SYLLABUS

For

B.TECH. PROGRAMME

In

ELECTRONICS & COMMUNICATION ENGINEERING

INSTITUTE OF TECHNOLOGY

UNIVERSITY OF KASHMIR

ZAKURA CAMPUS

SRINAGAR, J&K, 190006

Autumn Session, 2017

COURSE STRUCTURE
B.Tech 1st Semester
University of Kashmir, Zakura Campus

Course Code	Course Title	Teaching Periods Per Week			Credits
		L	T	P	
MTH-1117B	Engineering Mathematics-I	3	1	0	4
PHY-1217B	Engineering Physics	3	1	0	4
ELE-1317B	Basic Electrical Engineering	3	1	0	4
CSE-1417B	Fundamentals of Computer Programming	2	1	0	3
HUM-1517B	Communication Skills	2	1	0	3
MEE-1617B	Engineering Drawing	3	1	0	4
PHY-1217BL	Engineering Physics Lab	0	0	2	1
ELE-1317BL	Basic Electrical Engineering Lab	0	0	2	1
CSE-1417BL	Fundamentals of Computer Programming Lab	0	0	2	1
Total		16	6	6	25

COURSE STRUCTURE
B.Tech 2nd Semester
University of Kashmir, Zakura Campus

Course Code	Course Title	Teaching Periods Per Week			Credits
		L	T	P	
MTH-2117B	Engineering Mathematics-II	3	1	o	4
CHM-2217B	Engineering Chemistry	3	1	0	4
ECE-2317B	Basic Electronics Engineering	3	1	0	4
MEE-2417B	Computer Aided Drawing	2	1	2	4
MEE-2517B	Fundamentals of Mechanics	3	1	0	4
CHM-2217BL	Engineering Chemistry Lab	0	0	2	1
ECE-2317BL	Basic Electronics Engineering-Lab	0	0	2	1
MEE-2617BW	Workshop Practice	2	0	2	3
Total		16	5	8	25

3rd Semester

Course No	Subject	*Teaching Periods*			*Credits*
		Lect	*Tut*	*Prac*	
MTH3117B	**Engineering Mathematics-III**	3	1	0	4
ECE3217B	**Network Analysis and Synthesis**	3	1	0	4
ECE3317B	**Analog Electronic Circuits-I**	3	2	0	5
ECE3417B	**Signals and Systems**	3	1	0	4
ECE3517B	**Material Science**	3	1	0	4
ECE3217BL	**Network Analysis and Synthesis Lab**	0	0	2	1
ECE3317BL	**Analog Electronic Circuits Lab – I**	0	0	2	1
ECE3617BL	**EDA Tools Lab**	0	0	4	2
Total		15	6	8	25

4th Semester

Course No	*Subject*	*Teaching Periods*			*Credits*
		Lect	*Tut*	*Prac*	
MTH4117B	**Engineering Mathematics – IV**	3	1	0	4
ECE4217B	**Analog Electronic Circuits-II**	3	2	0	5
ECE4317B	**Communication Systems- I**	3	1	0	4
ECE4417B	**Electromagnetic Fields and Waves**	3	1	0	4
ECE4517B	**Digital Electronics and Logic Design**	3	1	0	4
ECE4217BL	**Analog Electronics Circuits- II Lab**	0	0	2	1
ECE4517BL	**Digital Electronics and Logic Design Lab**	0	0	2	1
ECE4617BL	**Communication Systems-I / EMF Lab**	0	0	4	2
Total		15	6	8	25

5th Semester

Course No.	Subject	Teaching Periods			Credits
		Lect	Tut	Prac	
ECE5117B	**Digital Signal Processing**	3	1	0	4
ECE5217B	**Electrical Machines**	3	1	0	4
ECE5317B	**Digital Communication and Information Theory**	3	1	0	4
ECE5417B	**Microprocessors**	3	2	0	5
ECE 5517B	**Control Systems**	3	1	0	4
ECE5117BL	**DSP Lab**	0	0	2	1
ECE5217BL	**Electrical Machines Lab**	0	0	2	1
ECE5417BL	**Microprocessors Lab**	0	0	2	1
ECE 5517BL	**Control Systems Lab**	0	0	2	1
Total		15	6	8	25

6th Semester

Course No	*Subject*	*Teaching Periods*			Credits
		Lect	*Tut*	*Prac*	
ECE6117B	**Communication Systems - II**	**3**	**1**	**0**	**4**
ECE6217B	**Microcontrollers and Embedded Systems**	**3**	**1**	**0**	**4**
ECE6317B	**Computer Organization and Architecture**	**3**	**1**	**0**	**4**
ECE6417B	**Electronic Measurement & Instrumentation**	**3**	**2**	**0**	**5**
ECE6517B	**Power Electronics**	**3**	**1**	**0**	**4**
ECE6217BL	**Microcontrollers and Embedded Systems Lab**	**0**	**0**	**2**	**1**
ECE6517BL	**Power Electronics Lab**	**0**	**0**	**2**	**1**
ECE6617BL	**Electronic Measurement & Instrumentation / Communication Systems –II Lab**	**0**	**0**	**4**	**2**
	Total	**15**	**6**	**8**	**25**

7th Semester

Course No	*Subject*	*Teaching Periods*			Credits
		Lect	*Tut*	*Prac./ Proj.*	
ECE7117B	**VLSI Design**	3	1	0	4
ECE7217B	**Data Communication**	3	1	0	4
ECE7317B	**Microwave Engineering**	3	1	0	4
ECE7417B	**Power Systems**	3	1	0	4
ECE7**17BE	**Elective – I**	3	1	0	4
ECE7117BL	**VLSI Lab**	0	0	2	1
ECE7217BL	**Data Communication Lab**	0	0	2	1
ECE7317BL	**Microwave Engineering Lab**	0	0	2	1
ECE7417BL	**Power Systems Lab**	0	0	2	1
ECE7517B	**Seminar & Pre-project**	0	0	2	1
	Total	15	5	10	25

8th Semester

Course No	*Subject*	*Teaching Periods*			*Credits*
		Lect	*Tut*	*Prac /Proj*	
ECE8117B	**Wireless Communication**	3	1	0	4
MTH8217B	**Engineering Mathematics-V**	3	1	0	4
ECE8**17BE	**Elective II**	3	1	0	4
ECE8117BL	**Wireless Communication Lab**	0	0	2	1
ECE8317B	**Project**	-	0	16	8
ECE8417B	**Practical Training Viva / Professional Viva**	-	-	0	4
	Total	9	3	18	25

List of Electives **ECE-X**17BE**
where
X=7 or 8
and
****** is as per **S. No**. below:

S. No.	TOPIC
01	Data Structures
02	Industrial Organization and Management
03	Advanced Computer Networks
04	Advanced Control Systems
05	Advanced Power Electronics
06	Analog and Mixed Signal Design
07	Nanotechnology & Nano-electronics
08	RF Design
09	Quantum Devices and Computing
10	TV Engineering
11	System Design
12	MM Wave Communication
13	Molecular Electronics
14	Theory of Computation
15	Compiler Design
16	RISC Architecture
17	Systems Programming
18	Telemedicine
19	Java Programming & Web Tech.
20	GIS & Remote Sensing
21	Mobile Computing
22	Distributed computing
23	High Speed Networks Client Server
24	Computer Vision & Robotics
25	Real Time Systems
26	H.R. Management
27	Managerial Economics
28	Enterprise network Management
29	E-commerce Strategic IT Management
30	Enterprise Resource Management
31	Technology Management
32	Decision support & Executive Management
33	Software Technology
34	DSP Core

35	Digital Image Processing
36	Optical Communications
37	VLSI Technology
38	Molecular Electronics
39	Computer & Network Security
40	Software Technology
41	Telemedicine
42	Real Time operating systems
43	Compiler Design
44	Virtual Instrumentation
45	Advanced Instrumentation Technologies
46	Biomedical Instrumentation
47	Wireless Sensor Networks
48	Internet of Things (IOT)
49	Artificial Intelligence and Machine Learning
50	Solid State Physics
51	Process Control Instrumentation

FIRST SEMESTER

COURSE CODE:
MTH-1117B

ENGINEERING MATHEMATICS - I

Credits: 04

S. No	Topics	Number of Hours
1.	Calculus: Differential calculus of functions of several variables, Partial differentiation, Homogeneous functions and Euler's theorem,	8
2.	Taylors and Maclaurin's series, Taylor's theorem and mean value theorem for functions of two variables, Errors and approximations	8
3.	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.	9
4.	Applications of Definite Integrals: Application of definite integrals to area, arc length, surface area and volume, Double integrals, Triple integrals.	8
5.	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	9
6.	Application of Vector Calculus: Flux, solenoidal and irrotational vectors, Green's, Gauss' and Stokes' theorems and their applications.	8
Total number of Hours		50

Text Books:

S. No	Name of Book	Author	Publisher
1.	Advanced Engineering Mathematics	Kreyszig E	John Wiley, Singapore
2.	Advanced Engineering Mathematics	Jain, R K and Iyengar S R K	Narosa Publishing House
3.	Differential Calculus	Das & Mukherjee	U.N. Dhur & Sons Pvt. Ltd
4.	Integral Calculus	Das & Mukherjee	U.N. Dhur & Sons Pvt. Ltd

COURSE CODE:
PHY-1217B

ENGINEERING PHYSICS

Credits: 04

S. No	Topics	Number of Hours
1.	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	7
2.	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	7
3.	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.	6
4.	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	7
5.	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.	6
6.	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.	6
7.	Quantum Theory: The Compton effect, matter waves; group and phase velocities, Uncertainty principle and its application; time independent and time dependent	5
8.	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).	6
Total number of Hours		50

Text Books:

S. No	Name of Book	Author	Publisher
1.	Introduction to Electrodynamics	Griffiths D	Prentice Hall of India
2.	Perspective of Modern physics	Beiser	McGraw-Hill
3.	Elementary Modern Physics	Arya A P	Addison-Wesley, Singapore
4.	Introduction to Modern Physics	Mani, H S and Mehta G K	Affiliated East West Press, New Delhi

COURSE CODE:
ELE-1317B

BASIC ELECTRICAL ENGINEERING

Credits: 04

S. No	Topics	Number of Hours
1.	Review of basic electrical Signals, Review of electric circuit concepts, Terminology, Electric circuit parameters (Resistance, Conductance, Inductance, Capacitance, Reactance, Impedance), Basic electric circuit terminologies: Nodes, Junctions, Paths, Loops, Branches, Series and Parallel combinations of resistance.	3
2.	Ideal and practical voltage and current sources and their transformation, Dependent Sources, Power and energy relations, Ohm's law: validity of ohms law, Ohmic and non Ohmic conductors, applications of ohms law.	5
3.	Introduction to D.C. voltage & Current and D.C. circuits, Voltage and current Divider Laws, Kirchhoff's current law (KCL) and Kirchhoff's voltage law (KVL), Analysis of series & parallel D.C. Circuits: Loop analysis of D.C. Circuits, Nodal methods of analysis, Mesh analysis, Super node, and Super mesh.	8
4.	Super-position theorem, Thevenin's theorem, Norton's theorems, Maximum power transfer theorem, Reciprocity & Millman's theorem, Delta-Star (Y) Transformations.	7
5.	Introduction to Alternating Voltage & Current and A.C. circuits, Basic terminology and definitions (Signal, Parameters, Generation, Applications, non-sinusoidal A.C.'s, EMF Equations, Mean, Average, RMS, Peak, and Form Factor), Complex number representation of A.C. circuits.	7
6.	Phasor representation of A.C. circuits, Solutions of sinusoidally excited RLC circuits, Power and energy relations in A.C. circuits, Concepts of active & reactive powers.	7
7.	Applications of network theorems to A.C. circuits, Resonance in series and parallel circuits.	6
8.	Single and three phase A.C. systems, Analysis of 3 phase systems, Current and voltage relationships in Y-Δ&Δ-Y configurations, Balanced / un-balanced systems.	7
Total number of Hours		50

Text Books:

S. No	Name of Book	Author	Publisher
1.	Fundamentals of Electric Circuits	Alexander & Sadiku	McGraw-Hill
2.	Engineering circuit Analysis	Hayt & Kimberly	McGraw-Hill
3.	Electric Engineering Fundamentals	Vincent Del Toro	PHI
4.	Introduction to Circuit Analysis & Design	Glisson	Springer
5.	Basic Electric Circuit Analysis	Johnson, Hilburn, Johnson	Wiley

COURSE CODE:
CSE-1417B

FUNDAMENTALS OF COMPUTER PROGRAMMING

Credits: 03

S. No.	Topic	No. of Hours
1.	Introduction to Programming and Problem Solving – Types of Programming Languages- Machine Level, Assembly level, and High Level language.	2
2.	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.	5
3.	Simple C programs Conditional Statements and Loops -Decision making within a program, Conditions, Relational Operators, Logical Connectives, if statement, if-else statement.	5
4.	Loops: while loop, do while, for loop, Nested loops, Infinite loops, Switch statement, structured Programming.	4
5.	Arrays - one dimensional array: 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.	6
6.	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.	6
7.	Structures and Unions - Structure , nested structure, structures and functions, structures and arrays: arrays of structures, structures containing arrays, unions,	5
8.	Pointers- Address operators, pointer type declaration, pointer assignment, pointer initialization, pointer arithmetic, functions and pointers, Arrays and Pointers, pointer arrays.	6
Total		39

Text Books:

S. No	**Name of Book**	**Author**	**Publisher**
1.	Programming with C	Byron Gottfried	Pearson Education
2.	Programming with ANSI & Turbo C	A. Kamthane	Pearson Education
3.	Programming in C	Pradip Dey, Manas Ghosh	Oxford University Press
4.	Programming Language Concepts and Constructs	Ravi Sethi	Pearson Education

COURSE CODE:
HUM-1517B

COMMUNICATION SKILLS

Credits: 03

S. No.	Topic	No. of Hours
1.	Communication: Meaning, its types, significance, process, Channels, barriers to Communication, making communication effective, role in society, Communication model.	5
2.	Discussion Meeting and Telephonic Skills: Group discussions, conducting a meeting, attending telephonic calls, oral presentation and role of audio visual aids.	5
3.	Grammar: Transformation of sentences, words used as different parts of speech one word substation, abbreviations, technical terms etc.	5
4.	Reading Skills: Process of reading, reading purposes, models, strategies, methodologies, reading activities.	4
5.	Writing Skills: Elements of effective writing, writing style, scientific and technical writing.	4
6.	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.	5
7.	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,	4
8.	Resume writing, Report Writing,	3
9.	Conducting a Meeting, Minutes of Meeting, Oral Presentation, Group Discussion, CV writing, Purchase order, Job Application Letter.	4
Total		39

Text Books:

S. No	**Name of Book**	**Author**	**Publisher**
1.	Effective Business Communication	Rodriques M V	Concept Publishing Company
2.	Handbook of Practical Communication Skills	Wright, Chrissie	Jaico Publishing
3.	An Approach to Communication Skills	Bhattacharya. Indrajit	Dhanpat rai Co
4.	Modern Business Correspondence	Gartside L	Pitman Publishing London
5.	How to Write and Publish a Scientific Paper	Day, Robert A	Cambridge University
6.	An Introduction to the Pronunciation of English	Gimson A C	ELBS

COURSE CODE:
MEE-1617B

ENGINEERING DRAWING

Credits: 04

S. No.	Topic	No. of Hours
1.	Introduction to engineering drawing (equipment, drafting tools, symbols and conventions in drawing), dimensioning, types of lines and their use, dividing a given straight line into any number of equal parts, bisecting a given angle, drawing a regular polygon given one side, special methods of constructing a pentagon and hexagon. Conic sections, ellipse, parabola, hyperbola, cycloid and trochoid.	04
2.	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 HP, line inclined to both the planes.	09
3.	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 in first and third quadrant, axis parallel to one and perpendicular to other.	09
4.	Section planes perpendicular to one plane and parallel or inclined to other plane.	09
5.	Development of prisms, pyramids and cylindrical & conical surfaces.	09
6.	Isometric projection and isometric views of different planes and simple solids, introduction to perspective projection.	10
Total		50

Text Books:

S. No	**Name of Book**	**Author**	**Publisher**
1.	Engineering Graphics and drafting	GillP, S	Katria and Sons
2.	Elementary Engineering Drawing-Plane and Solid Geometry	Bhat N.D.	Chartotar Publishing House
3.	Fundamentals of Engineering Drawing	Luzzad.W.J	Prentice Hall of India

COURSE CODE: PHY-1217BL

ENGINEERING PHYSICS LAB

Credits: 01

S. No.	Experiment
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 Fresnel's biprism/diffraction grating.
10.	To Determine Plank's Constant.

COURSE CODE:
ELE-1317BL

BASIC ELECTRICAL ENGINEERING LAB

Credits: 01

S. No	Experiment
1.	To study the colour coding of resistors
2.	Connection of Ammeters, Voltmeters, Wattmeters and multi-meters in DC and AC circuits and selection of their ranges.
3.	Use of LCRQ meter.
4.	To study the series / parallel operation of resistors and verifying their effective values by LCRQ meter.
5.	To verify the KVL and KCL in DC circuits.
6.	To verify the star delta transformation of networks.
7.	To verify the superposition theorem.
8.	To verify the maximum power transfer theorem
9.	Basic R, L, C circuits excited from A.C
10.	To measure electric power in single-phase AC circuits with resistive load, RL load and RLC load.
11.	To measure the power and power factor in three phase AC circuits.
12.	To study the series resonance.
13.	To study the parallel resonance.
14.	To study the handling of CRO and use it for the study of different voltage waveforms.

