3EC1A ELECTRONIC DEVICES & CIRCUITS

B.Tech. (EC) 3rd Sem. **Max. Marks: 100**

3L+0T **Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	**SEMICONDUCTOR PHYSICS** - Mobility and conductivity, Charge densities in a semiconductor, Fermi Dirac distribution, Fermi-Dirac statistics and Boltzmann approximation to the Fermi-Dirac statistics, Carrier concentrations and Fermi levels in semiconductor, Generation and recombination of charges, Diffusion and continuity equation, Transport equations, Mass action Law, Hall effect.	8
II	**JUNCTION DIODES -** Formation of homogenous and hetrojuntion diodes and their energy band diagrams, Calculation of contact potential and depletion width, V-I characteristics, Small signal models of diode, Diode as a circuit element, Diode parameters and load line concept, C-V characteristics and dopant profile. Applications of diodes in rectifier, Clipping, Clamping circuits and voltage multipliers, Transient behavior of PN diode, Breakdown diodes, Schottky diodes, and Zener diode as voltage regulator, Construction, Characteristics and operating principle of UJT.	8
III	**TRANSISTORS -** Characteristics, Current components, Current gains: alpha and beta. Variation of transistor parameter with temperature and current level, Operating point, Hybrid model, DC model of transistor, h-parameter equivalent circuits. CE, CB and CC configuration. DC and AC analysis of single stage CE, CC (Emitter follower) and CB amplifiers AC & DC load line, Ebers-Moll model. Biasing & stabilization techniques. Thermal runaway, Thermal stability.	8
IV	**JFET & MOSFET -** Construction and operation, Noise performances of FET, Parasitic of MOSFET, Small signal models of JFET & MOSFET, Biasing of JFET's & MOSFET's, Low frequency single stage CS and CD (source follower) JFET amplifiers, FET as voltage variable resistor and FET as active load.	8
V	**SMALL SIGNAL AMPLIFIERS AT LOW FREQUENCY -** Analysis of BJT and FET multistage amplifier, DC and RC coupled amplifiers. Frequency response of single and multistage amplifier, mid-band gain, gains at low and high frequency. Analysis of DC and differential amplifiers, Miller's Theorem, use of Miller and bootstrap configuration. Cascade and cascode configuration of multistage amplifiers (CE-CE, CE-CB, CS-CS and CS-CD), Darlington pair.	8
	TOTAL	**40**

TEXT BOOKs:

1. Integrated Electronics, Millman Halkias, T.M.H, (2001)

REFERENCE BOOKs:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Electronic devices & circuits theory, R.L. Boylestad, Louis Nashelsky , Pearson education	1978
2	Electronic devices & circuits, David Bell, Oxford Publications	2009
3	M Rashid – Microelectronic circuits : Analysis & Design, Cengage learning	1999
4	Millman, Electronics Devices and Circuits, TMH	2010
5	Electronic Devices,7e, Floyd, Pearson	2008
6	A.S. Sedra and K.C. Smith, Microelectronic Circuits, Saunder's College Publishing	1991

3EC2A DATA STRUCTURES & ALGORITHMS

B.Tech. (EC) 3rd Sem. **Max. Marks: 100**
3L+0T **Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	**DEFINITION & CHARACTERISTICS OF ALGORITHMS** – Structures, Difficulties in estimating exact execution time of algorithms, Concept of complexity of program, Asymptotic notations: Big-Oh, theta, Omega- Definitions and examples, Determination of time and space complexity of simple algorithms without recursion, Representing a function in asymptotic notations viz $5n^2-6n=\theta(n^2)$ ARRAYS: Array as storage element, Row major & column major form of arrays, computation of address of elements of n dimensional array.	**6**
II	**ARRAYS AS STORAGE ELEMENTS** for representing polynomial of one or more degrees for addition & multiplication, Sparse matrices for transposing & multiplication, stack, queue, Dequeue, Circular queue for insertion and deletion with condition for over and underflow, Transposition of sparse matrices with algorithms of varying complexity (Includes algorithms for operations as mentioned). **EVALUATION OF EXPRESSION** - Concept of precedence and associativity in expressions, Difficulties in dealing with infix expressions, Resolving precedence of operators and association of operands, Postfix & prefix expressions, conversion of expression from one form to other form using stack (with & without parenthesis), Evaluation of expression in infix, postfix & prefix forms using stack. Recursion.	**10**
III	**LINEAR LINKED LISTS** - Singly, doubly and circularly connected linear linked lists- insertion, Deletion at/ from beginning and any point in ordered or unordered lists, Comparison of arrays and linked lists as data structures Linked implementation of stack, queue and de-queue, Algorithms for of insertion, deletion and traversal of stack, Queue, Dequeue implemented using linked structures. Polynomial representation using linked lists for addition, Concepts of Head Node in linked lists **SEARCHING -** Sequential and binary search	**8**
IV	**NON-LINEAR STRUCTURES -** Trees definition, Characteristics concept of child, Sibling, Parent child relationship etc, Binary tree: different types of binary trees based on distribution of nodes, Binary tree (threaded and unthreaded) as data structure, insertion, Deletion and traversal of binary trees, constructing binary tree from traversal results. Threaded binary Tree. Time complexity of insertion, deletion and traversal in threaded and ordinary binary trees. AVL tree: Concept of balanced trees, balance factor in AVL trees, insertion into and deletion from AVL tree, balancing AVL tree after insertion and deletion. Application of trees for representation of sets.	**9**
V	**GRAPHS -** Definition, Relation between tree & graph, directed and undirected graph, representation of graphs using adjacency matrix and list. Depth first and breadth first traversal of graphs, Finding connected components and spanning	**7**

	tree. Single source single destination shortest path algorithms **SORTING** - Insertion, quick, Heap, Topological and bubble sorting algorithms for different characteristics of input data. Comparison of sorting algorithms in term of time complexity. **Note:** 1. Algorithm for any operation mentioned with a data structure or required to implement the particular data structure is included in the curriculum.	
	TOTAL	**40**

Text Books:

1. Malik – Data structures using C++, Cengage Learning (2010)

References Books:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Drozdek – Data structures and algorithms in C++ , Cengage learning	2013
2	An introduction to data structures with applications By Jean-Paul Tremblay, P. G. Sorenson, TMH	1984
3	Data Structures in C/C++, Horowitz, Sawhney, Galgotia	2001
4	Gilberg & Forouzan – Data structures: A pseudocode approach with c, Cengage learning	2004
5	Data Structures in C/C++, Tanenbaum, Pearson	2014
6	Data Structures in C++, Weiss, Parson	1992

3EC3A DIGITAL ELECTRONICS

B.Tech. (EC) 3rd semester **Max. Marks: 100**
3L+0T **Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	**NUMBER SYSTEMS, BASIC LOGIC GATES & BOOLEAN ALGEBRA -** Binary Arithmetic & Radix representation of different numbers. Sign & magnitude representation, Fixed point representation, complement notation, various codes & arithmetic in different codes & their inter conversion. Features of logic algebra, postulates of Boolean algebra, Theorems of Boolean algebra. Boolean function. Derived logic gates: Exclusive-OR, NAND, NOR gates, their block diagrams and truth tables. Logic diagrams from Boolean expressions and vica-versa, Converting logic diagrams to universal logic. Positive, Negative and mixed logic, Logic gate conversion.	**8**
II	**DIGITAL LOGIC GATE CHARACTERISTICS -** TTL logic gate characteristics. Theory & operation of TTL NAND gate circuitry. Open collector TTL. Three state output logic. TTL subfamilies. MOS & CMOS logic families, Realization of logic gates in RTL, DTL, ECL, C-MOS & MOSFET, Interfacing logic families to one another.	**6**
III	**MINIMIZATION TECHNIQUES -** Minterm, Maxterm, Karnaugh Map, K-map upto 4 variables, Simplification of logic functions with K-map, conversion of truth tables in POS and SOP form. Incomplete specified functions, Variable mapping. Quinn-Mc Klusky minimization techniques.	**10**
IV	**COMBINATIONAL SYSTEMS -** Combinational logic circuit design, half and full adder, subtractor. Binary serial and parallel adders. BCD adder. Binary multiplier. **Decoder:** Binary to Gray decoder, BCD to decimal, BCD to 7-segment decoder. Multiplexer, Demultiplexer, Encoder. Octal to binary, BCD to excess-3 encoder. Diode switching matrix. Design of logic circuits by multiplexers, encoders, decoders and demultiplexers.	**8**
V	**SEQUENTIAL SYSTEMS -** Latches, Flip-flops, R-S, D, J-K, Master Slave flip flops. Conversions of flip-flops, Counters: Synchronous & Asynchronous ripple and decade counters, Modulus counter, Skipping state counter, Counter design, State diagrams and state reduction techniques, Ring counter, Counter applications, Registers: Buffer register, Shift register.	**8**
	TOTAL	**40**

TEXT BOOKs:

1. Digital integrated electronics, By Herbert Taub, Donald L. Schilling, TMH (2004)
2. Digital Logic and Computer Design By M. Morris Mano, Pearson(1979)

REFERENCE BOOKs:

SN	**Name of Authors /Books /Publisher**	**Year of Publication**
1	Ghoshal – Digital Electronics, Cengage Learning	2012
2	Roth – Fundamentals of Logic design, Cengage learning	2014
3	Pulse and digital Switching waveforms By Millman Taub, TMH	1984
4	Fundamentals of Digital circuits, A. Anand kumar, PHI	2009
5	Leach, Digital Principles and Applications, TMH	1995
7	Digital Electronics: Principles and Integrated Circuits, Maini, Wiley	2007

3EC4A CIRCUIT ANALYSIS & SYNTHESIS

B.Tech. (EC) 3rd sem. **Max. Marks: 100**
3L+1T **Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	**NETWORK THEOREMS AND ELEMENTS** - Thevenin's, Norton's, Reciprocity, Superposition, Compensation, Miller's, Tellegen's and maximum power transfer theorems. Networks with dependent sources. Inductively coupled circuits – mutual inductance, coefficient of coupling and mutual inductance between portions of same circuits and between parallel branches. Transformer equivalent, inductively and conductively coupled circuits.	**8**
II	**TRANSIENTS ANALYSIS** - Impulse, Step, Ramp and sinusoidal response analysis of first order and second order circuits. Time domain & transform domain (frequency, Laplace) analysis. Initial and final value theorems. Complex periodic waves and their analysis by Fourier analysis. Different kind of symmetry. Power in a circuit.	**7**
III	**NETWORK FUNCTIONS** - Terminals and terminal pairs, Driving point impedance transfer functions, Poles and zeros, Restrictions on pole and zero location in s-plane. Time domain behavior from pole and zero plot, Procedure for finding network functions for general two terminal pair networks, Stability & causality, Hurwitz polynomial, positive real function.	**9**
IV	**TWO PORT NETWORKS** - Two Port General Networks: Two port parameters (impedance, admittance, hybrid, ABCD and S parameters) and their inter relations. Equivalence of two ports. Transformer equivalent, interconnection of two port networks. The ladder network, image impedance, image transfer function, application to L-C network, attenuation and phase shift in symmetrical T and pi networks.	**6**
V	**NETWORK SYNTHESIS** - The four-reactance function forms, specification for reactance function. Foster form of reactance networks. Cauer form of reactance networks Synthesis of R-L and R-C and L-C networks in Foster and Cauer forms.	**10**
	TOTAL	**40**

TEXT BOOKs:

1. Network Analysis & Synthesis, Kuo, Wiley (2006)

REFERENCE BOOKs:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Circuits And Networks: Analysis And Synthesis, Sudhakar, TMH	2006
2	Sivanagaraju – Electrical circuit analysis, Cengage learning	2009
3	Robbins – Circuit analysis : Theory and Practice, Cengage Learning	2012
4	Electrical Networks, Singh, TMH	2009
5	Electric Circuits, Nilsson, Pearson	2009
6	Linear Circuits Analysis, Decarlo, Oxford	2007
7	Basic Engineering Circuit Analysis, Irwin, Wiley	2010
8	Network Theory: Analysis And Synthesis, Smarjit Ghosh, PHI	2005
9	Electric Circuit Analysis, Xavier, S.P. Eugene, New Age	2007

3EC5A ELECTROMAGNETIC PROPERTIES OF MATERIALS

B.Tech. (EC) 3rd Sem. **Max. Marks: 100**

3L+0T **Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	**DIELECTRICS MATERIALS -** Introduction, Polarization, Polarizability, Different types of polarization, Electronic, ionic, Orientation and space polarization, frequency and temperature dependence of different polarization, Dielectric loss and loss tangent, energy store and loss in dynamic polarization, Phenomenon of spontaneous polarization and ferro-electricity, Ferroelectric hysteresis loop, Piezoelectricity, piezoelectric materials: Quartz, Rochelle salt and PZT , Applications of dielectrics.	**7**
II	**MAGNETIC MATERIALS -** Introduction, magnetization, theory of Dia, Para, Ferro- Ferrimagnetism and antiferromagnetism, Weiss field and magnetic domains, BH hysteresis loop, soft and hard magnetic materials and their applications, magnetic energy. Magnetostriction, giant magnetostriction resistor (GMR) and engineering applications of it. Magnetic spin, new electronic devices based on magnetic spin	**8**
III	**SEMI CONDUCTOR MATERIALS** - Introduction, Energy band gap structures of semiconductors, Classifications of semiconductors, Degenerate and non-degenerate semiconductors, Direct and indirect band gap semiconductors, Electronic properties of Silicon, Germanium, Compound Semiconductor, Gallium Arsenide, Gallium phosphide & Silicon carbide, Variation of semiconductor conductivity, resistance and bandgap with temperature and doping. Thermistors, Sensitors.	**9**
IV	**CONDUCTIVE & SUPERCONDUCTIVE MATERIALS** - Electrical properties of conductive and resistive materials. , Energy bandgap structures of metals, resistivity of conductors and multiphase solids, Matthiessen's rule, Important characteristics and electronic applications of specific conductor & resistance materials, Superconductor phenomenon, Type I and Type II superconductors. Theory of superconductors, High temperature superconductors and their applications.	**8**
V	**NANOMATERIALS -** Introduction, Change in band structure at nano-stage. Structure of Quantom dots (nano-dots) & Quantom wires, Fabrication & Characterization of nanomaterials, Structure of single wall and multi-wall carbon nanotube (CNT), Change in electrical, Electronic and optical properties at nano stage, Potential applications of nano materials.	**8**
	TOTAL	**40**

TEXT BOOKs:

1. Kasap, Principles of Electronic Materials and Devices, TMH (2005).
2. Robert M Rose, Lawrence A. Shepard and Jhon Wulff, The structure and peroperties of materials vol.4 (Electronic properties), Willey Eastern University press. (2011)

REFERENCE BOOKs:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Askeland – The science and engineering of materials, Cengage learning	2005
2	Electronic Materials and Processes, Kaul Bhan & Jain, Genius publications	2013
3	Allison, Principles of Electronic Materials and Devices, TMH	2005
4	Neamen, Semiconductor Physics and Devices, TMH	2009
5	Guozhong Cao, Ying Wang Nanostructures and Nanomaterials Synthesis, Properties and Applications, World Scientific Series in Nanoscience and Nanotechnology	2011
6	Dekker, Electrical properties of materials	1995

3EC6A ADVANCED ENGINEERING MATHEMATICS I

B.Tech. (EC) 3rd Sem. **Max. Marks: 100**
3L+1T **Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	LAPLACE TRANSFORM - Laplace transform with its simple properties, applications to the solution of ordinary and partial differential equations having constant co-efficients with special reference to the wave and diffusion equations.	6
II	FOURIER SERIES & Z TRANSFORM – Expansion of simple functions in fourier series. Half range series, Change of intervals, Harmonic analysis. Z TRANSFORM - Introduction, Properties, Inverse Z Transform.	9
III	FOURIER TRANSFORM - Complex form of Fourier Transform and its inverse, Fourier sine and cosine transform and their inversion. Applications of Fourier Transform to solution of partial differential equations having constant co-efficient with special reference to heat equation and wave equation.	8
IV	COMPLEX VARIABLES - Analytic functions, Cauchy-Riemann equations, Elementary conformal mapping with simple applications, Line integral in complex domain, Cauchy;s theorem. Cauchy's integral formula.	9
V	COMPLEX VARIABLES -Taylor's series Laurent's series poles, Residues, Evaluation of simple definite real integrals using the theorem of residues. Simple contour integration.	8
	TOTAL	

TEXT BOOKs

1. Advanced Engineering Mathematics, Irvin Kreyszig, Wiley (2010)
2. Engineering Mathematics: A Foundation for Electronic, Electrical, Communications and Systems Engineers, 3/e Croft, Pearson (2009)

REFERENCE BOOKs

SN	Name of Authors /Books /Publisher	Year of Publication
1	Datta – Mathematical methods of science and engineering, Cengage Learning	**2006**
2	O'neil – Advanced engineering mathematics, Cengage learning	**2012**
3	Engineering Mathematics, T Veerarajan, TMH	**2005**
4	Advance Engineering Mathematics, Potter, Oxford	**2005**
5	Mathematical Methods, Dutta, D., New Age	**2006**
6	Elementary Number Theory with applications: Thomas Koshy, 2nd Ed., Elsevier.	**2007**
7	Engineering Mathematics III By Prof. K.C. Sarangi and others, Genius publications	**2013**
8	Engineering Mathematics, Babu Ram, Pearson	**2009**

3EC7A ELECTRONIC INSTRUMENTATION WORKSHOP

B.Tech. (EC) 3rd Sem. **Max. Marks: 75**

2P **Exam: 3 H**

S.No.	Contents
1	Identification, Study & Testing of various electronic components : (a) Resistances-Various types, Colour coding (b) Capacitors-Various types, Coding, (c) Inductors (d) Diodes (e) Transistors (f) SCRs (g) ICs (h) Photo diode (i) Photo transistor (j) LED (k) LDR (l) Potentiometers .
2	Study of symbols for various Electrical & Electronic Components, Devices, Circuit functions etc.
3	To study and perform experiment on CRO demonstration kit.
4	Soldering & Desoldering practice.
5	To Design & fabricate a PCB for a Regulated power supply. Assemble the Regulated power supply using PCB and test it.
6	To study and plot the characteristics of following Opto-Electronic devices –(a) LED (b) LDR (C) Photovoltatic cell (d) Opto-coupler (e) Photo diode (f) Photo transistor (g) Solar cell
7	To study the specifications and working of a Transistor radio (AM & FM) kit and perform measurements on it.
8	To study the specifications and working of a Public address System.
9	To prepare design layout of PCBs using software tools.
10	To fabricate PCB and testing of electronics circuit on PCB.
11	To design and test Switch Mode Power Supply using ICs
12	To study the specifications and working of a DVD Player.
13	To study the specifications and working of LCD TV.
14	To study the specifications and working of LED TV.

