code: ECT309 – 2 **Course: Introduction to Instrumentation System and Transducers (Open Elective)**

L: 3 Hrs, T: 1 Hr, P: 0 Hrs. Per week **Total Credits: 07**

Course Outcomes:

On completion of this course students will be able:

1. To understand Errors in instrumentation system.
2. To learn Classification of Transducers based on their functionality.
3. To know different type of sensors.
4. To understand the applications of sensors and transducers.

General Configuration and Functional Description of measuring instruments: Block schematic of general instrumentation system (Analog and Digital), Static and Dynamic Characteristics of Instrumentation system, errors in instrumentation system, Standards and calibration, Active and Passive Transducers and their classification.

Motion Transducers: Resistive strain gauge, LVDT, Capacitive transducers, Piezo-electric transducers, vibrometers and accelerometers.

Temperature Transducers: Thermistor, RTD, Thermocouple and their characteristics.

Piezoelectric Transducers: Piezoelectric phenomenon, Piezoelectric materials, Force, Strain, Torque, Pressure and Acceleration transducers.

Magnetostrictive Transducers: Magnetostriction phenomenon, Force, Torsion transducers, Hall Effect Transducers.

Electromechanical Transducers: Tachometers, Variable reluctance, Electrodynamic pressure, Electromagnetic flow meters.

Photoelectric Transducers: Photoelectric phenomenon, Photoconductive, Photovoltaic, Photoemmisive.

Digital Transducers: Digital displacement transducer, Digital tachometers.

Sensors: Proximity Devices, Bio-Sensors, Smart-Sensors, Piezo-electric Sensors, Recent Trends / Developements.

Text Books:

1. Transducers and Instrumentation: *Murty D.V. PHI, 10th print 2003*
2. Mechanical and Industrial Measurements: *Jain R.K., Khanna Publ. 10th Edition- 4th reprint 2000*
3. Electrical and Electronic Measurements and Instrumentation: *Sawhney A. K., Dhanpat Rai and Sons.*

Reference Books:

1. Sensors and Transducers: *Patranabis D., PHI, 2nd edition*
2. Instrumentation Devices and Systems: *Rangan C. S., Sharma G. R., Mani V. S. V., Tata McGraw Hill Publication Limited.*
3. Instrumentation Measurement and Analysis: *Nakra B. C., Chaudhary K. K., Tata McGraw Hill Publication Limited.*

Syllabus for Semester VI, B. E. (Electronics and Communication Engineering)

Course Code: ECP310 **Course: Electronics Workshop**

L: 0 Hrs, T: 0 Hr, P: 2 Hrs. Per week **Total Credits: 02**

Course Outcomes:

On completion of this laboratory students will be able:

1. To assemble various components on breadboard and test the circuit.
2. To use microcontroller IC for their project and develop program either in assembly or C language using Keil Compiler.
3. To program Microcontroller using Universal programmer.
4. To design PCB layout using ORCAD and fabricate it on copper clad board.
5. To develop mini project on various electronic applications.
   - Identification of Electronic Components and Testing.
   - Fabrication and testing of small electronics circuit.
   - PCB Design and its testing.
   - Study of Indian standards in electronic industry.
   - Manufacturing practices in Electronic Industry.
   - Microcontroller based mini project.
   - Technical Report presentation

Reference Books:

1) Electronic Component and Materials: *Dr. Madhuri Joshi*
2) Printed Circuit Boards – Design and Technology: *Walter Bosshart, McGraw Hill Education.*
3) Integrated circuit Fabrication Technology: *David J. Elliott, Tata McGraw Hill.*

VII SEMESTER

Syllabus for Semester VII, B. E. (Electronics and Communication Engineering)

Course Code : ECT401 **Course : Digital Communication**

L: 3 Hrs, T: 1 Hr, P: 0 Hrs. Per week **Total Credits : 07**

Course Outcomes:

On completion of this course students will be able to understand:

1. Digital Modulation Techniques, Source Encoding Techniques, Advance Source Encoding Techniques & Channel Coding Techniques.
2. Concept of Signal Space Representation and Spread Spectrum Modulation.
3. The design of Convolution Encoders and analyze its performance parameters.
4. The methods to further simulate modify and build innovative digital communication systems.

Prerequisites

Mathematics –IV, Statistical Signal Analysis, Fundamentals of Communication Engineering

Unit – I

Digital Modulation Techniques: - PCM systems, SNR in PCM Systems, Companding, Delta Modulation , Slope Overload & Granular Noise, Adaptive Delta modulation, Coherent Binary: PSK, FSK, QPSK, M-ary FSK, Minimum Shift Keying, Differential Phase Shift Keying.

Unit – II

Source coding methods: - Review of information theory, Concept of Entropy, DMS, Discrete Memory less Channel, BSC, Loss in Information & Information Transmission Rate, Rate Distortion Theory, Concept of Coding, Huffman Coding , Features of Huffman Coding , L-Z encoding algorithm..

Unit – III

Advance Source Coding Techniques: Need for Advance Source Coding, Sub-band Coding and transform coding, model based speech coding like Linear Predictive coding, Code Excited Linear Predictive Coding.

Unit – IV

Advanced transmission methods: - Review of channel coding , Concepts in convolution, encoding, Code Tree, Code Trellis, State Transition Diagram, Signal Flow graph and distance properties, Viterbi decoding algorithm and Fano decoding algorithm.

Unit – V

Advanced Modulation methods:-The signal space concept, Gram-Schmitt procedure for Orthogonalization, Signal space representation, Synthesizer for generating Signal and Analyzer for generating Signal Vectors, Correlation Receiver, Vector Transceiver System.

