SYLLABUS

FOR

B.TECH. PROGRAMME

IN

ELECTRONICS

&

COMMUNICATION ENGINEERING

INSTITUTE OF TECHNOLOGY
ZAKURA CAMPUS
UNIVERSITY OF KASHMIR
SRINAGAR
J&K
190006

Course Layout

1st Semester

Course No	Subject	Teaching Periods per week			Credits
		Lect	*Tut*	*Prac*	
MTH-1117	**Engineering Mathematics-I**	3	1	0	4
PHY-1217	**Engineering Physics**	2	1	0	3
ELE-1317	**Basic Electrical Engineering**	2	1	0	3
CSE-1417	**Introduction to Computing**	2	1	0	3
HUM-1517	**Communication Skills**	2	0	0	2
MEE-1617	**Engineering Graphics & Drawing**	1	3	0	4
PHY-1217L	**Engineering Physics Lab**	0	0	4	2
ELE-1317L	**Basic Electrical Engineering Lab**	0	0	4	2
CSE-1417L	**Introduction to Computing Lab**	0	0	4	2
	Total	**12**	**7**	**12**	**25**

2nd Semester

Course No	Subject	Teaching Periods per week			Credits
		Lect	*Tut*	*Prac*	
MTH-2117	**Engineering Mathematics-II**	2	1	0	3
CHM-2217	**Engineering Chemistry**	2	1	0	3
ECE-2317	**Basic Electronics Engineering**	2	1	0	3
CSE-2417	**Computer Programming**	2	1	0	3
MEE-2517	**Engineering Mechanics**	2	1	0	3
CHM-2217L	**Engineering Chemistry Lab**	0	0	4	2
CSE-2417L	**Computer Programming Lab**	0	0	4	2
ECE- 2317L	**Electronics Engineering-Lab**	0	0	4	2
MEE-2617W	**Workshop Practice**	0	0	8	4
	Total	**10**	**5**	**20**	**25**

3rd Semester

Course No	*Subject*	*Teaching Periods*			*Credits*
		Lect	*Tut*	*Prac*	
MTH3117	**Engineering Mathematics-III**	2	1	0	3
ECE3217	**Network Analysis and Synthesis**	3	1	0	4
ECE3317	**Analog Electronic Circuits-I**	2	1	0	3
ECE3417	**Signals and Systems**	3	1	0	4
ECE3517	**Digital Electronics and Logic Design**	2	1	0	3
ECE3617	**Material Science Engineering**	3	1	0	4
ECE3217L	**Network Analysis and Synthesis Lab**	0	0	2	1
ECE3317L	**Analog Electronic Circuits Lab – I**	0	0	2	1
ECE3717L	**EDA Tools Lab**	0	0	2	1
ECE3517L	**Digital Electronics Lab**	0	0	2	1
	Total	15	6	8	25

4th Semester

Course No	*Subject*	*Teaching Periods*			*Credits*
		Lect	*Tut*	*Prac*	
MTH4117	**Engineering Mathematics – IV**	2	1	0	3
ECE4217	**Analog Electronic Circuits-II**	3	1	0	4
ECE4317	**Control Systems**	3	1	0	4
ECE4417	**Communication Systems- I**	3	1	0	4
ECE4517	**Electromagnetic Fields and Waves**	2	1	0	3
ECE4617	**Microprocessors**	2	1	0	3
ECE4617L	**Microprocessors Lab**	0	0	2	1
ECE4417L	**Communication Systems-I / EMF Lab**	0	0	2	1
ECE4317L	**Control Systems Lab**	0	0	2	1
ECE4217L	**Analog Electronics Circuits - II Lab**	0	0	2	1
	Total	15	6	8	25

5th Semester

Course No	Subject	Teaching Periods			Credits
		Lect	Tut	Prac	
ECE5117	Digital Signal Processing	2	1	0	3
ECE5217	Electronic Instrumentation and PLC	3	1	0	4
ECE5317	Microcontrollers and Embedded Systems	2	1	0	3
ECE5417	Digital Communication and Information Theory	2	1	0	3
ECE5517	Solid State Devices	3	1	0	4
ECE5617	Electrical Machines	3	1	0	4
ECE5617L	Electrical Machines Lab	0	0	2	1
ECE5217L	Electronic Instrumentation and PLC Lab	0	0	2	1
ECE5317L	Microcontrollers and Embedded Systems Lab	0	0	2	1
ECE5117L	DSP Lab	0	0	2	1
	Total	15	6	8	25

6th Semester

Course No	*Subject*	*Teaching Periods*			Credits
		Lect	*Tut*	*Prac*	
ECE6117	**Communication Systems - II**	2	1	0	3
MTH6217	**Engineering Mathematics-V**	3	1	0	4
ECE6317	**Computer Organization and Architecture**	3	1	0	4
ECE6417	**VLSI Design**	2	1	0	3
CSE6517	**Data Structures**	3	1	0	4
ECE6617	**Power Electronics**	2	1	0	3
CSE6517L	**Data Structures Lab**	0	0	2	1
ECE6117L	**Communication Systems Lab**	0	0	2	1
ECE6617L	**Power Electronics Lab**	0	0	2	1
ECE-6417L	**VLSI Design Lab**	0	0	2	1
	Total	15	6	8	25

7th Semester

Course No	*Subject*	*Teaching Periods*			**Credits**
		Lect	*Tut*	*Prac./ Proj.*	
ECE7117	**Optical Fiber Communication**	3	1	0	4
ECE7217	**Data Communication**	2	1	0	3
HUM7317	**Industrial Organization and Management**	2	1	0	3
ECE7417	**Microwave & RADAR Engineering**	3	1	0	4
ECE7517	**Power Systems**	2	1	0	3
ECE7**17E	**Elective – I**	3	1	0	4
ECE7217L	**Data Communication & microwave lab**	0	0	2	1
ECE7117L	**OFC Lab**	0	0	2	1
ECE7517L	**Power Systems Lab**	0	0	2	1
ECE7617	**Seminar & Pre-project**	0	0	2	1
	Total	15	6	8	25

8th Semester

Course No	*Subject*	*Teaching Periods*			*Credits*
		Lect	*Tut*	*Prac./ Proj.*	
ECE8117	**Wireless and Mobile Communication**	3	1	0	4
ECE8**17E	**Elective II**	3	1	0	4
ECE8**17E	**Elective III**	3	1	0	4
ECE8**17EL	**Elective III Lab**	0	0	2	1
ECE8117L	**Wireless and Mobile Communication Lab**	0	0	2	1
ECE8217	**Project**	-	-	14	7
ECE8317	**Practical Training Viva/Professional Viva**	-	-	0	4
	Total	9	3	18	25

List of Electives ECE-X**17E X=7 or 8

01.	Advanced Computer Networks
02.	Advanced Control Systems
03.	Advanced Power Electronics
04.	Analog and Mixed Signal Design
05.	Nanotechnology & Nano-electronics
06.	RF Design
07.	Quantum Devices and Computing
08.	TV Engineering
09.	Radar Systems
10.	System Design
11.	MM Wave Communication
12.	Molecular Electronics
13.	Theory of Computation
14.	Compiler Design
15.	RISC Architecture
16.	Systems Programming
17.	Telemedicine
18.	Java Programming & Web Tech.
19.	GIS & Remote Sensing
20.	Mobile Computing
21.	Distributed computing
22.	High Speed Networks Client Server
23.	Computer Vision & Robotics
24.	Real Time Systems
25.	H.R. Management
26.	Managerial Economics
27.	Enterprise network Management
28.	E-commerce Strategic IT Management
29.	Enterprise Resource Management
30.	Technology Management
31.	Decision support & Executive Management
32.	Software Technology
33.	DSP Core
34.	Digital Image Processing
35.	Optical Communications
36.	VLSI Technology
37.	Molecular Electronics
38.	Computer & Network Security
39.	Software Technology

40.	Telemedicine
41.	Real Time operating systems
42.	Compiler Design
43.	Virtual Instrumentation
44.	Advanced Instrumentation Technologies
45.	Biomedical Instrumentation
46.	Wireless Sensor Networks
47.	Internet of Things (IOT)
48.	Artificial Intelligence and Machine Learning

DETAILED SYLLABUS

SEMESTER – 1

Course No:
MTH-1117

ENGINEERING MATHEMATICS-I

Calculus: Differential calculus of functions of several variables, Partial differentiation, Homogeneous functions and Euler‟s theorem, Taylor‟s and Maclaurin‟s series, Taylor‟s theorem and mean value theorem for functions of two variables, Errors and approximations.

Applications of Differential Calculus: Maxima and minima of several variables, Lagrange‟s method of multipliers for maxima and minima, Curvature of cartesian curves, Curvature of parametric & polar curves. Applications of Definite Integrals: Application of definite integrals to area, arc length, surface area and volume, Double integrals, Triple integrals.

Vector Calculus: Scalar and vector fields, differentiation of vectors, Velocity and acceleration,Vector differential operator, Del, Gradient and Divergence, Physical interpretation of the above operators, Line, surface and volume integrals.Application of Vector Calculus: Flux, solenoidal and irrotational vectors, Gauss divergence theorem, Green‟s theorem in plane, Stoke‟s theorem, Applications to electromagnetics and fluid mechanics.

Books Recommended

1. Kreyszig E, “Advanced Engineering Mathematics”, 8th Ed., John Wiley, Singapore (2001).
2. Jain, R K and Iyengar S R K, “Advanced Engineering Mathematics”, 2nd Ed., Narosa Publishing House, New Delhi (2003).
3. Das & Mukherjee, “Differential Calculus”, U.N. Dhur & Sons Pvt. Ltd.
4. Das & Mukherjee, “Integral Calculus”, U.N. Dhur & Sons Pvt. Ltd.

Course No

PHY-1217

ENGINEERING PHYSICS

Vectors and Electrostatics: Work and energy in electrostatics; dielectrics, Polarization, electric displacement, Susceptibility & permittivity, Clausius Mossotti equation. Transformation of vectors. Spherical and cylindrical coordinates system, Gradient of a scalar, Divergence and curl of a vector, Gauss's law and its applications, Electric potential and electric field (in vector form), Potential due to a monopole, Dipole and multipoles (multipole expansion **Magneto-statics**: Lorentz Force Law; magnetic field of a steady current (Biot-Savart law), Ampere"s law and its applications, Ampere"s law in magnetized materials.

Electrodynamics Electromotive force, Faraday"s law, Maxwell"s Equations, Wave Equation. Poynting Vector, Poynting Theorm (Statement only), Propagation of EM-Wave in conducting and non-conducting media. Interference due to division of wave front and division of amplitude. Young's double slit experiment **Interference and Diffraction**: Interference and principle of superposition. Theory of biprism, Interferences from parallel thin film, wedge shaped films, Newton's rings, Michelson Interferometer. Fresnel's Diffraction, Diffraction at straight edges, Fraunhoffer diffraction due to N-Slits, Diffraction grating, dispersive power of grating, resolving power of prism and grating.

Theory of Relativity: Invariance of an equation and concept of ether, Michelson Morley experiment, Einstein's postulates and Lorentz transformation equations, length, time and simultaneity in relativity, addition of velocity, variation of mass with velocity, mass-energy relation, energy-momentum relation. **Quantum Theory**: The Compton effect, matter waves; group and phase velocities, Uncertainty principle and its application; time independent and time dependent, Schrodinger wave equation, Eigen values and Eigen functions, Born"s interpretation and normalization of wave function, orthogonal wave functions, applications of Schrodinger wave equation (particle in a box and harmonic oscillator).

Text Books:

1. Griffiths D, "Introduction to Electrodynamics", 2nd Ed., Prentice Hall of India, New Delhi (1998).
2. Beiser, "Perspective of Modern physics" 5th Ed., McGraw-Hill Ltd., NewDelhi (2002).
3. Arya A P "Elementary Modern Physics" Addison-Wesley, Singapore
4. Mani,H S and Mehta G K "Introduction to Modern Physics", Affiliated East West Press, New Delhi.

Course No: ELE-1317

BASIC ELECTRICAL ENGINEERING

The Circuit Abstraction:
The power of abstraction, The lumped Matter Discipline, The lumped circuit abstraction, Review of basic electrical Signals, Review of electric circuit concepts, Terminology, Electric circuit parameters (Resistance, Conductance, Inductance, Capacitance, Reactance, Impedance), Ideal and practical voltage and current sources and their transformation, Dependent Sources, Power and energy relations, **Batteries:** Basic voltage and current considerations, types of rechargeable and non-rechargeable batteries, Series & Parallel connected Cells, internal resistance of batteries, constant voltage and current sources. **Resistors:** color coding, Types, circuit model, Variable Resistor Types, potentiometers and rheostats, Power Rating, **Ohm's law**: validity of ohms law, Ohmic and non Ohmic conductors, applications of ohms law.

D.C. Circuit Analysis:
Basic electric circuit terminology: Nodes, Junctions, Paths, Loops, Branches, Series and Parallel combinations of resistance, Voltage and current Dividers, Kirchhoff's current law (KCL) and Kirchhoff's voltage law (KVL). Analysis of series parallel D.C. Circuits, **Loop and Nodal methods:** Nodal analysis, Mesh analysis, Super node, Super mesh, Delta-Star(Y) Transformation, Super-position theorem, Thevenin's and Norton's theorems, Maximum power transfer theorem, Reciprocity & Millman's theorem.