3EC8A COMPUTER PROGRAMMING LAB-I

B.Tech. (EC) 3rd Sem. **Max. Marks: 75**

2P **Exam: 3 H**

S.No.	Contents
1	Write a simple C program on a 32 bit compiler to understand the concept of array storage, size of a word. The program shall be written illustrating the concept of row major and column major storage. Find the address of element and verify it with the theoretical value. Program may be written for arrays upto 4-dimensions.
2	Simulate a stack, queue, circular queue and dequeue using a one dimensional array as storage element. The program should implement the basic addition, deletion and traversal operations.
3	Represent a 2-variable polynomial using array. Use this representation to implement addition of polynomials.
4	Represent a sparse matrix using array. Implement addition and transposition operations using the representation.
5	Implement singly, doubly and circularly connected linked lists illustrating operations like addition at different locations, deletion from specified locations and traversal.
6	Repeat exercises 2, 3 & 4 with linked structures.
7	Implementation of binary tree with operations like addition, deletion, traversal.
8	Depth first and breadth first traversal of graphs represented using adjacency matrix and list.
9	Implementation of binary search in arrays and on linked Binary Search Tree.
10	Implementation of insertion, quick, heap, topological and bubble sorting algorithms.

3EC9A ELECTRONIC DEVICE LAB

B.Tech. (EC) 3rd Sem. **Max. Marks: 75**

2P **Exam: 3 H**

S.No.	Contents
1	Study the following devices: (a) Analog & digital multimeters (b) Function/ Signal generators (c) Regulated d. c. power supplies (constant voltage and constant current operations) (d) Study of analog CRO, measurement of time period, amplitude, frequency & phase angle using Lissajous figures.
2	Plot V-I characteristic of P-N junction diode & calculate cut-in voltage, reverse Saturation current and static & dynamic resistances.
3	Plot V-I characteristic of zener diode and study of zener diode as voltage regulator. Observe the effect of load changes and determine load limits of the voltage regulator.
4	Plot frequency response curve for single stage amplifier and to determine gain bandwidth product
5	Plot drain current - drain voltage and drain current – gate bias characteristics of field effect transistor and measure of Idss & Vp
6	Application of Diode as clipper & clamper
7	Plot gain- frequency characteristic of two stage RC coupled amplifier & calculate its bandwidth and compare it with theoretical value.
8	Plot gain- frequency characteristic of emitter follower & find out its input and output resistances.
9	Plot input and output characteristics of BJT in CB, CC and CE configurations. Find their h-parameters
10	Study half wave rectifier and effect of filters on wave. Also calculate theoretical & practical ripple factor.
11	Study bridge rectifier and measure the effect of filter network on D.C. voltage output & ripple factor.

3EC10A DIGITAL ELECTRONICS LAB

B.Tech. (EC) 3th Sem. **Max. Marks: 75**

2P **Exam: 3 H**

S.No.	Contents
1	To verify the truth tables of basic logic gates: AND, OR, NOR, NAND, NOR. Also to verify the truth table of Ex-OR, Ex-NOR (For 2, 3, & 4 inputs using gates with 2, 3, & 4 inputs).
2	To verify the truth table of OR, AND, NOR, Ex-OR, Ex-NOR realized using NAND & NOR gates.
3	To realize an SOP and POS expression.
4	To realize Half adder/ Subtractor & Full Adder/ Subtractor using NAND & NOR gates and to verify their truth tables
5	To realize a 4-bit ripple adder/ Subtractor using basic Half adder/ Subtractor & basic Full Adder/ Subtractor.
6	To verify the truth table of 4-to-1 multiplexer and 1-to-4 demultiplexer. Realize the multiplexer using basic gates only. Also to construct and 8-to-1 multiplexer and 1-to-8 demultiplexer using blocks of 4-to-1 multiplexer and 1-to-4 demultiplexer
7	Design & Realize a combinational circuit that will accept a 2421 BCD code and drive a TIL -312 seven-segment display
8	Using basic logic gates, realize the R-S, J-K and D-flip flops with and without clock signal and verify their truth table.
9	Construct a divide by 2, 4 & 8 asynchronous counter. Construct a 4-bit binary counter and ring counter for a particular output pattern using D flip flop.
10	Perform input/output operations on parallel in/Parallel out and Serial in/Serial out registers using clock. Also exercise loading only one of multiple values into the register using multiplexer. Note: As far as possible, the experiments shall be performed on bread board. However experiment Nos. 1-4 are to be performed on bread board only

3EC11A BUSINESS ENTREPRENEURSHIP

B.Tech. (EC) 3th Sem. **Max. Marks: 50**

2 P **Exams: 3 H**

S.No.	Contents
1	**INTRODUCTION TO ENTREPRENEURSHIP** - Concept and need, Entrepreneurship and innovation, Entrepreneurship and economic growth.
2	**ENTREPRENEURIAL COMPETENCIES** - Leadership, Decision making, Motivation, Risk taking.
3	**BUSINESS ENTERPRISE PLANNING** - Identification of business opportunity, Idea generation, Demand estimation, Preparation of project report, Feasibility analysis.
4	**INTELLECTUAL PROPERTY RIGHTS, PATENTS, TAXATION**- Central excise & Sales tax, VAT.
5	**GOVERNMENT POLICIES** - for Entrepreneurs, Entrepreneurial career opportunities for Engineers, case studies.

TEXT BOOKS:

1. Rajeev Roy – Entrepreneurship Oxford Uni.. (2009)

REFERENCES BOOKS:

1. Bouchoux – Intellectual property: trademarks,copyrights, patents and trade secrets, Cengage learning. (2008)
2. Daft – Leadership, Cengage learning. (2014)
3. Kuratko/Rao – Entrepreneurship : A South asian perspective, Cengage learning. (2012)

4EC1A ANALOG ELECTRONICS

B.Tech. (EC) 4th semester **Max. Marks: 100**
3L+0T **Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	**FEEDBACK AMPLIFIERS** - Classification, Feedback concept, Feedback Topologies, Transfer gain with feedback, General characteristics of negative feedback amplifiers. Analysis of voltage-series, voltage-shunt, current-series and current-shunt feedback amplifier. Stability criterion. Compensation techniques, miller compensation.	9
II	**OSCILLATORS & Multivibrators** - Classification. Criterion for oscillation. Tuned collector, Hartley, Colpitts, RC Phase shift, Wien bridge and crystal oscillators, Astable, monostable and bistable multivibrators. Schmitt trigger. Blocking oscillators.	7
III	**HIGH FREQUENCY AMPLIFIERS** - Hybrid Pi model, Conductances and capacitances of hybrid Pi model, high frequency analysis of CE amplifier, gain bandwidth product, unity gain frequency f_T, Emitter follower at high frequencies.	8
IV	**TUNED AMPLIFIER -** Band Pass Amplifier, Parallel resonant Circuits, Band Width of Parallel resonant circuit. Analysis of Single Tuned Amplifier, Primary & Secondary Tuned Amplifier with BJT & FET, Double Tuned Transformer Coupled Amplifier. Stagger Tuned Amplifier. Pulse Response of such Amplifier, class C tuned amplifiers, Shunt Peaked Circuits for Increased Bandwidth.	7
V	**POWER AMPLIFIERS - C**lassification, Power transistors & power MOSFET (DMOS, VMOS). Output power, power dissipation and efficiency analysis of Class A, class B, class AB, class C, class D and class E amplifiers as output stages. Pushpull amplifiers with and without transformers, Complementary symmetry & quasi complimentary symmetry amplifiers	9
	TOTAL	**40**

TEXT BOOK

1. Millman, Integrated Electronics, TMH.(1972)
2. A. S. Sedra, Kenneth C. Smith, Microelectronic Circuits, Oxford University Press.(2007)

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Publication
1	M. H. Rashid, Microelectronic Circuits Analysis and Design, Cengage Learning	2010
2	Electronic Devices and Circuits–II, R.Tiwari, Genius publications	2013
3	Salivahnan, Electronics Devices and Circuits, TMH.	1998
4	Fundamentals of Analog Circuits 2e, Floyd, Pearson	2012
5	David A. BELL, Electronic Devices and Circuits, Oxford University Press.	2009

4EC2A RANDOM VARIABLES & STOCHASTIC PROCESSES

B.Tech. (EC) 4th semester **Max. Marks: 100**
3L+1T **Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	**PROBABILITY** - Introduction, definitions, conditional probability, combined experiments.	7
II	**RANDOM VARIABLES -** Introduction, Distribution and density functions, Discrete and continuous random variables, (Gaussian), Exponential, Rayleigh, Uniform, Bernoulli, Binominal, Poisson, discrete Uniform and conditional distributions. Functions of one random variable: distribution, mean, variance, moments and characteristics functions.	8
III	**MULTIPLE RANDOM VARIABLES** - distributions, Pne function of two random variables, Two functions of two random variables, Joint moments, Joint characteristics functions, Conditional distributions, conditional expected values, statistical independence. Multiple random variables: multiple functions of multiple random variables, jointly Gaussian random variables, sums of random variable, Central limit theorem.	9
IV	**STOCHASTIC PROCESSES** - Definitions, Random process concept, Statistics of stochastic processes: mean, autocorrelation, strict and wide sense stationary, random processes and Linear Systems.	7
V	**STOCHASTIC PROCESSES IN FREQUENCY DOMAIN** - Power spectrum of stochastic processes, Transmission over LTI systems, Gaussian and White processes, Properties of power spectral density.	9
	TOTAL	40

TEXT BOOK

1. Probability, Random Variables And Stochastic Processes, Papoulis, TMH (2002)
2. Stochastic Processes, 2ed, Ross, Wiley.(1996)

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Publication
1	Devore – Probability and statistics for engineering and sciences, Cengage learning	**2011**
2	Mendenhall – Introduction to probability and statistics, Cengage learning	**2012**
3	Probability, Random Variables And Random Signal Principles, Peebles, TMH	**2002**
4	Probability Theory and Stochastic Processes for Engineers, Bhat, Pearson	**2011**
5	Probability and Random Processes with Application to Signal Processing, 3/e, Stark, Pearson	**2002**
6	Random Variables & Stochastic Processes, Gaur and Srivastava, Genius publications	**2003**
7	Random Processes: Filtering, Estimation and Detection, Ludeman, Wiley	**2002**
8	An Introduction to Probability Theory & Its App., Feller, Wiley	**1969**

4EC3A ELECTRONIC MEASUREMENT & INSTRUMENTATION

B.Tech. (EC) 4th Sem. **Max. Marks: 100**
3L+0T **Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	**THEORY OF ERRORS** - Accuracy & precision, Repeatability, Limits of errors, Systematic & random errors, Modeling of errors, Probable error & standard deviation, Gaussian error analysis, Combination of errors.	7
II	**ELECTRONIC INSTRUMENTS** - Electronic Voltmeter, Electronic Multimeters, Digital Voltmeter, and Component Measuring Instruments: Q meter, Vector Impedance meter, RF Power & Voltage Measurements, Introduction to shielding & grounding.	9
III	**OSCILLOSCOPES** - CRT Construction, Basic CRO circuits, CRO Probes, Techniques of Measurement of frequency, Phase Angle and Time Delay, Multibeam, multi trace, storage & sampling Oscilloscopes.	6
IV	**SIGNAL GENERATION AND SIGNAL ANALYSIS** - Sine wave generators, Frequency synthesized signal generators, Sweep frequency generators. Signal Analysis - Measurement Technique, Wave Analyzers, and Frequency - selective wave analyser, Heterodyne wave analyser, Harmonic distortion analyser, and Spectrum analyser.	8
V	**TRANSDUCERS** - Classification, Selection Criteria, Characteristics, Construction, Working Principles and Application of following Transducers:- RTD, Thermocouples, Thermistors, LVDT, Strain Gauges, Bourdon Tubes, Seismic Accelerometers, Tachogenerators, Load Cell, Piezoelectric Transducers, Ultrasonic Flow Meters.	10
	TOTAL	40

TEXT BOOK

1. Electronic Instrument and Measurment, Bell, Oxford .(2007)
2. Electronic Measurements & Instrumentation, Bernard Oliver, TMH.(1971)

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Publication
1	Electronic Instrumentation, H S Kalsi, TMH	2012
2	Instrumentation Measurement & Analysis, B.C.Nakra,K.K. Chaudhry, TMH	2004
3	Electronic Measurements and Instrumentation, Gupta & Soni, Genius pub.	2014
4	Electronic Measurements & Instrumentation, Bernard Oliver, John Cage, TMH	1971
5	Electronic Measurements and Instrumentation, Lal Kishore, Pearson	2010
6	Elements of Electronic Instrumentation And Measurement, Carr, Pearson	1996
7	Instrumentation for Engineering Measurements, 2ed, Dally, Wiley	1993
8	Introduction To Measurements and Instrumetation, Arun K. Ghosh, PHI	2012

4EC4A ELECTROMAGNETIC FIELD THEORY

B.Tech. (EC) 4th Sem. **Max. Marks: 100**
3L+1T **Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	**INTRODUCTION** - Vector Algebra, different Coordinate system, Relation in rectangular, cylindrical, spherical and general curvilinear coordinates system. Line, Surface and volume integral, Concept and physical interpretation of gradient, Divergence and curl. Divergence, Stoke's and Green's theorems.	6
II	**ELECTROSTATICS -** Electric field intensity & flux density (D). Electric field due to various charge configurations. Gauss's law, divergence of electric flux and Maxwell's first equation, The potential functions and gradient of electric potential. Maxwell curl equation for static electric field. Poisson's and Laplace's equation and their solution. Divergence of current density (J) and Continuity equation for current. Duality of J and D, Capacitance and electrostatics energy. Field determination by method of images, Boundary conditions, Field mapping and concept of field cells.	9
III	**MAGNETOSTATICS** - Bio-Savart's law, Ampere's circuital law Magnetic field intensity H, flux density B & magnetization M, their interrelation. Curl of H. Magnetic scalar and vector potential, Faraday's Law, self & mutual inductance, Energy stored in magnetic field, Boundary conditions, Analogy between electric and magnetic field, Field maping and concept of field cells.	9
IV	**TIME VARYING FIELDS** - Displacement currents, displacement vector and equation of continuity. Maxwell's equations, Uniform plane wave in free space, dielectrics and conductors, Depth of penetration-skin effect, Sinusoidal time variations, Reflection & Refraction of Uniform Plane Wave, standing wave ratio. Pointing vector and power considerations.	9
V	**RADIATION, EMI AND EMC** - Retarded Potentials and concepts of radiation, Radiation from a small current element. Radiation Resistance: Introduction to Electromagnetic Interference and Electromagnetic compatibility, EMI error in equipments, EMI standard, EMI coupling modes, Methods of eliminating interference, shielding, grounding, conducted EMI, EMI testing: emission testing, susceptibility testing.	7
	TOTAL	40

TEXT BOOKs:

1. Sadiku, Electromagnetic Field Theory, Oxford .(2000)
2. Mahapatra, Principles of Electromagnetics, TMH.(2011)

REFERENCE BOOKs:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Kshetrimeyum – Electromagnetic field theory, Cengage learning	2012
2	Hayt, Engineering Electromagnetics, TMH	2007
3	Jordan Balmain, Electromagnetic Field Theory and Radiations, PHI	1968
4	Kaduskar ,Principles of Electromagnetics, Wiley	2010
5	Reitz ,Foundations of Electromagnetic Theory, Pearson	2009
6	Seavganokar, Electromagnetic Waves, TMH	2005
7	Rao, Electromagnetic Field Theory and Transmission Lines, Wiley	2012
8	David K. Chang, Electromagnetic Field Theory, Pearson	1999