Unit – VI

Spread – Spectrum Communication: - Study of PN sequences, direct sequence methods, Frequency hop methods, digital spread spectrum, slow and fast frequency hop, performance analysis, synchronization methods for spread spectrum, Application of spread spectrum, CDMA, Recent Trends/Developments.

Text Books:

1) Digital communication: *John G Proakis, Tata McGraw Hill Publication*.
2) Digital communication: *Simon Haykin, Wiley Publication*

Reference Books:

1) Modern communication systems (Principles and application): *Leon W. Couch II, PHI*.
2) Digital Communication : *K Sam Shanmugham, Wiley Publication*
3) Fundamentals of Error Correcting codes – *Huffman and Piess, Cambridge Press*

Syllabus for Semester VII, B. E. (Electronics and Communication Engineering)

Course Code: ECT402 **Course : Computer Communication Networks**

L: 4 Hrs, T: 0 Hr, P: 0 Hrs. Per week **Total Credits : 08**

Course Outcomes:

On completion of this course students will be able:

1. To understand OSI/TCP reference model for data transfer in a network.
2. To know principle of computer communication including multiplexing, flow control and error control.
3. To analyze wide area, local area and metropolitan area network.
4. To understand IEEE standards such as 802.11, 802.16, IP addressing, etc.
5. To understand security of a network using cryptography technique such as public key, secret key.

Prerequisite: Fundamentals of Communication Engineering

Unit – I

Basics of Communication Network, Approaches to network Design, Types of Network, Two Stage, three Stage network, Network Topologies, Time Division Switching, time Space Time Switching.

Unit – II

OSI reference Model, TCP/IP Architecture, IP packets, IP addressing, subnet addressing, address resolution and reverse address resolution, TCP/IP utilities

Unit – III

LAN structure, IEEE Standard 802 for LAN & MAN, CSMA/CD protocols, Error detection & correction

Unit – IV

Transmission medium, ATM, SONET, Data Link Layer design, Sliding window protocols

Unit – V

Network layer design, Routing, congestion, Internetworking Transport layer design issues, Internet transport protocol, Introduction to Cross Layer Design, Snoop protocol.

Unit – VI

Network security, cryptography, secret key, public-key digital signature, Domain Name system, Real Time Transport protocol, Electronic Mail security, Recent Trends/Developments

Text Books:

1) Computer Networks: *Andrew Tanenbaum, 4th Edition, PHI.*

2) Computer Communication Networks : Frouzan, 4th Edition, Tata Mc-Graw Hill

Reference Books:

1) Telecommunication Switching systems & Networks: *Vishwanathan , 3rd Edition, PHI*

2) Computer Communication: *W. Stanlling*

3) Communication Networks: *Leon-Gracia*

Syllabus for Semester VII, B. E. (Electronics and Communication Engineering)

Course Code: ECT403 **Course: Digital Signal Processing**

L: 4 Hrs, T: 1 Hr, P: 0 Hrs. Per week **Total Credits: 09**

Course Outcomes:

On completion of this course students will be able:

1. To know the classification of discrete signals such as periodic- Aperiodic signals, Symmetric-Antisymmetric signals, Causal- non causal signals, Stable –unstable signals and mathematical operations.
2. To identify various types of systems such as linear- nonlinear, causal-Non causal Time invariant - Time variant, Stable –unstable systems etc.
3. To learn frequency domain analysis using Fourier transform and Z-transform.
4. To implement N-point FFT using DIT and DIF algorithms.
5. To learn digital filter design methods viz. IIR Butterworth, Chebysheve and FIR filter.

Unit – I

Introduction to digital signal processing: Discrete time signals & systems: Discrete time signals and its classification, Discrete time systems, Classification of discrete time systems, Linear convolution, Cross Correlation, Autocorrelation of two sequences, sampling theorem & sampling process, Reconstruction of sampling data.

Unit – II

The Z-transform: Definition, Region of convergence for the Z-transform, properties of Z-transform, Inverse Z-transform using long division, partial fraction expansion and residue methods, Solution of difference equation for causal systems.

Unit – III

Structures for realization of LTI discrete-time systems in z domain:

IIR systems: Direct Form-I, Direct Form-II, Cascade form and parallel form.

FIR systems: Direct form, cascade form and linear phase realization.

Unit-IV

Frequency domain representation of discrete time signals and systems, Fourier transform of discrete time signals, properties of discrete time Fourier transform, Frequency response analysis of discrete time systems.

Unit – V

Discrete Fourier Transform: Discrete Fourier transform definition, properties of DFT, circular convolution, Decimation in time FFT algorithm, decimation in frequency FFT algorithm, Inverse FFT.

Unit – VI

Filter design Techniques: Design of discrete time IIR filters from continuous time filters, Design of FIR filters by windowing method – Hamming and Kaiser.

Introduction to DSP processor and its applications, Recent Trends/Developments.

Text Books:

1) Discrete time signal processing: *Alan V. Oppenheim, Ronald W. Schafer & Buch, Pearson Education.*
2) Digital Signal Processing: *Salivahanan, Tata McGraw Hill.*

Reference Books:

1) Digital Signal Processing Theory and application: *Proakis and Manolakis, PHI Ltd.*
2) Digital Signal Processing: *Sanjit K. Mitra, Tata McGraw Hill.*
3) Digital Signal Processing: *Jonathan Stein, Wiley India Ltd.*

Syllabus for Semester VII, B. E. (Electronics and Communication Engineering)

Course Code: ECP403 **Course: Digital Signal Processing Lab.**

L: 0 Hrs, T: 0 Hr, P: 2 Hrs. Per week **Total Credits: 02**

Course Outcomes:

On completion of this laboratory students will be able:

1. To use Open Source software SCILAB for all practical analysis.
2. To generate standard signals in discrete and continuous form.
3. To implement FIR Filter for given specifications.
4. To implement Digital Filter for Audio Processing Applications.
5. To explore the possibilities of application of DSP to various domains.