A.C. Circuit analysis:
Alternating Voltage & Current: (Signal, Parameters, Generation, Applications, non-sinusoidal A.C.'s, EMF Equations, Mean, Average, RMS, Peak, Form Factor).**Capacitors:** Types, Coding, Charging & Discharging, Capacitive Reactance, Capacitors in series and parallels, Capacitive Circuits. **Inductors:** Types, Self Inductance, Mutual Inductance, Inductors in series & Parallels, Inductive Reactance, Inductive Circuits, A.C. power Generation & Transmission, Single and three phase A.C. systems.

Text Books:
1.Annant Aggarwal and Jeffery D Lang, **"**Foundations of analog and Digital electronic circuits"Elsevier.
2. W H Hayt J E Kemmerly S M Durbin "Engineering Circuit Analysis", Tata McGraw Hill
3. Del Torro, "Electrical Engineering Fundamentals", 2nd Edition, Prentice Hall of India Pvt. Ltd., New Delhi (1994).
4. B.C. Theraja, "Principles of Electrical Engineering."
5. Kothari D P and Nagrath I J, "Basic Electrical Engineering", Tata McGraw Hill, New
6. Fundamentals of Electric Circuits, Alexander Sadeker, McGraw- Hill, 3rd Ed.

Course No: CSE-1417

INTRODUCTION TO COMPUTING

Computer Organization
Computer and processor abstraction, Generations of computers, Hardware Organization of Computer, Central Processing unit, Memory, Types of Primary memory, Secondary Storage Devices and their types, Input Devices and their types, Output Devices and their Types. Various types of ports and their specifications and usage., Review of basic digital and analog signals, Binary number system and Digital Arithmetic, Digital coding Schemes, , Microprocessors, Microcontrollers, CPU, GPU. Various applications of computers in Aerospace, Agriculture, Finance, Medical, Media, Industries and Commerce.

Operating Systems and Networking – Computer Software & its various types, Types of system and application softwares. File and directory operations on Windows, DOS and Linux Operating Systems, Use of various tools and utilities in Windows and Linux., Fundamentals of Networking, Internet, and various services offered through the Internet: LAN,PAN, WAN, MAN, SAN, VPN, WWW, INTERNET, INTRANET, Email, Search engines. Introduction to various networking Devices, OSI model, TCP/IP protocol Stack.

Introduction to Programming and Problem Solving – Types of Programming Languages- Machine Level, Assembly level, and High Level language, Algorithms, Flow-charts, Compilation, Assembling, Linking and Loading, Testing and Debugging, Documentation, Algorithms for GCD (Greatest Common Division) of two numbers, Test whether a number is prime or not, Sorting Numbers, Finding Square root & factorial of a number, Generation of Fibonacci sequence, Finding largest number in an array, Evaluation of a Polynomial.

Text Books:

1. P.K. Sinha and P. Sinha, "Foundation of Computers" BPB Publishers.
2. C.V Rajaramn, "Fundamentals of computers" PHI publishers

Course No: HUM-1517
COMMUNICATION SKILLS

Communication: Meaning, its types, significance, process, Channels, barriers to Communication, making communication effective, role in society, Communication model. Discussion Meeting and Telephonic Skills: Group discussion, conducting a meeting, attending telephonic calls, oral presentation and role of audio visual aids. Grammar: Transformation of sentences, words used as different parts of speech one word substation, abbreviations, technical terms etc.

Reading Skills: Process of reading, reading purposes, models, strategies, methodologies, reading activities. **Writing Skills:** Elements of effective writing, writing style, scientific and technical writing. **Listening Skills:** The process of listening, the barrier to listening, the effective listening skills, feedback skills. Speaking Skills: Speech mechanism, organs of speech, production and classification of speech sound, phonetic transcription, the skills of effective speaking, the components of effective talk.

Business Letters: Structure of business letters, language in business letters. Letters of inquiry & their places. Sales Letters, Memorandum, Quotations/tenders, Bank correspondence, Letters of application and appointments, Resume writing, Report Writing, Conducting a Meeting, Minutes of Meeting, Oral Presentation, Group Discussion, CV writing, Purchase order, Job Application Letter.

Text Books:

1. Rodriques M V, "Effective Business Communication", Concept Publishing Company New Delhi, 1992, reprint (2000)
2. Bhattacharya. Indrajit, An Approach to Communication Skills. Dhanpat rai Co., (Pvt.) Ltd. New Delhi
3. Wright, Chrissie, Handbook of Practical Communication Skills. Jaico Publishing House. Mumbai
4. Gartside L, Modern Business Correspondence. Pitman Publishing London
5. Day, Robert A., How to Write and Publish a Scientific Paper. Cambridge University Press Cambridge
6. Gimson A C, "An Introduction to the Pronunciation of English", ELBS. (YP) Bansal, R K and Harrison J B "Spoken English", Orient Longman Hyderabad.

Course No:
MEE-1617

ENGINEERING GRAPHICS & DRAWING

Introduction to Engineering drawing: Equipment and drafting tools, symbols and conventions in drawing. Types of lines and their use, material section representation, introduction to dimensioning. Using any available CAD software to draw simple machine parts and blocks. Use of various fundamental commands to edit a drawing, e.g. erase, copy, mirror offset, array, move, trim. Use of features, extrude, extrude cut and revolve. Projection of points: Projection of points in the first, the second, the third and the fourth quadrant. Projection of lines: Line parallel to both the planes – line parallel to the horizontal plane and perpendicular to the vertical plane, line parallel to HP and inclined to VP, line parallel to HP and inclined to profile plane, line parallel to VP and inclined to PP, line inclined to both the planes.

Projections: projection on horizontal and vertical planes, principal views, different system of projections- symbols-notations. Projection of Planes in first and third quadrant. Projection of solids, projection of solids in first and third quadrant, axis parallel to one and perpendicular to other. Section of solids: definition of sectioning and its purpose, procedure of sectioning, application to few typical examples. Development of surfaces: Purpose of development, parallel line method. Insertion of new planes and drawing necessary features on the plane. Sectioning and obtaining sectioned views, dimensioning 2d drawing and labeling.

Orthographic projections of simple machine parts: Drawing of blocks and machine parts. Isometric projection: Basic principle of isometric projection, Isometric projection of simple machine parts for which orthographic views are given. Introduction to temporary and permanent fasteners, Representation of screw threads and threaded fasteners. Rivets and riveted joints. Welding symbols.Introduction to shaft couplings and bearings: assembly of various components of universal coupling and Oldham's coupling, types of bearings, assembly of various components of bushed bearing and foot step bearing.

Text Books:

1. Gill P S, "*Engineering Graphics and drafting" ,* Katria and Sons, Delhi (2001).
2. Bhat N D, "*Elementary Engineering Drawing-Plane and Solid Geometry*", Chartotar Publishing House, Anand (1988).
3. Naryana K L and Kanaiah P, "*Engineering Graphics*", Tata Mc GrawHill Publishing Company Limited, New Delhi (1992).
4. Luzzadde Warren J, "*Fundamentals of Engineering Drawing*", Prentice Hall of IndiaPrivate Limited, New Delhi (1988).
5. Bertoline G R, Wiebe E N, Miller G L, and Mother J L, "*Technical Graphics Communication*", Irwin McGraw Hill New York (1997).

Course No:
PHY-1217L

ENGINEERING PHYSICS LAB

The students are required to conduct experiments on following practical work:

1. Measurement of Resistance.
2. Measurement of e/m by Helical method.
3. Measurement of Numerical Aperture of Optical Fiber.
4. Determination of Resistivity of a given wire.
5. Determination of Band Gap of a semiconductor.
6. Verify Biot-Savart law.
7. To determine the refractive index of the prism material using spectrometer.
8. To verify the laws of vibrating strings by Melde"s experiments.
9. To determine the wavelength using Fresnsel"s biprism/diffraction grating.
10. To Determine Plank"s Constant.

Course No:
ELE-1317L

BASIC ELECTRICAL ENGINEERING LAB

The students are required to conduct experiments on following practical work:

1. To get familiar with the working knowledge of the following instruments:
   - i. Digital Storage Oscilloscope.
   - ii. Cathode Ray Oscilloscope (CRO).
   - iii. Multimeter (Analog and Digital).
   - iv. Function Generator.
   - v. Power supply.
   - vi. Variac
2. i. To set the power supply in constant current and constant voltage mode, study of current limiting in power supplies, series and parallel combination of power supplies.
   ii. Measurement of various parameters (voltage, frequency,)of a signal on DSO/CRO. Hands on with controls like volts/division, time /division, trigger, Xmag, positioning, time and voltage cursor measurements, saving and recalling of waveforms.
   iii. Measurment of resistance, capacitance, voltage, current, continuity, frequency using bench type/handheld Multimeter.
   iv. Hands on with different controls (frequency,type of waveform, D.C. offset, duty cycle) of function generator.
3. Verification of current and power rating of different wattage Resistors.
4. Verification of deviation of ideal parameters of resistance with increase in frequency.
5. Verification of Ohm"s law for D.C. and A.C. circuits.
6. Verification of KVL and KCL.
7. Verification of Thevenin"s and Norton"s theorem.
8. Verification of Maximum Power Transfer Theorem.
9. Calculation of RMS, peak to peak , average value of an A.C. signal using DSO/CRO.
10. To plot the resonance curve for a series and parallel resonance.
11. Measurement of current, voltages and power in R-L-C series circuit excited by (single phase) AC supply

COURSE NO: CSE-1417L

INTRODUCTION TO COMPUTING LAB

Unit 1: Introduction to computer organization

1. Familiarity with internal Hardware organization of the computer viz. processor, RAM, ROM, Hard disk, CD ROM. Mother board, CPU fan, Buses, etc. Familiarity with various types of I/O ports.

2. **Office Automation Tools**

Ms Excel :

(a)Getting data into Ms Excel.

(b)Manipulating Data in Ms Excel

(c)working with Ms excel functions,formulas and charts.

(d)problem solving using Ms excel

(e)Solving Engineering Problems using Ms Excel

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Unit 2: Operating systems and networking

1 Familiarity with various versions of Windows, Virtual Machines (Virtual Box / VmWare accessing various run commands of windows for faster and tricky access. Familiarity with various flavors of Linux Operating Systems like Ubuntu, Fedora etc. And usage of simple Linux commands. Familiarity with networking devices like switch, hub, POE(Power Over Ethernet), LAN Cable, LAN Connector, Ethernet card.

2. **Office Automation Tools**

Ms Access:

(a)Getting data into Ms Access.

(b)Manipulating Data in Ms Access

(c) Problem solving using Ms excel

(d)Solving Engineering Problems using Ms Excel

Unit 3: Introduction to problem solving

Writing Algorithms and drawing Flow Charts for stated problems

Course No:
MTH- 2117

ENGINEERING MATHEMATICS – II

Ordinary and Linear Differential Equations: Formation of ordinary differential equations, Solution of first order differential equations by separation of variables, Homogeneous equations, Exact differential equations, Equations reducible to exact form by integrating factors, Linear differential equations with constant coefficients, Cauchy"s homogeneous linear equations, Legendre"s linear equations

Partial Differential Equations: Formulation and classification of PDE"s, Solution of first order linear equations, Four standard forms of non-linear equations, Separation of variable method for solution of heat, wave and Laplace equation Matrices: Rank of a matrix, Elementary transformations, Consistency and solutions of a system of linear equations by matrix methods, Eigen values & Eigen vectors, Properties, Cayley-Hamilton"s theorem

Probability: Basic concepts of probability, Types of probability: Marginal, joint and conditional, probability rules: Addition, Multiplication, complement; Probability tree, probability under conditions of statistical independence and dependence , Baye"s Theorm. **Random Variables and Distribution:** Random variables, Probability distribution, Probability density function, Discrete and continuous distributions- Binomial, Poisson, Normal distributions, Measures of central tendency and dispersion, Sampling distribution, standard error,Central limit theorem

Text Books:

1. E. Kreyszig, "Advanced Engineering Mathematics", John Wiley.
2. R. K. Jain & S. R. K. Iyengar, "Advanced Engineering Mathematics", Narosa Publishing House.
3. Frank Ayres, "Matrices", Mc Graw Hills.
4. Malik & Arrora, "Advanced Mathematical Analysis", S. Chand &Co.

Course No:
CHM-2217

ENGINEERING CHEMISTRY

Electrochemistry: Reduction Potentials, Redox stability in water, The diagrammatic presentation of potential data, The effect of complex formation on potentials. Electrolytes and non-electrolyte solutions, Kinds of Electrodes, Concentration Cells, The Lead Storage Cell and Fuel Cell. Laws of Photochemistry, Photo physical processes, Fluorescence and Phosphorescence, Photochemical reactions: photolysis of HI, Photochemical reaction between H2 and Br2, Rotational and Vibrational Spectroscopy-Principles and application to simple molecules, magnetic Resonance **UV-visible spectrophotometry** :- Electronic transitions & electronic spectra, Application to simple systems (Analysis of Fe, Cu, Cr), Bear-lambert's law & its applications. IR spectroscopy – IR spectrum, Application of IR Spectra (Alcohols, Acids, phenols, Concept of Vibrational Spectra.