4EC5A OPTIMIZATION TECHNIQUES

B.Tech. (EC) 4th semester **Max. Marks: 100**
3L+1T **Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	**INTRODUCTION** - Historical development, engineering application of optimization, Formulation of design problems as a mathematical programming problem, Classification of optimization problems	8
II	**LINEAR PROGRAMMING** - Simplex methods, Revised simplex method, Duality in linear programming, post optimality analysis.	8
III	**APPLICATIONS OF LINEAR PROGRAMMING -** Transportation and assignment problems	6
IV	**NON-LINEAR PROGRAMMING** - Unconstrained optimization techniques, Direct search methods, Descent methods, Constrained optimization, Direct and Indirect methods.	10
V	**DYNAMIC PROGRAMMING-** Introduction, multi-decision processes, computational procedure	8
	TOTAL	40

TEXT BOOK

1. Albright - Data analysis, optimization and simulation modeling, Cengage learning .(2011)

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Publication
1	Hiller and Lieberman, Introduction to Operation Research (Seventh Edition),TMH	2010
2	Prasad – Operations Research, Cengage learning	2011
3	Ravindren Philips and Solberg, Operation Research Principles and Practice (Second Edition), Wiley	2007
4	Anderson – An introduction to management science, quantitative approaches to decision making, Cengage learning	2012

4EC6A ADVANCED ENGINEERING MATHEMATICS-II

B.Tech. (EC) 4th semester **Max. Marks: 100**
3L+1T **Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	**NUMERICAL ANALYSIS-** Finite differences – Forward, Backward and Central differences. Newton's forward and backward differences, interpolation formulae. Stirling's formula, Lagrange's interpolation formula.	6
II	**NUMERICAL ANALYSIS**- Integration-Trapezoidal rule, Simpson's one third and three-eighth rules. Numerical solution of ordinary differential equations of first order - Picard's mathod, Euler's and modified Euler's methods, Miline's method and Runga-Kutta fourth order method, Differentiation.	8
III	**SPECIAL FUNCTIONS** – Bessel's functions of first and second kind, simple recurrence relations, orthogonal property of Bessel's, Transformation, Generating functions, Legendre's function of first kind. Simple recurrence relations, Orthogonal property, Generating function.	9
IV	**STATISTICS AND PROBABILITY** - Elementary theory of probability, Baye's IV theorem with simple applications, Expected value, theoretical probability distributions-Binomial, Poisson and Normal distributions. Lines of regression, co-relation and rank correlation.	9
V	**CALCULUS OF VARIATIONS** - Functional, strong and weak variations simple variation problems, the Euler's equation.	8
	TOTAL	40

TEXT BOOK

1. Advanced Engg. Mathematics, Irvin Kreyszig, Wiley .(2007)

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Publication
1	Datta – Mathematical methods of science & engineering, Cengage learning	2012
2	O'neil – Advanced Engineering mathematics, Cengage learning	2007
3	Applied Statics & Probability, Montgomery, Wiley	2013
4	Engineering Mathematics, T Veerarajan, TMH	2011
5	Mathematical Techniques, Jordan, Oxford	2002
6	Engineering Mathematics IV, K.C. Sarangi and others, Genius publications	2011
7	Advance Engineering Mathematics, Potter, Oxford	2005
8	Advanced Engineering Mathematics, 2/e, Greenberg	1998

4EC7A COMPUTER PROGRAMMING LAB-II

B.Tech. (EC) 4th Sem. **Max. Marks: 100**

2P **Exam: 3 H**

S.No.	Contents
	Programs in C++
1	Write a program to perform the complex arithmetic.
2	Write a program to perform the rational number arithmetic.
3	Write a program to perform the matrix operations. (Transpose, addition, subtraction, multiplication, test if a matrix is symmetric/ lower triangular/ upper triangular)
4	Implement Morse code to text conversion and vice-versa.
5	To calculate Greatest Common Divisor of given numbers.
6	To implement tower of Hanoi problem.
	Program in Java
7	To implement spell checker using dictionary.
8	To implement a color selector from a given set of colors.
9	To implement a shape selector from a given set of shapes.
10	To implement a calculator with its functionality.
11	By mapping keys to pens of different colors, implement turtle graphics.
12	To implement a graph and display BFS/DFS order of nodes.

4EC8A ANALOG ELECTRONICS LAB

B.Tech. (EC) 4th Sem. **Max. Marks: 100**

2P **Exam: 3 H**

S.No.	Contents
1	Plot gain-frequency characteristics of BJT amplifier with and without feedback in the emitter circuit and determine bandwidths, gain bandwidth products and gains at 1kHz with and without negative feedback.
2	Study of series and shunt voltage regulators and measurement of line regulation and ripple factor.
3	Plot and study the characteristics of small signal amplifier using FET.
4	Study of push pull amplifier. Measure variation of output power & distortion with load.
5	Study Wein bridge oscillator and observe the effect of variation in R oscillator frequency
6	Study transistor phase shift oscillator and observe the effect of variation in R & C on oscillator frequency and compare with theoretical value.
7	Study the following oscillators and observe the effect of variation of C on oscillator frequency: (a) Hartley (b) Colpitts
8	Design Fabrication and Testing of k-derived filters (LP/HP).
9	Study of a Digital Storage CRO and store a transient on it.
10	To plot the characteristics of UJT and UJT as relaxation.
11	To plot the characteristics of MOSFET and CMOS.

4EC9A MEASUREMENT & INSTRUMENTATION LAB

B.Tech. (EC) 4th Sem. **Max. Marks: 100**

2P **Exam: 3 H**

S.No.	Contents
1	Measure earth resistance using fall of potential method.
2	Plot V-I characteristics & measure open circuit voltage & short circuit current of a solar panel
3	Measure unknown inductance capacitance resistance using following bridges (a) Anderson Bridge (b) Maxwell Bridge
4	To measure unknown frequency & capacitance using Wein's bridge.
5	Measurement of the distance with the help of ultrasonic transmitter & receiver.
6	Measurement of displacement with the help of LVDT.
7	Draw the characteristics of the following temperature transducers (a) RTD (Pt-100) (b) Thermistors.
8	Draw the characteristics between temperature & voltage of a K type thermocouple.
9	Calibrate an ammeter using D.C. slide wire potentiometer.
10	Measurement of strain/ force with the help of strain gauge load cell.
11	Study the working of Q-meter and measure Q of coils.
12	Calibrate a single-phase energy meter (Analog and Digital) by phantom loading at different power factor by: (i) Phase shifting transformer (ii) Auto transformer .

4EC10A HUMANITIES & SOCIAL SCIENCES

B.Tech. (EC) 4th Sem. **Max Marks: 50**

2P **Exam: 3 H**

S.No.	Contents
1	**India- Brief History of Indian Constitution**- Framing, Features, Fundamental Rights, Duties.
2	**Society- Social groups- Concept & Types, Socialization-** Concept & Theory, Social Control- Concept, Social Problem in Contemporary India, Status & Role.
3	**Microeconomics**- Demand, Supply and Their elasticity's, Cardinal and Ordinal approach to consumption, Consumer Surplus, Laws of returns, Returns to scale, cost analysis
4	**Macroeconomics**- National Income, Money & Banking, Monetary & Fiscal policies, Unemployment, Inflation, Characteristics of Indian Economy.
5	**Introduction to Industrial Psychology** - Definitions & Scope Major influences on industrial Psychology- Scientific management and human relations schools Hawthorne Experiments. **Individual in Workplace:** Motivation and Job satisfaction, Stress management, Organizational culture, Leadership & group dynamics.

Textbook:

1. Schiller," Essential of Economics" Mc-Grew Hill, 2013
2. Miner J.B. Industrial/Organizational Psychology. N Y : McGraw Hill.(1992)

References Books:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Kaur – Micro ECON, Cengage learning	2012
2	McEachern/Indra – Macro ECON, Cengage Learning	2012
3	Lipsay "Economics" Oxford Press	2010

5EC1A SIGNALS AND SYSTEMS

B. Tech. (EC) 5th Sem. **Max. Marks: 100**

3L + 1T **Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	**Introduction**: Continuous time and discrete time signals and systems, Properties of systems**.**	**3**
	Linear time invariant systems- continuous time and discrete time. Properties of LTI systems and their block diagrams.	**5**
	Convolution, Discrete time systems described by difference equations.	**1**
II	**Fourier series representation of signals:** Fourier series representation of continuous periodic signal & its properties.	**3**
	Fourier series representation of Discrete periodic signal & its properties.	**3**
	Continuous time filters & Discrete time filters described by Diff. equation.	**2**
III	**Fourier transform**: The continuous time Fourier transform for periodic and non-periodic signals, Properties of CTFT.	**4**
	Discrete time Fourier transform for periodic and non-periodic signals Properties of DTFT.	**4**
IV	**Z-transform & laplace transform:** The region of convergence for the Z-transform. The Inverse Z-transform. Two dimensional Z transform.	**3**
	Properties of Z transform.	**1**
	Laplace transform: Properties of Laplace Transform,	**2**
	Application of Laplace transform to system analysis.	**2**
V	**SAMPLING:** Mathematical theory of sampling. Sampling theorem. Ideal & Real sampling.	**2**
	Interpolation technique for the reconstruction of a signal from its samples. Aliasing.	**2**
	Sampling in freq. domain. Sampling of discrete time signals.	**3**
	TOTAL	**40**

TEXT BOOKS

1. Signals And Systems, Oppenheim, Willsky, Nawab, PHI.(1992)
2. Signals And Systems M J Roberts, Mc-Graw Hill.(2004)

REFERENCE BOOKS

S.No.	Name of Authors /Books /Publisher	Publication year
1	Principles Of Linear Systems And Signals, 2e (Intl. Version), Lathi 2nd, Oxford	2002
2	Signal & Systems 3e, Chen 3rd, Oxford	2004
3	Fundamentals Of Signals And Systems, Wiley	2009
4	Signals And Systems, P Rao, Mc-Graw Hill	2011
5	Signals And Systems: A Simplified Approach, Ganesh Rao, 4e, Pearson	2012
6	Signals And Systems: Continuous And Discrete, Roger E Ziemer, 4e, PHI	1998
7	Signals And Systems, Ravi Kumar, PHI	2009
8	Signals & Systems, Iyer, Cengage Learning	2009

5EC2A LINEAR INTEGRATED CIRCUITS

B.Tech. (EC) 5th Sem. **Max. Marks: 100**

3L+0T **Exam Hours: 3**

Unit	Contents	Contact Hours
I	**OPERATIONAL AMPLIFIERS:** Basic differential amplifier analysis, Basic structure and principle of operation, Single ended and double ended configurations ,, calculation of differential gain, common mode gain, Op-amp configurations with feedback, Op-amp parameters, Inverting and Non-Inverting configuration, Comparators, Adder.	08
II	**OPERATIONAL AMPLIFIER APPLICATIONS:** Integrator, Differentiator, Voltage to frequency & Frequency to voltage converters. Oscillators: Phase shift, Wien bridge, Quadrature, precision rectifier, half and full wave rectifiers, square wave, triangular wave, sawtooth oscillators. Voltage controlled oscillators.	08
III	**ACTIVE FILTERS:** Low pass, high pass, band pass and band reject filters, All pass filter, Switched capacitor filter, Butterworth filter design, Chebyshev Filter design.	08
IV	**LINEAR ICs:** Four quadrant multiplier & its applications, Basic blocks of linear IC voltage regulators, Three terminal voltage regulators, Positive and negative voltage regulators. , A/D and D/A converters, analog switches, The 555 timer as astable and monostable multivibrators. Zero crossing detector, Schmitt trigger and its applications.	08
V	**Non- linear Applications of OP-AMP:** log and antilog amplifiers, and multipliers. Solution of differential equation and analog computer **PHASE-LOCKED LOOPS:** Operating Principles of PLL, Linear Model of PLL, Lock range, Capture range, Applications of PLL as FM detector, FSK demodulator, AM detector, frequency translator, phase shifter, tracking filter, signal synchronizer and frequency synthesizer, Building blocks of PLL, LM 565 PLL.	08
	TOTAL	**40**

TEXT BOOKs

S.No.	Name of Authors /Books /Publisher	Publication Year
1	OP-AMP and linear integrated circuits 2nd edition, PLHI by Ramakant A. Gayakwad.	1992
2	Design with operation amplifiers and Analog Integrated circuits by Sergei Franco.	2007
3	Integrated Electronics: Analog and Digital circuits & system by Millman & Halkias.	1972
4	Linear Integrated Circuits by D.R.Chaudhary (WEL).	2007

Reference Books:

1. Operational amplifier with linear integrated circuits, 4th edition, W.D. Stanley, Pearson.(2002)
2. Op Amps and Linear Integrated Circuits: Concepts and Applications, Fiore, Cengage learning (2010)

5EC3A TELECOMMUNICATION ENGINEERING

B.Tech. (EC) 5th Sem. **Max. Marks: 100**

3L+0T **Exam Hours: 3**

Unit	Contents	Contact Hours
I	**TRANSMISSION LINE**: Types of transmission lines, general transmission line equation, line constant, equivalent circuits, infinite line, and reflection on a line, SWR of line with different type of terminations. Distortion less and dissipation less lines, Coaxial cables, Transmission lines at audio and radio frequencies, Losses in transmission line, Characteristics of quarter wave, half wave and lines of other lengths.	08
II	**TRANSMISSION LINE APPLICATIONS:** Smith chart and its application. Transmission line applications, Impedance matching Network. Single & double Stub matching. Measurement of parameters of transmission line, measurement of attenuation, insertion loss, reflection coefficient and standing wave ratio.	08
III	**ATTENUATORS & FILTERS:** Elements of telephone transmission networks, symmetrical and Asymmetrical two port networks. Different Attenuators, π-section & T-section attenuators, stub matching, Transmission equalizers Filters, constant K-section, Ladder type, π-section, T-section filter, m-derived filter sections, Lattice filter section.	08
IV	**TELEPHONY:** Voice transmission, Two wire/ Four wire transmission, Multi-channel systems: Frequency division & time division multiplexing, Echo suppressors & cancellers, cross talk. Telephone set, Touch tone dial types, Numbering Concept for Telephony, Essentials of Traffic Engineering, Telephone Traffic Measurements, Subscriber loop Design.	08
V	**Switching and Signaling for Analog and Digital Telephone Networks**: Introduction to switching Concepts, De-generation, Availability and Grading, Principle of Electronic Exchange, EPABX and SPC Digital telephone Exchange, Fascimile services. Approaches to PCM Switching: Multistage switches, Time Switch, Space Switch, STS and TST Switches, Concept of Supervisory and AC signaling.	08
	TOTAL	**40**

TEXT BOOKs:

1. Telecommunication System Engineering, Roger L. Freeman, Wiley (2004)
2. Telecommunication Switching Systems & Networks, Thiagrajan Vishwanathan, PHI(1994)

REFERENCE BOOKs:

S.No.	Name of Authors /Books /Publisher	Publication Year
1.	Introduction to Telecommunications, Gokhale ,Cengage learning	2011
2.	Telecommunication, W.Fraser., PHI	1970
3.	Digital Telephony, Bellamy, Wiley.	2000
4.	Schaum's Outline of Theory and Problems of Transmission Lines,TMH.	2007
5.	Transmission Lines and Networks, Umesh Sinha, Satya Prakashan.	2010
6.	E.Keiser&E.Strange, Digital Telephony and Network Integration, (2/e), Van Nostrand,.	1995
7.	Principles of Telephony, N.N. Biswas, Sangam Books Limited.	1993
8.	Transmission Lines and Networks, Umesh Sinha, Satya Prakashan	
9.	Telecommunications Switching, Traffic and Networks, J.E. Flood, Pearson	

5EC4A ANALOG COMMUNICATION

B.Tech. (EC) 5th Sem. **Max. Marks: 100**

3L+1T **Exam: 3 Hours**

Unit	Contents	Contact Hours
I	**NOISE EFFECTS IN COMMUNICATION SYSTEMS**: Representation of Band Limited and Band Pass Process, Noise Sources and Classification, Resistor noise, Networks with reactive elements, Noise temperature, Noise bandwidth, effective input noise temperature, Noise figure. Noise figure & equivalent noise temperature in cascaded circuits. Narrow band Noise Representation.	08
II	**AMPLITUDE MODULATION**: Frequency translation, Single Tone Modulation, Recovery of base band signal, Spectrum & power relations in AM systems. Methods of Modulation & Demodulation of AM-DSB, DSB-SC and SSB signals. AM Broadcast Transmitters & Receivers, Single Sideband Transmission and Reception, Super heterodyne receivers, Vestigial Sideband Modulation.	09
III	**FREQUENCY MODULATION:** Phase & freq. modulation & their relationship, Spectrum & band width of a Sinusoidal modulated FM signal, Phasor diagram, Narrow band & wide band FM. Generation & demodulation of FM signals. Effect of Channel Non-Linearity, Comparison of AM, FM & PM, Threshold in FM, PLL demodulator. FM Broadcasting transmitters & Receivers.	08
IV	**NOISE IN AM AND FM**: Noise in CW modulation systems, SNR calculations for synchronous detection of DSB and SSB and envelope detection of AM, SNR calculations for angle modulation system, Pre-emphasis and de-emphasis, Threshold effect, Noise in Communication subsystems - Internal and external noise.	08
V	**PULSE ANALOG MODULATION**: Practical aspects of sampling: Natural and flat top sampling. Reconstruction, PAM, PWM, PPM modulation and demodulation methods, Noise Performance of Pulse Analog Modulation Systems.	07
	TOTAL	**40**