COURSE CODE: CSE-1417BL

FUNDAMENTALS OF COMPUTER PROGRAMMING LAB

Credits: 01

S. No.	Experiment
1.	Program to understand basic data types.
2.	Programming on looping and decision statements.
3.	Example of Fibonacci series program.
4.	Finding a factorial for a given number.
5.	Programs using i. Library functions. ii. Built-in math functions.
6.	Programs on i. functions ii. arrays iii. string manipulations iv. Structures and unions. v. Pointers. vi. Basic file operations.

SECOND SEMESTER

COURSE CODE:
MTH-2117B

ENGINEERING MATHEMATICS II

Credits: 04

S. No.	Topic	No. of Hours
1.	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	9
2.	Ordinary and Linear Differential Equations: Formation of ordinary differential equations, Solution of first order differential equations by separation of variables	7
3.	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	8
4.	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	9
5.	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, Bayes' Theorem.	9
6.	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	8
Total		50

Text Books:

S. No	**Name of Book**	**Author**	**Publisher**
1.	Advanced Engineering Mathematics	E. Kreyszig	John Wiley
2.	Advanced Engineering Mathematics	R. K. Jain & S. R. K. Iyengar	Narosa Publishing House
3.	Matrices	Frank Ayres	Mc Graw Hills
4.	Advanced Mathematical Analysis	Malik & Arrora	S. Chand &Co

COURSE CODE:
CHM-2217B

ENGINEERING CHEMISTRY

Credits: 04

S. No.	Topic	No. of Hours
1.	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	7
2.	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	7
3.	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.	7
4.	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.	6
5.	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.)	6
6.	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.	5
7.	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.	6
8.	Inorganic Systems:- Transition Metals, fundamental concepts of transition metal complexes, consequences of orbital splitting, colour 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.	6
Total		50

Text Books:

S. No	Name of Book	Author	Publisher
1.	Inorganic Chemistry	Shriver D F and Atkin A W	Oxford Press, Delhi
2.	Physical Chemistry	Castellan G W	Narosa
3.	Principles of Instrumental Analysis	Skoog D A, and Holles F J	Hercaurt Asia PTE Ltd
4.	Chemistry for changing times	Hill J W	Macmillan, Canada
5.	Engineering Chemistry	P. C. Jain	Dhanpat Rai & Sons
6.	Chemistry In engineering	L.A. Munro	Prentice Hall

COURSE CODE:
ECE-2317B

BASIC ELECTRONICS ENGINEERING

Credits: 03

S. No.	Topic	No. of Hours
1.	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.	6
2.	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.	4
3.	p-n junctions: contact potential-equilibrium Fermi levels- space charge at junctions- current components at a junction: majority and minority carrier currents.	4
4.	Diodes: volt-ampere characteristics-capacitance of p-n junctions. Diode as circuit element. Half wave - fullwave,Rectifiers:CentreTappedandbridgerectifiers-working-analysisanddesign-Cfilter analysis-	5
5.	Zenerandavalanchebreakdown-Zenerdiodes:volt-amperecharacteristics-regulatedpower supplies - IC based regulated power supplies.	4
6.	Tunnel diodes: tunneling phenomena -volt-ampere characteristics- Varactor diodes- Photo diodes: detection principle- light emitting diodes- volt-ampere characteristics.	4
7.	Transistors: BipolarjunctiontransistorsNPNandPNPtransistoraction-opencircuitedtransistor- biasing in active region-majority and minority carrier distribution- terminal currents- operation- characteristics.	5
8.	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.	3
9.	MOSFETS n-channel & p-channel. Depletion and enhancement modes.	4
Total		39

Text Books:

S. No	**Name of Book**	**Author**	**Publisher**
1.	Solid State Electronic Devices	B. G. Streetman	Prentice Hall of India
2.	Electronic devices and circuits	R. Boylsted and L. Nashelsky	Prentice Hall Publications
3.	Electronic devices	Floyd	Pearson Education
4.	Electronic Principles	Malvino	Tata McGraw Hill

COURSE CODE:
MEE-2417B
COMPUTER AIDED DRAWING

Credits: 04

S. No.	Topic	No. of Hours
1.	Thread forms: Thread terminology, sectional views of threads. ISO Metric (Internal & External), BSW (Internal and External), square, Acme and Sellers thread, American Standard thread.	5
2.	Hexagonal headed bolt and nut with washer (assembly), square headed bolt and nut with washer (assembly), Flanged nut, slotted nut.	6
3.	Locking arrangement for nuts: taper and split pin for locking Simple assembly using stud bolts with nut and lock nut, countersunk head screw, grub screw, Allen screw.	4
4.	Eye foundation bolt, Rag foundation bolt, Lewis foundation bolt and Cotter foundation bolt.	2
5.	Riveted joints: Forms and proportions of rivet heads, Different views of different types of riveted Lap and Butt joints.	4
6.	Shaft joints: Cotter joint and Knuckle joint, Socket and Spigot joint.	4
7.	Shaft coupling: Muff, Flanged, Flexible, Universal and Oldham's coupling.	4
8.	Shaft bearing: Solid and bush bearing, Plummer block, Footstep bearing.	6
9.	Spur gear in mesh with approximate construction of tooth profile, Rack and pinion.	5
10.	Assembly and detailed drawings of Engine Parts: Piston, Stuffing box, cross head, Vertical & Horizontal engine, Connecting rod, Crank, Eccentric. Valves: Steam stop valves, Feed check valve, Safety valves, Blow off cock.	10
Total		50

Text Books:

S. No	Name of Book	Author	Publisher
1.	Machine Drawing	Bhat. N. D	Charotar Publishing house
2.	Machine Drawing	GillP, S	Katria and Sons

COURSE CODE: MEE-2517B
FUNDAMENTALS OF MECHANICS

Credits: 04

S. No.	Topic	No. of Hours
1.	Equilibrium of a particle, Condition for the Equilibrium of a Particle, The Free-Body Diagram, Coplanar Force Systems, Three-Dimensional Force Systems	02
2.	Force System Resultants Moment of a Force—Scalar Formulation, Cross Product, Moment of a Force—Vector Formulation, Principle of Moments, Moment of a Force about a Specified Axis, Moment of a Couple, Simplification of a Force and Couple System, Further Simplification of a Force and Couple System, Reduction of a Simple Distributed Loading.	06
3.	Moments of Inertia Definition of Moments of Inertia for Areas, Parallel-Axis Theorem for an Area, Radius of Gyration of an Area, Moments of Inertia for Composite Areas, Product of Inertia for an Area, Moments of Inertia for an Area about Inclined Axes.	05
4.	Planar Kinematics of a Rigid Body, Translation: Rotation about a Fixed Axis, Absolute Motion Analysis, Relative-Motion Analysis (velocity), Instantaneous Centre of Zero Velocity, Relative-Motion Analysis (acceleration),Relative-Motion Analysis using Rotating Axes.	05
5.	Planar Kinetics of a Rigid Body, Force and Acceleration: Mass Moment of Inertia, Planar Kinetic Equations of Motion (translation, rotation about a fixed Axis, General Plane Motion).	07
6.	Planar Kinetics of a Rigid Body, Work and Energy: Kinetic Energy, The Work of a Force, The Work of a Couple Moment, Principle of Work and Energy, Conservation of Energy.	07
7.	Planar Kinetics of a Rigid Body, Impulse and Momentum: Linear and Angular Momentum, Principle of Impulse and Momentum, Conservation of Momentum, Eccentric Impact.	06
8.	Three-Dimensional Kinematics of a Rigid Body: Rotation About a Fixed Point, The Time Derivative of a Vector Measured from Either a Fixed or Translating-Rotating System, General Motion, Relative Motion Analysis Using Translating and Rotating Axes.	06
9.	Three-Dimensional Kinetics of a Rigid Body: Moments and Products of Inertia, Angular Momentum, Kinetic Energy, Equations of Motion, Gyroscopic Motion, Torque-Free Motion.	06
Total		50

Text Books:

S. No	Name of Book	Author	Publisher
1.	Dynamics	Hibbeler, R.C	Prentice Hall
2.	Statics	Hibbeler, R.C	Prentice Hall
3.	Engineering Mechanics: Vol.1, Statics	Meriam, J.L., Kraige, L.G	John Wiley & Sons
4.	Engineering Mechanics: Vol.2, Dynamics	Meriam, J.L., Kraige, L.G	John Wiley & Sons

COURSE CODE: CHM-2217BL

ENGINEERING CHEMISTRY LAB

Credits: 01

S. No.	Experiment
1.	To draw the pH-titration curve of strong acid vs. strong base
2.	Standardization of $KMnO_4$ 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 CODE:
ECE-2317BL

BASIC ELECTRONICS ENGINEERING LAB

Credits: 01

S. No.	Experiment
1.	Characterize various commercial diodes on the basis of voltage and current ratings. Study/simulation of their I-V characteristics using multi-sim/p-spice.,
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
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 CODE:

MEE-2617BW

WORKSHOP PRACTICE

Credits: 03

S. No.	Topic	Number of Hours
1.	Machining section (a) Theoretical instructions: Safety precautions, working 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.	06
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 metal materials. (b) Practical demonstrations: Exercise in rating, soldering and brazing of making jobs of various materials such as trays, flower vases, photo frame etc., and 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.	06
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 450, preparation of stud to cut external threads with the help of dies, drilling, countersinking, 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 equipment's. Aim: To assemble the mild steel work pieces with radius fitting.	04
4.	Welding Section (a) Theoretical instructions:Safety precautions, introduction of all welding processes like gas welding, MIG welding, TIG welding, submerged arc welding and spot welding, advantages and disadvantages over electric arc welding and their applications, welding techniques like right ward, left ward and over head, various fluxes and electrode used in welding, difference between A.C. and D.C. 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 make V-butt joint, out-side corner joint and head tee-joint	06
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, mouldings and its composition and preparation, moulding methods, core	06

	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, aluminum, waxes etc. by using different types of patterns. Aim: To prepare a greens and 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.	06
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, mortise 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 prepare scarf joint and pen-stand as per the drawing.	05
Total		39

List of books recommended:-

1. Workshop Technology by Chapman Vol.I.
2. Workshop Technology by Hajra Chowdhary, Vol. II.
3. Workshop Technology by Swarn Singh, Vol.I.
4. Workshop Technology by Virender Narula, Vol. I.

3rd Semester

Course No	Subject	Teaching Periods		Credits
		Lect	Tut	
MTH3117B	Engineering Mathematics-III	3	1	4

Section	Course contents	hours
1.	Laplace transform, shifting theorem	4
2.	Laplace transform of differential functions	4
3.	Heaviside's unit step function	2
4.	Dirac-delta function and its laplace transform	2
5.	Heaviside's expansion theorem	2
6.	Inverse laplace transform	4
7.	initial and final value theorem	3
8.	Convolution theorem	1
9.	Applications of laplace transform in the solution of linear differential equations	4
10.	Fourier series, Harmonic Analysis	4
11.	Definition of Fourier transform, Fourier sine and Cosine Transform	3
12.	Fourier integral formulla	2
13.	Applications to solutions of BVP	2
14.	Z- transform, Definition , Linearity property	2
15.	Z- transform of elementary functions	3
16.	Shifting theorems,	2
17.	Initial and final value theorems, convolution theorem	3
18.	Inversion of Z- transform.	3
TOTAL HOURS FOR THE COURSE		**50**

References

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

Course No.	Subject	Teaching Periods		Credits
		Lect	Tut	
ECE3217B	Network Analysis and Synthesis	3	1	4

Section	Course contents	Hours
1	Charge and energy, capacitance, inductance and resistance parameters in the light of field and circuit concepts.	3
2	Approximate realization of a physical system as a circuit. Reference directions for currents and voltages, conventions for magnetically coupled circuits, Circuit topology.	4
3	First order differential equation: Differential equations as applied in solving networks. Application of initial conditions. Evaluating initial conditions in networks.	6
4	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	6
5	Network theorems and impedance functions: Complex frequency, transformer impedance and transform circuits, series and parallel combination of elements	5
6	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.	5
7	Two port parameters: Relationship between two-port parameters. Admittance, impedance, transmission and hybrid parameters.	6
8	Relationship between parameter sets. Parallel connection of two port Networks. Characteristic impedance of two port networks.	5
9	Filters Filter fundamentals - pass & stop band, filter classification.	5
10	Constant-k and m-derived Filters	5
TOTAL HOURS FOR THE COURSE		**50**

Books Recommended

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

Course No.	Subject	Teaching Periods		Credits
		Lect	Tut	
ECE3317B	Analog Electronic Circuits-I	3	2	5

Section	Course contents	Hours
1	Bipolar Junction Transistors (BJT) fundamentals: transistor configurations, DC operating point, BJT characteristics & parameters, fixed bias,	3
2	emitter bias with and without emitter resistance, analysis of above circuits and their design,	2
3	variation of operating point and its stability.	3
4	BJT AC Analysis	3
5	BJT Transistor Modeling, The re transistor model, Common emitter fixed bias, Voltage divider bias, Emitter follower configuration.	3
6	Emitter follower configuration;Complete Hybrid equivalent model, Hybrid π Model.	2
7	Multistage Amplifiers: Need for multistage amplifier, Gain of multistage amplifier, Different types of multistage amplifier like RC coupled,	3
8	transformer coupled, direct coupled, and their frequency response and bandwidth.	2
9	Feedback Basics: Negative feedback, Effect of negative feedback on the performance of amplifiers e.g. on bandwidth.	3
10	Types of feedback amplifiers, current shunt, current series,	5
11	voltage shunt, and voltage series feedback. Analysis of feedback amplifiers circuits.	3
12	Field Effect Transistors: Construction	3
13	Characteristics of JFETs, Transfer Characteristics,	3
14	Depletion type MOSFET, Enhancement type MOSFET. ,	3
15	FET Amplifiers: JFET small signal model, Fixed bias configuration,	3
16	Self bias configuration, Voltage divider configuration,	2
17	Common Gate configuration.	2
18	Source-Follower Configuration, Cascade configuration.	2
TOTAL HOURS FOR THE COURSE		**50**

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 Application,”
3. Fundamentals of Microelectronics, Behzad Razavi, John Wiley
4. J.Millman & C.C.Halkias―Integrated Electronics, TMH
5. K. A. Navas, “Electronics Lab Manual”, Volume I, PHI

Course No.	Subject	Teaching Periods		Credits
		Lect	Tut	
ECE3417B	Signals and Systems	3	1	4

Section	Course contents	hours
1	Introduction to Signals & Systems: Definition of a signal & System, Classification of Signals, Basic operations on Signals, Elementary Signals	3
2	Systems viewed as interconnection of operations, Properties of Systems, Sampling theorem, Graphical & Analytical proof of Band-limited signals	4
3	Impulse Sampling, Aliasing.	3
4	Linear Time Invariant (LTI) Systems:	2
5	Time-Domain representation & Characterization of LTI systems,	3
6	Impulse response representation, Convolution integral & Convolution sum,	5
7	properties of LTI systems, Stability criteria for LTI systems, Elements of Continuous time & Discrete-time LTI systems.	2
8	Fourier Representation of Signals Fourier representation of Signals, Continuous -time Fourier series and their properties	4
9	Application of Fourier series to LTI systems, Fourier Transform & its properties,	3
10	Applications of Fourier Transform to LTI systems, Discrete-time Fourier Transform & its properties.	3
11	Circular Convolution, Relationship to other transforms.	1
12	Laplace Transform: Introduction & Definition, Region-of- convergence,	1
13	Properties of Laplace transform, Inverse Laplace Transform, Applications of Laplace Transform in analysis of LTI systems,	5
14	Unilateral Laplace transform & its applications to solve differential equations, Analysis of Electric circuits	3
15	Z-Transform The Z-Transform, Region-of-convergence, properties of Z-Transform, Inverse Z-Transform,	4
16	Transform Analysis of Discrete-time LTI systems, Unilateral Z-Transform & its applications to LTI systems described by difference equations	4
TOTAL HOURS FOR THE COURSE		**50**

References

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

Course No.	Subject	Teaching Periods		Credits
		Lect	Tut	
ECE3517B	Material Science	3	1	4

S.No.	Topic	Hours
1	Crystal Structure: Fundamental concepts, Closed packed structures, Crystal systems, Crystallographic planes and directions, Miller indices, Point defects.	6
2	Free electron Theory , classification of solids into conductors ,Semiconductors and insulators, Effective mass	5
3	Dielectric Properties: Dielectric materials, Polarization mechanisms, Dipole moment, Dielectric strength, Methods for producing polarization, Application of dielectric materials.	6
4	Magnetic Properties: Basic concepts, Soft and hard magnetic materials, Ferrites, Selection techniques for applications, Magnetic recording, Magnetic memories.	5
5	Optical Properties: Index of refraction, Damping constant, Characteristic penetration depth and absorbance, Reflectivity and transmissivity, Atomic theory of the optical properties, Optical storage devices	7
6	Device Materials: Materials for resistors, capacitors and inductors. Superconductivity: Properties of superconductors, Applications of superconductors.	6
7	Semiconductor Materials: Intrinsic and extrinsic materials, Electron and hole concentrations at equilibrium, Temperature dependence of carrier concentrations, Conductivity and mobility,	6
8	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.	6
9	Si, Ge, GaAs and other binary semiconductors.	3
Total Hours		50

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.
4. Pillai S O “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.

Course No.	Subject	Teaching Periods	Credits
		P	
ECE3217BL	**Network Analysis and Synthesis Lab**	2	1

List of Experiments

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

Course No.	Subject	Teaching Periods	Credits
		P	
ECE3317BL	**Analog Electronic Circuits Lab-I**	2	1

List of Experiments

1. Study I-V characteristics of:
   a. PN junction diode
   b. zener diode
   c. varactor diode
   d. light emiting 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.