Environmental Chemistry :- Environmental segments, composition of atmosphere , earth's radiation balance, particles, Ions, & radicals in atmosphere, greenhouse effect, ozone layer in stratosphere –Its significance and consequence of depletion. **Pollution**: - Air Pollution, Natural and man-made pollutants (Cox, NoX, HC, SoX, SpM, Acid rains). Effect of pollutants on human and plant life. Sources and classification of water pollutants (Organic, Inorganic, Sediments, Radioactive materials, heat.)
Water and its treatment: Alkalinity of water, Determination of Alkalinity by using phenolphthalein and methyl orange indicators. Hardness of water, its types, methods of estimation. Treatment of water (Municipal treatment, lime soda process, demineralization by ion exchange process.

Lubricants : - Introduction, surface roughness, concept of friction and wear, lubrication, Mechanism of hydrodynamics, boundary and extreme pressure lubrication. Classification of lubricants, semi-solid & liquid lubricants, blended oils, synthetic lubricants , Lubricating emulsions. Properties of greases, liquid lubricants with special reference to flash point, viscosity and viscosity index. Criteria for selection of lubricants for specific purposes. **Inorganic Systems**: - Transition Metals, fundamental concepts of transition metal complexes, consequences of orbital splitting, color and magnetic properties. Structure and bonding of organo-metallic complexes, the sixteen and eighteen electron rule. Role of trace metals in biological systems, oxygen carrier, electron transfer.

Text Books:

1. Shriver D F and Atkin A W, "Inorganic Chemistry",3rd Ed., ELBS, Oxford Press, Delhi (1999).
2. Castellan G W "Physical Chemistry" 3rd Ed., Narosa (1995).
3. Puri, Sharma & Kalia "Inorganic chemistry" (2012)
4. Puri, Sharma & Pathania "Principles of Physical chemistry" (2012)
5. Skoog D A, and Holles F J, "Principles of Instrumental Analysis", 5th Ed., Hercaurt Asia PTE Ltd., Singapore (2001).
6. Hill J W "Chemistry for changing times" 6th Ed., Macmillan , Canada (1995).
7. J.C.Kuriacose & J. Rajaraman : Chemistry in engineering and technology, Volume I & II (Tata McGraw Hill Publishing Company Ltd. New Delhi)
8. P.C.Jain : Engineering Chemistry, (Dhanpat Rai & Sons, Nai Sarak, New Delhi)

9. C.V.Agrawal – Chemistry Of Engineering materials (Tata Publishing Works, Varanasi)
10. L.A. Munro – Chemistry In engineering (Prentice Hall, New York)

Course:
ECE- 2317
BASIC ELECTRONICS ENGINEERING

Solid State Physics: Energy bands and charge carriers in semiconductors: energy bands- metals- semiconductors and insulators- direct and indirect semiconductors- charge carriers in semiconductors: electrons and holes- intrinsic and extrinsic material- n-material and p-material- carrier concentration: Fermi level- EHPs- temperature dependence- conductivity and mobility- drift and resistance- effect of temperature and doping on mobility, Hall Effect. Diffusion of carriers- derivation of diffusion constant D-Einstein relation- continuity equation- p-n junctions: contact potential- equilibrium Fermi levels- space charge at junctions- current components at a junction: majority and minority carrier currents-

Diodes: volt-ampere characteristics- capacitance of p-n junctions. Diode as circuit element. Half wave- full wave, Rectifiers: Centre Tapped and bridge rectifiers- working- analysis and design- C filter analysis- Zener and avalanche breakdown- Zener diodes: volt-ampere characteristics- regulated power supplies - IC based regulated power supplies. Tunnel diodes: tunneling phenomena- volt-ampere characteristics- Varactor diodes- Photo diodes: detection principle- light emitting diodes- volt-ampere characteristics.

Transistors: Bipolar junction transistors NPN and PNP transistor action- open circuited transistor- biasing in active region- majority and minority carrier distribution- terminal currents- operation- characteristics- Types of Transistor Configurations: - CE, CB and CC configurations. Transistor as Amplifier. Field effect transistors: operation- pinch off and saturation- pinch off voltage- gate control- volt-ampere characteristics. MOSFETS n-channel & p-channel. Depletion and enhancement modes.

Text Books:

1. Solid State Electronic Devices by B. G. Streetman, Prentice Hall of India Ltd, N. Delhi, 5th Edition, 2000.
2. Electronic devices and circuits by R. Boylsted and L. Nashelsky, Prentice Hall Publications, 7th Edition.
3. Electronic devices by Floyd, Pearson Education, 7th Edition, 2008.
4. Electronic Principles: Malvino- Tata Mc Graw Hill.

Course No:
CSE-2417

COMPUTER PROGRAMMING

Introduction to C Language – Brush-up of algorithms and flowcharts. Character set, Variables and Identifiers, Built-in Data Types, Variable Definition, Arithmetic operators and Expressions, Constants and Literals, Simple assignment statement, Basic input/output statement, Simple „C" programs Conditional Statements and Loops -Decision making within a program, Conditions, Relational Operators, Logical Connectives, *if* statement, *if- else* statement, Loops: *while* loop, do while, *for* loop, Nested loops, Infinite loops, S*witch* statement, structured Programming.

A**rrays** - One dimensional arrays: Array manipulation; Searching, Insertion, Deletion of an element from an array; Finding the largest/smallest element in an array; Two dimensional arrays, Addition/Multiplication of two matrices, Functions- Modular programming and functions, Standard Library of C functions, Prototype of a function: Formal parameter list, Return Type, Function call, Block structure, Passing arguments to a Function: call by reference, call by value, Recursive Functions, arrays as function arguments.

Structures and Unions - Structure , nested structure, structures and functions, structures and arrays: arrays of structures, structures containing arrays, unions, **Pointers-** Address operators, pointer type declaration, pointer assignment, pointer initialization, pointer arithmetic, functions and pointers, Arrays and Pointers, pointer arrays. File Processing - Concept of Files, File opening in various modes and closing of a file, Reading from a file, writing onto a file. Introduction to Object Oriented Programming with C++ . Objects and Classes. Object hierarchy. Inheritance, Polymorphism. Introduction to Advanced C/C++ Compilers viz. Ellipse/Netbeans.

Text Book:

1. E. Balaguruswamy, "Programming with ANSI-C"
2. Byron Gottfried "Programming with C"
3. A. Kamthane, "Programming with ANSI & Turbo C"
4. H. Schildt, "C++: The Complete Reference"
5. B. Stroustrup, "The C++ Programming Language"

Course No:
MEE- 2517

ENGINEERING MECHANICS

System of forces: Coplanar concurrent force system, Composition and Resolution of forces, Equilibrium of rigid bodies, Free body diagram, Lami"s Theorem.
Stress and Strain: Concept of Stress and Strain, Simple Stresses, Tensile, Compressive, Shear,Bending and Torsion, Stress-Strain Curves, Elongation of bars, Composite bars, Thermal Stresses, Elastic Constants, Mohr"s Circle

Centre of Gravity and Moment of Inertia: Concept of C.G. and Centroid, Position of Centroid, Theorem of Parallel and Perpendicular Axes, Moment of inertia of simple geometrical figures. Analysis of Framed Structure: Reaction in different types of beams with different end conditions, bending moment and shear stress diagrams. Determination of reactions in members of trusses: a) Analytical Methods b) Graphical Method

Physical Properties of fluids: System, Extensive and intensive properties: specific weight, mass density, specific gravity, viscosity , specific gravity, surface tension and capillarity ,**e**vaporability and vapor pressure**,** Newtonian and Non-Newtonian fluids.
Fluids Statics : Pressure, Hydrostatic law, Pascal" s law, Different types of manometer and other pressure measuring devices, Determination of metacentric height.
Fluid Kinematics and Dynamics: Classification of fluids, Streamline, Streak line and Path lines, Flow rate and continuity equation, Bernoulli's Theorem, Kinetic energy correction factor and momentum correction factor in Bernoulli's equation.

Books Recommended

1. Bhavikatti S S and Rajashekarappa K G, *"Engineering Mechanics",* New Age International, NewDelhi (1998).
2. TimoshenkoS P and Young D H, "*Engineering Mechanics*", McGraw Hill(International) 4/e, New Delhi (1984).
3. Kumar D S, " *Fluid Mechanics",* S.K.Katira and Sons, Delhi (1998).
4. Modi P N and Seth S N, "*Fluid Mechanics",* Standard Book House, New Delhi (1998),
5. Engineering Mechanics by R.S. Khurmi

Course No:
CHM-2217L

ENGINEERING CHEMISTRY LAB

The students are required to conduct experiments on following practical work:

1. To draw the pH-titration curve of strong acid vs. strong base
2. Standardization of KMnO4 using sodium oxalate.
3. Determination of Ferrous iron in Mohr's salt by potassium permanganate.
4. Determination of partition coefficients of iodine between benzene and water.
5. Determination of amount of sodium hydroxide and sodium carbonate in a mixture
6. Determination of total hardness of water by EDTA method.
7. To verify Bear's law for a colored solution and to determine the concentration of a given unknown solution.
8. Synthesis of some polymers like Crazy ball.

Course No:
CSE-2417L

COMPUTER PROGRAMMING LAB

List of Experiments

Note: Experiments and programs to be performed on varied platforms like Linux, Windows, Arduino, Raspberry etc.

1. Program on Control Structures and Decision making statements.
2. Program using Loops.
3. Program using Switch case statements with use of break, continue and goto.
4. Programs on array operations.
5. Programs on matrix operations and manipulations.
6. Programs on modular programming and functions.
7. Programs on recursive functions.
8. Programs on structures and unions.
9. Programs on pointers and their manipulations.
10. Programs on files.

Course No:
ECE-2317L

ELECTRONICS ENGINEERING LAB

1.Characterize various commercial diodes on the basis of voltage and current ratings. Study/simulation of their I-V characteristics using multisim/pspice.,

2. Characterize various commercial Zener diodes on the basis of voltage and current ratings, Study/simulation of I-V characteristics of Zener Diode.

3. Study of I-V characteristics of a Light emitting Diode.Design of current limiting resistors for different input voltages.

4. To assemble/simulate a half wave rectifier using power diodes and LEDs and study their performance

5. To assemble/simulate a center tapped full wave rectifier using power diodes and LEDs and study their performance

6. To assemble/simulate a bridge wave rectifier using power diodes and LEDs and study their performance

7. Study/simulation of diode applications like clippers, clampers, protection circuits.

8. Study of zener diodes as voltage regulators.

9. Design of an IC based Voltage regulator.

10. Study V-I characteristics of transistor (PNP and NPN). Calculate the performance parameters of transistor.

11. Use NPN transistor as an inverter switch.

Course No: MEE- 2617W

WORKSHOP PRACTICE

1. Machining section

(a) Theoretical Instructions:

Safety Precautions, W orking principal of Milling, Shaper, Slotter, Grinding, power hacksaw and other related metal cutting machine. Basic operations of various machines. introduction of various types of cutting tools (Nomenclature).

(b)Practical Demonstrations:

Demonstration of knurling thread cutting, boring etc on lathe machine,
Simple operations on Milling, Shaper, Slotter/planner and grinding machines,
Simple jobs involved all the basic operations on shaper, milling and grinding machines.

Aim: TO PREPARE A CYLINDRICAL JOB ON LATHE FOR MANUFACTURING OF A GEAR ON MILLING MACHINE

2. Sheet Metal and Spray Painting section:-

(a) Theoretical Instructions:

Safety Precautions, Soldering, brazing and shearing, fluxes in use and their applications, study of material used for painting, knowledge of different machines such as shearing, bending, wiring and power presses, method of pattern development in detail, study of air compressor and air guns-its use, care, maintenance and operating instructions. Advantages of spray painting, Knowledge of different sheet metals materials.

(b)Practical Demonstrations:

Exercise in rating, soldering and brazing of making jobs of various materials such as Trays, Flower vases, photo frame etc. preparation of surfaces for painting by using a spray gun with the help of air compressor.

Aim: TO DEVELOP A FUNNEL AS PER THE DRAWING WITH SOLDERING.

3. Fitting and Bench work section:-

(a) Theoretical Instructions:

Safety Precautions, Introduction of common materials using in fitting shop, description and demonstration of various work holding devices such as surface plate and V-block, Introduction and use of measuring tools like Vernier caliper, micro-meter, height gauge, profile projector, surface roughness tester and other gauges.

(b)Practical Demonstrations:

Demonstration of angular cutting, practice of 45^0, preparation of stud to cut external threads with the help of dies, drilling, counter sinking, counter boring and internal thread cutting with taps, pipe cutting practice and thread cutting on G.I pipe with pipe dies. Demonstration of Tap sets and measuring equipments.

Aim: TO ASSEMBLE THE MILD STEEL WORK PIECES WITH RADIUS FITTING.

4. Welding Section:-

(a) Theoretical Instructions:

Safety Precautions, Introduction of all welding processes like Gas welding, MIG W elding, TIG welding, Submerged arc welding and spot welding, Advantages and disadvantages over electric arc welding and their applications. W elding techniques like right ward, left ward and over head, various fluxes and electrodes used in welding. Difference between AC and DC welding. Characteristics, size and class of electrodes.

(b) Practical Demonstrations:

Demonstration of different types of joints by using gas welding and arc welding etc.