TEXT BOOKs:

1. Analog Communications Systems, P RamaKrishna Rao, Mc Graw Hill (2008)
2. Communications Systems, 5ed-, Haykins, Wiley (2009)

REFERENCE BOOKs:

S.No.	Name of Authors /Books /Publisher	Year of Publication
1	Principles of Communication Systems, Herbert Taub, Donald Schilling, Goutam Saha, TMH	2009
2	Analog and Digital Communication, Schum Series, TMH	2006
3	Digital & Analog Communication Systems, Leon W. Couch, Pearson	2013
4	Analog & Digital Communication Systems, Singal, TMH	2001
5	An Introduction To Analog & Digital Communications, Haykins, Wiley	2009
6	Electronic Communication Systems-, Kennedy Devis, TMH	1999
7	Digital And Analog Communication Systems, Shanmugam, Wiley	1994
8	Proakis J. G. and Salehi M., "Communication Systems Engineering", Pearson Education	2002
9	Electronic Communication Systems, Blake, Cengage learning	2006

5EC5A MICROWAVE ENGINEERING – I

B.Tech. (EC) 5th semester **Max. Marks: 100**
3L+0T **Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	**MICROWAVE TRANSMISSION LINES:** Introduction of Microwaves and their applications. Rectangular Waveguides: TE and TM wave solutions, Field patterns, Wave impedance and Power flow.	5
	PLANAR TRANSMISSION LINES: Stripline and microstrip lines – Dominant mode of propagation, Field patterns, Characteristic impedance, Basic design formulas and characteristics. Parallel coupled striplines and microstrip lines- Even- and odd- mode excitations. Slot lines and Coplanar lines. Advantages over waveguides.	5
II	**MICROWAVE NETWORK ANALYSIS:** Impedance and Admittance matrices, Scattering matrix, Parameters of reciprocal and Loss less networks, ABCD Matrix, Scattering matrices of typical two- port, three-port and four-port networks, Conversion between two- port network matrices.	8
III	**MICROWAVE PASSIVE COMPONENTS**: Waveguide Components: *E*-plane and *H*- plane Tees, Magic Tee, Shorting plunger, Directional couplers, and Attenuator.	4
	Stripline and Microstrip line Components*:* Open and shorted ends. Half wave resonator, Lumped elements (inductors, capacitors and resistors) in microstrip. Ring resonator, 3-dB branchline coupler, backward wave coupler, Wilkinson power dividers and rat- race hybrid ring. Low pass and band pass filters.	5
IV	**MICROWAVE MEASUREMENTS:** Detection of microwaves, Microwave power measurement, Impedance measurement, Measurement of reflection loss (VSWR), and transmission loss in components. Passive and active circuit measurement & characterization using network analyser, spectrum analyser and noise figuremeter.	6
V	**MICROWAVE INTEGRATED CIRCUIT TECHNOLOGY:** Substrates for Microwave Integrated Circuits (MICs) and their properties. Hybrid technology – Photolithographic process, deposited and discrete lumped components. Microwave Monolithic Integrated Circuit (MMIC) technology- Substrates, MMIC process, comparison with hybrid integrated circuit technology (MIC technology).	7
	TOTAL	**40**

TEXT BOOKs

1. A. Das and S. Das, Microwave Engineering, Tata McGraw-Hill, 2000.
2. D. M. Pozar, *Microwave Engineering*, John Wiley & Sons, 1998. (Use the latest version)

REFERENCE BOOKs

SN	Name of Authors /Books /Publisher	Year of
		Publication
1	B. Bhat and S. K. Koul, Stripline-like Transmission Lines for Microwave Integrated Circuits, Wiley Eastern Ltd.,	1989
2	T. C. Edwards, Foundations for Microstrip Circuit Design, John Wiley & Sons,.	1981
3	K. C. Gupta, R. Garg, I.Bahl and P. Bhartia, Microstrip Lines and Slotlines, Second Edition, Artech House	1996
4	K.C Gupta, Microwaves, Wiley Eastern Ltd.	1979
5	P.A. Rizzi, Microwave Engineering- Passive Circuits, Prentice Hall,.	1988
6	Robert E. Collin, Foundations for microwave engineering 2ed	2012
7	Microwave Engineering , Raghuvanshi,Cengage learning	

5EC6.1A BIOMEDICAL INSTRUMENTATION

B.Tech. (EC) 5th Sem **Max. Marks: 100**
3L+0T **Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	**HUMAN BODY SUBSYSTEMS-** Brief description of neural, muscular, cardiovascular and respiratory systems; their electrical, mechanical and chemical activities.	3
	TRANSDUCERS AND ELECTRODES- Principles and classification of transducers for Bio-medical applications, Electrode theory, different types of electrodes, Selection criteria for transducers and electrodes.	3
II	**BIOPOTENTIALS-** Electrical activity of excitable cells, ENG, EMG, ECG, ERG, ECG. Neuron potential.	2
	CARDIOVASCULAR SYSTEM MEASUREMENTS- Measurement of blood pressure, blood flow, cardiac output, cardiac rate, heart sounds, Electrocardiograph, phonocardiograph, Plethysmograph, Echocardiograph.	5
III	**INSTRUMENTATION FOR CLINICAL LABORATORY-** Measurement of pH value of blood, ESR measurement, hemoglobin measurement, O2 and CO2 concentration in blood, GSR measurement. Spectrophotomentry, chromatography, Hematology,	4
	MEDICAL IMAGING: Diagnostic X-rays, CAT, MRI, thermography, ultrasonography, medical use of isotopes, endoscopy.	4
IV	**PATIENT CARE, BIOTELEMETRY AND SAFETY MEASURES** Elements of Intensive care monitoring basic hospital systems and components, physiological effects of electric current shock hazards from electrical equipment, safety measures, Standards & practices. Biomedical Telemetry: Introduction, block diagram and description of single channel/multi channel telemetry systems.	7
	THERAPEUTIC AND PROSTHETIC DEVICES - Introduction to cardiac pacemakers, defibrillators, ventilators, muscle stimulators, diathermy, heart lung machine, Hemodialysis, Applications of Laser.	5
V	**APPLICATIONS OF BIOPOTENTIALS:** Electrocardiographic diagnostic criteria for Identification of cardiac disorders, Electrocardiographic pattern of ischemia, Atrial abnormalities, Ventricular enlargement, Abnormal ECG patterns, Clinical applications of EEG, EMG, ERG	4
	COMPUTER APPLICATIONS: data acquisition and processing, remote data recording and management. Real time computer applications	3
	TOTAL	**40**

TEXT BOOKs:

1. L. Cromwell, F. J. Weibell, and L. A. Pfeiffer, Biomedical Instrumentation and Measurements, Pearson Education, Delhi, (1990)

2. J. J. Carr and J. M. Brown, Introduction to Biomedical Equipment Technology, 4th ed., Pearson Education, Delhi, (2001)

REFERENCE BOOKs:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Biomedical Instrumentation Systems , Chatterjee, Cengage learning	**2011**
2	Aston, "Principles of Biomedical Instrumentation and measurements", McGraw Hill publishing Co,	1990
3	L.A. Geddes and L.E. Baker, Principles of Applied Biomedical Instrumentation , John Wiley & Sons, Inc,	1989
4	Richard Aston, Principles of Biomedical Instrumentation and Measurement , Merrill Publishing Company,.	1990
5	Jacobson B. and Webster J.G., Medical Clinical Engineers , Prentice Hall Inc.,.	1979
6	J. G. Webster, Medical Instrumentation Application and Design, 3rd ed., John Wiley & Sons, N.Y.,	1998
7	R. S. Khandpur, Handbook of Biomedical Instrumentation, 2nd ed., Tata McGraw Hill,	2003
8	R. Anandanatarajan, "Biomedical Instrumentation", PHI Learning,	2009

5EC6.2A ADVANCED DATA STRUCTURES AND ALGORITHMS

B.Tech. (EC) 5th Sem. **Max. Marks: 100**
3L+0T **Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	**Basic Concepts of OOPs** – Templates Function and class templates – Algorithms: performance analysis: time complexity and space complexity– ADT – List (Singly– Doubly and Circular) Implementation – Array – Pointer – Cursor Implementation	6
II	**Stacks and Queues** – ADT– Implementation and Applications – Trees – General– Binary – Binary Search – Expression Search – AVL – Introduction to Red Black trees and Splay tree – B Trees – Implementations – Tree Traversals	6
III	**Set** – Implementation – Basic Operations on Set – Priority Queue – Implementation – Graphs – Directed Graphs – Shortest Path Problem – Undirected Graph – Spanning Trees – Graph Traversals: hash table representation: hash functions: collision resolution: separate chaining: open addressing: linear probing: quadratic probing: double hashing: rehashing	10
IV	**Issues** – Managing Equal Sized Blocks – Garbage Collection Algorithms for Equal Sized Blocks – Storage Allocation for Objects with Mixed Sizes – Buddy Systems – Storage Compaction	8
V	**Searching Techniques** – Sorting – Internal Sorting – Bubble Sort – Insertion Sort – Quick Sort – Heap Sort – Bin Sort – Radix Sort – External Sorting – Merge Sort – Multiway Merge Sort – Polyphase Sorting – Design Techniques – Divide and Conquer – Dynamic Programming – Greedy Algorithm – Backtracking – Local Search Algorithms	10
	TOTAL	**40**

TEXT BOOKs

1. Tanenbaum A.S, Langram Y, Augestien M.J., Data Structures using C & C++, Prentice Hall of India, (2002).
2. Data structures, Algorithms and Applications in C++, S.Sahni, University Press (India) Pvt.Ltd, 2nd edition, Universities Press Orient Longman Pvt. Ltd. (2005)

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Publication
1	Mark Allen Weiss:Data Structures and Algorithm Analysis in C++,Pearson Education	2002
2	Aho Hopcroft Ullman, ―Data Structures and Algorithms, Pearson Education,	2002
3	Horowitz Sahni, Rajasekaran, ―Computer Algorithms, Galgotia,.	2000
4	Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and Mount, Wiley student edition, John Wiley and Sons.	1989
5	Data Structure and Algorithm in C++ , Drozdek, Cengage learning	1990
6	Data Structures: A Pseudocode Approach with C, Gilberg,Cengage learning	1996

5EC6.3A COMPUTER ORIENTED NUMERICAL & STATISTICAL METHODS

B.Tech. (EC) 5th Sem. **Max. Marks: 100**
3L+0T **Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	**SOLUTION OF LINEAR EQUATIONS-** Cramer's Rule, Gauss Elimination, Gauss Jordan Elimination and Gauss Seidal Iterative Methods	8
	and their Computer Programming in C. Matrix Inversion by Gauss Elimination, Computer Programs for Matrix Inversion.	
II	**SOLUTION OF NON-LINEAR EQUATIONS-** Interval Bisection Method, Secant Method, Regula- Falsi Method, Curve Fitting, Method of Least Squares and their Computer Programming in C	7
III	**SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS-** Solution of Partial Differential Equations with Special Reference to Heat Equation, Laplace Equation and Wave Equation Milne's and their Computer Programming in C. Curve Fitting Methods – Method of Least Squares, Fitting a Straight Line, Parabola..	9
IV	**STOCHASTIC PROCESSES -** Definitions, Random Process Concept, Statistics of Stochastic Processes: Mean, Autocorrelation, Autocovariance. Stationary Processes, Strict and Wide Sense Stationary, Random Processes and Linear Systems.	9
V	**STOCHASTIC PROCESSES IN FREQUENCY DOMAIN -** Power Spectrum of Stochastic Processes, Transmission over LTI systems, Gaussian and White Processes, Properties of Power Spectral Density	7
	TOTAL	40

TEXT BOOKs:

1. Numerical methods for Scientific and Engineering Computation by M.K.Jain, S.R.K.Iyengar, R.K. Jain. (2003)

2. Computer based numerical algorithms by E.V. Krishnamoorthy.(2004)

REFERENCE BOOKS:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Introduction to Numerical Analysis by E. Atkinson	1984
2	Peebles, P. Probability, random variables and random signal principles. Mc Graw Hill.	2007
3	Computer Oriented Numerical & Statistical Methods by Dr. Gokhroo & Others	2012
4	Elementary Numerical Analysis by Samuel D.Conte and Cart de Boor, McGraw Hill International Edition.	19100
5	Numerical methods for Science and Engineering, PHI by R.G.Stanton	1963
6	Papoulis, A. Probability, random variables and stochastic processes. Mc Graw Hill (international Students' edition), Singapore.	2012
7	Childers, D. G. Probability and random processes using MATLAB. Mc Graw Hill,	1997
8	Smith, G. D. Numerical Solution of PDE, Oxford Uni. Press	2002
9	Numerical Analysis, Burden, Cengage learning	2004
10	Numerical Mathematics and Computing , Cheney , Cengage learning	2005

5EC7A ELECTRONIC ENGINEERING DESIGN LAB

B.Tech. (EC) 5th Sem. **Max. Marks: 75**

2P **Exam: 3 H**

S.No.	Contents
	To design the following circuits, assemble these on bread board and test them. Simulation of these circuits with the help of appropriate software.
1	Op-Amp characteristics and get data for input bias current measure the output-offset voltage and reduce it to zero and calculate slew rate.
2	Op-Amp in inverting and non-inverting modes.
3	Op-Amp as scalar, summer and voltage follower.
4	Op-Amp as differentiator and integrator.
5	Design LPF and HPF using Op-Amp 741
6	Design Band Pass and Band reject Active filters using Op-Amp 741.
7	Design Oscillators using Op-Amp (i) RC phase shift (ii) Hartley (iii) Colpitts
8	Design (i) Astable (ii) Monostable multivibrators using IC-555 timer
9	Design Triangular & square wave generator using 555 timer.
10	Design Amplifier (for given gain) using Bipolar Junction Transistor.

5EC8A MICROWAVE ENGINEERING LAB

B.Tech. (EC) 5th Sem. **Max. Marks: 75**

2P **Exam: 3 H**

S.No.	Contents
1.	Study of various microwave components and instruments like frequency meter, attenuator, detector and VSWR meter. (a) Measurement of guide wavelength and frequency using a X-band slotted line setup. (b) Measurement of low and high VSWR using a X-band slotted line setup.
2.	Measurement of SWR and shift in the standing wave minimum with unknown load, and calculation of unknown load impedance using Smith chart.
3.	(a) Draw the V-I characteristics of a Gunn diode, and determine the output power and frequency as a function of voltage (b) Study the square wave modulation of microwave signal using PIN diode modulator.
4.	Measurement of resonance characteristics of a microstrip ring resonator using power meter and Determination of the substrate dielectric constant.
5.	(a) To study the coupling characteristics of (i) a microstrip 3dB branchline coupler, and (ii) a stripline backward wave coupler as a function of frequency. Compare the bandwidth in the two cases. (b) Measure the microwave input, direct, coupled and isolated powers of a backward wave stripline coupler at the centre frequency using a power meter. From the measurements calculate the coupling, isolation and directivity of the coupler.
6.	Measure the power division and isolation characteristics of a microstrip 3dB power divider.
7.	Study of rat race hybrid ring (equivalent of waveguide Magic-Tee) in microstrip
8.	(a) Study of low pass and band pass microstrip filters (b) Measurement of gain versus frequency of a microwave amplifier using power meter.

5EC9A COMMUNICATION LAB – I

B.Tech. (EC) 5th Sem. **Max. Marks: 75**
2P **Exam: 3H**

S.No.	Contents
1.	To generate the different type of waveforms using fundamental frequency and its harmonics and also analysis these waveforms.
2.	Perform the experiment of the amplitude modulation and calculate the modulation index. Also study the DSB, DSB-SC, SSB modulation & demodulation and also observe the effect of AGC.
3.	To Study the properties of Super Heterodyne receiver in AM transmitting & receiving. Sensitivity, selectivity through experimental setup.
4.	To perform the different type of FM modulation & demodulation schemes and study the effect of Amplitude limiter in FM demodulator.
5.	To find the characteristics impedance, input impedance, losses, standing waves, phase shifting in transmission line.
6.	To perform the PAM (natural, flat top, sample & hold sampling), PWM, PPM Modulation & demodulation techniques.
7.	To perform the experiment of and observe the effect of change in type of modulating signal as sine , square, arbitrary and change in frequency of sampling signal in PAM, PWM, PPM modulation and demodulation.
8.	To Study & observation of the four channel analog TDM using DSB-SC through experimental setup.
9.	To Study& observation of the FDM through experimental setup.
10.	To perform the experiment of the various sampling (natural, flat top & sample & hold) of analog signal of type sine, square & arbitrary.