Course No.	Subject	Teaching Periods	Credits
		P	
ECE3617BL	**EDA Tools Lab**	4	2

List of Experiments

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.

4th Semester

Course No	Subject	Teaching Periods		Credits
		Lect	Tut	
MTH4117B	**Engineering Mathematics – IV**	3	1	4

Section	Course contents	hours
1.	Analytical Functions, C-R Equations	4
2.	Complex Integration	3
3.	Cauchy's Fundamental Theorem, Cauchy's Integral Theorem	3
4.	Cauchy's Inequality and Liouville's theorem on Integral Function	2
5.	Taylor's and Laurent's Expansions	3
6.	Zeroes and Poles of Analytic Functions	2
7.	Residues and Contour Integration	3
8.	Solution of Series	2
9.	Legendre's Functions, Rodrigues's Formula	3
10.	Generating Functions for Legendre's Polynomials and Recurrence Formulae	3
11.	Bessel's Functions	3
12.	Recurrence Formulae and Bessel's Functions of Integral Order.	3
13.	Continuous Wavelet Transform, Basic Properties of Wavelet Transform	3
14.	Discrete Wavelet Transform, Orthonormal Wavelets	3
15.	Multi Resolution Analysis	2
16.	Construction of Orthonormal Wavelets	2
17.	Daubchie's Wavelets and Algorithms	3
18.	Band limited wavelets, Balian low theorem	3
TOTAL HOURS FOR THE COURSE		**50**

References:

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

Course No.	Subject	Teaching Periods		Credits
		Lect	Tut	
ECE4217B	**Analog Electronic Circuits-II**	3	2	5

Section	Course contents	Hours
1.	Block diagram representation of a typical op-amp, Analysis op-amp ICC circuits, types, designations, packages,	3
2.	Pin configurations and power supplies. Ideal op-amp, equivalent circuit, open loop op amp configurations of differential, inverting and non-inverting amplifiers,	2
3.	Op amp feedback amplifier analysis, differential amplifier with one, two and three op amps.	3
4.	Op amp parameters - offset voltages and currents, bias current, drift, PSRR, CMRR, SNR, offset nulling methods	3
5.	AC performance of Op amp: Bandwidth, slew rate and frequency response.	3
6.	DC and AC amplifiers, peaking, summing scaling and averaging	2
7.	amplifiers, instrumentation amplifier, differential input and differential,	
8.	V to I and I to V converters, integrator,	3
9.	Differentiator comparator, non-linear amplifier.	2
10.	Sinusoidal oscillators: Basic Operations, analysis, Barkhausen's Criteria, Various types of oscillator circuits and their analysis, Design of Practical Oscillator Circuits.	3
11.	OPAMP based design of Phase shift oscillator, Wien bridge oscillator, square, triangular and sawtooth wave generator,	5
12.	voltage controlled oscillator, zero crossing detector, window detector.	3
13.	Non-linear IC applications using OPAMP: OPAMP Comparator, Schimtt Trigger, Sample and Hold Circuit, Active Filters,	3
14.	Effect of slew rate on waveform generation- monostable circuits- Principles of VCO circuits. Comparator Circuits: Zero Crossing Detector- Regenerative comparator circuits.	3
15.	Multivibrators and Wave Form Generators: Bistable multivibrators, Bistable circuit as a memory element, Generation of Square & Triangular waves using Astable multivibrator,	3
16.	Generation of the standard Pulse-The Monostable multivibrator, Integrated circuit Timers,	3
17.	Implementation of Astable, Monostable and Bistable multivibrators using 555 Timer, Various practical applications of 555 Timer.	2
18.	Power Amplifiers and Power Supplies: Classification of power amplifiers, Class A, Class B, Class AB and Class C power amplifiers;	2
19.	Analysis and design. Power supplies and IC regulators.	2
TOTAL HOURS FOR THE COURSE		**50**

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

Course No.	Subject	Teaching Periods		Credits
		Lect	Tut	
ECE4317B	**Communication Systems-I**	3	1	4

Section	Course contents	Hours
1.	Introduction to Analog modulation, AM, DSB/SC, SSB, VSB,	3
2.	AM, DSB/SC, SSB, VSB, detailed explanation, waveforms, and mathematical expressions	5
3.	Angle modulation, NBFM, WBFM	3
4.	Diode detector, Frequency discriminator,	2
5.	AM & FM, Transmitter	2
6.	Demodulation: AM and FM	3
7.	Signals Radio Receivers – AM & FM (Block diagram).	2
8.	Introduction to digital communication techniques	2
9.	ASK,FSK,PSK,DPSK,DEPSK,QPSK, M-ary PSK, ASK, FSK	5
10.	similarity of BFSK and BPSK	1
11.	Baseband signal receiver	2
12.	probability of error, probability of error using matched filter,	3
13.	the optimum filter, matched filter	2
14.	coherent reception, non-coherent detection of FSK,	2
15.	calculation of error probability of ASK,BPSK,BFSK,QPSK	4
16.	Introduction to Noise Analysis ,types of noise	2
17.	Performance of AM & FM Systems, in presence of noise	3
18.	Threshold in AM & FM, Demodulation,	2
19.	Pre-emphasis and De-emphasis in FM Systems	2
TOTAL HOURS FOR THE COURSE		**50**

Books Recommended

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

Course No.	Subject	Teaching Periods		Credits
		Lect	Tut	
ECE4417B	**Electromagnetic Fields and Waves**	3	1	4

Section	Course contents	Hours
1.	Review of Electric Field Coulombs law, Electric field due to a point charge,surface charge and volume charge, divergence and curl of E, Electric potential	4
2.	Review of Magnetic Field, Lorentz law, Biot Savarts law, B due to line current, Surface current and volume current densities, Divergence and curl of B, Magnetic Potential	4
3.	Maxwell's Equations,Maxwells =ns in Electrostatics and magnetostatics, in medium, final Maxwells =ns	2
4.	Potential functions, Boundary conditions	2
5.	Wave equation and its solution	2
6.	Electromagnetic Waves, Poynting Theorem,	3
7.	Phase and group velocity,	2
8.	Plane waves in lossless and lossy media,	3
9.	Wave propagation in Ferrites-Faraday Rotation and Birefrigerence.	3
10.	Normal and oblique incidence at plane conducting boundary	2
11.	Normal and oblique incidence at plane dielectric boundary	2
12.	Transmission Lines Transmission Line equations and solutions,	3
13.	Characteristic impedance and propagation constant	3
14.	Reflection and transmission coefficients, SWR	3
15.	Open and short circuit lines- their use as circuit elements at UHF	4
16.	Line impedance and admittance	3
17.	Smith Chart	2
18.	Impedance Matching	3
TOTAL HOURS FOR THE COURSE		**50**

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

Course No.	Subject	Teaching Periods		Credits
		Lect	Tut	
ECE4517B	**Digital Electronics and Logic Design**	3	1	4

Section	Course contents	hours
1.	Review of Number systems, Radix conversion, Binary and Hexadecimal Arithmetic.9's ,10's, 1's & 2's complements and their usage, Binary codes(Weighted and non-Weighted), Error detecting and Correcting codes, Applications of various binary digital codes.	6
2.	Introduction to Boolean Algebra, Theorems of Boolean algebra, Canonical forms, Representation of logical functions using Boolean Algebra, Truth Tables and Simplification using Boolean functions, Karnaugh map and Tabulation method	6
3.	Basic Logic Gates, Implementation of Boolean functions using various logic gates. Implementation of various Boolean functions using AND-OR-NOT ,NAND-NAND,NOR-NOR, OR-AND-NOT and DEDICATED Gate logic.	5
4.	**Digital Logic Families:** Introduction to bipolar Logic families:DDL, RTL, 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 on the basis of design parameters.	10
5.	Multiplexers and De-multiplexers, Encoders and Decoders, Code Converters, Adders, Subtractors, Multipliers, Parity Checker and Magnitude Comparator. Multiplexer and decoder logic. Implementation of various Boolean functions using multiplexer and decoder logic.	9
6.	**Introduction to Sequential logic,** Flipflops-SR,JK,D and T flipflops- Level triggering and edge triggering, Excitation tables-Counters-Asynchronous and synchronous Type Modulo counters, design with state equation state diagram, Shift registers.	10
7.	Memory organization, Classification, and characteristics of memories, Sequential memories, ROMs, R/W memories, Content Addressable memories, CCD memory, PLA, PAL and Gate Array.	6
TOTAL HOURS FOR THE COURSE		**52**

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

Course No.	Subject	Teaching Periods	Credits
		P	
ECE4217BL	**Analog Electronics Circuits- II Lab**	2	1

List of Experiments

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.