Aim: TO MAKEV-BUTT JOINT, OUT-SIDE CORNER JOINT AND HEAD Tee-JOINT.

5. Foundry and Casting Section:-

(a) Theoretical Instructions:

Safety Precautions, Introduction to casting processes, basic steps in casting processes, types of pattern, allowances, risers, runners, gates, moulding sand and its composition, Sand preparation, moulding methods, Core sand and core making, mould assembly, casting defects and remedies. Introduction of Cupola. Various test of moulding sand like, shatter index test, moisture content test, grain fineness test etc.

(b) Practical Demonstrations:

Demonstration and practice of mould making with the use of split patterns and cores, sand preparation and testing, casting practice of various materials like brass, alluminuim, waxes etc. by using different types of patterns

Aim: TO PREPARE A GREEN SAND MOULDS BY USING SPLIT AND SELF CORED PATTERN FOR CASTING.

6. Smithy And Forging Section:-

(a) Theoretical Instructions:

Safety Precautions, Introduction of various forging methods like hand forging, drop forging, press forging and machine forging and defects, brief description of metal forming processes, comparison of hot and cold working. Introduction of forging machines such as forging hammer and presses.

(b) Practical Demonstrations:

Demonstration and practice of MS rod into forged MS ring and octagonal cross section.

Aim: TO PREPARE A SQUARE HEADED BOLT FROM MS-ROUND.

7. Carpentry and Pattern Making Section:-

(a) Theoretical Instructions:

Safety Precautions, Introduction of wood, different methods of seasoning, quality of good timber, wood working machines like band saw, circular saw, jig saw, lathe, grinder, thickness planning machine, mortoise machine and radial saw.

(b) Practical Demonstrations:

Demonstration and practice of different types of joints, technical terms related to joinery their description, identification and application. polishing, putting and material use,, their names, ingredients, methods of preparation and use, joining materials like nuts, screws, dovels, hinges, glue, window and roof trusses.

Aim: TO PREPAREP SCARF JOINT AND PEN STAND AS PER THE DRAWING.

8. Electrical and Electronics Section:-

(a) Theoretical Instructions:

Safety Precautions, Introduction of different types of wiring, circuit breakers, protective relays. power supply, system and its types. various types of circuits, electrification of a workshop. Polarity test, earthing. electrical symbols.

Soldering technique of a circuit board and soldering joint quality.

(b) Practical Demonstrations:

Demonstration and practice of transformer, extension cord, gyser, electrical motor.

Aim: HOUSE WIRING, STAIRCASE WIRING FOR FLUORESCENT TUBE LIGHT, THREE PHASE WIRING FOR ELECTRICAL MOTORS.

TO MASS SOLDERING OF PRINTED CIRCUIT BOARDS AS PER THE INSTRUCTIONS.

List of books recommended: -

1 **Workshop Technology by Chapman.**
2 **Workshop Technology by Hajra Chowdhary.**
3 **Workshop Technology by Swarn Singh.**
4 **Workshop Technology by Virender Narula.**

3rd Semester

MTH3117

Engineering Mathematics-III

Laplace Transforms: Laplace Transform, Shifting Theorem, Laplace transforms of different functions, Heaviside's Unit function, Dirac Delta Function its Laplace transforms. Heavisides Expansion Theorm, Inverse Laplace Transforms. Initial and final value theorems, Convolution theorem and Applications, Use of Laplace Transforms in the solution of linear Differential equations.

Fourier transform: Fourier Series, Harmonic Analysis, Definition of Fourier Transform, Fourier sine and cosine transform, Fourier integral Formula. Applications to solutions of boundary value problems.

Z-Transform: Definition, Linearity property, Z- Transform of elementary functions, Shifting Theorems. Initial and final value Theorem, Convolution theorem, inversion of Z-transforms.

Books Recomended

1. Laplace Transforms by Murray R. Speigal
2. Advanced Engg. Mathematics: Erwin Kreyzing- Wiley Eastern. Pub.
3. Higher Engg. Mathematics: B.S. Grewal - Khanna publishers.
4. Advanced Engineering Mathematics: Michael D Greenberg-PHI.
5. Higher engineering mathematics: H. K. Dass, Rajnish Verma-S. Chand

ECE3217

Network Analysis and Synthesis

Basic Concepts: Charge and energy, capacitance, inductance and resistance parameters in the light of field and circuit concepts. Approximate realization of a physical system as a circuit. Reference directions for currents and voltages, conventions for magnetically coupled circuits, Circuit topology. **First order differential equation:** Differential equations as applied in solving networks. Application of initial conditions. Evaluating initial conditions in networks.

Laplace Transformations. Wave form analysis and Synthesis; The unit step, ramp and impulse functions and Laplace transforms. Initial and final value theorem, Convolution integral, convolution as summation..**Network theorems and impedance functions**: Complex frequency, transformer impedance and transform circuits, series and parallel combination of elements. **Network Functions – Poles and Zones:** Ports of terminal pairs. Network functions for one port and two port network. Time domain behaviour from poles zero plot.

Two port parameters: Relationship between two-port parameters. Admittance, impedance, transmission and hybrid parameters. Relationship between parameter sets. Parallel connection of two port Networks. Characteristic impedance of two port networks. **Filters** Filter fundamentals - pass & stop band, filter classification, constant-k and m-derived Filters.

Books Recommended

1. Network Analysis by Van Valkenberg
2. Network Analysis & Synthesis by F. Kuo
3. Network Analysis by G.K.Mittal

ECE3317

Analog Electronics Circuits-I

Bipolar Junction Transistors (BJT) fundamentals: transistor configurations, DC operating point, BJT characteristics & parameters, fixed bias, emitter bias with and without emitter resistance, analysis of above circuits and their design, variation of operating point and its stability. **BJT AC Analysis:** BJT Transistor Modeling, The re transistor model, Common emitter fixed bias, Voltage divider bias, Emitter follower configuration. Darlington connection-DC bias; The Hybrid equivalent model, Approximate Hybrid Equivalent Circuit- Fixed bias, Voltage divider, Emitter follower configuration; Complete Hybrid equivalent model, Hybrid π Model.

Multistage Amplifiers: Need for multistage amplifier, Gain of multistage amplifier, Different types of multistage amplifier like RC coupled, transformer coupled, direct coupled, and their frequency response and bandwidth. **Feedback Basics:** Negative feedback, Effect of negative feedback on the performance of amplifiers e.g. on bandwidth. Types of feedback amplifiers, current shunt, current series, voltage shunt, and voltage series feedback. Analysis of feedback amplifiers circuits.

Field Effect Transistors: Construction and Characteristics of JFETs, Transfer Characteristics, Depletion type MOSFET, Enhancement type MOSFET. **FET Amplifiers:** JFET small signal model, Fixed bias configuration, Self bias configuration, Voltage divider configuration, Common Gate configuration. Source-Follower Configuration, Cascade configuration.

References:

1. Robert L. Boylestad and Louis Nashelsky, "Electronics devices and Circuit theory", Pearson
2. Adel S. Sedra and Kenneth C. Smith, "Micro Electronic Circuits Theory And Applicatication,"
3. Fundamentals of Microelectronics, Behzad Razavi, John Weily
4. J.Millman & C.C.Halkias—Integrated Electronics, TMH
5. K. A. Navas, "Electronics Lab Manual", Volume I, PHI

ECE3417

Signals and Systems

Introduction to Signals & Systems: Definition of a signal & System, Classification of Signals, Basic operations on Signals, Elementary Signals, Systems viewed as interconnection of operations, Properties of Systems, Sampling theorem, Graphical & Analytical proof of Band-limited signals, Impulse Sampling, Aliasing. **Linear Time Invariant (LTI) Systems:** Time-Domain representation & Characterization of LTI systems, Impulse response representation, Convolution integral & Convolution sum, properties of LTI systems, Stability criteria for LTI systems, Elements of Continuous time & Discrete-time LTI systems.

Fourier Representation of Signals Fourier representation of Signals, Continuous -time Fourier series and their properties, Application of Fourier series to LTI systems, Fourier Transform & its properties, Applications of Fourier Transform to LTI systems, Discrete-time Fourier Transform & its properties. Circular Convolution, Relationship to other transforms.

Laplace Transform: Introduction & Definition, Region-of- convergence, Properties of Laplace transform, Inverse Laplace Transform, Applications of Laplace Transform in analysis of LTI systems, Unilateral Laplace transform & its applications to solve differential equations, Analysis of Electric circuits. **Z-Transform** The Z-Transform, Region-of-convergence, properties of Z-Transform, Inverse Z-Transform, Transform Analysis of Discrete-time LTI systems, Unilateral Z-Transform & its applications to LTI systems described by difference equations

Books Recommended

1. Signals & Systems by Haykins
2. Signals & Systems by Ziemer and Tranter
3. Signals & Systems by Oppenhiem

ECE 3517
Digital Electronics and Logic Design

Number Systems And Boolean Algebra: Review of Number systems, Radix conversion Complements 9's & 10's, Subtraction using 1's & 2's complements, Binary codes, Error detecting and Correcting codes, Theorems of Boolean algebra, Canonical forms, Logic gates. **Digital Logic Families:** Introduction to bipolar Logic families: RTL, DCTL, DTL, TTL, ECL and MOS Logic families: NMOS, PMOS, CMOS, Details of TTL logic family- Totem pole, Open collector outputs, TTL subfamilies, Comparison of different logic families.

CombinationalLogic: Representationoflogicfunctions,SimplificationusingKarnaugh map, Tabulation method, Implementation of combinational logic using standard logic gates, Multiplexers and Demultiplexers, Encoders and Decoders, Code Converters, Adders, Serial adders, Parallel adders, Subtractors, Multipliers, Parity Checker and Magnitude Comparator.

SequentialLogicConceptsAndComponents: Flipflops-SR,JK,DandTflipflops- Level triggering and edge triggering, Excitation tables-Counters-Asynchronous and synchronous Type Modulo counters, design with state equation state diagram, Shift registers, type of registers, Circuit diagrams. **Semiconductor Memories:** Memory organization, Classification, and characteristics of memories, Sequential memories, ROMs, R/W memories, Content Addressable memories, CCD memory, PLA, PAL and GateArray.

References:

1. Anil K. Maini, "Digital Electronics", Wiley.
2. Malvino and Leach, "Digital principles and Applications" Tata Mc Graw Hill.
3. Jain R P, "Modern Digital Electronics", Tata Mc Graw-Hill, Third Edition,(2003)
4. Mano M. Morris, "Digital Design", Pearson Education, Third Edition,(2006)
5. Flecther, "An Engineering Approach to Digital Design", Prentice Hall of India, New Delhi.
6. Tocci Ronald J, "Digital Systems- Principles and Applications" Prentice Hall of India, New Delhi

ELE3617
Material Science Engineering

Crystal Structure: Fundamental concepts, Closed packed structures, Crystalsystems, Crystallographic planes and directions, Miller indices, Point defects, Free electron Theory, Classificationofsolidsintoconductors,Semiconductorsandinsulators, Effective mass.
Dielectric Properties: Dielectric materials, Polarization mechanisms, Dipole moment, Dielectric strength, Methods for producing polarization, Application of dielectric materials.

Magnetic Properties: Basic concepts, Soft and hard magnetic materials, Ferrites, Selection techniques for applications, Magnetic recording, Magnetic memories. **Optical Properties:** Index of refraction, Damping constant, Characteristic penetration depth and absorbance, Reflectivity and transmissivity, Atomic theory of the optical properties, Optical storage devices.

Semiconductor Materials: Intrinsic and extrinsic materials, Electron and hole concentrations at equilibrium, Temperature dependence of carrier concentrations, Conductivity and mobility, Effect of temperature and doping on mobility, Direct and indirect recombination of electron and holes, Diffusion and drift of carriers, Diffusion length, Contact potential. Hall Effect and its Applications. **Device Materials:** Materials for resistors, capacitors and inductors. **Superconductivity:** Properties of superconductors, Applications of superconductors.

References:

1.Hummel R E, "Electronic Properties of Materials", Narosa Publishing House.
2.William D Callister, Jr "Materials Science and Engineering", John Wiley and Sons, Inc.
3.Dekker A J "Solid State Physics", Mac Millan, India Limited, Madras,(2000)
4.PillaiSO"SolidStatePhysics",New Age International Publishers.
5.Van Vlack L H "Elements of Material Science and Engineering", Addison Wesley Publishers
6.Streetman B G and Banerjee S "Solid State Electron Devices", Prentice Hall of India.

ECE3217L

Network Analysis and Synthesis Lab

1. Study of CRO - Measurement of Voltage frequency and Phase of a given waveform.
2. To assemble RC circuits and observe its performance in low pass and high pass mode.

3. To measure image & characteristic impedance of a symmetrical Tee and Pi networks.
4. For a given two port network measure:
   i) ABCD parameters.
   ii) h - parameters.
5. To experimentally determine the characteristic impedance and to plot the attenuation characteristics of the following circuits.
   i) Prototype low pass filter. ii)
   Prototype high pass filter. iii)
   Prototype band-pass filter. iv)
   m-derived LPF.
   v) m-derived HPF

ECE3317L

Analog Electronic Circuits Lab-I

1. Study I-V characteristics of:
    a. PN junction diode
    b. zener diode
    c. varactor diode
    d. lightemiting diode
    e. tunnel diode

    Calculation of DC and dynamic resistance in each case.