5EC10A SIGNAL PROCESSING LAB

B.Tech. (EC) 5th Sem. **Max. Marks: 75**

2P **Exam: 3 H**

S.No.	Contents
1	Simulation in MATLAB Environment: Generation of continuous and discrete elementary signals (periodic and non-periodic) using mathematical expression.
2	Generation of Continuous and Discrete Unit Step Signal.
3	Generation of Exponential and Ramp signals in Continuous & Discrete domain.
4	Continuous and discrete time Convolution (using basic definition).
5	Adding and subtracting two given signals. (Continuous as well as Discrete signals)
6	To generate uniform random numbers between (0, 1).
7	To generate a random binary wave.
8	To generate random sequences with arbitrary distributions, means and variances for following : (a) Rayleigh distribution (b) Normal distributions: N(0,1). (c) Gaussion distributions: N (m_x, σ_x^2)
9	To plot the probability density functions. Find mean and variance for the above distributions

5EC11A PROFESSIONAL ETHICS AND DISASTER MANAGEMENT

B.Tech. (EC) 5th Sem. **Max. Marks:50**
2P **Exam: 3 H**

S.No.	CONTENTS
1.	**Issues on ethics and values:** Moral and ethical values, classification of values , value system, deterioration of social values, social norms & social control.
2.	**Profession , professionalism &ethics:** Professional responsibilities, competencies and expectations .Role of a professional , person, professional accountability and professional ethics .
3.	**Ethics in engineering and disaster management:** Engineering professionals , role of engineers ,technology & society ,engineering as social experimentation , engineering ethics.
4.	**Types of disasters:** Environmental, economic & social disasters ; causes , impact and prevention , Case studies.
5.	**Thoughts of ethics**

TEXT BOOKs:

1. Engineering Ethics: Concepts & Cases by Harris, Cengage Learning (2013)

6EC1A MICROWAVE ENGINEERING – II

B.Tech. (EC) 6th semester **Max. Marks: 100**
Exam Hours: 3

3L+1T

UNIT	CONTENTS	CONTACT HOURS
I	**IMPEDANCE TRANSFORMATION AND MATCHING:** Lumped elements for MICs and MMICs- printed inductors, capacitors and resonant elements. The Smith chart- combined impedance-admittance chart. Impedance matching with lumped elements (L networks) and Smith chart solutions. Single stub tuning in microstrip circuits using shunt stub. Single section quarter-wave transformer.	**8**
II	**MICROWAVE DIODES AND DIODE CIRCUITS**: *Detector Diodes* – Silicon crystal diode and Schottky diode. V-I characteristic of detector diode, basic operation of detection and mixing, single diode mixer circuit. *PIN diode* - Equivalent circuit and characteristics of PIN diode, single-pole PIN diode switches and single bit phase shifters. *Varactor diode*- Device characteristics and circuit applications. *Gunn diode*- Gunn effect, principle of operation and characteristics, typical oscillator circuit using Gunn diode. *IMPATT diode*- Characteristics, negative resistance, power output and efficiency.	**9**
III	**MICROWAVE TRANSISTORS AND CIRCUITS**: *Bipolar Junction Transistors (BJTs)* – Geometry of silicon bipolar transistor, DC biasing, microwave equivalent circuit and characteristics. *Microwave Field Effect Transistors* (*FETs*) - Physical structure and principle of operation of JFET, MOSFET and MESFET, characteristics, comparison of FET devices and circuit applications. Single stage FET amplifier – Block schematic of a single stage FET amplifier circuit, Stability considerations, analysis and derivation of expression for transducer gain with unilateral transistor, design criteria for maximum gain.	**8**
IV	***Klystrons***- Limitations of conventional vacuum tubes. Reflex klystron – Basic schematic, mechanism of operation, modes of oscillation and modulation. Velocity modulation and electron bunching (analytical treatment), ***Magnetrons-*** Types of magnetron. Basic structure of magnetron, analysis, resonant modes in magnetron, operation, mechanism of oscillations, practical consideration of cavity magnetron. Introduction to coaxial, frequency angle and voltage tunable magnetrons.	**8**

V	***Two cavity klystron amplifier***- Basic schematic and mechanism of operation. ***Travelling Wave Tube Amplifier***- Basic schematic of helix type TWT tube. Introduction to CW power pulsed dual mode TWT. TWT amplifier operational characteristics. Applications of TWT. Crossed- field amplifier.	**7**
	TOTAL	**40**

TEXT BOOK:

1. A. Das and S. Das, Microwave Engineering, Tata McGraw-Hill, (2000).
2. S.Y.Liao, Microwave devices and circuits, Prentice Hall, 2nd Edition (1985).

REFERENCE BOOKS:

SN	Name of Authors /Books /Publisher	Year of Publication
1	B. Bhat and S. K. Koul, Stripline-like Transmission Lines for Microwave Integrated Circuits, Wiley Eastern Ltd.,	1989
2	T. C. Edwards, Foundations for Microstrip Circuit Design, John Wiley & Sons,.	1981
3	K. C. Gupta, R. Garg, I. Bahl and P. Bhartia, Microstrip Lines and Slotlines, Second Edition, Artech House	1996
4	K.C Gupta, Microwaves, Wiley Eastern Ltd.	1979
5	P.A. Rizzi, Microwave Engineering- Passive Circuits, Prentice Hall,.	1988
6	D. M. Pozar, Microwave Engineering, John Wiley & Sons,. (Use the latest version)	1998
7	Dennis Roddy, Microwave Technology, Prentice-Hall,	1986
8	Roy Mitra, Microwave semiconductor devices, PHI,	2004
9.	Robert E. Collin, Foundations for microwave engineering 2ed	2012
10	Microwave and Radar Engineering, G.S.B. Rao, Pearson	2013
11.	Microwave Engineering, Raghuvanshi, cengage learning	2013

6EC2A MICROPROCESSORS

B.Tech. (EC) 6th Sem. **Max. Marks: 100**

3L+0T **Exam Hours: 3**

Unit	Contents	Contact Hours
1	INTRODUCTION: The 8085 architecture, memory, I/O Devices, Logic devices for interfacing, Memory, Interfacing, addressing modes, Instructions, programming techniques.	8
2	INTRODUCTION TO 8085 INSTRUCTIONS: Looping, counting and Indexing, Data Transfer and Arithmetic instructions, Counters and Time Displays, stacks & subroutines, conditional call and return instructions.	8
3	Code Conversion, BCD Arithmetic and 16 Bit Data Operations additional data transfer & 16 bit arithmetic Instructions, arithmetic operations related to memory counter and time delays.	8
4	Interrupts: The 8085 Interrupt, vectored interrupts, additional I/O concepts and processes, serial I/O & data communication.	8
5	General purpose programming peripheral devices: 8255 Programmable peripheral interface, Interfacing keyboard and Seven Segment display. The 8254 programmable Interval timer, the 8259 programmable Interrupt controller.8257 DMA controller.	8
	TOTAL	**40**

TEXT BOOKS:

1. Microprocessors Architecture, Programming &Application, Ramesh S. Gaonkar, (2000)
2. A Textbook of Microprocessors and Microcontrollers, R.S. Kaler I.K International Publishing House Pvt. Ltd.

REFERENCE BOOKS:

SN	Name of Authors /Books /Publisher	Year of Publication
1.	Introduction to Microprocessors, A.P. Mathur, Mc Graw Hill	2002

6EC3A INDUSTRIAL ELECTRONICS

B.Tech. (EC) 6th Sem. **Max. Marks: 100**
Exam Hours: 3

3L+0T

UNIT	CONTENTS	CONTACT HOURS
I	**SEMICONDUCTOR POWER DEVICES -** Basic characteristics & working of Power Diodes, Diac, SCR, Triac, Power Transistor, MOSFETs, IGBT, and GTO	7
II	**RECTIFIERS & INVERTERS - Working principles of single and three phase bridge rectifiers, Voltage and current source inverters**	8
III	**POWER SUPPLIES:** Principle of operation of choppers. Step up, Step down and reversible choppers. High frequency electronic ballast, Switch Mode Power Supply: Fly back converter, forward/buck converter, Boost converter and buck-boost converter. Uninterruptible Power Supply.	10
IV	**MOTOR CONTROL:** Introduction to speed control of DC motors using phase controlled converters and choppers, Basic idea of speed control of three phase induction motors using voltage and frequency control methods.	8
V	**Stepper Motors:** Variable reluctance, Permanent magnet and hybrid stepper motors. Induction and dielectric heating control.	7
	TOTAL	40

TEXT BOOKs:

1. Power Electronics Principles & Applications, Joseph Vithayathil, TMH , (2010).
2. Power Eletronics, Ravish Singh, TMH, (2012).

REFERENCE BOOKs:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Industrial Electronics And Control, Ttti, TMH	2001
2	Power Electronics: Converters Applications., Mohan, Robbins, Wiley	1995
3	Power Electronics, Moorthi, Oxford	2005
4	Elements Of Power Electronics, Krein, Oxford	1998
5	Power Electronics, R.S.Murthy, Pearson	2012
6	Power Electronics: Circuits, Devices And Applications	2004

6EC4A DIGITAL COMMUNICATION

B.Tech. (EC) 6th sem. **Max. Marks: 100**
Exam Hours: 3

3L+1T

UNIT	CONTENTS	CONTACT HOURS
I	**Digital Transmission Of Analog Signals:** Uniform and Non-uniform quantization. PCM and delta modulation, Signal to quantization noise ratio in PCM and delta modulation. DPCM, ADM, T1 Carrier System, Error probability in PCM system.	8
II	**Base Band Transmission:** Line coding (RZ, NRZ): Polar, Bipolar, Manchester, AMI. Inter symbol interference, Pulse shaping, Nyquist criterion, Raised cosine spectrum. Optimum detection, Matched filter.	8
III	**Digital Modulation Techniques:** Geometric interpretation of signals and Orthogonalization. ASK, BPSK, BFSK, QPSK, M-ary PSK, MSK and GMSK modulation techniques and Coherent detection of these techniques. Signal constellation and calculation of error probabilities.	8
IV	**Information Theory:** Measure of Information, Average Information, Entropy, Information rate, Increase in Average information per bit by coding, Shannon's Theorem and Shannon's bound, Capacity of a Gaussian Channel, BW-S/N trade off,	8
V	**Source & Error Control Coding**: Coding and decoding of Information Source coding, Entropy coding, Hamming code, Single Parity- Bit Code, Linear Block code, Cyclic code & Convolutional code.	8
	TOTAL	**40**

TEXT BOOKs:

1. Digital Communications Systems, P RamaKrishna Rao, Mc Graw Hill
2. Digital Communications Systems, Simon Haykins, Wiley

REFERENCE BOOKs:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Digital Communications: Fundamentals and Applications, Bernard Sklar, Pearson Education	2002
2	Analog and Digital Communication, Schum Series, TMH	2006
3	Digital & Analog Communication Systems, Leon W. Couch, Pearson	2013
4	Analog & Digital Communication Systems, Singal, TMH	2012
5	An Introduction To Analog & Digital Communications, Haykins, Wiley	2010
6	Digital And Analog Communication Systems, Shanmugam, Wiley	2004
7	Proakis J. G. and Salehi M., "Communication Systems Engineering", Pearson Education	2008
8	Electronic Communication Systems-, Kennedy Devis, TMH	2013

6EC5A CONTROL SYSTEM

B.Tech. (EC) 6th Sem. **Max. Marks: 100**
3L+0T **Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	**CONTROL SYSTEM AND THEIR REPRESENTATION**: Terminology and basic structure of control system, Open loop and Closed loop systems, servomechanism, regulatory system, analogous systems. Physical Systems and their models, Electromechanical systems, electrical analogy of physical systems.	**4**
	Transfer function, Block diagram representation of physical systems, Block diagram algebra, Signal Flow graph and Mason's formula.	**3**
II	**TIME RESPONSE**: Types of test inputs, Response of first and second order system, Time domain specifications, Error coefficients, generalized error series	**4**
	STABILITY: Concepts of stability, location of roots in s-plane for stability, asymptotic stability and relative stability, Routh-Hurwitz stability criterion.	**3**
III	**ROOT LOCUS**: Root locus plot, Properties of Root loci and applications, Stability range from the loci. Determination of roots of the closed loop system, Effect of pole zero addition	**4**
	NYQUIST PLOTS: Polar plots, Nyquist plots and Nyquist stability criterion	**4**
IV	**BODE PLOTS**: Concepts of Gain margin and phase margin, Bode plots .	**5**
	Frequency-domain specifications	**1**
	M and N loci ,Nichols chart	**2**
V	**CONTROLLERS**: Introduction to PID and Lag-lead type Controllers	**2**
	STATE VARIABLE ANALYSIS: Concepts of state, state variable and state model. State variable models for LTI systems. Canonical representations, Transfer function to state-space and vice-versa. Solution to state equations. Concepts of controllability & observability.	**6**
	COMPENSATION DESIGN: compensation design using frequency domain techniques	**2**
	TOTAL	**40**

TEXT BOOKs: TEXT BOOK

1. Modern control Engineering, Ogata, Pearson.(2009)
2. Nise's Control System Engineering, Rajeev Gupta, Wiley (2011)

REFERENCE BOOKS

SN	**Name of Authors /Books /Publisher**	**Year of Publication**
1	Control Systems: Principles & Design, M. Gopal, TMH	2002
2	Automatic Control System,B. C. Kuo,Wiley	2009
3	Singh & Janardhanan - Modern control engineering, Cengage learning	2010
4	Control Systems,Srivastava,TMH	2009
5	Systems and Control - Stanislawhizak, Oxford	2002
6	Control System Engineering,S. K. Bhattacharya,Pearson	2009
7	Control Systems: Theory And Applications,Ghosh,Pearson	2004
8	Manik – Control systems, Cengage learning	2012

6EC6.1A NEURAL NETWORKS

B.Tech. (EC) 6th Sem. **Max. Marks: 100**
Exam Hours: 3

3L+0T

UNIT	CONTENTS	CONTACT HOURS
I	**NEUROPHYSIOLOGY:** Introduction: Elementary neurophysiology - From neurons to ANNs - Neuron model McCulloch-Pitts model, Hebbian Hypothesis; limitations of single-layered neural networks.	5
II	**THE PERCEPTRON**: The Perceptron and its learning law. Classification of linearly separable patterns.	2
	LINEAR NETWORKS: Adaline --- the adaptive linear element. Linear regression. The Wiener-Hopf equation. The Least-Mean-Square (Widrow-Hoff) learning algorithm. Method of steepest descent. Adaline as a linear adaptive filter. A sequential regression algorithm.	4
III	**MULTI-LAYER FEEDFORWARD NEURAL NETWORKS**: Multi-Layer Perceptrons. Supervised Learning. Approximation and interpolation of functions. Back-Propagation Learning law. Fast training algorithms. Applications of multilayer perceptrons: Image coding, Paint-quality inspection, Nettalk.	5
	SELF-ORGANISING SYSTEMS: Unsupervised Learning. Local learning laws. Generalised Hebbian Algorithm. The Oja's and Sanger's rules. Principal component analysis --- Karhunen-Loeve transform.	4
IV	**COMPETITIVE LEARNING:** MinNet and MaxNet networks. Clustering. Learning Vector Quantisation. Codebooks. Application in data compression. **SELF-ORGANISING FEATURE MAPS**: Kohonen networks.	4
	RADIAL-BASIS FUNCTION NETWORKS: Radial-Basis function (RBF) networks and their application in function interpolation, approximation and modelling probability distributions. **RECURRENT NETWORKS**: Hopfield networks	5
V	**APPLICATIONS OF NEURAL NETWORKS**: Pattern classification, Associative memories, Optimization, Applications in Image Processing-Iris, finger print & face, Applications in decision making, TSP Problem.	6
	TOTAL	40

TEXT BOOKs:

1. Jacek M. Zurada, **Introduction to artificial neural systems,** Jaico Publ. House, (1994)**.**
2. S.N. Sivanandam**,** S. Sumathi and S.N. Deepa, **Introduction to Neural Networks using MATLAB 6.0,** Tata McGraw-Hill, (2006).