All the experiments are to be performed using Open source software SCILAB.

(The lab has been migrated from MATLAB to SCILAB under lab migration project, approved by FOSSEE project, IIT, Bombay)

1) *Experiment – 1:* Basic operations on sequences and plotting them in continuous/discrete form.
2) *Experiment – 2:* Analyzing the effect of sampling of continuous time signal to avoid aliasing.
3) *Experiment – 3:* Convolving two sequences in discrete time domain.
4) *Experiment – 4:* Evaluating circular convolution using DFT-IDFT method.
5) *Experiment – 5:* Designing of FIR filters for low pass, high pass, band pass and band reject response.
6) *Experiment – 6:* Designing of butterworth IIR filters and its realization to filter our noise from a given signal.
7) *Experiment – 7:* Designing of chebychev/inverse chebyshev/elliptical filter from a given transfer function.
8) *Experiment – 8:* Application of sound effect on wave file like Flanging, Echo and Equalizer.
9) *Experiment – 9:* Polyphase decomposition by decimation method for a given decimation factor.
10) *Experiment – 10:* Spectral estimation of a sequence using Periodogram method.
11) *Experiment – 11:* Real time Data acquisition and plotting through external hardware interfaced (serial port).

Syllabus for Semester VII, B. E. (Electronics and Communication Engineering)

Course Code: ECT404 **Course: Digital System Design with HDL**

L: 3 Hrs, T: 1 Hr, P: 0 Hrs. Per week **Total Credits: 07**

Course Outcomes

After successful completion of course the students will be able to:

1. Design combinational and sequential circuits using HDL.
2. Understand the concepts of Hardware implementation of HDL codes.
3. Simulate HDL codes for functional verification of designed hardware.
4. Implement application specific hardware using HDL.

Unit I

Introduction to VHDL and Verilog, Fundamentals of VHDL and Verilog including language basics and relation to circuit implementation, Concepts of PAL, PLA, PLD and FPGA's.

Unit II

Combinational logic circuit design and VHDL implementation, Synchronous sequential circuit design: Sequential circuit components & FSMs.

Unit III

Processor level component design, Memory interface concepts with memory array design including general purpose memory, FIFO and Buffers.

Unit IV

Introduction to System Design, Application based designing, Design and simulation of PID controller, NOC basic router.

Unit V

Introduction to IP cores and softcore processors, Altera NIOS-II basics including architecture and programming

Unit VI

Generic architecture of CPLD and FPGA, area and delay analysis and interpretation, Recent Trends/Developments

Text Books:

1) VHDL: *Douglas Perry, 3rd Edition, Tata McGraw Hill.*
2) Fundamentals of Digital Logic with VHDL design: *Stephen Brown, Zvonko Vranesic, Tata McGraw Hill.*
3) Digital Design principles: *Fletcher, PHI*

Reference Books:

1) Digital System Design: *John F. Wakerley, 3rd edition, PHI*
2) VHDL Synthesis: *J Bhasker, Pearson Education*
3) VHDL Primer: *J Bhasker, Pearson Education*
4) Principles of CMOS VLSI Design: *Neil Weste, 2nd edition, Addison Wesley*
5) Digital System Design Using VHDL: *Charles H. Roth, CL Engineering*
6) VHDL: *Zainalabedin Navabbi, McGraw Hill Professional*

Syllabus for Semester VII, B. E. (Electronics and Communication Engineering)

Course Code: ECP404 **Course: Digital System Design with HDL Lab**

L: 0 Hrs, T: 0 Hr, P: 2 Hrs. Per week **Total Credits: 02**

Course Outcomes:

On completion of this laboratory students will be able:

1. To use simulation tools to implement and test HDL based design.
2. To design basic combinational and sequential circuits.
3. To design arithmetic blocks in HDL and implement the same.
4. To design HDL codes for small scale computer blocks.
5. To implement HDL based designs on CPLD/FPGA.

Experiments based on:

- Combinational and sequential circuits.
- Different styles of modeling.
- VHDL statements and test benches
- Design of arithmetic blocks in HDL and implement the same.
- Design of HDL codes for small scale computer blocks.
- Implementation of HDL based designs on CPLD/FPGA.

Syllabus for Semester VII, B. E. (Electronics and Communication Engineering)

Course Code: ECT405 – 1 **Course: Pattern Recognition (Departmental Elective – II)**

L: 4 Hrs, T: 0 Hr, P: 0 Hrs. Per week **Total Credits: 08**

Course Outcomes

On completion of this course students will be able to:

1) Know the basic principle of pattern recognition theory and the main application domains.
2) Understanding the fundamental pattern recognition methods and algorithms
3) Select the most efficient algorithm based on problem requirements.

Unit – I

Statistical Decision Theory, Probability – probabilities of events, random variables, joint distribution & densities, moments of random variables, estimation of parameters from samples, minimum risk estimators.

Unit – II

Stastical Decision Making: Baye's theorem, multiple features, conditionally independent features, decision boundaries, unequal cast of error, estimation of error rates, the leaving-one-out technique, characteristics curve, estimating the composition of population.