2. Study I/O characteristics of photodiode.
3. Study V-I characteristics of transistor (PNP and NPN) and calculate the performance parameters of a transistor in CB, CE and CC Configurations.
4. To assemble a CB amplifier with various biasing configurations and observe its performance.
5. To assemble a CE amplifier with various biasing configurations and observe its performance.
6. To assemble a CC amplifier and observe its performance.
7. To assemble a two stage RC-coupled amplifier and observe its output.
8. To assemble a two stage transformer-coupled amplifier and observe its output.
9. To design a practical amplifier using transistors with given specifications and parameters
10. To Study V-I characteristics of JFET and MOSFET. Determination of their performance parameters.
11. To Study various FET and MOSFET configurations and their practical application. circuits
12. To do the following:
    a. To assemble current series feedback amplifier and study its performance.
    b. To assemble current shunt feedback amplifier and study its performance.
    c. To assemble a voltage shunt feedback amplifier and study its performance.
    d. To assemble a voltage series feedback amplifier and study its performance.

ECE3717L

EDA Tools Lab

A: MULTISIM/PROTEUS/ORCAD/PSPICE

1. a)To Simulate a half wave and a full wave rectifiers (bridge and center-tapped) and to study their performance.
   b)To suppress the ripple of half wave rectifier, bridge and center-tapped rectifiers using RC filter.
2. To Simulate Zener diode as a voltage regulator
3. To Design & simulate Zener diode based voltage regulated power supply with short circuit protection.
4. To Design & simulate an IC voltage regulator based power supply of 5v, 9V& 12V.
5. To Simulate and observe the performance of clipping and clamping circuits.
6. To Simulate a CB amplifier and observe its performance.
7. To Simulate a CE amplifiers with various biasing configurations.
8. To Simulate a CC amplifiers with various biasing configurations.
9. To Design & Simulate a two stage RC-coupled amplifier and observe its output.
10. Simulation &Verification of the truth tables of TTL gates (7400, 7402, 7404, 7408, 7432, 7486….).
11. Simulation & Verification of NAND and NOR gates as universal logic gates and implement all other gates using these universal gates.
12. Simulation and verification of truth tables of various combinational circuits like encoders, decoders, multiplexers, demultiplexers, priority encoders, magnitude comparators, display decoders, adders, subtractors, etc.
13. Design and Simulation of basic NOT, OR, AND, NAND, NOR gates using DDL,RTL,DTL,TTL & CMOS integrated circuits.
14. Design & Simulation of various flip-flops like SR, JK, D and T, WITH VARIOUS SYNCHRONOUS AND ASYNCHRONOUS INPUTS AND CONFIGURATIONS.

B: MATLAB/SIMULINK:

1.Basic Array Operations
2.2D plotting and 3D plotting.
3. Control structure programming.
4. Working with audio and pictures.

C: LAB VIEW:

1. Computing expressions using graphical programming.
2.Creating a VI to find the decimal equivalent of a binary number.
3. Creating a sub VI to find Grey Code Equivalent ofa BCD number.
4. Create a VI to display a waveform chart.
5. Build a VI to generate a sine waveform with options to vary amplitude,frequency and offset.

ECE3517L

Digital Electronics Lab

1. To do the following:

A.To verify the truth table of following logic gates:

I. AND OR and NOT
II. NAND, NOR, XOR and XNOR

B. Design of Basic NOT, OR, AND, NAND, NOR Gates using DDL, RTL, DTL, TTL, and CMOS integrated circuits. Study of Open Collector, Open Drain and Totem-Pole Logic Family Configurations.

2. To implement XOR and XNOR using universal logic gates.
3.
A. To verify De Morgans law using logic gates.
B. To implement certain Boolean expressions and check their equality.
4. To design and realize:-
a. Half adder and verify its truth table.
b. Full adder and verify its truth table.
c. Half subtractor and verify its truth table
d. Full subtractor and verify its truth table.

5. To design a multiplexer/demultiplexer using two input NAND gates

6. To design a 4 bit binary to decimal converter.

7. To design a modulo-10 counter.

8. Given a frequency f obtain the waveforms with frequencies f/2,f/5 & f/10.

9. Design and realize the following flip flops using logic gates.

a. RS flip flop
b. JK flip flop
c. D flip flop
d. T flip flop

10. Use PLL as:

a. Frequency multiplier.
b. Frequency demodulator.

4th Semester

MTH4117

Engineering Mathematics-IV

Complex Variables: Analytic functions, Cauchy Riemann equations, complex integration, Cauchy's fundamental theorem, Cauchy's integral theorem, Cauchy's inequality and Liouville's theorem on integral function, Taylor's and Laurent's expansions, Zeroes and poles of analytic functions, Residues and contour integration.

Special Functions: Solution of series, Legendres functions, Rodriguess formula, generating functions for Legendres Polynomials and recurrence formulae. Bessel's functions, Recurrence formulae and Bessel's functions of integral order.

Wavelet Transform: Continuous wavelet transform, Basic properties of wavelet transform, Discrete wavelet transform, Orthonormal wavelets, multi Resolution analysis, Construction of Orthonormal wavelets, Daubchies wavelets and algorithms. Band limited wavelets, Balian low theorem.

References:

1. Complex Variables & Applications by R. V. Churchill
2. Theory of Functions of Complex Variables by E. I. Copson

ECE4217

Analog Electronic Circuits-II

Introduction to OPAMP: Block diagram representation of a typical op-amp, Analysis op-amp ICC circuits, types, designations, packages, pin configurations and power supplies. Ideal op-amp, equivalent circuit, open loop op amp configurations of differential, inverting and non-inverting amplifiers, op amp feedback amplifier analysis, differential amplifier with one, two and three op amps.Op amp parameters - offset voltages and currents, bias current, drift, PSRR, CMRR, SNR, offset nulling methods.. AC performance of O-amp: Bandwidth, slew rate and frequency response. DC and AC amplifiers, peaking, summing scaling and averaging amplifiers, instrumentation amplifier, differential input and differential, output amplifier, V to I and I to V converters, integrator, differentiator comparator, non-linear amplifier.

Sinusoidal oscillators: Basic Operations, analysis, Barkhausen's Criteria, Various types of oscillator circuits and their analysis, Design of Practical Oscillator Circuits. OPAMP based design of Phase shift oscillator, Wien bridge oscillator, square, triangular and sawtooth wave generator, voltage controlled oscillator, zero crossing detector, window detector. **Non linear IC applications using OPAMP:** OPAMP Comparator, Schimtt Trigger, Sample and Hold Circuit, Active Filters, Effect of slew rate on waveform generation- monostable circuits-Principles of VCO circuits. Comparator Circuits: Zero Crossing Detector- Regenerative comparator circuits.

Multivibrators and Wave Form Generators: Bistable multivibrators, Bistable circuit as a memory element, Generation of Square & Triangular waves using Astable multivibrator, Generation of the standard Pulse-The Monostable multivibrator, Integrated circuit Timers, Implementation of Astable, Monostable and Bistable multivibrators using 555 Timer, Various practical applications of 555 Timer. **Power Amplifiers and Power Supplies:** Classification of power amplifiers, Class A, Class B, Class AB and Class C power amplifiers; analysis and design. Power supplies and IC regulators.

Books Recommended

1. Operational Amplifiers by Ramakant Gaekwad
2. Integrated Electronics by J. Millman & C. Halkias
3. Microelectronics by Sedra & Smith
4. Electronic Circuits by D. Schelling & Belove.
5. Electronic Devices & Circuits by R. Boylestad

ECE4517C

Electromagnetic Fields and Waves

Electromagnetic Fields and Maxwell's Equations: Review of Electric and Magnetic fields, Maxwell's Equations, Potential functions, Boundary conditions, Wave equation and its solution

Plane Electromagnetic Waves Transverse Electromagnetic Waves, Poynting Theorem, Phase and group velocity, Plane waves in lossless and lossy media, Wave propagation in Ferrites-Faraday Rotation and Birefrigerence. Normal and oblique incidence at plane conducting boundary, Normal and oblique incidence at plane dielectric boundary

Transmission Lines Transmission Line equations and solutions, Characteristic impedance and propagation constant, Reflection and transmission coefficients, SWR, Open and short circuit lines--their use as circuit elements at UHF, Line impedance and admittance , Smith Chart, Impedance Matching

References

1. Jordan E and Balman K: Electromagnetic Waves & Radiating Systems, PHI
2. David K. Cheng: Field and Wave Electromagnetics, Addison Wesley
3. Krauss: Electromagnetics ,Mc Graw Hill.
4. Griffiths: Introduction to Electrodynamics, PHI

ECE4417

Communication Systems – I

Analog Modulation: AM, DSB/SC, SSB, VSB, Angle modulation, NBFM, WBFM, Diode detector, Frequency discriminator, AM & FM, Transmitter. **Demodulation:** AM and FM Signals Radio Receivers – AM & FM (Block diagram).

Introduction,ASK,FSK,PSK,DPSK,DEPSK,QPSK,M-aryPSK,ASK,FSK,similarity of BFSK and BPSK. Baseband signal receiver, probability of error, the optimum filter, matched filter, probabilityoferrorusingmatchedfilter,coherentreception,non-coherent detection of FSK, calculationoferrorprobabilityofASK,BPSK,BFSK,QPSK.

Noise Analysis: Performance of AM & FM Systems, in presence of noise Threshold in AM & FM, Demodulation, pre emphasis and De emphasis in FM Systems.

Books Recommended

1. Principles of Communication Systems by Taub & Schelling.
2. Electronic Communication Systems by G. Kennedy.
3. Communication systems by S. Haykins.

ECE4317

Control Systems

Introduction to linear Control System: Control Systems, types of control systems, feedback and its effects, mathematical modeling of physical systems. **System Representations:** Block diagrams, transfer functions, signal flow graphs. Time Domain Analysis of Control Systems: Typical test signals for time response of control systems, time domain performance of first and second order control systems (steady state response and transient response), P I D Controllers.

Stability of Control Systems: Stability characteristic equation, state transition matrix, stability of linear time invariant systems, Rough-Hurwitz Criterion, Nyquist criterion, Root locus plot, Bode diagrams. **Frequency Domain Analysis of Control Systems:** Frequency domain characteristics second order systems relative stability, graphic methods of determining gain margin and phase margin, Nichols chart.

Introduction to Modern Control Theory: State Equations, State Transition Matrix, State transition equations, State Diagrams, concept of controllability and observability.

Books Recommended

1. Modern Control Engineering by K. Ogatta
2. Automatic Control Systems by B. C. Kuo

ECE4617

Microprocessors

Microcomputer Structure and Operations: Basic Microcomputer Elements, Typical Microcomputer Structure, CPU, Memory System, Input Output. **Microprocessors and Memory:** Typical 8, 16 and 32 bit Microprocessors, 8085 Microprocessor Specification, Memory Technologies

Assembly Language Programming I: Programming Model of 8085, Registers, Fetch, Execute Operation of CPU, Instruction Set. **Assembly Language Programming II:** Addressing Modes, Basic Operations, Microprocessor Arithmetic, Program Flow Control Using Looping and Branching. **Assembly Language Programming III:** Stack, Subroutines, Interrupts, Resets.

Bus System: System Bus Structure, Bus Operations, Cycle by Cycle Operations, Timing and Control, Priority Management, Address Decoding. **Microprocessors Interfacing:** Interfacing concepts, Parallel Input Output, Memory Interfacing, Direct Memory Access, The Serial Subsystems, Peripheral Interface, Analog Converter Subsystem.

References:-

1. Microprocessor Architecture, Programming & Applications by Ramesh Goankar
2. Microprocessor & Applications by Leventhal.
3. Microprocessors by Mathur.

ECE4617L

Microprocessors Lab

1. i) To develop a program to add two double byte numbers.
   ii) To develop a subroutine to add two floating point quantities.
2. i) To develop program to multiply two single byte unsigned numbers, giving a 16 bit product
   ii) To develop subroutine which will multiply two positive floating point numbers.
3. To write program to evaluate P* Q*+R* & S are 8 bit binary numbers.
4. To write a program to divide a 4 byte number by another 4 byte number.
5. To write a program to divide an 8 bit number by another 8 bit number upto a fractional quotient of 16 bit.
6. Write a program for adding first N natural numbers and store the results in memory location X.
7. Write a program which decrements a hex number stored in register C. The Program should half when the program register reads zero.
8. Write a program to introduce a time delay of 100 ms using this program as a subroutine display numbers from 01H to OAH with the above calculated time delay between every two numbers.
9. N hex numbers are stored at consecutive memory locations starting from X. Find the largest number and store it at location Y.
10. Interface a display circuit with the microprocessor either directly with the bus or by using I/O ports. Write a programme by which the data stored in a RAM table is displayed.
11. To design and interface a circuit to read data from an A/D converter, using the 8255 A in the memory mapped I/O.
12. To design and interface a circuit to convert digital data into analog signal using the 8255 A in the memory mapped I/O.
13. To interface a keyboard with the microprocessor using 8279 chip and transfer the output to the printer.
14. To design a circuit to interface a memory chip with microprocessor with given memory map.