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Publication
1	Artificial Neural Network,Robert Schalloff,TMH	1997
2	Fundamental Of Neural Network Architecture And Application,Laurene V. Fausett,Pearson	1993
3	Neural Network Algorithm And Programing Tech,James A Freeman,Pearson	1991
4	Neural N/W For Pattern Recognition,Cristopher, M.Bhishop,Oxford	1995
5	Fuzzy Neuro Approach To Agent Application,Lee ,Raymond S.T.,New Age	2008
6	Fuzzy Logic and Neural Networks: Basic Concept And Application,A Lavala, Chemakesava R.,New Age	2012
7	Neural Network Design w/CD, Hagan, Cengage Learning	2007

6EC6.2A PARALLEL COMPUTATION & ARCHITECTURE

B.Tech. (EC) 6th Sem. **Max. Marks: 100**

3L+0T **Exam Hours: 3**

Unit	Content	Hours
1	Overview Of Parallel Processing: Constraints of conventional architecture, Parallelism in uniprocessor system, Architectural Classification.	5
	Applications of parallel processing, Sorting networks, PRAM models, interconnection network, memory consistency models, shared memory multiprocessors	4
2	Hardware taxonomy: Flynn's classification, Handler's classification, Software taxonomy, Kung's taxonomy, SPMD,	5
	Basic Algorithms – Fast Fourier Transform, Linear System Solution etc.	3
3	Instruction level Parallelism and Thread Level Parallelism, Explicitly Parallel Instruction Computing (EPIC) Architecture,	3
	Principles of scalable performance: Performance Metrics and Measures, Speedup Performance Laws efficiency utilization, overheads	4
4	Vector and Array Processor Basic vector architecture, Issues in Vector Processing, Vector performance modeling, SIMD Computer Organization Masking and Data network mechanism.	4
	Inter PE Communication, Interconnection networks of SIMD, Static V s Dynamic network, cube hyper cube and Mesh Interconnection network, Parallel Algorithms For Array Processors.	5
5	Multiprocessor Architecture Loosely and Tightly coupled multiprocessors, Processor characteristics of multiprocessors,	4
	Inter Processor communication network, Time shared bus, Crossbar switch.	3

Text Books:

1. V.Rajaraman, L Sivaram Murthy, "Parallel Computers", PID. (2004)

2. William Stallings, "Computer Organization and Architecture, Designing for performancePrentice Hall, Sixth edition.(2007)

Reference Books:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Kai Hwang, Scalable Parallel Computing.	1998
2	Harrold Stone, High performance computer Architectures.	1992
3	Richard Y. Kain , Advanced Computer Architecture.	2000
4	Parallel Computing in C and OpenMPI , M. J. Quinn, McGraw-Hill	2004
5	Assembly Language and Computer Architure Using C++ and JAVA w/CD, Reis, Cengage Learning	2011

6EC6.3A OPTICAL FIBER COMMUNICATION

B.Tech. (EC) 6th sem. **Max. Marks: 100**
Exam Hours: 3

3L+0T

UNIT	CONTENTS	CONTACT HOURS
I	**Optical Fiber Overview-** Introduction, Ray theory, Optical fibers: multimode, single mode, step index, graded index, plastic & glass fibers.	**3**
	Transmission Characteristics of Optical Fibers - Introduction, Attenuation, Material absorption loss, Fiber bend loss, scattering, Dispersion (intermodal & intramodal), Dispersion Shifted Fibers, Dispersion Compensating Fiber. **Manufacturing of Optical Fibers –** preparation of optical fiber, Liquid phase techniques and vapor phase depositions techniques.	**6**
II	**OPTICAL FIBER SOURCES-** **Laser-** Emission and absorption of radiation, Einstein relation, Absorption of radiation, Population inversion, Optical feedback, Threshold condition. Population inversion and threshold, working of three levels & four level lasers. Basic idea of solid state, semiconductors, gas & liquid laser. Basic concept of Q-switching and mode locking.	**5**
	Light Emitting Diode - Structure, Material, Characteristics, Power & Efficiency.	**2**
III	**Optical Detectors -** Optical detection principles, quantum efficiency, Responsivity, PIN photo diode, Avalanche photo diodes, Noise in Detectors, Photo Diode Materials.	**4**
	Optical Connectors - Fiber Alignment, fiber splices, fiber connectors, expanded beam connectors, fiber couplers.	**4**
IV	**Optical Fiber Measurements -** Measurements of Fiber Attenuation, Dispersion, Refractive Index Profile, Cut off Wave Length, Numerical Aperture & Diameter.	**5**
	Optical Time Domain Reflectometry (OTDR) - Field measurement through optical time domain reflectometry, Laser based systems for measurement of distance, Velocity, Holography.	**3**
V	**Optical Fiber Systems –** Wavelength division multiplexing, DWDM, active and passive components, optical sensors, optical amplifiers.	**5**
	Optical Fiber Applications - public network applications, military, civil and industrial applications.	**3**
	TOTAL	**40**

TEXT Books:

1. J.M. Senior, Optical Fiber Communication: Principles and Practice, Pearson Education. (2013)
2. R.P. Khare, Fiber Optics & Optoelectronics, Oxford Publications. (2014)

REFERENCE Books:

SN	Name of Authors /Books /Publisher	Year of Publication
1	R.P. Khare, Fiber Optics & Optoelectronics, Oxford Publications.	2004
2	J.Gowar, Optical Communication Systems, PHI.	1999
3	A.Ghatak & K.Thygarajan, Introduction to Fiber Optics, Cambridge University Press.	2006
4	Joseph C Palais, Fiber Optics Communication, PHI.	2010
5	Harold Kolimbris, Fiber Optics Communication, Pearson Education.	2009
6	D. Anuradha, Optical Fiber and Laser, Principles and Applications, New Age.	2008

6EC7A COMMUNICATION LAB – II

B.Tech. (EC) 6th sem. **Max. Marks: 75**
3P **Exam Hours: 3**

S.No.	Contents
1	To identify & solve the aliasing problem and verify the Nyquist criteria through the experimental setup.
2	To perform the experiment of observe the transmission of four signals over a single channel using TDM-PAM method.
3	To study the 4 channel PCM multiplexing & de-multiplexing in telephony system and calculate line speed and baud rate through the experimental setup.
4	To study the PCM, DPCM modulation & demodulation and study the effect of channel like as attenuation, noise in between modulator & demodulator through the experimental setup.
5	To study the Delta, Adaptive delta & sigma delta modulation & demodulation and also study the effect of channel like as attenuation, noise in between modulator & demodulator through the experimental setup.
6	To perform the experiment of generation and study the various data formatting schemes (Uni-polar, Bi-polar, Manchester, AMI etc.)
7	To perform the experiment of generation and detection of ASK, FSK, BPSK, DBPSK signals with variable length data pattern
8	To perform the experiment of generation and detection of QPSK, OQPSK, DQPSK signals with variable length data pattern.
9	To study the working of MSK modulation and its demodulation through the experimental setup.
10	To study the working of cyclic code, block code error check methods in communication system through the experimental setup.
Simulation using any virtual Instrumentation Software:	
11	To carry out convolution in both continuous time and discrete time systems.
12	Companding and multiplexing of PCM signals.
13	Perform various keying Techniques: PSK, ASK, FSK & MSK.

6EC8A MICROPROCESSOR LAB

B.Tech. (EC) 6th sem. **Max. Marks: 75**
2P **Exam: 3 H**

S.No.	Contents
	Following exercises are to be done in 8085 assembly language.
1	Arranging a set of data in Ascending order.
2	Arranging a set of data in Descending order.
3	Finding out number of Positive, Negative and Zeros from a Data Set.
4	Searching the Existence of a certain data in a given data.
5	BCD to Binary conversion.
6	Binary to BCD conversion
7	Design a Up/Down Counter
8	Multiply Two 8 Bit Numbers using Successive Addition and Shifting method.
9	Find Factorial of a number.
10	Solve the given Algebraic Equation
11	Generate a Software Delay.
12	Division of 8 bit Unsigned Numbers.
13	A program to display real time clock. Assume a periodic signal is interrupting RST 7.5 signal after every 0.5 seconds,
14	Generate a square wave and rectangular wave of given frequency at the Output pin of 8255 chip.

6EC9A RF SIMULATION LAB

B.Tech. (EC) 6th sem. **Max. Marks: 75**
3P **Exam Hours: 3**

S.No.	Contents
1	Study of field pattern of various modes inside a rectangular waveguide.
2	Study of field pattern of various modes inside a rectangular waveguide cavity.
3	Observe the transient phenomenon of terminated coaxial transmission lines in order to study their time domain behaviour.
4	Study the behavior of terminated coaxial transmission lines in frequency domain.
5	Introduction to Smith chart and its application for the unknown impedance measurement.
6	Study the behavior of impedance matching for passive networks (RL, RC, RLC, T- and Π-network) using Smith chart.
7	Find the change in characteristics impedance and reflection coefficients of the transmission line by changing the dielectric properties of materials embedded between two conductors.
8	Design and simulate the following *Planar Transmission Lines:* 1. Stripline and microstrip lines 2. Parallel coupled striplines and microstrip lines 3. Slot lines and Coplanar lines Determine their Field patterns and Characteristic impedance.
9	Design and simulate the following; 1. 3-dB branchline coupler, 2. backward wave coupler, 3. Wilkinson power dividers 4. rat- race hybrid ring. 5. Low pass filters 6. band pass filters.
10	Design RF amplifier using microwave BJT.
11	Design RF frequency doublers using microwave FET.

6EC10A INDUSTRIAL ELECTRONICS LAB

B.Tech. (EC) 6th Sem. **Max. Marks: 75**
2P **Exam Hours: 3**

S.No.	Contents
1.	Study the characteristics of SCR and observe the terminal configuration, Measure the breakdown voltage, latching and holding current. Plot V-I characteristics.
2.	Perform experiment on triggering circuits for SCR. i.e. R-triggering,R-C triggering and UJT triggering circuit.
3.	Study and test AC voltage regulators using triac, antiparallel thyristors and triac & diac.
4.	Study and obtain the waveforms for single-phase bridge converter.
5.	Perform experiment on single phase PWM inverter.
6.	Perform experiment on buck, boost and buck-boost regulators.
7.	Control speed of a dc motor using a chopper and plot armature voltage versus speed characteristic.
8.	Control speed of a single-phase induction motor using single phase AC voltage regulator.
9.	i) Study single-phase dual converter. ii) Study speed control of dc motor using single-phase dual converter.
10.	Study single-phase cycloconverter.
11.	Perform experiment on Motor control – open loop & closed loop.
12.	Design, observe and perform experiment on various type of pulse generation from DSP/ FPGA Platform. Perform experiment for PWM inverters and choppers.

6EC11A PERSONALITY DEVELOPMENT AND GENERAL APTITUDE

B.Tech. (EC) 6th sem. **Max. Marks: 50**
2P **Exam Hours: 3**

S.No.	CONTENTS
	PURPOSE 1. To make students appreciate the notion and components of personality, thereby to apply the acquired information to themselves and to march towards brilliance in their respective academic and professional careers. 2. To enable students to keep themselves abreast of general knowledge and current affairs. 3. To bring out creativity and other latent talents with right goal setting so that self- esteem gets enhanced. 4. To sharpen memory skills and other study skills vital for academic and professional excellence. 5. To give training for positive thinking to keep the students in a good stead at the time of crisis.
1.	**Introduction** • Meaning of Personality • Determinants of Personality- biological, psychological and socio- cultural factors. • Misconceptions and clarifications • Need for personality development
2.	**Self-Awareness and Self Motivation** • Self analysis through SWOT and Johari window • Elements of motivation • Seven rules of motivation • Techniques and strategies for self motivation • Motivation checklist and Goal setting based on principle of SMART • Self motivation and life • Importance of self-esteem.
3.	**Memory and study skills** • Definition and importance of memory • Causes of forgetting • How to forget (thought stopping), how to remember (techniques for improving memory) • The technique of passing exams-management of examination fear.
4.	**Power of positive thinking** • Nurturing creativity, decision-making and problem solving. • Thinking power- seven steps for dealing with doubt • Traits of positive thinkers and high achievers

	• Goals and techniques for positive thinking • Enhancement of concentration through positive thinking • Practicing a positive life style.
5.	**General Knowledge and Current Affairs** • Regional, national and international events • Geographical, political and historical facts • Information on sports and other recreational activities • Basic knowledge with regard to health and health promotion
PRACTICAL TRAINING The course would include the following practical exercises. Ice-breaking. Brainstorming and simulation exercises. Thought stopping. Memory and study skills training	

TEXTBOOKs:

1. Hurlock, E.B, Personality Development, 28th Reprint. New Delhi: Tata Mc Graw Hill. (2006).
2. Mikew, Martin, schinzinger, Ethics in engineering, TMH. (2010)

REFERENCES BOOKs:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Mile, D.J., Power of positive thinking. Delhi: Rohan Book Company.	2004
2	Pravesh Kumar, All about self- Motivation. New Delhi: Goodwill Publishing House.	2005
3	Dudley, G.A. ,Double your learning power. Delhi: Konark Press. Thomas Publishing Group Ltd.	2004
4	Lorayne, H. ,How to develop a super power memory. Delhi: Konark Press. Thomas Publishing Group Ltd	2004
5	Personal Development for Life and Work, Wallace, Cengage Learning	2013
6	Soft Skills for Everyone w/CD, Butterfield, Cengage Learning	2013

7EC1A ANTENNAS & WAVE PROPAGATION

B.Tech. (EC) 7th sem. **Max. Marks: 100**

3L+0T **Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	**ANTENNA FUNDAMENTALS** – Review of Electromagnetic theory. Short elementary dipole and its fields. Basic antenna parameters - Radiation pattern, beamwidth, beam solid angle, directivity, efficiency, gain, radiation intensity, radiation resistance, input impedance and polarization. Receiving antenna- Reciprocity, effective length and aperture, antenna temperature.	8
II	**ANTENNA ARRAYS –** Point source, Array of two isotropic point sources. Uniform array of N point sources and array factor –Examples of 4 element broadside and endfire arrays. N-element linear array of elementary dipoles and principle of pattern multiplication. Two element array of elementary dipoles - Excitation with different relative phase shift and for different spacing.	7
III	**DIFFERENT TYPES OF ANTENNAS –** Thin linear antenna and thin half- wave dipole. V- and Rhombic antennas. Monopole antenna, Small loop antenna, Folded dipole and Yagi-Uda antenna. Broadband antennas – Broadband basics, log-periodic dipole array. Reflector antennas –Flat sheet, corner and parabolic reflector antennas. Slot, Horn and Lens antennas, Helical antennas. Microstrip patch antennas- Rectangular patch antenna, Two- element microstrip patch. *Antenna Measurements* - Antenna radiation pattern, gain, directivity and polarization. .	10
IV	**GROUND WAVE PROPAGATION** - Mechanism of radio wave propagation. Theory of ground reflection- Plane earth reflection, reflection factors for horizontal and vertical polarizations. Refraction and diffraction of radio waves. Space and surface waves. Tropospheric propagation, duct propagation and tropospheric scattering. .	7
V	**IONOSPHERIC PROPAGATION:** Various ionospheric layers, Electrical properties of the ionosphere and their effects on wave propagation. Critical frequency, virtual height, skip distance, maximum usable frequency. Multiple hop transmission. Effect of earth's magnetic field and Faraday rotation. Solar activity and meteorological conditions on wave propagation.	8
	TOTAL	**40**

TEXT BOOK

1. Sisir. Das and A. Das, Antenna and wave propagation, Tata McGraw-Hill Education Pvt. Ltd, (2013).
2. A.R. Harish and M. Sachidananda, Antennas and Wave Propagation, Oxford Univ. Press, Edition (2011).

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Publication
1.	J.D. Kraus, *Antennas*, Tata McGraw-Hill, 2nd Edition,	1999
2.	E.C. Jordan and K.G. Balmain, *Electromagnetic Waves and Radiating Systems*, Prentice-Hall of India, 2nd Edition,	1986
3.	T. Milligan, Microstrip Antenna Design, Wiley,	2005
4.	J.D. Kraus and R.J. Marhefka, Antennas for All Applications, Tata McGraw-Hill, Edition	2004
5.	R. Chatterjee, *Antenna Theory and Practice*,Wiley Eastern Ltd.,	1988
6.	Balanis Constantine A, Antenna theory, Analysis and design, 3rd edition, A John Wiley & Sons Inc. Publication	2005
7.	Collin R. E. And F. J. Zucker, Antenna Theory: Part I, McGraw-Hill, New York	1969
8.	Collin R. E. And F. J. Zucker, Antenna Theory: Part II, McGraw-Hill, New York	1969
9.	Ramesh Garg, P. Bhartia, Inder Bahl, and A Ittipiboon, Microstrip Antenna Design Hand, Artech House, Inc.	2001

7EC2A DIGITAL SIGNAL PROCESSING

B.Tech. (EC) 7th Sem. **Max. Marks: 100**

3L+1T **Exam Hours: 3**

UNIT	CONTENTS	Contact Hours
I	**SAMPLING** - Discrete time processing of Continuous-time signals, continuous time processing of discrete-time signals,	5
	Changing the sampling rate using discrete-time processing.	2
II	**TRANSFORM ANALYSIS OF LTI SYSTEMS** - Introduction, The frequency response of LTI systems, System functions for systems characterized by LCCD (Linear Constant Coefficient Difference) equations,	4
	All-pass system, Minimum-Phase systems, Linear systems with linear phase.	3
III	**STRUCTURES FOR DISCRETE-TIME SYSTEMS**- Block diagram and signal flow graph representation of LCCD equations,	2
	Basic structures for IIR and FIR systems, Transposed forms.	5
IV	**FILTER DESIGN TECHNIQUES -** Introduction, Analog filter Design: Butterworth & Chebyshev,	3
	IIR filter design by impulse invariance & Bilinear transformation,	2
	Design of FIR filters by Windowing: Rectangular, Hanning, Hamming & Kaiser.	5
V	**DFT, FFT**- The Discrete Fourier transform (DFT), Properties of the DFT, Linear Convolution using DFT,	5
	Efficient computation of the DFT: Decimation–in-Time and Decimation-in frequency FFT Algorithms.	4
	Total	**40**

TEXT BOOKs:

1. Proakis, Manolakis, "Digital Signal Processing: Principals, Algorithms And Applications", 4th ed., Pearson Education. (2006)
2. Oppenheim, Schafer, "Discrete Time Signal Processing", 3rd ed. , PHI (2010)

REFERENCE BOOKs:

S.No.	Name of Authors/Book/Publisher	Publication Year
1.	Digital Signal Processing: A Modern Introduction, Ambardar, cengage learning	2011
2.	Introduction to Digital Signal Processing using MATLAB, Schilling	2011
3	Sanjit K Mitra, "Digital Signal Processing", 4th ed., TMH	2013
4	Tan, Jiang, "Digital Signal Processing: Fundamentals and Applications",2nd ed., Elsevier	2008
5	Ifeachor, Jervis, "Digital Signal Processing", 2nd ed., Pearson Education	2009