Unit – III

Non parametric decision Making: Histograms, kernel and window estimators, nearest neighbor classification techniques, adaptive decision boundaries, adaptive discriminant functions, minimum squared error estimation functions, choosing a decision making technique.

Unit – IV

Distance metrics – Euclidian, Manhatten, Clustering: sequential clustering, hierarchical clustering, probabilistic clustering, partitional clustering, clustering for region segmentation, Introduction to Neural Network, back-propagation algorithm.

Unit – V

Processing of waveforms and images: Gray level scaling transformations, equalization, geometric image scaling and interpolation.

Unit – VI

Smoothing transformation, edge detection, line detection and template matching, logarithmic gray level scaling, statistical significance of image features, Recent Trends/Developments.

Text Books

1) Pattern recognition and Image Analysis: *Earl Gose, Richard Johnsonbaugh & Steve Jost, PHI*

2) Image Processing Analysis and Machine Vision: *Millan Sonka, Vaclav Hiavac, Roger Boyle, Vikas publishing house.*

Reference Books:

Vision: A Computational Investigation Into the Human Representation and Processing of Visual Information

1) : David Marr

2) Pattern Recognition Principles: *Julus T. Tou and Rafel C. Gonzalez, Addision, Wiley publishing company.*

3) Digital Image Processing: *Rafel C. Gonzalez, Richard E. Woods, 2nd edition, Pearson Education*

Syllabus for Semester VII, B. E. (Electronics and Communication Engineering)

Course Code: ECT405 – 2 **Course: Advanced Microprocessor**

(Departmental Elective – II)

L: 4 Hrs, T: 0 Hr, P: 0 Hrs. Per week **Total Credits: 08**

Course outcomes

On completion of this course students will be able:

1. To understand 8086 Architecture and its available resources such as instruction set, flags and register structure.
2. To develop the logic of assembly language program for Microprocessor based systems.
3. To handle hardware and software interrupts.
4. To understand interfacing of memory and I/O ports with LED Displays, Keyboards, ADCs, DACs and stepper motors.
5. To perform complex mathematical operations with math coprocessor 8087.

Unit – I

Introduction to 16 bit processors 8086/8088, CPU architectures, Register set, flags, Memory organization, Signal Descriptions, Minimum mode system & memory Read /Write cycles comparison of 8086/8088.

Unit – II

Addressing modes, Instruction formats & data types, Instruction set, pseudo operations, assembler directives, Assembly language programming (MASM/TASM support), Interrupts, operation of stack & block diagram.

Unit – III

Interfacing Memory with 8086/8088, Interfacing 8255 as 8 bit & 16 bit ports, Interfacing & programming of 8259 Programmable interrupt controller (PIC) and 8279 Keyboard and display controller (KBDC).

Unit – IV

8086/8088, Maximum mode system, memory read write cycles, 8087 Co-processor Interfacing and programming

Unit – V

80386 architecture, real and Virtual memory ,protected mode, flags of 80386,scale addressing mode, virtual 8086 mode, paging ,task switching, Architecture of Pentium IV

Unit – VI

8275 (CRT Interface), 8272 (Floppy disc controller) Buses USB, RS 232, I2C, PCI concepts of plug n play, Recent Trends/Developments.

Text Books:

1) Advanced Microprocessors & Peripherals: *A. K. Ray, K. M. Bhurchandi, Tata McGraw Hill*
2) Programming & Interfacing of 8086/8088: *D.V. Hall, 2nd edition, TMH*.

Reference Books:

1) Advanced microprocessor & Interfacing: *Badri Ram- Tata McGraw Hill Education*.
2) Advanced Microprocessor: *Daniel Tabak, Tata McGraw Hill Education*.
3) Intel Reference Manuals, Microprocessors & Microcontrollers: *Intel*.
4) Microcontrollers: *Peatman, 2nd edition, Mc Graw Hill*.
5) The 8086 microprocessor: *2nd edition, Ayala*

Syllabus for Semester VII, B. E. (Electronics and Communication Engineering)

Course Code: ECT405 – 3 **Course : Advanced Microcontrollers (Departmental Elective – II)**

L: 4 Hrs, T: 0 Hr, P: 0 Hrs. Per week **Total Credits: 08**

Course Outcomes:

On completion of this course students will be able to:

1. Understand embedded systems using ARM.
2. Develop programs for ARM based embedded system applications.
3. Explore different embedded communication protocols.

Unit – I

Fundamentals of Operating Systems Overview of operating systems, Process and threads, Processes and Programs, Programmer view of processes, OS View of processes, Threads, Scheduling, Process Synchronization, Semaphores, Message Passing, Deadlocks

Unit – II

Introduction to ARM Architecture: RISC overview, Architectural Inheritance, Core & Architectures, Registers, Pipeline, Interrupts, ARM organization, ARM processor family, Co-processors.

Unit – III

Basic ARM Programming And High Level Language Support Instruction set, Thumb instruction set, ARM Assembly Language Programming examples, ARM Development tools, 'C' programming, ARM floating point Architecture, data types, Expressions, Loops, functions, conditional statements.

Unit – IV

Memory Hierarchy Memory Hierarchy, memory size and speed, on-chip memory, caches, cache design, memory management.

Unit – V

Embedded Communication Protocols Embedded Networking: Introduction to Serial/Parallel Communication, Serial communication protocols - RS232 standard and RS485, Synchronous Serial Protocols – Serial Peripheral Interface (SPI) and Inter Integrated Circuits (I2C), PC Parallel port programming - ISA/PCI Bus protocols, J-TAG

Unit – VI

ARM Applications Embedded ARM applications such as USB interface, Bluetooth, Ethernet, GSM, and Recent Trends/Developments.