ECE-4417L

Communication Systems-I / EMF Lab

A. Communication Systems-I Lab:

1. Generation and detection of amplitude modulated signals.
2. Generation and detection of frequency modulated signals.
3. To measure sensitivity, selectivity, and fidelity of a radio receiver.
4. To generate PAM and PDM signals using IC 555.
5. To test a pulse code modulator.
6. To measure the noise figure of the following systems:
    a. A.M. System.
    b. F.M. System.

B. EMF Lab

1. Study of Transmission Line Concepts using Trainer Kit.

ECE4317CL Control

Systems Lab

1. Study working of PID Trainer Kit for various controller configurations.
2. Use of Simulink for response study of inputs like:
   i. Step ii. Ramp
   for systems of various orders: with and without feedback.
3. Write a Matlab program to find
   a. Step response of a first order system
   b. Impulse response of first order system
4. Write a Matlab program to obtain impulse, step & ramp response of a second order system.
5. Write a Matlab program to find rise time, peak time, maximum overshoot & settling time of second order systems.
6. Write a Matlab program to find unit step response of second &higher order systems.
7. Write a Matlab program to plot root locus of second & higher order system & hence comment on stability.
8. Write a Matlab program to demonstrate effect of addition of poles & zeros to a transferfunction.
9. Write a Matlab program to obtain Bode plot of transfer function. Find gain margin &hence comment on stability.
10. Write a Matlab program to determine Polar plot of a given transfer function.
11. Write a Matlab program to draw Nyquist plot of a second & higher order system.

ECE4217L

Analog Electronics Circuits – II Lab

1. To assemble an RC phase shift oscillator.
2. To assemble a differential amplifier and obtain its CMRR.
3. To study different applications of OP AMPS.
    a. OP-AMP as an inverting amplifier.
    b. OP AMP as a non inverting amplifier
    c. OP AMP as an integrator
    d. OP AMP as a differentiator
4. To measure the following parameters of a typical OP-AMP.
    a. I/P Impedance
    b. O/P Impedance
    c. Slew rate
    d. CMRR
5. Obtain frequency response of an OP-AMP & hence find its bandwidth.
6. Study performance of multivibrator circuits using 555 chip in following modes:
    a. Bistable
    b. Astable
    c. Monostable
    d. Use of 555 chip as a timer circuit.
7. To assemble a Schmitt trigger Circuit and to obtain its characteristics and to use it as squaring circuit.
8. To assemble a Class A Power amplifier and to determine its power gain
9. To study the performance of a voltage regulator IC Chip.

5th Semester

ECE5117

Digital Signal Processing

Introduction: Limitations of analog signal processing, Advantages of digital signal processing and its applications; Some elementary discrete time sequences and systems; Basic elements of digital signal processing such as convolution, correlation and auto correlation, Concepts of stability, causality, linearity, difference equations. **Frequency Domain Representation of Discrete Time Signal and Systems:** Complex exponentials as Eigen functions of LTI systems; Fourier Transform of sequences. Fourier Transform theorems and symmetry properties of Fourier Transform. **Sampling of Continuous Time Signals:** Sampling and aliasing problem, Reconstruction of a continuous time signal from its samples; Discrete Time Processing of Continuous time signals and vice-versa. Decimation & Interpolation; changing the sampling rate by integer and non-integer factors using discrete time processing.

Z-Transform: Z-Transform, Region of convergence; Properties of the Z-transform; convolution theorem; Parseval's relation; Unilateral Z-transform and its application to difference equations with non zero initial condition. **Discrete Fourier Transform:** DFT and its properties; Linear Periodic and Circular convolution; Linear Filtering Methods based on DFT; Filtering of long data sequences; Fast Fourier Transform algorithm using decimation in time and decimation frequency techniques; Linear filtering approaches to computation of DFT.

Design of Digital Filters: Linear Phase FIR filters; Design methods for FIR filters; IIR filter design by Impulse Invariance, Bilinear Transformation, Matched Z-Transformation, Frequency Transformation in the Analog and Digital Domain, Applications of DSP Processing. Architecture of a Real time Signal Processing System, Digital Signal Processor Architecture, comparative study between a General Purpose Processor and Digital Signal Processor, Evolution of Digital Signal Processors, Different types of Digital Signal Processors, Various practical DSP's.

Books:

1. A textbook of DSP Techniques by Steven W. Smith
2. Digital Signal Processing using John. G. Proakis and Dimitry G. Manolakis.
3. Digital Signal Processors, B. Venkataramani & M. Bhaskar, Tata McGrawHill

ECE5217

Electronic Instrumentation and PLC

Measurement System and Standards: Instrumentation System and its classification, Primary and secondary standards, Standards of various electrical quantities, IEEE standards, Static and Dynamic response, Errors, and accuracy of an instrumentation system. **Measurement of Basic Parameters:** Galvanometer and its principle, Moving Coil, Moving iron meters, true rms meter, Bridge measurements, Q meters, Measurement of Voltage, Current, Power, Energy. Measurement of Resistance, Capacitance, Inductance.**Transducers, Sensors, and Actuators:** Active and Passive, Transducers types: Resistive, Inductive, capacitive, Piezoelectric, Optical, Photo diodes; Measurement of Physical, Physiological, Chemical quantities.

Signal Generators and Analyzers: Function generators, RF Signal Generator, Sweep Generator, Frequency synthesizer, Wave Analyzers for Audio and radio frequency waves. Measurement of harmonic distortion. Spectrum analysis. **Digital Instrumentation:** Comparison of analog and digital techniques, Digital voltmeter, Digital multimeter, Frequency counter, Measurement of frequency and time interval, extension of frequency range, Measurement errors. **Data Acquisition System:** Components of data acquisition system, Interfacing of transducers.

PLC Fundamentals – Discrete state versus continuous state control-Evolution of modern day PLCs building blocks of PLCs-Communication in PLCs. PLC Applications-Programming methods- Relay & logic ladder diagrams-Boolean logic- High level languages-Graphical representation- programming examples - Comparative study of industrial PLCs.

References:

1. Electronic Measurements by W. Cooper
2. Electrical & Electronic Measurements by A. K. Sawhney
3. Programmable Logical Controllers by Hughes. T., ISA Press

ECE5317

Microcontrollers and Embedded Systems

Embedded systems and processors: Introduction to embedded systems, components of an embedded system, types of embedded system, levels of embedded system, Embedded System applications, Embedded system design considerations, Embedded Processors: Microprocessors, Microcontrollers, DSP and ASICs, Comparative Assessment of Embedded Processors. Embedded memory devices and Embedded I/O. Embedded high and low level programming. **Microcontrollers**: Microcontrollers for embedded systems, classes of microcontrollers, types of microcontrollers, introduction to microcontroller platforms: ARM,ATMEL/ AVR, PIC, ARDUINO, Raspberry and 8051. Choosing a Microcontroller for an embedded application.

8051 Architecture: 8051 Microcontroller hardware, internal Architecture, input/output pin and port architecture, bare minimum system with external circuits, other members of 8051. **Instructions and Programming :** Addressing modes :accessing memory using various addressing mode, Jump, Loop and call instructions,time delay generation and calculation, Single bit instructions and programming,I/O port programming: I/O programming, bit manipulation.

8051 Timers,Counters, Serial Communication , Interrupts and their Programming : Timer and counter architecture in 8051,programming 8051 timers, counter programming, pulse frequency and pulse width measurements. Serial communication in 8051: Basics of serial communication, 8051 connection toRS232, 8051 serial communication programming. Interrupts programming: Interrupts of 8051,programming timer interrupts, programming external hardware interrupts, and programming serial communication interrupts. **Application of 8051 Microcontroller :**Interfacing memory with 8051,Programmable peripheral interface (PPI)-8255, programming 8255, 8255 interfacing with 8051. Interfacing Key board. Interfacing LED/ LCD, Interfacing A/D & D/A converters, Interfacing DC motor,Relay,solenoid,steppermotor,servomotor.

Books:

1. The 8051 Microcontrollers and Embedded Systems : Muhammed Ali Mazidi
2. The 8051 Microcontrollers Architecture, Programming & Applications Kenneth J. Ayala
3. Design with PIC Microcontroller: John Petman

ECE5417

Digital Communication and Information Theory

Discrete messages, concept of amount of information and its properties. Average information, Entropy and its properties. Information rate, Mutual information and its properties, Introduction to Source coding, Advantages, Shannon's theorem, Shanon-Fano coding, Huffman coding, efficiency calculations, channel capacity of discrete and analog Channels, capacity of a Gaussian channel, bandwidth–S/N tradeoff.

Introduction to LINEAR BLOCK CODES, Matrix description of Linear Block codes, Error Detection and error correction capabilities of Linear block codes, Hamming codes, Binary cyclic codes, Algebraic structure, encoding, syndrome calculation, BCH Codes. Introduction to CONVOLUTION CODES, encoding of convolution codes, time domain approach, transform domain approach. Graphical approach: state, tree and trellis diagram decoding using Viterbi algorithm.

Elements of digital communication systems, advantages of digital communication systems, pulse modulation as a base to digital communication,Pulse Amplitude Modulation (PAM), PAM Modulator Circuit, Demodulation of PAM Signals, Pulse Time Modulation(PTM); Pulse Width Modulation (PWM), Pulse Position Modulation (PPM), PWM and PPM Demodulators. Elements of PCM: Sampling, Quantization & Coding, Quantization error, Companding in PCM systems. Differential PCM systems(DPCM). Delta modulation, its drawbacks, adaptive delta modulation, comparison of PCM and DM systems, noise in PCM and DM systems.

References

1. Digital Communication by Simon Haykins.
2. Information Theory and Coding by Ranjan Bose.
3. Information Theory and Coding by J.S. Chitode.
4. Digital Communication by Taub Schelling.

ECE5517

Solid State Devices

Overview of Free Electron Theory. Band Theory of Electronic Conduction:Kroning Penny model, block wave Brillion zones, effective mass, density of states & energy discontinuity, electron and hole conduction.Semiconductor Physics: Fermi Dirac distribution functions, Fermi energy and contact potential, electronic conductivity and mean free time.

Instrinsic and Extrinsic semicondctors, free carrier concentration and Fermi level, donor and acceptor states, derivation of fermi level, carrier concentration and mobility, scattering mechanisms, semicondcutor materials and their energy band structures.Transport and Recombination Phenomenon.

Physics of:Metal semiconductor contact, p-n junction diodes, bipolar junction transistor, thyristor, junction field effect transistor, metal insulator semiconductor structure, MOSFET.High Frequency Devices:Varactor diodes, tunnel diodes, read diode, IMPATT & trapatt diodes, Gunn diodes.Optical Devices:Junction, luminescence and energy band gap, spontaneous emission and carrier life time for band to band transition, stimulated emission, p-n junction laser, photo-detective and photo-conductive devices.

References

1. Semiconductor Physics and Devices, *Basic Principles* by Donald E. Neaman, McGraw-Hill Publishing, 3rd Edition, 2003.
2. Physics of Semiconductor Devices by S. M. Sze, John Wiley and Sons, 2nd Edition, 1981.
3. Electronic Processes & Materials by Azaroff & Brophy
4. Fundamentals of Solid State Devices & Circuits by Barlev
5. Solid State Electronic Devices by Ben G. Streetman
6. Fundamental s of Semiconductor Theory by S. Wang

ECE5617

Electrical Machines

Transformers: Operating principle, classification, construction, emf equation, phasor diagrams, equivalent circuit model, losses & efficiency, voltage regulation, frequency response, polarity test, autotransformers, three-phase transformer connections, impedance matching, isolation & instrument transformers.

D.C. Machines: Operating principle, generator & motor action, construction, types of excitation, emf & torque equations, power stages & efficiency. Commutation & Armature Reaction, characteristics & application of d.c generators, starting & speed control of d.c motors, characteristics & applications of d.c motors, electric braking.**Induction Machines:** Three-phase induction motors. Principle of operation, construction, types. Rotating magnetic field, emf equation of an AC Machine, torque developed in an induction motor, equivalent circuit model, torque-speed characteristics, starting & speed control. Single phase induction motros, starting, application

Synchronous Machines: Construction, types & operating principle of synchronous generator, A.C armature windings, equivalent circuit, phasor diagrams, voltage regulation, parallel operation, synchronization, Power Angle characteristics, effect of field excitation change.Synchronous Motor, principle, starting, hunting, damper windings.**Special Purpose Motors:** Stepper Motor, Universal Motor, Shaded-pole Motor.

Books Recommended

1. Electric Machinery by Fitzgerald
2. Electric Machinery by Nagarath

ECE5617L Electrical

Machines Lab

1. Familiarity with Power Transformer, Auto Transformer, Dimmerstat, Servo Stabilizer.
2. Determination of open circuit characteristics(OCC) of a DC machine.
3. Starting and speed control of a DC shunt motor.
4. Connection and testing of a single-phase energy meter (unit power factor load only).
5. Two-wattmeter method of measuring power in three-phase circuit (resistive load only).
6. Poly phase connection of single phase transformer.
7. To determine the armature and field resistance of a DC Machine.
8. To calibrate a test (moving iron) ammeter and a (dynamometer) wattmeter with respect to standard (DCPMMC) ammeter and voltmeters.
9. Open circuit and short circuit tests on a single phase transformer.
10. Connection and starting of a three-phase induction motor using direct online (DOL) or star-delta starter.