Course No.	Subject	Teaching Periods	Credits
		P	
ECE4517BL	**Digital Electronics and Logic Design Lab**	2	1

List of Experiments

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 Morgan's 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.

Course No.	Subject	Teaching Periods	Credits
		P	
ECE4617BL	**Communication Systems-I /EMF Lab**	4	2

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.

7. Familiarization with various Communication Techniques/Technologies using various Trainer Kits.

B. EMF Lab

1. Study of Transmission Line Concepts using Trainer Kit.

5th Semester

Course No	Subject	Teaching Periods		Credits
		Lect	Tut	
ECE5117B	Digital Signal Processing	3	1	4

Section	Course Contents	Hours
1.	Introduction: Limitations of analog signal processing, Advantages of digital signal processing and its applications; Some elementary discrete time sequences and systems;	3
2.	Basic elements of digital signal processing such as convolution, correlation and auto correlation, Concepts of stability, causality, linearity, difference equations.	4
3.	Frequency Domain Representation of Discrete Time Signal and Systems: Complex exponentials as Eigen functions of LTI systems;	3
4.	Fourier Transform of sequences. Fourier Transform theorems and symmetry properties of Fourier Transform.	3
5.	Sampling of Continuous Time Signals: Sampling and aliasing problem, Reconstruction of a continuous time signal from its samples.	3
6.	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.	3
7.	Z-Transform, Region of convergence.	1
8.	Properties of the Z-transform; convolution theorem; Parseval's relation.	4
9.	Unilateral Z-transform and its application to difference equations with non zero initial condition.	3
10.	Discrete Fourier Transform: DFT and its properties; Linear Periodic and Circular convolution	4
11.	Linear Filtering Methods based on DFT; Filtering of long data sequences	3
12.	Fast Fourier Transform algorithm using decimation in time and decimation frequency techniques; Linear filtering approaches to computation of DFT.	4
13.	Linear Phase FIR filters; Design methods for FIR filters; IIR filter design by Impulse Invariance, Bilinear Transformation, Matched Z-Transformation	4
14.	Frequency Transformation in the Analog and Digital Domain, Applications of DSP Processing	4
15.	Architecture of a Real time Signal Processing System, Digital Signal Processor Architecture, comparative study between a General Purpose Processor and Digital Signal Processor	3
16.	Evolution of Digital Signal Processors, Different types of Digital Signal Processors, Various practical DSP's.	3
TOTAL HOURS FOR THE COURSE		**52**

References

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

Course No.	Subject	Teaching Periods		Credits
		Lect	Tut	
ECE5217B	Electrical Machines	3	1	4

Section	Course contents	Hours
1.	Transformers: Operating principle, classification, construction, emf equation, phasor diagrams, equivalent circuit model, losses & efficiency, voltage regulation, frequency response, polarity test	6
2.	autotransformers, three- phase transformer connections, impedance matching	4
3.	isolation & instrument transformers	3
4.	D.C. Machines: Operating principle, generator & motor action, construction, types of excitation, emf & torque equations, power stages & efficiency. Commutation & Armature Reaction,	6
5.	characteristics & application of d.c generators, starting & speed control of d.c motors,	4
6.	characteristics & applications of d.c motors,	3
7.	electric braking	1
8.	Induction Machines: Three-phase induction motors. Principle of operation, construction, types.	3
9.	Rotating magnetic field, emf equation of an AC Machine, torque developed in an induction motor, equivalent circuit model, torque-speed characteristics, starting & speed control	6
10.	Single phase induction motors, starting, application	3
11.	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	6
12.	Synchronous Motor, principle, starting, hunting, damper windings	3
13.	Special Purpose Motors: Stepper Motor, Universal Motor, Shaded-pole Motor.	4
TOTAL HOURS FOR THE COURSE		**52**

Books Recommended

1. Electric Machinery by Fitzgerald
2. Electric Machinery by Nagrath

Course No.	Subject	Teaching Periods		Credits
		Lect	Tut	
ECE5317B	Digital Communication and Information Theory	3	1	4

Section	Course contents	Hours
1.	Discrete messages, concept of amount of information and its properties.	2
2.	Average information, Entropy and its properties. Information rate, Mutual information and its properties	5
3.	Introduction to Source coding, Advantages, Shannon's theorem, Shanon-Fano coding, Huffman coding, efficiency calculations	3
4.	Channel capacity of discrete and analog Channels, capacity of a Gaussian channel, bandwidth–S/N trade-off.	3
5.	Introduction to LINEAR BLOCK CODES, Matrix description of Linear Block codes	3
6.	Error Detection and error correction capabilities of Linear block codes, Hamming codes, Binary cyclic codes	4
7.	Algebraic structure, encoding, syndrome calculation, BCH Codes.	3
8.	Introduction to CONVOLUTION CODES, encoding of convolution codes, time domain approach, transform domain approach.	4
9.	Graphical approach: state, tree and trellis diagram decoding using Viterbi algorithm.	3
10.	Elements of digital communication systems, advantages of digital communication systems, pulse modulation as a base to digital communication.	3
11.	Pulse Amplitude Modulation (PAM), PAM Modulator Circuit, Demodulation of PAM Signals	3
12.	Pulse Time Modulation(PTM); Pulse Width Modulation (PWM), Pulse Position Modulation (PPM), PWM and PPM Demodulators.	5
13.	Elements of PCM: Sampling, Quantization & Coding, Quantization error, Companding in PCM systems.	4
14.	Differential PCM systems(DPCM)	1
15.	Delta modulation, its drawbacks, adaptive delta modulation	2
16.	Comparison of PCM and DM systems, noise in PCM and DM systems.	2
TOTAL HOURS FOR THE COURSE		**50**

References

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

Course No.	Subject	Teaching Periods		Credits
		Lect	Tut	
ECE5417B	**Microprocessors**	3	2	5

Section	Course contents	Hours
1.	Microcomputer Structure and Operations: Basic Microcomputer Elements	3
2.	Typical Microcomputer Structure	2
3.	CPU, Memory System	3
4.	Input Output	3
5.	Microprocessors and Memory: Typical 8, 16 and 32 bit Microprocessors	5
6.	8085 Microprocessor Specification	2
7.	Memory Technologies	2
8.	Assembly Language Programming I: Programming Model of 8085, Registers, Fetch, Execute Operation of CPU, Instruction Set	6
9.	Assembly Language Programming II: Addressing Modes, Basic Operations, Microprocessor Arithmetic, Program Flow Control Using Looping and Branching.	6
10.	Assembly Language Programming III: Stack, Subroutines, Interrupts, Resets	6
11.	Bus System: System Bus Structure, Bus Operations, Cycle by Cycle Operations, Timing and Control, Priority Management, Address Decoding.	6
12.	Microprocessors Interfacing: Interfacing concepts, Parallel Input Output, Memory Interfacing, Direct Memory Access, The Serial Subsystems, Peripheral Interface, Analog Converter Subsystem	6
TOTAL HOURS FOR THE COURSE		**50**

References

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

Course No.	Subject	Teaching Periods		Credits
		Lect	Tut	
ECE5517B	**Control Systems**	3	1	4

Section	Course contents	Hours
1	**Introduction to linear Control System:** Control Systems, types of control systems, feedback and its effects, mathematical modeling of physical systems	5
2	System Representations: Block diagrams, transfer functions, signal flow graphs.	5
3	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),	6
4	P I D Controllers	4
5	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	6
6	Frequency Domain Analysis of Control Systems: Frequency domain characteristics second order systems relative stability	6
7	graphic methods of determining gain margin and phase margin, Nichols chart	5
8	Introduction to Modern Control Theory: State Equations, State Transition Matrix, State transition equations,	7
9	State Diagrams, concept of controllability and observability	6
TOTAL HOURS FOR THE COURSE		50

References

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

Course No.	Subject	Teaching Periods	Credits
		P	
ECE5117BL	**DSP Lab**	2	1

List of Experiments

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.

Course No.	Subject	Teaching Periods	Credits
		P	
ECE5217BL	**Electrical Machines Lab**	2	1

Exp No	Particulars
1.	Familiarisation with Transformer, Auto Transformer, Dimmerstat, Servo Stabilizer.
2.	Studying the constructional aspects and nameplate of a single-phase two-winding transformer
3.	Polarity, Open circuit and short circuit tests on a single phase transformer.
4.	Determination of Voltage Regulation and Efficiency of a single-phase transformer.
5.	Three-phase transformer connections.
6.	Studying the constructional aspects and nameplates of DC machines
7.	Determination of open circuit characteristics (OCC) of a DC machine.
8.	Starting and speed control of a DC shunt motor.
9.	Studying the constructional aspects and nameplates of single and three-phase induction motors.
10.	Connection and starting of a three-phase induction motor (direct online (DOL) , star-delta starter)
11.	Testing of three-phase induction motors; circle diagram

Course No.	Subject	Teaching Periods	Credits
		P	
ECE5417BL	**Microprocessor Lab**	2	1

List of Experiments

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 8255A 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.