Text Books:

1) ARM system on chip architecture: *Steve Furber, Addision Wesley, 2nd Edition*
2) Operating Systems A concept based Approach: *Dhananjay M. Dhamdhere, Tata Mcgraw-Hill*

Reference Books/ Links:

1) ARM System Developer's Guide Designing and Optimizing System Software: *Andrew N. Sloss, Dominic Symes, Chris Wright, John Rayfield, Elsevier 2007.*
2) The Insider's Guide To The Philips ARM7 – Based Microcontrollers: *Trevor Martin*
3) ARM Architecture Reference Manual
4) www.arm.com
5) www.nxp.com

Syllabus for Semester VII, B. E. (Electronics and Communication Engineering)

Course Code: ECP406 **Course: Project Phase – I**

L: 0 Hrs, T: 0 Hr, P: 4 Hrs. Per week **Total Credits: 08**

Course Outcomes:

1. Students will be able to apply the Engineering knowledge gained to analyze, formulate and provide solutions to Electronics & communication based Engineering problems.
2. Students will get acquaintance of Simulation Software
3. Leadership and team Spirit will be inculcated
4. Presentations will lead help in overall development of the student providing platform to improve communication skills.

The students will carry out following tasks for Project Phase – I

- Project group Formation, as per rules
- Literature Survey, as per Allocated Guide's Directions
- Project Short listing
- Application & Feasibility check of short listed projects
- Project Finalization
- Planning for Project Implementation
- Conceptual Study , Block Schematic of the Project, Software study
- First Stage Implementations or Modeling or Simulations for the Project
- Presentation and Seminar Report writing based on all above work to expert panel

VIII SEMESTER

Syllabus for Semester VIII, B. E. (Electronics and Communication Engineering)

Course Code: ECT407 **Course: Wireless Communication**

L: 3 Hrs, T: 1 Hr, P: 0 Hrs. Per week **Total Credits: 07**

Course Outcomes:

On completion of this course students will be able to understand:

1. The Concepts in Cellular Communication.
2. GSM & CDMA system.
3. Diversity and equalization Techniques, Modulation Techniques and Channel Coding in Mobile Communication.
4. Cognitive Communication and Cognitive Radio System
5. Students will develop self confidence and will be motivated to learn the methods to further simulate modify and build innovative Wireless Communication systems.

Prerequisites – Statistical Signal Analysis, Fundamentals of Communication Engineering, Digital Communication

Unit – I

The Cellular Concepts: Architecture of mobile communication systems, call processing, cellular concepts, Frequency reuse, channel assignment, Hand of strategies interference & system capacity, improving grade of service & capacity in cellular systems.

Unit – II

Equalization, diversity and Modulation Techniques: fundamentals of equalization, space polarization, frequency and time diversity techniques, Pilot SSB Modulation, QAM, OQPSK, $\pi/4$ QPSK, GMSK

Unit – III

Channel Coding in Mobile Communications: Evolution & Introduction of Turbo Encoding, Low Density Parity Check Codes and Reed Solomon Codes, Encoding & decoding in Turbo Codes, Introduction to concatenated coding techniques

Unit – IV

Multiple access techniques: Introduction to Narrow band: FDMA, TDMA, Space Division Multiple access – SDMA, wideband: FHMA, CDMA and other hybrid techniques.

Unit – V

GSM- global system for mobile: services, features, architecture, GSM radio subsystem, GSM channel types, frame structure, signal processing and call setup in GSM, and introduction to CDMA

Unit VI

Introduction to Cognitive Communication: Concept of Bandwidth Underutilization, Dynamic Spectrum Allocation, Introduction to Cognitive Radio and Software Defined Radio, Various Approaches, Various Types of CR, Basic Functions in CR, Benefits & Challenges, Recent Trends/ Developments.

Text Books:

1) Wireless Communication – Principles and practice: *T S. Rappaport, Prentice Hall PTR, upper saddle river, New Jersey, 2nd edition, 2007*
2) Mobile Communications – Design fundamentals: *William C. Y. Lee, John Willey, 2nd Edition, 2010*

Reference Books:

1) Wireless digital communication: *Kamilo Feher, Prentice Hall*
2) Mobile Cellular Communication: *W. C. Y. Lee, Mc Graw Hill*
3) The Mobile Radio Propagation channel: *J.D. Parson, Wiley, 2nd edition*
4) Error Control coding for Performance Improvement – Meeting Challenges in Cognitive Radio: *Rajeshree Raut, Verlag Academia, August 2012*.

Syllabus for Semester VIII, B. E. (Electronics and Communication Engineering)

Course Code: ECT408 **Course: Microwave Engineering**

L: 4 Hrs, T: 1 Hr, P: 0 Hrs. Per week **Total Credits: 09**

Course Outcomes:

On Completion of this course students will be able:

1. To identify different communication band in spectrum and limitation of conventional devices at ultra high frequency.
2. To understand role of semiconductor and the semiconductor devices at UHF and microwave frequencies.
3. To analyze active and passive microwave devices.
4. To analyze the wave transmission and reflection characteristics with the help of scattering matrix.
5. To understand basic radar systems and its different blocks.
6. To distinguish between radar systems and make decisions for selection of radar systems as needed.