ECE5217L

Electronic Instrumentation and PLC Lab

1. Find Q of an LC Circuit.
2. To study use of 741 as an instrumentation Amplifier.
3. Study of ADC 0801.
4. Study of DAC 0808.
5. Experiments on study and use of transducers for common electrical and non-electrical quantities.
6. Experiments on wave form analysis for audio and radio range of signals.
7. Study of intelligent instruments and measurement systems.
8. Study of basic programming of PLC.
9. Analog operation in PLC
10. Arithmetic operation, Timer, Counter operation using PLC
11. Application using PLC PC based programming (Level control, Temperature control, Speed Control)

ECE5317L
Microcontrollers and Embedded Systems Lab

1. Generate a specified time delay using Embedded 'C'.
2. Interface a ADC and a temperature sensor to measure temperature
3. Interface a DAC & Generate a stair case wave form – with step duration and no. of steps as variables
4. Flash a LED connected at a specified output port terminal
5. Interface a stepper motor – and rotate it clock wise or anti clock wise through given angle steps
6. Using Keil software write a program to pick the smallest among a given set of numbers
7. Using Keil software write a program to pick the largest among a given set of numbers
8. Using Keil software write a program to arrange a given set of numbers in ascending order
9. Using Keil software write a program to arrange a given set of numbers in descending order
10. Using Keil software write a program to generate a rectangular wave form at a specified port terminal

ECE5117L

DSP Lab

1. Familiarization with DSP processor TMS 320 C 6713.
2. Write a program to generate a sine/triangular/square wave.
3. Write a program to generate a sine/triangular/square wave of variable. amplitude and frequency.
4. Write a program to generate AM signal.
5. Write a program to generate an echo of an audio signal.
6. Write a program to perform convolution of two signals.
7. Write a program to perform DFT & IDFT of a signal.
8. Write a program to design a low pass audio digital filter.

6th Semester

ECE6117

Communication Systems-II

Waveguides and Cavity Resonators Transverse Electric and Transverse magnetic Waves, Wave propagation through rectangular and circular waveguides, Power transmission and attenuation in waveguides, Electromagnetic Resonators, Rectangular & Circular cavities. **Strip Lines** Propagation Constant, Characteristic impedance and attenuation characteristics of strip lines and microstrips

Propagation of Waves Waves in free space, Attenuation, Absorption and polarization, effects of environment, Ground wave propagation, sky wave propagation, space wave propagation, Tropo scatter propagation and Extra terrestrial propagation. **Radiation** Retarded Potential and Electromagnetic field, Radiation from a short current element, Half wave dipole, Radiation Resistance, Effect of ground on radiating elements

Antennas Basic Antenna parameters, Radiation pattern, Directivity and Antenna Gain, Bandwidth and beam-width, Polarization, Folded dipole and applications. Antenna arrays, Parabolic reflector, Properties and feed mechanism, Horn Antenna, Loop Antenna. **Satellite Communication**

References:

1. Liao, S. Y Microwave Devices & Circuits, PHI
2. David Pozar: Microwave Engineering, John Wiley
3. Jordan, E and Balman, K: Electromagnetic Waves & Radiating Systems, PHI
4. 4. Krauss, J.D: Antennas, Mc Graw Hill

MTH6217

Engineering Mathematics - V

(Operation Research and Optimization Techniques)

Introduction: Introduction to OR Modeling Approach and Various Real Life Situations. Linear Programming Problems (LPP): Basic LPP and Applications; Various Components of LP Problem Formulation

Solving Linear Programming Problems: Using Simultaneous Equations and Graphical Method; Simplex Method; Duality Theory; Charnes' Big – M Method. Transportation Problems and Assignment Problems.

Network Analysis: Shortest Path: Dijkstra Algorithm; Floyd Algorithm; Maximal Flow Problem (Ford-Fulkerson); PERT-CPM (Cost Analysis, Crashing, Resource Allocation excluded). Queuing Theory: Introduction; Basic Definitions and Notations; Axiomatic Derivation of the Arrival & Departure (Poisson Queue). Poisson Queue Models: M/M/1: ∞/FIFO and M/M/1: N/ FIFO.

References:

1. H.A. Taha, " Operations Research", Macmillan Publishing Company.
2. Hadley G., "Linear Programming", Narosa Publishers.
3. Mital, "Optimization Methods", New Age International.
4. Rao, "Engineering Optimization", New Age International.

ECE6317

Computer Organization & Architecture

Review of Number Systems, Computer Level Hierarchy, Evolution of Computers, Von-Neuman Architecture, Structure and Components of Computers, Computer Functions, Instruction Execution and Instruction Cycle State Diagrams, Computer Buses, Bus Interconnection and Hierarchy, Elements of Bus Design, Bus Arbitration and Timings, introduction to High speed buses. Basic CPU equation. Measuring Performance – MIPS, FLOPS, CPI/IPC, Benchmark, Geometric and Arithmetic Mean, Speedup, Amdahl's and Moore's Laws.

Instructions and Instruction Set–Characteristics, Types, Functions, Execution, Representation, Format, Addressing Modes, CPU Registers – Organization, Programmer Visible, Status/Control, Accumulator, and general purpose registers, Stack based CPU, computer arithmetic logic design, fast adders, multiplication, Booth's algorithm, fast multiplication, integer division, floating point arithmetic. ALU–Fixed and Floating point ALU Organization. Control Unit – Functional Requirements, Structure, Control Signals, hardwire and Micro-programmed Wilkes Control unit, Micro-instructions and its formats, Control Memory. Introduction to Pipelining and Parallel Processing.

Memory Hierarchy, types and Characteristics, Primary Memory- Types, Working, Chip Organization, Expansion, Cache Memory- Mapping Schemes, Replacement Policies, Hit and Miss, Write policies, Coherence. Computer Storage–Magnetic and Optical Storage Organization and Format, Virtual memory–Overlays, Paging, Segmentation and Fragmentation, Introduction to RAID, and CAM. **Parallel processing:** Introduction to parallel processing and architecture- classification, array processors, pipeline architectures, vector processors, GPU's, interconnection networks, multistage networks, message passing architecture.

References:

1. Computer Organization & Architecture by M. M. Mao
2. Computer organization by Hamachar

ECE6417

VLSI Design

Review of MOSFET: Constructional & Operational features of MOSFET, I-V Equation, 2ND Order Effects, MOS Capacitor, C-V Characteristics, MOSFET Switch, Transmission gate, CMOS Inverter (Pull-up & Pull-down), Inverter Static Characteristics, Noise Margin, Switching characteristics of Inverter (Fall Time, Rise Time, Delay Time), Dynamic Characteristics, Power Dissipation .

VLSI Technology: Wafer Processing, Oxidation, Epitaxy, Deposition, Ion-Implantation & Diffusion, The Silicon gate Process, n-well CMOS Process, p-well Process, Twin-Tub Process, Silicon On Insulator. **CMOS Logic Design (Gates):** CMOS Logic Gate Design (NAND & NOR Logic), Switching Characteristics (Delay Time, Power, Fan-in, Fan-out), Transistor Sizing, The Compound Gates.

CMOS Logic Structures: CMOS Logic, Pseudo-nMOS Logic, Dynamic CMOS Logic, C2MOS Logic, BiCMOS Logic, NP Domino Logic. **Layout:** Design Rules/Floor planning, Simple Layout Examples. **CMOS Logic Design (Circuits):** Multiplexers, MUX Implementation in CMOS & Transmission Gate, RAM Cell Implementation, Implementation of Flip-Flop, Register/Counter.

References:

1. CMOS VLSI Design: A Systems Perspective by N. Weste & K. Eshraghian
2. CMOS VLSI Design: A Circuits & Systems Perspective by N. Weste, D. Harris & A. Bannerjee
3. Digital Integrated Circuits: A Design Perspective by Rabaey

ECE6617

Power Electronics

An Introduction to Thyristor Engineering. Power Electronic Devices: Heavy current and high voltage solid state devices, power diodes, power transistors, SCR's. Triacs Diacs and other Thyristors, Basic theory of operation and characteristics of SCR, Ratingts, protection, series and parallel operation of SCRs. Driving circuits, GIO"s, IGBT,MOSFET.

Firing Circuits: Line commutation of SCRs and forced commutation techniques. **Line Commutated Converters:** 2 pulse, 3 pulse, 6 pulse and higher pulse configurations. **AC Phase Control** Integral cycle control.

Choppers: Principle and basic chopper circuits. **Inverters:-** Series parallel and bridge inverters and voltage control. **Application of Thyristor Technology to Electric Drives. Design of transformers, pulse transformer and design of inductors.**

References:

1. Power Electronics: Circuits, Devices and Applications M. H. Rashid Pearson education india
2. Power Electronics C.W Lander. McGraw-Hill
3. Power semi-conductor controlled Drives G.K.Dubey Prentice Hall
4. Thyristorized Power controllers G.K. Dubey, Doradla, Joshi and Sinha New age international publishers
5. Power Electronics and Variable Frequency Drives B.K Bose IEEE press

CSE6517

Data Structures

Definitions and operations on Arrays, Stacks, Queues, Lists, Trees, Evaluation of arithmetic expressions using stacks.

List representation, Recursive and non-recursive definition of tree structures. Operations using recursive and non-recursive algorithms.

Forests, Simple searching and sorting algorithms. Hashing Techniques.

References

1. Data Structures through C by Rajni Jindal
2. Data Structures through C by Chatupadyay et. al

CSE6517L Data

Structures Lab

1. Understanding structures and pointers
2. Implementation of link list.
3. Static Implementation of stacks using arrays.
4. Dynamic implementation of stacks using link list.
5. Static implementation of queues using arrays.
6. Dynamic implementation of queues using link list
7. Implementation of sorting algorithms.
8. Implementation of hash tables.

ECE6117L

Communication Systems LAB

Communication Systems-II Experiments:

1. To measure and plot radiation patterns of different antennas.
2. To study Satellite Communication using trainer kit.

ECE6417L VLSI

Design Lab

Experiments on Design using VHDL and Implementation using Xilinx/Spartan Kits:

Combinational Design & Implementation Exercises:

1. Design and implementation of basic Gates: AND, OR, NOT.
2. Design and implementation of universal gates.
3. Design and implementation of 2:1 Mux using other basic gates.
4. Design and implementation of 2 to 4 Decoder.
5. Design and implementation of Half-Adder, Full Adder, Half Subtractor, Full Subtractor.
6. Design and implementation of 3:8 Decoder.
7. Design and implementation of 8:3 Priority Encoder.
8. Design and implementation of 4 Bit Binary to Grey code Converter.
9. Design and implementation of 4 Bit Binary to BCD Converter using sequential statement.
10. Design an 8 Bit parity generator (with for loop and Generic statements).
11. Design and implementation of 2"s Complementary for 8-bit Binary number using Generate statements.

Sequential Design & Implementation Exercises:

12. Design and implementation of all type of Flip-Flops using (if-then-else) Sequential Constructs
13. Design and implementation of 8-Bit Shift Register with shift Right, shift Left, Load and Synchronous reset.
14. Design and implementation of Synchronous 8-bit Johnson Counter.
15. Design and implementation of Synchronous 8-Bit universal shift register (parallel-in, parallel-out) with 3-state output (IC 74299).
16. Design and implementation of counters (MOD 3, MOD 5, MOD 8, MOD 16).
17. Design and implementation of a decimal up/down counter that counts up from 00 to 99 or down from 99 to 00.
18. Design and implementation of 3-line to 8-line decoder with address latch.

ECE6617L

Power Electronics Lab

1: To do the following:
(a) To obtain V-I Characteristics of an SCR.
(b) To obtain V-I Characteristics of a Triac.

2: To obtain the Static Emitter Characteristics of a UJT.
3: To study the Line-synchronized UJT Relaxation Oscillator as a triggering agent for a thyristor and plot load voltage Vs. firing angle.
4: To study various firing schemes of an SCR and draw the traces for various waveforms:
(a) Resistance Triggering Technique,
(b) R-C Triggering Technique,
(c) Linear Firing Scheme,
(d) Inverse Cosine Firing Scheme.
5: To study a Single-Phase Half-Wave Converter and plot Source voltage, Load voltage and load current for R and R-L loads.
6: To study a Single-Phase Semi-Converter and plot Source voltage, Source current, Load voltage and load current for R, R-L and Motor Loads.
7: To study a Single-Phase Full-Converter and plot Source voltage, Source current, Load voltage and load current for R, R-L and Motor Loads.
8: To study a Three-Phase Semi-Converter and plot Source voltage, Source current, Load voltage and load current for R, R-L and Motor Loads.
9: To study a Three-Phase Full-Converter and plot Source voltage, Source current, Load voltage and load current for R, R-L and Motor Loads.
10: To study a Single-Phase Dual Converter on Motor Load.
11: To study a DC-DC Buck Converter (Step Down Chopper) for R, R-L and DC Motor Load and plot Load voltage Vs. Duty Ratio.
12: To study a Single-Phase Voltage Source Inverter on R and R-L Loads.
13: To study a Three-Phase Voltage Source Inverter on R and R-L Loads.
14: To study a Single-Phase PWM Voltage Source Inverter on R and R-L Loads and plot Load voltage Vs. Modulation index.