Course No.	Subject	Teaching Periods	Credits
		P	
ECE5517BL	**Control Systems Lab**	2	1

List of Experiments

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 transfer function.
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.

6th Semester

Course No	Subject	Teaching Periods		Credits
		Lect	Tut	
ECE6117B	**Communication Systems - II**	3	1	4

Section	Course contents	Hours
1.	Waveguides and Cavity Resonators, Transverse Electric and Transverse magnetic Waves.	3
2.	Wave propagation through rectangular and circular waveguides, Power transmission and attenuation in waveguides.	4
3.	Electromagnetic Resonators, Rectangular & Circular cavities.	4
4.	Strip Lines: Propagation Constant, Characteristic impedance and attenuation characteristics of strip lines and microstrips.	4
5.	Propagation of Waves: Waves in free space, Attenuation, Absorption and polarization, effects of environment	5
6.	Ground wave propagation, sky wave propagation, space wave propagation	5
7.	Troposcatter propagation and Extra terrestrial propagation.	3
8.	Radiation: Retarded Potential and Electromagnetic field, Radiation from a short current element	3
9.	Half wave dipole, Radiation Resistance, Effect of ground on radiating elements.	3
10.	Antennas: Basic Antenna parameters, Radiation pattern, Directivity and Antenna Gain	3
11.	Bandwidth and beam-width, Polarization	3
12.	Folded dipole and applications. Antenna arrays	3
13.	Parabolic reflector, Properties and feed mechanism	2
14.	Horn Antenna, Loop Antenna	1
15.	Satellite Communication	4
TOTAL HOURS FOR THE COURSE		**50**

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. Krauss, J.D: Antennas, Mc Graw Hill

Course No.	Subject	Teaching Periods		Credits
		Lect	Tut	
ECE6217B	**Microcontrollers and Embedded Systems**	3	1	4

Section	Course contents	hours
1.	Introduction to embedded systems, components of an embedded system, types of embedded system, levels of embedded system,	3
2.	Embedded System applications, Embedded system design considerations, Embedded Processors: Microprocessors, Microcontrollers, DSP and ASICs, ASSP, MP ,FPGA, SoC	4
3.	Comparative Assessment of Embedded Processors. Embedded memory devices and Embedded I/O.	3
4.	Embedded high and low level programming.	2
5.	Microcontrollers for embedded systems, classes of microcontrollers, types of microcontrollers,	3
6.	Introduction to microcontroller platforms: ARM, ATMEL/ AVR, PIC, ARDUINO, Raspberry and 8051.	2
7.	Choosing a Microcontroller for an embedded application.	1
8.	8051 Microcontroller hardware, internal Architecture, input/output pin and port architecture, Bare minimum system with external circuits, other members of 8051.	4
9.	Addressing modes ,accessing memory using various addressing modes	3
10.	Jump, Loop and call instructions, time delay generation and calculation,	3
11.	Single bit instructions and programming, I/O port programming: I/O programming, bit manipulation.	2
12.	Timer and counter architecture in 8051,programming 8051 timers, counter programming, pulse frequency and pulse width measurements.	4
13.	Serial communication in 8051: Basics of serial communication, 8051 connection to RS232, 8051 serial communication programming.	3
14.	Interrupts programming: Interrupts of 8051,programming timer interrupts, programming external hardware interrupts, and programming serial communication interrupts.	4
15.	Interfacing memory (EEPROM) with 8051,	2
16.	Programmable peripheral interface(PPI)-8255,programming 8255, 8255 interfacing with 8051.	2
17.	Interfacing Key board. Interfacing LED/ LCD,	2
18.	Interfacing A/D & D/A converters,	1
19.	Interfacing DC motor, Relay, solenoid, stepper-motor, servomotor.	2
TOTAL HOURS FOR THE COURSE		**50**

References

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
4. Embedded systems by Raj Kamal

Course No.	Subject	Teaching Periods		Credits
		Lect	Tut	
ECE6317B	**Computer Organization and Architecture**	3	1	4

Section	Course contents	Hours
1.	Review of Number Systems,	2
2.	Computer Level Hierarchy	2
3.	Evolution of Computers, Von-Neuman Architecture, Structure and Components of Computers,	3
4.	Computer Functions, Instruction Execution and Instruction Cycle State Diagrams, Computer Buses	3
5.	Bus Interconnection and Hierarchy	2
6.	Elements of Bus Design	1
7.	Bus Arbitration and Timings	3
8.	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.	4
9.	Instructions and Instruction Set–Characteristics, Types, Functions, Execution, Representation, Format, Addressing Modes,	3
10.	CPU Registers – Organization, Programmer Visible, Status/Control, Accumulator, and general purpose registers, Stack based CPU,	3
11.	Computer arithmetic logic design, fast adders, multiplication, Booth's algorithm, fast multiplication, integer division, floating p o i n t arithmetic.	3
12.	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	4
13.	Introduction to Pipelining and Parallel Processing.	2
14.	Memory Hierarchy, types and Characteristics, Primary Memory- Types, Working, Chip Organization, Expansion,	3
15.	Cache Memory- Mapping Schemes, Replacement Policies, Hit and Miss,	3
16.	Write policies, Coherence. Computer Storage–Magnetic and Optical Storage Organization and Format, Virtual memory– Overlays, Paging, Segmentation and Fragmentation	3
17.	Introduction to RAID, and CAM. **Parallel processing:** Introduction to parallel processing and architecture- classification, array processors, pipeline architectures, vector processors,	3
18.	GPU's, interconnection networks, multistage networks, message passing architecture.	3
TOTAL HOURS FOR THE COURSE		**50**

References

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

Course No.	Subject	Teaching Periods		Credits
		Lect	Tut	
ECE6417B	**Electronic Measurement & Instrumentation**	3	2	5

Section	Topic	Hours
1	Measurement System and Standards: Instrumentation System and its classification, Primary and secondary standards, Standards of various electrical quantities	6
2	IEEE standards, Static and Dynamic response	2
3	Errors, and accuracy of an instrumentation system	3
4	Measurement of Basic Parameters: Galvanometer and its principle, Moving Coil, Moving iron meters	4
5	true rms meter, Bridge measurements	4
6	Q meters, Measurement of Voltage, Current, Power, Energy	4
7	Measurement of Resistance, Capacitance, Inductance	3
8	Transducers, Sensors, and Actuators: Active and Passive, Transducers types: Resistive, Inductive, capacitive, Piezoelectric, Optical, Photo diodes; Measurement of Physical, Physiological, Chemical quantities	6
9	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.	7
10	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.	7
11	Data Acquisition System: Components of data acquisition system, Interfacing of transducers.	4
Total Hours		50

References:

1. Electronic Measurements by W. Cooper
2. Electrical & Electronic Measurements by A. K. Sawhney

Course No.	Subject	Teaching Periods		Credits
		Lect	Tut	
ECE6517B	**Power Electronics**	3	1	4

Section	Course contents	hours
1.	Review of power semiconductor switching devices, Diode, Thyristors, MOSFET, IGBT, characteristics and applications	7
2.	Introduction to Turn-ON/Turn-OFF mechanism of switching devices, Gate-drive circuits, Switching-aid circuits,protection, Heat sink design	7
3.	Single phase rectifiers (uncontrolled, semicontrolled, controlled) with passive loads, performance analysis, Applications	8
4.	Three-phase rectifiers (uncontrolled, semicontrolled, controlled) with passive loads, performance analysis, Applications	7
5.	Single-phase inverter : principle of operation, single phase bridge inverter, voltage control in inverters and harmonic reduction using PWM strategies, Applications	8
6.	Three-phase inverters: 180 degree conduction and 120 degree conduction, voltage control in inverters and harmonic reduction using PWM strategies	8
7.	Introduction to DC-DC converters; buck, boost and buck-boost converters, Applications	5
TOTAL HOURS FOR THE COURSE		**50**

References

1. Fundamental of Power Electronics: Robert Erickson, D. Maksimovic
2. Power Electronics, Circuits, Devices and Applications: Muhammad H. Rashid
3. Power Electronic, Devices, Applications, and Passive Components: Barry W. Williams
4. Power Electronics - converters, Applications, and Design: Ned Mohan, Tore. M. Undeland, William P. Robbins

Course No.	Subject	Teaching Periods	Credits
		P	
ECE6217BL	**Microcontrollers and Embedded Systems Lab**	2	1

List of Experiments

1. Generate a specified time delay using Embedded ‘C’.
2. Interface an 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

Course No.	Subject	Teaching Periods	Credits
		P	
ECE6517BL	**Power Electronics Lab**	2	1

List of Experiments

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.

Course No.	Subject	Teaching Periods	Credits
		P	
ECE6617BL	**Electronic Measurement & Instrumentation / Communication Systems – II Lab**	4	2

List of Experiments

Electronic Measurement & Instrumentation Experiments

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 various Trainer Kits pertaining to the subject.