7EC3A DIGITAL IMAGE PROCESSING

B.Tech. (EC) 7th Sem. **Max. Marks: 100**

3L+1T **Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	**DIGITAL IMAGE FUNDAMENTALS**: Image sensing and acquisition, Image sampling and quantization, Representing digital images, Spatial and gray-level resolution,	3
	Spatial operations, Vector & matrix operations, Zooming and Shrinking of digital images. RGB and HSI Color models	3
II	**BASIC IMAGE OPERATIONS:** Intensity transformation functions, Histogram equalization, Spatial filtering for image smoothing,	3
	Image sharpening by first and second order derivatives, Image smoothing and sharpening using frequency domain filters	5
III	**IMAGE RESTORATION:** Image restoration model, Noise Models, Spatial and frequency properties of noise, noise probability density functions,	3
	Noise only- spatial filter, Mean, order Statistic and adaptive filters, Concepts of inverse and Wiener filtering	5
IV	**MORPHOLOGICAL IMAGE PROCESSING:** Erosion and Dilation, Opening and closing,	3
	morphological algorithms for Boundary extraction, thinning, pruning, smoothing and thickening	5
V	**IMAGE SEGMENTATION AND COMPRESSION:** Edge based segmentation, Edge detection masks, Gradient operators,	3
	Thresholding, Region growing, Watershed transform,	3
	Fundamentals of image compression; Loss-less compression techniques; Lossy compression techniques, compression standards	4
	Total	**40**

TEXT BOOKs:

1. Gonzalez, Woods and Eddins, "Digital Image Processing", 3rd ed. , Pearson Education (2010)
2. Anil K Jain, "Fundamentals of Digital Image Processing", 4th ed., Prentice Hall (2010)

REFERENCE BOOKs:

SN	Name of Authors/Book/Publisher	Publication Year
1	Tamal Bose, "Digital Signal and Image Processing", ", 3rd ed. , John Wiley	2005
2	Sonaka,Hlavac and Boyle, "Image Processing, Analysis and Machine Vision", 3rd ed. , Cengage Learning	2013
3	Pratt, "Digital Image Processing", 4th ed. , John Wiley	2001
4.	Image Processing, Analysis, and Machine Vision, Sonka, cengage learning	2006

7EC4A WIRELESS COMMUNICATION

B.Tech. (EC) 7th sem. **Max. Marks: 100**
Exam Hours: 3

3L+0T

UNIT	CONTENTS	CONTACT HOURS
I	**Spread Spectrum Modulation Techniques –** Concept of spread spectrum, system processing gain, Spread Spectrum signals: Direct-sequence spread spectrum signals, Frequency-hopped spread spectrum signals, Code-division multiplexing, Spreading codes	8
II	**Wireless Microwave Communication**- Link Engineering, Frequency planning, Free space loss, Fresnel zone clearance, bending of radio beam, Effective earth radius, Fundamentals of fading, types and effects, Multipath channels; parameters, measurements, Building blocks of Transmitter & Receiver.	8
III	**Multiple Access Techniques and Networks** - FDMA, TDMA and CDMA with reference to mobile radio and satellite systems. TDMA based networks, OFDM and its characteristics, Packet radio multiple access techniques. CDMA based networks: Architecture, Air interface, Call processing, power control, Rake receiver concept and performance of CDMA system.	8
IV	**Cellular Wireless Networks**-, GSM: Introduction, overview of the GSM systems, GSM codec, channel coding and interleaving, radio like control. Cordless systems and WLL, Mobile IP, Wireless access protocol. Wireless LAN's: Technology, IEEE 1002.11 standards, Broadband Wireless 1002.16, Blue tooth, Wi-Fi, Wi-Max, Zigbee & RFID technology.	8
V	**Satellite Communication** - Elements of satellite communication: Frequency bands, Transmission and Multiple access. Satellite orbit and description- orbital period and velocity, effects of orbital inclination, Azimuth and elevation, Coverage angle and slant range, Satellite Link: basic link design and analysis, Geostationary orbit, Satellite subsystems. Earth Station antenna, high-power amplifier, low-noise amplifier, up converter, down converter, monitoring and control, reliability.	8
	TOTAL	**40**

TEXT Books:

1. William Stallings, Wireless Communication and Networks, Pearson Education (2013)
2. Rappaport, T.S., Wireless Communications, Pearson Education (2013)

REFERENCE Books:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Gottapu Sasibhushana Rao, Mobile Cellular Communications, Pearson Education	2013
2	Singal, T.L, Wireless Communication, Tata McGraw Hill	2011
3	Vijay Kr. Garg, Wireless Communications and Networking, Morgan Kaufmann, Elsevier	2013
4	Blake, Wireless Communication Technology, Cengage Learning	2013
5	W.C.Y. Lee , Mobile Cellular Telecommunications , Tata McGraw Hill	2011
6	Wireless Communications and Networking, Price, TMH	2014
7	Pratt, Bostain, Satellite Communications, Wiley India	2011
8	Mark Zhuang, Wireless Communications and Networking, Prentice Hall of India	2003
9	Simon Haykin, Modern Wireless Communications, Pearson Education	2005
10	Price, Fundamentals of Wireless Networking, Tata McGraw Hill	2012

7EC5A VLSI DESIGN

B.Tech. (EC) 7th Sem. **Max. Marks: 100**

3L+0T **Exam: 3 H**

Unit	Contents	Contact hours
I	**INTRODUCTION TO MOSFET: -** Basic MOS transistors, Enhancement Mode transistor action, Depletion Mode transistor action, NMOS and CMOS fabrication. Aspects of threshold voltage, threshold voltage with body effect. Ids versus Vds relationship, channel length modulation. Transistor Trans-conductance gm. MOS transistor circuit Model, Model parameter (oxide and junction capacitor, channel resistance) variation with scaling and biasing. High order effects (i.e. subthreshold conduction, hot electron effect, narrow channel effect and punch through effect.	10
II	**CMOS LOGIC CIRCUITS-** nMOS inverter (resistive and active load), Pull up to Pull-down ratio for a NMOS Inverter and CMOS Inverter (Bn/Bp), , determination of inverter parameter ($V_{IL,}$ V_{IH} V_{OL} V_{OH}) and Noise Margin. **Speed and power dissipation analysis of CMOS inverter.** Combinational Logic, NAND Gate, NOR gate, XOR gate, Compound Gates, 2 input CMOS Multiplexer, Memory latches and registers, Transmission Gate, estimation of Gate delays, Power dissipation and Transistor sizing.	8
III	Basic physical design of simple Gates and Layout issues. Layout issues for CMOS inverter, Layout for NAND, NOR and Complex Logic gates, Layout of TG, Layout optimization using Eular path. DRC rules for layout and issues of interconnects, Latch up problem.	8
IV	**Dynamic CMOS circuits**: Clocked CMOS (C^2MOS) logic, DOMINO logic, NORA logic, NP(ZIPPER) logic, PE(pre-charge and Evaluation) Logic. Basic Memory circuits, SRAM and DRAM.	8
V	**Physical Design**: Introduction to ECAD tools for first and back end design of VLSI circuits. Custom /ASIC design, Design using FPGA and VHDL. VHDL Code for simple Logic gates, flip-flops, shift registers	6
	Total	**40**

Text Books:

1. **CMO S DIGITAL INTEGRATE**D **CIRCUITS Analysis and Design.** SUNG-MO (STEVE) ANG, YUSUF LEBLEBIGI, McGraw Hill (2008)

Reference Books:

SN	Name of Authors/Book/Publisher	Publication Year
1	N.Weste and K. Eshraghian, Principles of CMOS VLSI, 2e, Pearson Education.	2011
2	VLSI Design , P P Sahu , , McGraw.	2013
3	VLSI Design, D.P. Das, Oxford.	2011
4	Chip Design for Submicron VLSI: CMOS Layout & Simulation, Uyemura, cengage learning	2009

7EC6.1A ADVANCED MICROPROCESSORS

B.Tech. (EC) 7th sem. **Max. Marks: 100**
3L+0T **Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	**The 8086 Microprocessor Family:** 8086 ARCHITECTURE- Hardware specifications, Pins and signals, Internal data operations and Registers, Minimum and maximum mode, System Bus Timing, Linking and execution of Programs,	8
II	**Software & Instruction Set:** Assembly language programming: addressing mode and instructions of 8086, Strings, Procedures and Macros, 8086 interrupts. Assembler Directives and operators.	8
III	**Analog Interfacing:** A/D and D/A converter interfacing, keyboard and display interfacing, RS 232 & IEEE 488 communication standards. An 8086 based Process Control Systems	8
IV	**Digital Interfacing:** Programmable parallel ports, Interfacing microprocessor to keyboard and alphanumeric displays, Memory interfacing and Decoding , DMA controller.	8
V	**Multiprocessor Configurations:** - Multiuser / Multi tasking operating system concepts, 8086 based Multiprocessor systems. Introduction and basic features of 286, 386, 486 & Pentium processors.	8
	TOTAL	**40**

TEXT BOOK

1. A Nagoor Kani “Microprocessors and Microcontrollers” Mc Graw Hill Education 2ed. (2012)
2. Douglas V. Hall “Microprocessors and Interfacing Programming and Hardware” Tata Mc Graw Hill.(2000)

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Publication
1	A. Ray & K. Bhurchandi. “Advanced Microprocessors and Peripherals. Tata Mc Graw Hill,	2012
2	A Nagoor Kani “Microprocessors and Microcontrollers” Mc Graw Hill Education 2ed.	2012
3	Introduction to Microprocessors, A. P. Mathur Mc Graw Hill	2011
4	The Intel Family of Microprocessors: Hardware and Software Principles and Applications, Antonakos, cengage learning	2012
	The 8086 Microprocessor: Programming & Interfacing the PC, Ayala, cengage learning	2007

7EC6.2A ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS

B.Tech. (EC) 7th Sem. **Max. Marks: 100**

3L+0T **Exam: 3 Hours**

Unit	Contents	Contact Hours
I	**Introduction to Artificial Intelligence:** Intelligent Agents, State Space Search, Uninformed Search, Informed Search, Two Players Games, Constraint Satisfaction Problems.	09
II	**Knowledge Representation:** Knowledge Representation And Logic, Interface in Propositional Logic, First Order Logic, Reasoning Using First Order Logic, Resolution in FOPL	05
III	**KNOWLEDGE ORGANIZATION:** Rule based System, Semantic Net, Reasoning in Semantic Net Frames, Planning	10
IV	**KNOWLEDGE SYSTEMS:** Rule Based Expert System, Reasoning with Uncertainty, Fuzzy Reasoning	07
V	**KNOWLEDGE ACQUISITION:** Introduction to Learning, Rule Induction and Decision Trees, Learning Using neural Networks, Probabilistic Learning Natural Language Processing	09
	TOTAL	**40**

TEXT BOOK:

1. Elaine Rich and Kevin Knight, Artificial Intelligence 3/e, TMH (1991)
2. PADHY: ARTIFICIAL INTELLIGENCE & INTELLIGENT SYSTEMS, Oxford(2005)

REFERENCE BOOKS:

SN	Name of Authors /Books /Publisher	Year of Publication
1	James A Anderson, An introduction to Neural Networks. Bradford Books	1995
2	Dan. W Patterson, Artificial Intelligence and Expert Systems,PHI	1990
3	Kumar Satish, "Neural Networks" Tata Mc Graw Hill	2004
4	S. Rajsekaran & G.A. Vijayalakshmi Pai, "Neural Networks,Fuzzy Logic and Genetic Algorithm:Synthesis and Applications" Prentice Hall of India.	2006
6	Siman Haykin,"Neural Netowrks"Prentice Hall of India	1990
7	Artificial Intelligence, Kaushik, cengage learning	1997

7EC4.3A VHDL

B.Tech. (EC) 7th Sem. **Max. Marks: 100**

3L+0T **Exam: 3 Hours**

Unit	Contents	Contact Hours
I	**INTRODUCTION:**VHDL/PLD Design Methodology, Advantages, Requirement Analysis and specification, VHDL description, Verification Using simulations, Functional Simulation, Logic Synthesis, Place and route and timing Simulation Fundamental & history of various hardware description language, VHDL for Synthesis V/s Simulation, Design flow of ASICs and standard logic circuits. Implementation Details for SPLDs, CPLDs and FPGAs	06
II	**LANGUAGE FUNDAMENTALS:** Entities, Architectures and coding Styles, Signals and Data types, Packages, Dataflow, Structural, Behavioral and RTL Style of Combinational design, Event- Driven Simulation: Simulation Approaches, Elaboration Signal Drivers Simulator Kernel process, Signals verses Variables.	07
III	**COMBINATIONAL and SEQUENCIAL CIRCUITS BUILDING BLOCKS:** Multiplexer, Synthesis using Shannon's expansions, Decoders, encoders, Code Converters, VHDL Code for Combinational Circuits. VHDL code for Flip-Flops, shift registers, Counters.	09
IV	**SYNCHRONOUS/ ASYNCHRONOUS SEQUENCIAL CIRCUITS:** Mealy & Moore type FSMs, VHDL Code for Mealy & Moore Machines, VHDL Codes for Serial Adder, Vending Machine.	09
V	**DIGITAL SYSTEM DESIGN:** Building Block circuits, Memory organization, SRAM, Design examples of divider, Multiplier, Shifting & Sorting Operations, Clock Synchronization, CPU organization and design concepts.	09
	TOTAL	**40**

TEXT BOOK:

1. Digital Logic with VHDL Design, Brown, TMH.(2007)
2. VHDL for Engineers, Short, Pearson. (2011)

REFERENCE BOOKS:

SN	Name of Authors /Books /Publisher	Year of Publication
1	VHDL (Text BOOK Binding), Douglas L. Perry, TMH	2002
2	VHDL , A design oriented Approach, S S Limaye, TMH	2008
3	VHDL: Programming By Example, Douglas Perry, Oxford	2002
4	The Designer's Guide To VHDL, Peter J. Ashenden, Oxford	2010
5	Circuit Design With VHDL , By Volnei A Pedroni, PHI	2004
6	VHDL Bascis to programming, Gaganpreet Kaurt, Pearson	2013
7	Digital System Design Using VHDL, cengage learning	2008
8	HDL Programming Fundamentals VHDL & VERILOG. Botros. cengage learning	2002

7EC7A SIGNAL AND IMAGE PROCESSING LAB

B.Tech. (EC) 7th sem. **Max. Marks: 100**
2P **Exam Hours: 3**

S.No.	Contents
1	To simulate the transmitter and receiver for BPSK
2	To design and simulate FIR digital filter (LP/HP).
3	To design and simulate IIR digital filter (LP/HP).
4	Reading and displaying Gray/ Colour images of different formats
5	RGB/HSI conversions in an image, Image arithmetic operations.
6	Image Histogram and histogram equalization
7	Image filtering in Spatial and frequency domain
8	Morphological operations in analyzing image structures
9	Thresholding-based image segmentation
10	Study of image compression

7EC8A WIRELESS COMMUNICATION LAB

B.Tech. (EC) 7th Sem. **Max. Marks: 100**

3P **Exam: 3 Hours**

S.No.	Contents
1	Measurement of antenna input characteristics: Measure the input return loss versus frequency in the operating band for (i) Half wave dipole (printed dipole/strip dipole), (ii) Folded dipole and (ii) Log-periodic antenna.
2	Measurement of radiation characteristics of a (i) Half wave dipole (printed dipole/strip dipole), and (ii) Printed Yagi antenna -. Measure radiation patterns in the two principal planes and plot on polar chart. Determine beam width, directivity and antenna efficiency.
3	Measurement of antenna gain using absolute gain and relative gain measurements: • Measure gain of Bi-quad antenna using absolute gain measurements. • Measure gain of log-periodic antenna and printed slot antenna using relative gain measurements.
4	Circular polarization measurements on helical antenna.
5	Antenna array theory demonstration using single EM coupled rectangular patch, 2x1 EM coupled and 2x2 EM coupled rectangular patch antennas.
6	Communication link budget calculations- Friis formula and demonstration with transmit and receive antenna setup.
7	Radar Trainer: Working of Doppler radar, velocity of moving object, time and frequency measurement and other applications.
8	To perform Modulation, Demodulation and BER measurement using CDMA – DSSS Trainer.
9	To establish analog/digital communication link and transmit & receive three signals (audio, video, tone) simultaneously using Satellite Communication Trainer.
10	To study GPS Receiver, establishing link between GPS satellite & GPS trainer and measure of latitude & longitude

8EC1A IC TECHNOLOGY

B.Tech. (EC) 8th Sem. **Max. Marks: 100**

3L+0T **Exam: 3 H**

Unit	Contents	Contact hours
I	**INTRODUCTION TO IC TECHNOLOGY-** Semiconductor Substrate-Crystal defects, Electronic Grade Silicon, Czochralski Growth, Float Zone Growth, Characterization & evaluation of Crystals; Wafer Preparation- Silicon Shaping, Etching and Polishing, Chemical cleaning.	8
II	**DIFFUSION & OXIDATION -** Ficks diffusion Equation in One Dimension, Atomic model, Analytic Solution of Ficks Law, correction to simple theory, Diffusion in SiO_2. Ion Implantation and Ion Implantation Systems. Oxidation Growth mechanism and Deal-Grove Model of oxidation, Linear and Parabolic Rate co-efficient, Structure of SiO_2, Oxidation techniques and system, Oxide properties.	9
III	**CHEMICAL VAPOUR DEPOSITION AND EPITAXIAL LAYER GROWTH-** CVD for deposition of dielectric and polysilicon thick Layer – a simple CVD system, Chemical equilibrium and the law of mass action, Introduction to atmospheric CVD of dielectric, low pressure CVD of dielectric and semiconductor. Epitaxy-Vapour Phase Expitaxy, Defects in Epitaxial growth, Metal Organic Chemical Vapor Deposition, Molecular beam epitaxy.	9
IV	**PATTERN TRANSFER & ETCHING -** Introduction to photo/optical lithography, Contact/ proximity printers Projection printers, Mask generation, photo resists. Dry & Wet etching, methods for anisotropic etching, Plasma etching, Reaction ion etching (RIE).	8
V	**VLSI PROCESS INTEGRATION-** Junction and Oxide Isolation, LOCOS methods, Trench Isolation, SOI; Metallization, Planarization. Fundamental consideration for IC Processing, NMOS IC Technology, CMOS IC Technology, Bipolar IC Technology. Fault diagnosis and characterization techniques.	6
	Total	**40**