7th Semester

ECE7117
Optical Fiber Communication

Overview of optical fiber communication – Historical development, The general system advantages of optical fiber communications. Optical fiber waveguides-Introduction ,Ray theory , Total Internal reflection, Acceptance angle, Numerical Aperture, Skew rays. Cylindrical fibers-Modes, V Number, Mode coupling, Step Index fibers, Graded Index fibers. Single mode fibers – Cutoff wavelength, Mod Field Diameter, Effective Refractive Index. Fiber materials. Signal distortion in optical fibers-Attenuation, Absorption, Scattering and Bending losses, Core and Cladding losses.

Information capacity determination, Group delay, Types of Dispersion-Material dispersion, Wave-guide dispersion, Polarization mode dispersion, Intermodal dispersion. Pulse broadening. Overall fiber dispersion in Multi mode and Single mode fibers, Transmission distance , Eye pattern. Optical fiber Connectors-Connector types, Single mode fiber connectors, Connect or return loss. Splicing, Fiber alignment and joint loss.

Optical sources: LEDs, Structures, Materials, Quantum efficiency, Power, Modulation, Power bandwidth product. Injection Laser Diodes- Modes, Threshold conditions, Output patterns, Numerical Aperture, Laser diode to fiber coupling. Optical detectors- Physical principles of PIN and APD, Comparison of Photo detectors, Optical receiver operation-Fundamental receiver operation, Digital signal transmission, error sources, Receiver configuration, Analog optical receivers. Optical system design— Considerations, Component choice, Measurement of Attenuation and Dispersion.

References

1. Optical Fiber Communications – Gerd Keiser, McGraw-Hill International edition, 3rd Edition, 2000.
2. Optical Fiber Communications – John M. Senior, PHI, 2nd Edition, 2002.
3. Fiber Optic Communications–D. K. Mynbaev, S. C. Gupta and Lowell L. Scheiner, PearsonEducation,2005.
4. Text Book on Optical Fibre Communication and its Applications–S. C. Gupta, PHI, 2005.
5. Fiber Optic Communication Systems – Govind P. Agarwal, John Wiley, 3rd Ediition,2004.
6. Fiber Optic Communications – Joseph C. Palais, 4th Edition, Pearson Education.

ECE7217

Data Communication

Data Transmission, data encoding, digital data communication technique, protocol, interface standard. Error detection and error correction techniques, nature of transmission errors, error detection codes, error correction codes, retransmission codes. Multiplexing and de-multiplexing techniques viz. TDM, FDM, OFDM, WDM, DWDM.

Introduction to transmission media and network topologies. MAN, LAN, WAN and their comparative study. Pseudo-Noise(PN)sequences (Properties and Circuit Implementation), Spread-Spectrum Modulation (theory and applications), Spread-Spectrum techniques, Direct-Sequence Spread Spectrum(DSSS), Frequency Hopping Spread-Spectrum and Time Hopping Spread-Spectrum.

Synchronous and asynchronous networks, bit and frame synchronization. Circuit switching, message switching and packet switching, relative advantages and disadvantages. Routing techniques, flooding static routing, centralized routing, distributed routing. Multiple access schemes viz. TDMA, FDMA, ALOHA, CSMA techniques.

References:

1. Data Communications and Computer Networks by W. Stallings
2. Data Communications and Computer Networking by Behrouz Forouzan

HUM7317C

Industrial Organization and Management

Industry, meaning of Industrialization, Industrial revolution, Need problems and prospects of Industrial change in the developing countries. Industrial Evolution in India. Downfall of early industries, evolution of modern industry, effects of partition, industrial policy and progress after independence. Forms of Industrial Organization: a) Single Proprietorship, b) Partnership ,c) Joint Stock companies, d) Cooperatives and e) State Enterprises.

Growth of Industry and Management Meaning of industrial management, functions and tools of management, growth of management concepts. Objectives of Industrial Management: Defining management objectives, managerial activity and objectives, tests of management of objectives, primary, secondary personal and social objectives of management. Management Organization: Various forms of organization of departmentalization line staff, functional and committee organization, formal and non formal organization.

Management and Authority. Decision Making in Management. Leadership, Definition, Traits, inborn traits, acquired traits, analytical etc. Marketing of Industrial Products and the Sales Manager. Personal Management: Recent changes in personal management function of personal departments, sections, training and placement other functions of personal department.

References:

1. Principles of Management by G. R. Terry
2. Industrial Organization & Management by Tara Chand
3. Business Organization & Management by M. C. Suckla

ECE7417

Microwave Engineering & Radars

Microwave Semiconductor Devices: Classification of Microwave Devices, Point Contact diode; Tunnel Diode; Gunn Diode, two valley structures, mode of operation, circuit realization. IMPATT Diode, circuit realization. PIN diode, basic principles of operation equivalent circuit, and application as switch, modulator and Phase shifter .Microwave Bi-polar and Field effect Transistors-Characteristics and performance.

Microwave Waveguides: Fundamentals of Microwave Waveguides, Rectangular Waveguides, TE & TM modes in Rectangular magnitudes, excitation of modes in Rectangular Wave guides. **Microwave Components:** Microwave Hybrid Circuits: Waveguide tee: E-plane tee, H-plane tee, Magic tee, hybrid rings (rat-race circuits), directional Couplers, S-Matrix of direction Coupler. Circulators and isolators. Microwave filters, Duplexers Scattering matrix representation of multiport network, properties of S-parameters.

Microwave Amplifiers & Oscillators : Microwave tubes: lead inductance and Inter electrode capacitive effects Transient angle effect, Gain bandwidth Limitation, Cavity Resonators, Klystrons: Multi-cavity Klystron and Reflex Klystron, Gunn Oscillator, Magnetron oscillator. **Radar Systems** Radar Equation, CW and frequency Modulated radar, MTI and Pulse Doppler Radar, Radar Receivers, Radar Beacon, Tracking Concepts.

References:

1. Liao, S. Y, Microwave Devices & Circuits, PHI
2. David Pozar, Microwave Engineering, John Wiley
3. R E Collin: Foundations for Microwave Engineering, Mc Graw Hill
4. Skolnik: Introduction to Radar Engineering, Mc Graw Hill

ECE7517

Power Systems

DC and AC Distribution System: Introduction to a power system (an overall view) distribution systems Feeder, distribution, service Mains classification, connection schemes, various types of DC and AC distributors, voltage drop calculations.

Overhead AC Transmission lines: Line Parameters, types of conductors. Aluminium Core Steel Reinforced (ACSR) etc. Stranding, bundling of conductors, Resistance calculations, skin effect, proximity effect. Inductance and capacitance and capacitance of single Phase, 3 phase, single circuit and double circuit lines. Representations and performance of short medium and log lines, ABCD constants, surge impedance, Feranti effect, Power flow through a transmission lines.

Insulators for overhead lines: Materials for insulators, types of insulators, potential distribution over a string of suspension insulators, methods for equalizing the potential. **Interference of power lines with communication circuits, Electrostatic and electromagnetic effect. Corona:** Visual and critical disruptive voltage, conditions effecting corona, former loss due to corona, Practical consideration. **Mechanical design of transmission lines.** Sag and tension calculations.

References

1. Elements of Power System Analysis by W. D. Stevenson
2. Transmission & Distribution of Electrical Energy by H. Cotton & Barber
3. Power System Engg. by Nagrath & Kothari 4. Electrical Power Systems by C. L. Wadwa

ECE7217L

Data Communication & MICROWAVE LAB.

1. Study of Serial Port Study of Parallel Port
2. Study of Synchronous Serial Communication Study of Asynchronous Serial Communication
3. Study of PC-PC Serial Communication using RS-232 cable Study of different Modem used in Serial Communication Study of Flow controls in Serial Communication
4. Study of Protocols in Serial Communication Study of Fiber Optic Communication
5. Study of Modem Communication Study of Wireless Communication
6. Study of PC-PC Parallel Communication using DB25 cable Study of printer interface using parallel port
7. Study of various multiplexing techniques using kits.
8. Study of Various Data encoding Techniques.

Microwave Engineering & Radar Lab Experiments:

1. Study of Microwave components and Instruments
2. To plot and study the V-I characteristics of a Gunn diode.
3. Tuning of Gunn Oscillator
4. To study the characteristics of reflex Klystron
5. Tuning of Klystron Oscillator
6. To study the Characteristics of Detector.
7. To measure the Frequency using direct reading frequency meter and compare it with indirect frequency meter.
8. To study the properties of E- and H-plane waveguide tee junctions and to determine isolations, coupling coefficients and input VSWR.
9. To measure VSWR, Insertion loss and attention of fixed and variable attenuator
10. Measurement of Directivity and Coupling coefficient of a directional coupler
11. To match impedance for maximum power transfer using a slide screw tuner
12. Study of Radar using Educational Trainer Kit.

ECE7117L

OFC Lab

1. Setting up fiber optic analog link.
2. Study of losses in optical fiber.
3. Study of numerical aperture of optical fiber.
4. Study of time division multiplexing (digital).
5. Study of framing in time division multiplexing.
6. Study of Manchester coding and decoding.
7. Study of voice coding and codec chip.
8. Study of characteristics of fiber optic LED's and photo detector.

ECE7517L

Power Systems Lab

1. A.C distribution

2. D.C. distribution

3. Efficiency, Regulation & ABCD parameters of Transmission line

4. Study of cables & find charging current.

5. Study of different types of insulators.

6. Computer Simulation of Power System.

ECE7317

Seminar & Pre-project

Seminar

The students are required to prepare a seminar report and presentation based on the latest trends and technologies in their respective fields of study. The work is to be carried out in the 6^{th} semester of their course individually. Each student will have to deliver a presentation before a panel of experts based on the seminar work carried by him/her.

Pre-project description

The pre-project work is carried out by students in a group. The group comprises of a minimum of three and a maximum of 5 students. In the pre project work students shall choose a specific topic/area for the project. The selected areas shall encompass recent and emerging trends in technologies that prove beneficial for society in general and humanity in particular. Supervisors will be assigned to each group in the beginning of the 7^{th} semester of their course. Each student at the end of the course will submit a Project report and the workable prototype regarding the project and the same will be evaluated for final award of the course.

8th Semester

ECE8117

Wireless and Mobile Communication

Introduction to Cellular Mobile Systems: A basic cellular system, performance criteria, uniqueness of mobile radio environment, operation of cellular systems, planning a cellular system, analog & digital cellular systems. **Elements of Cellular Radio Systems Design:** General description of the problem, concept of frequency reuse channels, co-channel interference reduction factor, desired C/I from a normal case in an omnidirectional antenna system, cell splitting, consideration of the components of cellular systems.**Cell Coverage for Signal & Traffic:** General introduction, obtaining the mobile point to point mode, Radio propagation characteristics: models for path loss, shadowing and multipath fading Propagation over water or flat open area, foliage loss, propagation nearin distance, long distance propagation, point to point prediction model characteristics, cellsite, antenna heights and signal coverage cells, mobile to mobile propagation.

Cell Site Antennas and Mobile Antennas: Characteristics of antennas, antenna at cell site, mobile antennas **Frequency Management, Channel Assignment and handoff:** Frequency management, fixed channel assignment, non-fixed channel assignment, traffic & channel assignment, handoff, types of hand off and their characteristics, hand off analysis, dropped call rates & their evaluation.

Multiple access techniques used in mobile wireless communications: FDMA/TDMA, CDMA. FDM / TDM Cellular systems, Cellular CDMA, soft capacity, Earlang capacity comparison of FDM / TDM systems and Cellular CDMA. **Global System for Mobile Communication (GSM) system overview**: GSM Architecture, Mobility management, Network signaling ,Frequency allocation and control, Base System and Master System, GSM, DCS1800, Various value added services.

References:

1. Wireless Communication; Principles and Practice; T. S. Rappaport
2. Principles of Mobile Communication, G. L Stuber Kluwer Academic, 1996.
3. Wireless and Digital Communications; Dr. Kamil o Feher (PHI)
4. Mobile Communication HandBook; 2nd Ed.; IEEE Press
5. Mobile Communication Engineering– Theory & Applications; TMH

ECE8117L

Wireless and Mobile Communication Lab

List of Experiments:

1. Study of Dual SIM Phone.
2. Study of GSM.
3. Study of 3G.
4. Study of CDMA.
5. Study of Bluetooth.

Project

In the final project the students are required to extend the pre-project work for the final submission of the course. The final project work is to be carried out in the last semester of their respective fields of study. The supervisors will guide the students from the beginning of the pre-project in 7^{th} semester to its accomplishment as a final project in the 8^{th} semester.
The students will be asked to submit a project report (one copy per student) in a group. These reports will be evaluated in partial fulfilment for the award of the degree of bachelors of engineering in their respective branches of study.

ECE8317

Practical Training Viva / Professional Viva

Practical /Industrial Training/Internship:

The students have to undergo a minimum four week practical training/internship/industrial training at 5^{th} semester or 7^{th} semester level at any relevant industrial organization . The students will be asked to submit a Practical training report (one copy per student). These reports will be evaluated in partial fulfillment for the award of the degree of bachelors of engineering in their respective branches of study.

Professional Viva:

The students have to undergo professional Viva at eighth semester level, The professional viva is to be taken by an external examiner, and includes the overall and in-depth assessment of all the subjects taken in all the semesters.