Communication Systems-II Experiments

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

7^{th} Semester

Course No	Subject	Teaching Periods		Credits
		Lect	Tut	
ECE7117B	**VLSI Design**	3	1	4

Section	Course contents	Hours
1	Review of MOSFET: Constructional & Operational features of MOSFET	3
2	I-V Equation, 2nd Order Effects	3
3	MOS Capacitor, C-V Characteristics	2
4	MOSFET Switch, Transmission gate	2
5	CMOS Inverter (Pull-up & Pull-down), Inverter Static Characteristics, Noise Margin,	3
6	Switching characteristics of Inverter (Fall Time, Rise Time, Delay Time), Dynamic Characteristics, Power Dissipation	3
7	VLSI Technology: Wafer Processing, Oxidation, Epitaxy, Deposition, Ion- Implantation & Diffusion,	4
8	The Silicon gate Process, n-well CMOS Process, p-well Process, Twin-Tub Process, Silicon On Insulator.	4
9	CMOS Logic Design (Gates): CMOS Logic Gate Design (NAND & NOR Logic)	3
10	Switching Characteristics (Delay Time, Power, Fan-in, Fan-out), Transistor Sizing, The Compound Gates	4
11	CMOS Logic Structures: CMOS Logic, Pseudo-nMOS Logic, Dynamic CMOS Logic, C2MOS Logic, BiCMOS Logic, NP Domino Logic.	5
12	Layout: Design Rules/Floor planning, Simple Layout Examples.	5
13	CMOS Logic Design (Circuits): Multiplexers, MUX Implementation in CMOS & Transmission Gate,	4
14	RAM Cell Implementation, Implementation of Flip-Flop, Register/Counters	5
TOTAL HOURS FOR THE COURSE		**50**

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

Course No.	Subject	Teaching Periods		Credits
		Lect	Tut	
ECE7217B	**Data Communication**	3	1	4

Section	Course contents	hours
1.	Introduction to Data Communications Technology with Diverse Applications. Data Representation, Data Flow, Data Encoding, Data transmission. Introduction to Networks, Internet, Protocols, Standards, Standards-organizations	4
2.	The OSI Model.TCP /IP Protocol,different layers and their functions.	4
3.	Introduction to transmission media (Guided,Unguided) and network topologies. MAN, LAN, WAN, SAN, BAN, PAN and their comparative study. Transmission-Impairments, Bandwidth, Throughput, Data rate, channel capacity, Latency, Bandwidth-Delay product.	6
4.	Line Encoding Schemes and their comparative study, Block coding and Scrambling, Transmission Modes	4
5.	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	9
6.	Multiplexing and de-multiplexing techniques viz. TDM, FDM, CDM, OFDM, WDM, DWDM.	7
7.	Synchronous and asynchronous networks, bit and frame synchronization. Circuit switching, message switching and packet switching, relative advantages and disadvantages.	7
8.	Multiple-access schemes viz. TDMA, FDMA, ALOHA, CSMA techniques. Framing ,Flow and Error control. Error detection and error correction techniques, nature of transmission errors, error detection codes, error correction codes, retransmission codes.	7
9.	Routing techniques, flooding static routing, centralized routing, distributed routing.	4
TOTAL HOURS FOR THE COURSE		**52**

References

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

Course No.	Subject	Teaching Periods		Credits
		Lect	Tut	
ECE7317B	**Microwave Engineering**	3	1	4

S. No.	Title	Hours
1	Microwave Semiconductor Devices: Classification of Microwave Devices	2
2	Point Contact diode; Tunnel Diode;	4
3	Gunn Diode, two valley structures, mode of operation, circuit realization	4
4	IMPATT Diode, circuit realization.	2
5	PIN diode, basic principles of operation equivalent circuit, and application as switch, modulator and Phase shifter	6
6	Microwave Bi-polar and Field effect Transistors-Characteristics and performance.	6
7	Microwave Components: Microwave Hybrid Circuits: Waveguide tee: E-plane tee, H-plane tee, Magic tee, hybrid rings (rat-race circuits)	10
8	Directional Couplers, S-Matrix of direction Coupler. Circulators and isolators	4
9	Microwave Amplifiers & Oscillators : Microwave tubes: lead inductance and Inter electrode capacitive effects Transient angle effect, Gain bandwidth Limitation,	5
10	Klystrons: Multi-cavity Klystron and Reflex Klystron	4
11	Gunn Oscillator, Magnetron oscillator	3
TOTAL HOURS		**50**

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

Course No.	Subject	Teaching Periods		Credits
		Lect	Tut	
ECE7417B	**Power Systems**	3	1	4

S. No.	Title	Hours
1	DC and AC Distribution System: Introduction to a power system (an overall view) distribution systems Feeder, distribution, service	6
2	Mains classification, connection schemes,	3
3	various types of DC and AC distributors	3
4	voltage drop calculations	3
5	Overhead AC Transmission lines: Line Parameters	3
6	types of conductors. Aluminium Core Steel Reinforced (ACSR) etc. Stranding, bundling of conductors	3
7	Resistance calculations, skin effect, proximity effect	3
8	Inductance and capacitance and capacitance of single Phase, 3 phase, single circuit and double circuit lines	4
9	Representations and performance of short medium and log lines	4
0	ABCD constants	2
11	surge impedance	2
12	Feranti effect	2
13	Power flow through a transmission lines	2
14	Insulators for overhead lines: Materials for insulators, types of insulators, potential distribution over a string of suspension insulators, methods for equalizing the potential	3
15	Interference of power lines with communication circuits, Electrostatic and electromagnetic effect.	3
16	Corona: Visual and critical disruptive voltage, conditions effecting corona, former loss due to corona, Practical consideration	3
17	Mechanical design of transmission lines. Sag and tension calculations	3
TOTAL HOURS		**52**

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

Course No.	Subject	Teaching Periods	Credits
		P	
ECE7117BL	**VLSI Lab**	2	1

List of Experiments

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.

Course No.	Subject	Teaching Periods	Credits
		P	
ECE7217BL	**Data Communication Lab**	2	1

Experiments

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.

Course No.	Subject	Teaching Periods	Credits
		P	
ECE7317BL	**Microwave Engineering Lab**	2	1

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

Course No.	Subject	Teaching Periods	Credits
		P	
ECE7417BL	**Power Systems Lab**	2	1

List of Experiments

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.

Course No.	Subject	Teaching Periods	Credits
		P	
ECE7517B	**Seminar & Pre-project**	2	1

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 7th 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 7th 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

Autumn Session, 2017

Course No	Subject	Teaching Periods		Credits
		Lect	Tut	
ECE8117B	**Wireless Communication**	3	1	4

Section	Course contents	hours
1.	**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.	4
2.	**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.	7
3.	**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.	7
4.	**Cell Site Antennas and Mobile Antennas:** Characteristics of antennas, antenna at cell site, mobile antennas,LOS antennas,TDD,FDD.	5
5.	**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.	7
6.	**Multiple access techniques used in mobile wireless communications**: FDMA/TDMA, CDMA. FDM / TDM Cellular systems, Cellular CDMA, comparison of FDM / TDM systems and Cellular CDMA.	7
7.	Capacity,soft capacity,erlang capacity and their usage.	3
8.	**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.	8
9.	Introduction to GPRS, EDGE, UMTS, HSPDA, HSUPA, LTE.	4
TOTAL HOURS FOR THE COURSE		**52**

References

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

Course No.	Subject	Teaching Periods		Credits
		Lect	Tut	
MTH8217B	**Engineering Mathematics-V**	3	1	4

Section	Course Contents	Hours
1.	Introduction to OR Modelling Approaches & various Real life Situations	2
2.	Linear Programming Problems (LPP)	2
3.	Basic LLP's Applications	2
4.	Various Components of LPP formulation	2
5.	Solving LPP	2
6.	Simultaneous Equations and Graphical Methods	3
7.	Simplex Method	3
8.	Duality Theory	3
9.	Big-M Method	3
10.	Transportation problems & Assignments Problems	5
11.	Network Analysis: Shortest Path	2
12.	Dijkstra Algorithm, Floyd Algorithms	4
13.	Maximal Flow Problem ((Ford-Fulkerson)	2
14.	PERT- CPM	4
15.	Queuing Theory: Introduction	2
16.	Basic Definitions & Notations	2
17.	Axiomatic Derivation of the Arrival & Departure (Poisson Queue)	3
18.	Poisson Queue Models: M/M/1: ∞/FIFO	2
19.	M/M/1: N/ FIFO.	2
TOTAL HOURS FOR THE COURSE		**50**

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.

Course No.	Subject	Teaching Periods	Credits
		P	
ECE8117BL	**Wireless Communication Lab**	2	1

Experiments

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

Course No.	Subject	Teaching Periods	Credits
		P	
ECE8317B	**Project**	16	8

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.

Course No.	Subject	Credits
ECE8417B	**Practical Training Viva/ Professional Viva**	4

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 fulfilment 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.