Text Books:

1. S.M. Sze (Ed), VLSI Technology, 2nd Edition, McGraw Hill (1988).

Reference Books:

S.No.	Name of Book/publication/Authors	Publication Year
1	S.K. Ghandhi, VLSI Fabrication Principles, John Wiley Inc., New York,	1983
2	IC Technology, Gouranga Bose, McGraw Hill	2013
3	C.Y. Chang and S.M.Sze (Ed),ULSI Technology, McGraw Hill Companies Inc	1996

8EC2A RADAR & TV ENGINEERING

B.Tech. (EC) 8th Sem. **Max. Marks: 100**
3L+1T **Exam Hours: 3**

Unit	Contents	Contact hours
I	**RADAR -** Radar Block diagram, frequencies and applications. Radar range equation. Continuous wave (CW) & FM radar; Moving target indicator (MTI): Delay line cancellers, blind velocity Pulse Doppler Radar. Tracking radar sequential lobbing, Conical scan and monopulse radar, Types of display, Radar receivers, Noise figure. NAVIGATIONAL AIDS - Principle of operation of Radar direction finder & range system. LORAN system, DME, TACAN, Aircraft landing systems.	10
II	T.V. systems. Block diagram of T.V. transmitters. Principles of Monochrome and colour T.V.system (PAL, SECAM, NTSC). Theory of scanning standards, Composite video signal analysis. T.V Cameras : Image orthicon, plumbicon, vidicon and CCD camera tubes. Types of Analog Monochrome and colour picture tubes,	8
III	**Processing and transmission of TV signals:** Modulation of video and sound signals, Vestigial side band transmission, Compatibility of colour and monochrome frequency interleaving & transmission of colour signals, Picture, sound and colour sub carriers. Encoding picture information. Generation of colour, colour difference and Chrominance signal modulation.TV transmission & reception antennas.	8
IV	**Basic circuits of TV RECEIVER:** Functional block diagram of T.V. receiver, R.F. Tuner, I.F. amplifier, Video detector, video amplifier, AGC, Synch. Separation, Sync. Processing and AFC. Deflection oscillators, vertical & horizontal deflection and sound system circuits. EHT generation. Common faults and their diagnosis. Basic idea of HDTV, DBS-TV and 3D-TV.	8
V	**MODERN TV SYSTEM:** Digital transmission and reception of TV signals, DISHTV, DTH and cable TV, transmission of TV signals through Satellite and Transponders, working principles of HDTV, DBS-TV, IPTV and 3D-TV. Modern TV receiver with LCD, LED and Plasma displays.	6
	Total	**40**

Text Books:

1. Monochrome and colour Television , R R Gulathi, Wiley Eastern Ltd. (2007).
2. Introduction to Radar System, 3rd, M I Skolink, MGH. (2003).

Reference Book:

S.No.	Name of Book/Publication/writer	Publication Year
1.	Television Engineering and Video System, R G Gupta, MGH	2005
2.	Television and Video Engineering , A M Dhake, MGH	1995
3.	Nathanson, F.E., "*Radar Design Principles*", McGraw-Hill Inc.,	1991
4.	Principles, Technology, Applications, Prentice Hall	1993
5.	D.K.Barton, Modern radar systems analysis, Artech House,	1988
6.	Microwave and radar engineering, G.S.B. Rao, Pearson P.	2013

8EC3A MEMS AND NANOTECHNOLOGY

B.Tech. (EC) 8th sem. **Max. Marks: 100**
3L+1T **Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	**Introduction to Nanoelectronics:** Top Down and Bottom UP Approach, Nanotechnology Potentials, Idea of band structure – Metals, Insulators and Semiconductors. Effect of crystal size on density of states and band gap, Electronic structure of nanoparticles. Nanostructured crystals, Size and dimensionality effects – Single electron tunneling – Applications – Superconductivity, Graphenes and CNT.	08
II	**Nano Fabrication and Patterning Techniques:** Si processing methods, Cleaning/etching, Oxidation, Gettering, doping, Epitaxy. CVD & MOCVD, Physical Vapor Deposition (PVD), Liquid Phase Techniques, Self assembly and catalysis. Etching: Wet and Dry, Nanolithography, Nanoimprinting, X-Ray Lithography(XRL), Particle beam lithography(e-beam, FIB, shadow mask evaporation),	09
III	**General Characterization Techniques:** X- Ray Diffraction studies – Bragg's law – particle size – Scherrer's equation, Infrared Spectroscopy of Semiconductors, Raman Spectroscopy, Dynamic Light Scattering (DLS), NMR Spectroscopy, ESR Spectroscopy. photo electron spectroscopy(XPS)-SEM,TEM,STM, Atomic force microscopy(AFM).	09
IV	**Electrical, Magnetic, Mechanical and Optical Properties and Applications :** Electronic and electrical properties -One dimensional systems-Metallic nanowires, Quantum dots -Two dimensional systems - Quantum wells. Magnetic properties -Transport in a magnetic field. Mechanical properties, Optical properties, Evolving interfaces of Nano in NanoBiology, Nano Sensors and Nanomedicines	07
V	**MEMS and Microsystems:** Evolution of Micro Fabrication – Micro Systems and Microelectronics. Application of MEMS in Various Fields. Introduction – Substrate and Wafer, Active Substrate Material. Silicon as a substrate material, MEMS packaging. Case study on pressure sensor with packaging.	07
	TOTAL	**40**

TEXT BOOKs

1. Nano Essentials, T Pradeep, Mc Graw Hill, (2008).
2. Nanotechnology-Enabled Sensors, Kourosh Kalantar-zadehand Benjamin Fry, Springer, (2007).

REFERENCE BOOKs

SN	Name of Authors /Books /Publisher	Year of Publication
1	Fundamental of Nanoelectronics, George W. Hanson, Pearson	2009
2	Principal of Nanotechnology, G. A. Mansoori, Wiley	2005
3	Mems and Micro Systems, Mahalik, TMH	2007
4	MEMS, Gabriel, Wiley	2006
5	MEMS, A.R. Jha, CRC	2008
6	Nano Fabrication, CRC	2012
7	MEMS & Microsystems, Design and Manufacture, Tai-Ran HSU, TMH	2013

8EC4.1A COMPUTER NETWORKS

B.Tech. (EC) 8th Sem. **Max. Marks: 100**
3L+0T **Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	**Queuing Theory**- Pure birth, Pure death & Birth-death processes,	2
	Mathematical models for M/M/1, M/M/∞, M/M/m, M/M/1/K and M/M/m/m queues. Little's formula.	5
II	**Physical and Data link layer** – OSI model & TCP/IP reference models, Line coding schemes, Packet & Circuit switching, Virtual circuit network,	3
	Framing, Simplex protocol, Simplex stop & wait protocol, Sliding window protocol, Go back N protocol, selective repeat,	3
	HDLC, PPP	2
III	**MAC Sublayer-** Static & dynamic channel allocation, Multiple Access Protocols: ALOHA, slotted ALOHA, CSMA, Token Bus, Token Ring, FDDI	4
	IEEE standards 1002.3 & 1002.5, Virtual circuit network: frame relay & ATM frame and protocol architecture,	3
	Network connection devices: Hubs, Bridges, switches, Routers and Gateways	2
IV	**Network Layer-** IPv4 & IPv6 addressing and datagram, Internetworking, Non-adaptive & Adaptive routing algorithms,	4
	Distance vector routing and Link state routing algorithms, OSPF and BGP	4
V	**Transport and Application Layer**- Client server paradigm, TCP frame format, Data traffic descriptors, QoS, Congestion and its control algorithms,	4
	Improving QoS by different queuing schemes, leaky bucket and token bucket implementation, Domain name, DNS in the internet, SMTP, FTP, WWW, HTTP	4
	Total	**40**

Text Book:

1. Forouzan, "Data Communications and Networks", 5th ed., Mcgraw-Hill, (2006).

REFERENCE BOOKS:

SN	Name of Authors/Book/Publisher	Publication Year
1	Tanenbaum, "Computer Network", 5th ed., Pearson Education	2012
2	Leon Garcia, Widjaja, "Communication Networks', 2nd ed., Mcgraw-Hill	2003
3	Stallings, "Data and Computer Communications", 10th ed., Pearson Education	2013
4	Bertsekas, Gallager, "Data Networks", 2nd ed., PHI	1992
5	Computer Networks, Dave, cengage learning	2003
6	Fundamentals of Networking and Data Communications, White, cengage learning	2013

8EC4.2A OPERATING SYSTEMS

B.Tech. (EC) 8th Sem. **Max. Marks: 100**

Exam Hours: 3

3L+0T

UNIT	CONTENTS	CONTACT HOURS
I	**INTRODUCTION** – History, Operating system services, types, responsibilities, generations, LINUX, WINDOWS.	6
II	**PROCESS MANAGEMENT**- Operations on process, Process state, Scheduling, Criteria, scheduling algorithms, Evaluation, Synchronization, Semaphores, Monitors.	8
III	**MEMORY MANAGEMENT**- Swapping, Continuous memory allocation, Paging, Pure paging, Demand paging, Page-replacement algorithms, thrashing, Example-Pentium, Disk Scheduling.	10
IV	**INFORMATION MANAGEMENT**- File and directory concept, Access methods, Protection, Free space management, Efficiency and performance, Access matrix, Capability-based systems, Program-threats, User authentication, Firewall.	10
V	**DEAD LOCKS**- System model, Dead lock characterization, Deadlock prevention, Avoidance, Detection, Recovery, Classic problems of synchronization.	6
	TOTAL	**40**

TEXT BOOKs:

1. Operating Systems, Dhamdhere, TMH, (2006).
2. Operating System:, Crowley, TMH, (1996).

REFERENCE BOOKS:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Modern Operating Systems, Andrew S Tanenbaum, PHI	2008
2	Operating Systems:, Pal Chaudhury, PHI	2009
3	Operating System Principles, Peter B. Galvin, Greg Gagne, John Wiley & Sons	2002
4	Operating Systems, Gary Nutt, Pearson	2003
5	Operating Systems: Internals And Design Principles, William Stallings, Pearson	2012
6	Understanding Operating System , Flynn, cengage learning	2009
7	Operating Systems: Principles, Design and Applications , cengage learning	2002

8EC4.3A MICROCONTROLLERS & EMBEDDED SYSTEMS

B.Tech. (EC) 8th sem. **Max. Marks: 100**
3L+0T **Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	**THE 8051 MICROCONTROLLER:** Introduction, The 8051 microcontroller hardware, I/O pins, Ports, External memory, Counters and Timers, Serial data.	8
II	**8051 ASSEMBLY LANGUAGE PROGRAMMING:** Addressing modes, External data moves, Stack,Push and Pop opcodes, Logical operations, Byte level and bit level logical operations. Arithmetic operations, Jump and call instructions, Interrupts & returns.	8
III	**REAL TIME CONTROL:** Interrupts, Multiple sources of interrupts, Non maskable sources of interrupts, Interrupt structure in 8051,Timers,Free running counter & Real Time control .	8
IV	**SYSTEM DESIGN**: Serial I/O interface, Parallel I/O ports interface, Digital and Analog interfacing methods, LED array, keyboard, Printer, Flash memory interfacing.	8
V	**INTRODUCTION TO EMBEDED SYSTEM**: Application of Microcontrollers in interfacing, MCU based measuring instruments. Real Time Operating System for System Design,Multitasking System, Task Definition in a Multitasking System, Round Robin Scheduling, Full PreemptiveScheduling, Basic study and Features of Commercial RTOS : WINCE and Embedded Linux.	8
	TOTAL	**40**

TEXT BOOKs:

1. Kenneth J.Ayala, "The 8051 Micro controller", Penram Interfacing Publishing, 1996.
2. Rajkamal, "Embedded Systems" TMH

REFERENCE BOOKS:

SN	Name of Authors /Books /Publisher	Year of Publication
1	A Textbook of Microprocessors and Microcontrollers, R. Thegarajan, Scitech Publishers	2002
2	The 8051 Microcontroller and Embedded Systems, Using Assembly and C, K Ayala & D. Gadre, Cengage Learning	2004
3	The 8051 Microcontrollers & Embedded Systems,Mazidi, ,PHI	2004
4	The 8051 Microcontroller, Ayala, cengage learning	2009
5	The 8051 Microcontroller & Embedded Systems using Assembly and C, Ayala /Gadre cengage learning	2005
6	A Textbook of Microprocessors and Microcontrollers, R.S. Kaler I. K. International Publishing House Pvt. Ltd.	2009
7	Embedded Systems & Robots: Projects Using the 8051 Microcontroller , cengage learning	
8	Embedded System Design Using C8051 , Huang , cengage learning	
9	Embedded Microcomputer System Real Time Interfacing, Valvano , cengage learning	

8EC5A RF FABRICATION LAB

B.Tech. (EC) 8th sem. **Max. Marks: 100**
3P **Exam Hours: 3**

S.No.	Contents
1.	Design and fabricate the following *Planar Transmission Lines:* • Stripline and microstrip lines • Parallel coupled striplines and microstrip lines • Slot lines and Coplanar lines Measure their S-parameters and Characteristic impedance.
2	Design and Fabricate the following; • 3-dB branchline coupler, • backward wave coupler, • Wilkinson power dividers • Low pass filters • band pass filters. Measure their S-parameters & frequency responses.
3	Design, fabrication, and measurement of RF amplifier using microwave BJT.

8EC6 INDUSTRIAL ECONOMICS & MANAGEMENT

B.Tech. (EC) 8th sem. **Max. Marks:50**
Exam Hours:3
2P

S.No.	CONTENTS
1.	Framework of industrial economics – organizational forms and alternative motives of the firm, industrial efficiency, theory of profitability, market structure, principles of costing.
2.	Approaches to industrial location analysis, Productivity analysis, Input-Output analysis, Concentration of economic power. New Industrial Policy – Critical analysis, Role of technology and entrepreneurship in industrial development.
3.	Industrial project appraisal- classification of industries, industrial legislations in India, recent trends in MNCs, LPG, FDI &joint ventures, methods of project evaluation-NPV,CBA,IRR, break-even analysis.
4.	Management – Principles of management, functions of management-planning,organizing,staffing,directing,controlling,co-ordinating,decision making
5.	Emerging issues – Total quality management, JIT , quality circle, KANBAN, benchmarking, six sigma, quality management, ,ISO 9000, ISO 14000 , Customer relationship management (CRM) .

TEXT BOOKs:

1. Subburay, Total quality management, TMH. (2011)
2. Barthwal R.R- industrial economics . wiley eastern limited

Reference Books:

1. Tirole jean – the theory of industrial organization . MIT PRESS
2. Ahluwalia I.J – industrial growth in india . Oxford university press
3. Divine P.J and R.M jones et Al- an introduction In industrial economics .George allen &Unwin limited London.
4. Peter F. drucker – principles and practice of management . Prentice hall ltd .

8EC7A VLSI DESIGN & OPTICAL FIBER LAB

B.Tech. (EC) 8th sem. **Max. Marks: 100**

3P **Exam Hours: 3**

S.No.	Contents
PART-I: Design and simulation of following VLSI circuits using EDA Tools (Software) Schematic design and make Device Level Layout of following circuits.	
1.	Design 2-input NAND, NOR and XOR using CMOS logic. Obtain its static and dynamic analysis for speed and power dissipation.
2.	Design 2X1 and 4X1 Multiplexer using Transmission Gate (TG. Obtain its static and dynamic analysis for speed and power dissipation.
3.	Design a SR-latch and D-latch using CMOS. Obtain its static and dynamic analysis for speed and power dissipation.
4.	Design a SRAM and DRAM Memory Cell. Obtain its static and dynamic analysis for speed and power dissipation.
PART-II Design and simulation of following VLSI circuits using VHDL and then burn/implement the circuits on FPGA kit for real input.	
5.	Design a 4- bit parallel Adder. Obtain its number of gates, area, and speed and power dissipation.
6.	Design a 4- bit Serial in-serial out shift register. Obtain its number of gates, area, and speed and power dissipation.
7.	Design a 4 bit binary synchronous counter. Obtain its number of gates, area, and speed and power dissipation.
PART-III. To perform following experiments based on Fiber Optic Trainer.	
8.	To set up Fiber Optic Analog link.
9.	To set up fiber Optic Digital link.
10.	Measurement of Propagation loss and numerical aperture.
11.	Characterization (VI Characteristics) of laser diode and light emitting diode.