Prerequisites- Electromagnetic Fields, Waves and Radiating Systems

Unit – I

Microwave Liner beam tubes: Importance of UHF & Microwave frequency range, Causes of failure of conventional tubes at high frequency, two cavity klystron amplifier, Reflex klystron oscillator, slow wave structure, traveling wave tube

Unit – II

Microwave cross field tubes: Magnetron: cylindrical magnetron, parallel plate magnetron, voltage tunable magnetron, Forward wave cross field amplifier, backward wave oscillator.

Microwave solid state devices: Gunn Diode, Modes of operation of Gunn, Basics of Avalanche Transit Time Devices

Unit – III

Microwave components & Scattering matrices: Scattering matrices of transmission lines, microwave junction and tees, Attenuators, Tees, Directional couplers, Circulators, Isolators, Gyrators, Phase shifter, Cavity resonator, Transmission line resonator.

Unit – IV

Microwave measurement: Microwave power measurement, Frequency measurement, VSWR measurement, Attenuation measurement, Impedance and Q factor measurement.

Unit – V

Applications of Microwave Engineering – Radar block diagram, Radar range equation, CW & FM Modulated radar, MTI & Pulse Doppler Radar, Tracking Radar

Unit – VI

RADAR Receivers – RADAR antennas, parabolic reflector, scanning filed reflector, Lens antennas, Displays & Duplexers, Detection of RADAR signals in noise, RADAR clutters, Recent Trends/Developments.

Text Books:

1) Microwave device and circuits: *Samuel Y.Lio, 3rd Edition, PHI*
2) Introduction of radar systems: *Skolilik, McGrawhill*

Reference books:

1) Antenna Theory and Practice: *R. Chatterjee, 2nd edition, WEL*
2) Foundations of microwave engineering: *R. E. Collins, 2nd edition, Wiley*.
3) Microwave communication: *E. Hund, McGraw Hill*
4) Microwave theory and measurement: *G. Lance*.
5) Radar Engineering : G. S. N. Raju, *IK International*

Syllabus for Semester VIII, B. E. (Electronics and Communication Engineering)

Course Code: ECP408 **Course: Microwave Engineering Lab**

L: 0 Hrs, T: 0 Hr, P: 2 Hrs. Per week **Total Credits: 02**

Course Outcomes:

On Completion of this laboratory students will be able:

1. To understand basic microwave bench setup using klystron or Gunn diode as power source
2. To analyze working of active and passive microwave devices.
3. To analyze the polar pattern of different Microwave antennas and plot them graphically.
4. To design and analyze the Microstrip lines used in high frequency integrated circuits.

Experiments based on:

- Study of Basic Microwave bench setup
- Study of passive and active microwave components
- Study of antenna and their radiation pattern
- Design and analysis of Microstrip lines

Syllabus for Semester VIII, B.E. (Electronics and Communication Engineering)

Course Code: ECT409 – 1 **Course: Optical and Satellite Communication (Departmental Elective – III)**

L: 4 Hrs, T: 0 Hr, P: 0 Hrs. Per week **Total Credits: 08**

Course Outcomes:

On completion of this course students will be able to understand:

1. Recent advancements in fiber optics, its working principle and its applications.
2. Splicing techniques, couplers, connectors and losses in OFC systems.
3. The principle of operation of optical sources and detectors and its parameter consideration while designing particular system.
4. Satellites subsystems & launching.
5. Link designing problems and finding engineering solution.

Unit – I

Principle of optical fiber communication, Advantages and applications, Ray model, Total internal reflection phenomenon, Acceptance angle, acceptance cone, Numerical aperture, Structures and characteristics of various fibers such as step index, graded index, Single mode and multi mode fibers, Meridional and skew rays.

Unit – II

Fiber joints, splices and connectors and couplers. Signal degradation in fibers – Attenuation, dispersion, bending losses, scattering losses, Absorption losses, propagation losses.

Unit – III

Optical sources – LED and LASER, Structures and properties, Source launching and coupling.

Photo detector – PIN and Avalanche Photo-detectors, Structures and Properties, Optical receiver.

Unit- IV

Introduction, Origin of satellite communication, Current state of satellite communication, General features, Satellite Frequency bands allocation

Introduction to Keplers laws, Orbital dynamics, Orbital characteristics, Satellite spacing and orbital capacity, Angle of Elevation eclipses, Launching and positioning

Unit V

Satellite construction (Space segment), Attitude and orbit control system, Telemetry, Tracking and command, Power systems, Communication sub-systems, Antenna sub-systems, Satellite transponder, Earth station subsystems, different types of earth stations.

Unit- VI

Satellite links: Introduction to general link design equation, System noise temperature, Satellite uplink & downlink design and analysis.

Text Books:

1) Optical fiber communication, principles and practice: *John M. Senior, PHI*
2) Optical fiber communication: *B. Keiser, Tata Mc-Graw Hill*
3) Satellite Communication: *T. Pratt*
4) Satellite Communication: *Dennis Roddy*

Reference Books

1) Optical communication system: *J. Gower, PHI.*
2) Optical Fiber System : *Kao, Tata Mc Graw Hill*
3) Satellite communication Systems – Design Principles: *M. Richaria,*
4) Satellite communication Systems engineering: *Wilbur L. Pritchars, Henri G Suyder and Robert A. Nelson, Pearson Education Ltd*

Syllabus for Semester VIII, B. E. (Electronics and Communication Engineering)

Course Code: ECT409 – 2 **Course: CMOS VLSI Design**

(Departmental Elective – III)

L: 4 Hrs, T: 0 Hr, P: 0 Hrs. Per week **Total Credits: 08**

Course Outcomes:

On completion of this course students will be able to:

1. Understand basic fabrication processes of VLSI design.
2. Design NMOS, PMOS & CMOS transistors.
3. Analyze working of MOS transistors in DC fields.
4. Design basic CMOS logic gates.
5. Design basic combinational circuits such as adders, MUX, DMUX etc. using CMOS technology.
6. Design basic sequential circuits such as latches, flip flops etc. using CMOS technology.
7. Understand working of some analog components of CMOSVLSI such as current mirrors, single stage amplifiers etc.

Prerequisites – Physics, Electronic Devices, Electronic Circuits, Analog Circuits

Unit – I

VLSI Design Flow, Basic MOS transistors, MOS transistor as Switches, Introduction to MOS transistor theory, MOS system under external bias, Drain Current Equations, saturated and non saturated region, V_{ds} Vs I_{ds} relationship, MOS scaling and small geometry effects, MOS Capacitances, MOS Small Signal Model

Unit – II

MOS Inverter: Design of MOS Inverter, Inverter with MOS load, CMOS Inverter, Static and dynamic characteristics, Noise margin, Delay Constraints, Static load MOS Inverters, Tristate Inverter, BiCMOS Inverter, Transmission Gate.

Unit – III

CMOS Processing technology: An Overview, CMOS fabrication, P well, N well & twin tub processes, CMOS process enhancements, Circuit elements: Resistor, capacitor, BJT, Layout Design Rules, Latch-Up & its prevention techniques.

UNIT – IV

CMOS logic structures: Transistor sizing, fan In, Fan out, Physical design of Simple logic gates, Stick diagrams, CMOS Complementary Logic, Bi CMOS Logic, Pseudo-nMOS Logic, Dynamic CMOS Logic, Clocked CMOS Logic, Pass Transistor Logic, CMOS Domino Logic, Cascaded Voltage Switch Logic (CVSL), Introduction to clocking strategies and clock distribution.

Unit – V

Combinational MOS Logic Circuits: Introduction, MOS Logic Circuits With Depletion NMOS Loads, Complex Logic Circuits, CMOS Transmission Gates (Tgs), MUX, DMUX.

Sequential MOS Logic Circuits: Introduction, Behaviour Of Bistable Elements, The SR Latch Circuit, Clocked Latch & Flip-Flop Circuit, CMOS D-Latch & Edge-Triggered Flip-Flop

Unit – VI

CMOS Analog Design: Introduction, Single stage Amplifier- CS, CG stage & Source follower, Differential Amplifier – Basic Differential Pair & Differential Pair with MOS Load, Current mirrors- Basic and Cascode Configuration, Recent Trends/Developments.

Text books:

1) Principles of CMOS VLSI Design – A Systems Perspective: *Neil H. Weste and K. Eshragian, 2nd edition, Pearson Education (Asia) Pvt. Ltd., 2000.*
2) CMOS Digital Integrated Circuits – Analysis and Design: *Sung-Mo Kang & Yusuf Leblebici, 3rd Edition, Tata McGraw-Hill*

Reference books:

1) Basic VLSI Design: *Douglas A. Pucknell & Kamran Eshraghian, PHI 3rd Edition*
2) Fundamentals of Semiconductor Devices: *M. K. Achuthan and K. N. Bhat, TMH*
3) Analysis and Design of Digital Integrated Circuits: *D.A Hodges, H.G Jackson and R.A Saleh, 3rd Edition, Tata McGraw-Hill*
4) Design of Analog CMOS Integrated Circuits: *Behzad Razavi, Tata McGraw-Hill*

Syllabus for Semester VIII, B. E. (Electronics and Communication Engineering)

Course Code: ECT410 – 1 **Course: Digital Image Processing (Departmental Elective – IV)**

L: 4 Hrs, T: 0 Hr, P: 0 Hrs. Per week **Total Credits: 08**

Course Outcomes

On completion of this course students will be able:

1. To acquire the fundamental concepts of digital image processing.
2. To analyze 2D signals in frequency domain.
3. To perform various digital image processing operations such as histogram equalization, enhancement, restoration, filtering and de-noising.

Unit – I

Digital image representation, elements of digital image processing systems, Sampling and quantization, simple image model, basic relationships between pixels and image geometry.

Unit – II

Image transforms – introduction to Fourier transform, DFT, properties of 2 dimensional DFT, FFT, other separable image transforms – DCT, DST, Walsh, Haar transforms.

Unit – III

Image enhancement – basic gray level transforms, Histogram processing enhancement using arithmetic/logic operations, spatial filtering, smoothing and sharpening filters, smoothing frequency domain filters, sharpening frequency domain filters.

Unit – IV

Image compression – fundamentals, image compression standards – JPEG, MPEG and Wavelet Compression. Information theory, error free compression, lossy compression, image compression standards.

Unit – V

Image segmentation – Detection of discontinuities, Edge linking and boundary detection, thresholding region based segmentation.

Unit – VI

Representation and description – Representation, boundary descriptors, Regional descriptors, Introduction and comparison of Wavelet transform, Ridgelet transform and Curvelet transform, Recent Trends/Developments.

Text Books:

1) Digital image processing: *Rafel C. Gonzalez and Richard E. Woods, Addition-wisely*
2) Fundamental of digital image processing: *Anil K. Jain, PHI*

Reference Books:

1) Image Processing, Analysis and Machine Vision: *Milan Sonka, Vaclav Hlavac and Roger Boyle.*
2) Digital picture processing: *Rosenfeld A.C. Kak, academic press inc 1976.*
3) Computer image processing and recognition: *Hall E.L., academic press inc 1979.*
4) Picture processing and digital filtering: *Huang T.S., Springer Verlag, Berlin Heidelberg.*

Syllabus for Semester VIII, B. E. (Electronics and Communication Engineering)

Course Code: ECT410 – 2 **Course: RF Circuit Design**
(Departmental Elective – IV)

L: 4 Hrs, T: 0 Hr, P: 0 Hrs. Per week **Total Credits: 08**

Course Outcomes:

On completion of this course students will be able to understand:

1. Circuit design, Dimensions and units in RF frequency spectrum.
2. Design and dimensions of Microstrip Transmission Lines
3. Analysis of Reflection coefficient, Impedance parameters using smith chart
4. Filter Implementation in radio frequency domain.
5. Semiconductor devices for very high frequency
6. Modelling of Active RF Component

Prerequisites – Electromagnetic Fields , Waves and Radiating Systems

Unit – I

Importance of radio frequency design, frequency spectrum, RF behavior of passive components: High frequency resistors, capacitors & inductors, Chip components and Circuit board considerations: Chip resistors, chip capacitors, surface mounted inductors, Examples of transmission Lines – 2 wire lines, Coaxial lines and Microstrip lines

Unit – II

The Smith Chart- Reflection coefficient in Phasor form, Normalized Impedance equation, Parametric reflection coefficient equation, graphical representation, Impedance transformation for general load, Standing wave ratio, Special transformation conditions, Admittance Transformations: Parametric admittance equation, Additional graphical displays, Parallel and series Connections: Parallel connections of R and L connections, Parallel connections of R and C connections, Series connections of R and L connections, Series connections of R and C connections, Example of a T Network.

Unit – III

RF Filter Design: Filter types and parameters, Low pass filter, High pass filter, Bandpass and bandstop filter, Insertion Loss, Special Filter Realizations: Butterworth type filter, Chebyshev type filters, Denormalization of standard low pass design, Filter Implementation: Unit Elements, Kuroda's Identities and Examples of Microstrip Filter Design, Coupled Filters: Odd and Even Mode Excitation, Bandpass Filter Design, Cascading bandpass filter elements, Design examples.

Unit – IV

Active RF Component Modeling: Transistor Models: Large-signal BJT Models, Small-signal BJT Models, Large-signal FET Models, Small-signal FET Models, Measurement of Active Devices: DC Characterization of Bipolar Transistors, Measurements of AC parameters of Bipolar Transistors, Measurement of Field Effect Bipolar Transistors Transistor Parameters, Scattering Parameter Device Characterization.

Unit – V

Matching and Biasing Networks – Impedance matching using discrete components: Two Component Matching Network, Microstrip lines Matching Network: From discrete component to Microstrip line, Stub Matching Networks, Amplifier classes of operation and biasing networks.

Unit – VI

RF transistor amplifier design: Amplifier Characteristics, Power relations, Stability considerations: stability circles, Unconditional stability and stabilization methods, Gain, Noise figure circles, Constant VSWR Circles, Broadband, High power multistage amplifiers, Recent Trends/Developments.

Text Books:

1) RF Circuit Design: *Reinhold Ludwig, Pavel Bretchko, Pearson Education Asia*.
2) Radio Freuency circuit Design: *W.Alan Davis , K K Agarwal, Wiley*

Reference Books:

1) Microwave Engineering: *Pozar, John Wiley*.
2) RF & Microwave Design Essential: *Mathew M. Radmanesh*

Syllabus for Semester VIII, B. E. (Electronics and Communication Engineering)

Course Code: ECP411 **Course: Communication and Networking Lab**

L: 0 Hrs, T: 0 Hr, P: 2 Hrs. Per week **Total Credits: 02**

Course Outcomes:

On completion of this Laboratory students will be able:

1. To understand the working of Optical Fiber Communication System with the help of OFC trainer kit.
2. To know wireless data transmission using Bluetooth trainer.
3. To measure fiber attenuation, dispersion, Refractive index profile in an OFC system.
4. To understand GSM and GPRS communication system.
5. To know the working of various topologies using LAN trainer.
6. To know the working principle of ISDN.

Practical exercises based on:

- Working of Optical Fiber Communication System with the help of OFC trainer kit.
- Analog and Digital optical communication system.
- Losses in an OFC system such as bending loss, scattering loss etc.
- Measurement of fiber attenuation, dispersion, Refractive index profile in an OFC system.
- Working of various topologies using LAN trainer.
- Working principle of ISDN.
- Simulation using network simulator.
- Wireless data transmission using Bluetooth trainer.
- GSM and GPRS communication system.
- GPS
- Simulation using COMMSIM software package
- Study of various Antennas for their radiation pattern using Antenna Trainer.
- Study of EM Radiation and its polarization using ANSYS – HFSS Package.
- Study of Satellite Communication Trainer
- Study of WiCOMM Trainer
- Study of CDMA/DSS Trainer

Syllabus for Semester VIII, B. E. (Electronics and Communication Engineering)

Course Code: ECP412 **Course: Project Phase – II**

L: 0 Hrs, T: 0 Hr, P: 4 Hrs. Per week **Total Credits: 08**

Course Outcomes:

1. Students will be able to apply the Engineering knowledge gained to analyze, formulate and provide solutions to Electronics & communication based Engineering problems.
2. Students will get acquaintance of Simulation Software
3. Leadership and team Spirit will be inculcated
4. Presentations will lead help in overall development of the student providing platform to improve communication skills.

The students will carry out following tasks for Project Phase – II

- Complete Implementation of the Project
- Validation Testing
- Application Testing
- Analysis & Measurements as per requirements
- Demonstration of the Project to expert panel
- Project Report writing