UNIVERSITY OF RAJASTHAN, JAIPUR

B.E. Electronics And Communication

(Four Year Semester Scheme)

Teaching and Examination Scheme for BE (4 Year Course)
in
Electronics & Communication Engineering

Distribution of Marks

Year:II Semester: III

Code	Subject	Hrs./week			Exam Hrs.	Maximum Marks		
		L	T	P	Hrs	*I.A.	Exam	Total
A. THEORY PAPERS								
3EC1	Mathematics III	3	1	-	3	20	80	100
3EC2	Electronic Devices & Circuits	3	1	-	3	20	80	100
3EC3	Circuit Analysis	3	1	-	3	20	80	100
3EC4	Electronic Measurements & Instrumentation	2	1	-	3	20	80	100
3EC5	Data Structure & Algorithms	3	0	-	3	20	80	100
3EC6	Elective (any one of the following)	3	0	-	3	20	80	100
3EC6.1	Electrical Technology							
3EC6.2	Electronic Materials & Processes							
3EC6.3	Environmental Engg.							
3EC6.4	Optimization Techniques							
B.Practical & Sessional								
3EC7	Electronics Workshop	-	-	2	-	45	30	75

3EC8	Computer Programming Lab	-	-	3	-	60	40	100
3EC9	Electronics Lab-I	-	-	3	-	60	40	100
3EC10	Electronic Measurement & Instrumentation Lab	-	-	3	-	45	30	75
3ECDC	**Discipline & Extra Curricular activities:**							50
	GRAND TOTAL	17	4	11	-	-	-	1000

***I.A. - Internal Assessment**

Teaching and Examination Scheme for BE (4 Year Course)
in
Electronics & Communication Engineering

Year:II Semester: IV

Code	Subject	Hrs./week			Exam Hrs.	Maximum Marks		
		L	T	P	Hrs	*I.A.	Exam	Total
A. THEORY PAPERS								
4EC1	Advanced Mathematics	3	1	-	3	20	80	100
4EC2	Applied Electronics	3	1	-	3	20	80	100
4EC3	Digital Electronics	3	0	-	3	20	80	100
4EC4	Electromagnetic Field Theory	3	1	-	3	20	80	100
4EC5	Telecommunication Engineering	3	1	-	3	20	80	100
4EC6	Elective (any one of the following)	3	0	-	3	20	80	100
4EC6.1	Object Oriented Prog.							
4EC6.2	Data Base Management System							
4EC6.3	Computer Graphics							
4EC6.4	Automobile Engineering							
B.Practical & Sessional:								
4EC7	Advanced Programming Lab	-	-	3	-	60	40	100
4EC8	Electronics Lab-II	-	-	3	-	60	40	125
4EC9	Digital Electronics Lab	-	-	2	-	45	30	75
4EC10	Humanities & Social Science	-	-	2	-	45	30	50
4ECDC	**Discipline & Extra Curricular**							50

	activities:							
	GRAND TOTAL	18	4	10	-	-	-	1000

***I.A. - Internal Assessment**

Teaching and Examination Scheme for BE (4 Year Course)
in
Electronics & Communication Engineering

Year:III Semester: V

Code	Subject	Hrs./week			Exam Hrs.	Maximum Marks		
		L	T	P	Hrs	*I.A.	Exam	Total
A. THEORY PAPERS								
5EC1	Signals and Systems	3	1	-	3	20	80	100
5EC2	Theory and Application of Integrated Circuits	3	0	-	3	20	80	100
5EC3	Computer Architecture	3	0	-	3	20	80	100
5EC4	Communication Theory	3	1	-	3	20	80	100
5EC5	Microwave Engg. - I	2	1	-	3	20	80	100
5EC6	Elective (any one of the following)	3	1	-	3	20	80	100
5EC6.1	Medical Electronics							
5EC6.2	Principles of Programming Languages							
5EC6.3	Audio Video Systems							
5EC6.4	Advanced Data Structures							
5EC6.5	Computer Oriented Numerical & Statisticals Methods							
B.Practical & Sessional:								
5EC7	Electronic Engineering Design Lab	-	-	3	-	60	40	100
5EC8	Microwave Engg. Lab-I	-	-	3	-	60	40	100
5EC9	Communication Lab-I	-	-	3	-	60	40	100
5EC10	Practical Training Seminar-I	-	-	2	-	30	20	50
5ECDC	**Discipline & Extra Curricular activities:**							50
	GRAND TOTAL	17	4	11	-	-	-	1000

***I.A. - Internal Assessment**

Teaching and Examination Scheme for BE (4 Year Course)
in
Electronics & Communication Engineering

Year:III Semester: VI

Code	Subject	Hrs./week			Exam Hrs.	Maximum Marks		
		L	T	P	Hrs	*I.A.	Exam	Total
A. THEORY PAPERS								
6EC1	Microwave Engg.-II	3	1	-	3	20	80	100
6EC2	Microprocessors and Microcontrollers	3	0	-	3	20	80	100
6EC3	Industrial Electronics	3	0	-	3	20	80	100
6EC4	Digital Communication	3	1	-	3	20	80	100
6EC5	Control System Engg.	3	1	-	3	20	80	100
6EC6	Elective (any one of the following)	3	1	-	3	20	80	100
6EC6.1	Neural Networks							
6EC6.2	Software Engineering							
6EC6.3	Parallel Computation & Architecture							
6EC6.4	Design and Analysis of Algorithms							
B.Practical & Sessional:								
6EC7	Communication Lab-II	-	-	3	-	60	40	100
6EC8	Microprocessor Lab	-	-	3	-	60	40	100
6EC9	Electronics CAD Lab	-	-	2	-	45	30	75
6EC10	Industrial Electronics Lab	-	-	3	-	45	30	75
6ECDC	**Discipline & Extra Curricular activities:**							50
	GRAND TOTAL	18	3	11	-	-	-	1000

***I.A. - Internal Assessment**

Teaching and Examination Scheme for BE (4 Year Course)
in
Electronics & Communication Engineering

Year:IV Semester: VII

Code	Subject	Hrs./week			Exam Hrs.	Maximum Marks		
		L	T	P	Hrs	*I.A.	Exam	Total
A. THEORY PAPERS								
7EC1	Antenna and Wave Propagation	3	1	-	3	20	80	100
7EC2	Digital Signal Processing	3	1	-	3	20	80	100
7EC3	Wireless Communication	3	1	-	3	20	80	100
7EC4	IC Technology	3	1	-	3	20	80	100
7EC5	VLSI Design	2	1	-	3	20	80	100
7EC6	Elective (any one of the following)	3	0	-	3	20	80	100
7EC6.1	Multimedia Systems							
7EC6.2	Advanced Microprocessor							
7EC6.3	Remote Sensing							
7EC6.4	AI and Expert System							
B.Practical & Sessional:								
7EC7	Minor Project	-	-	2	-	30	20	50
7EC8	Digital Communication & Signal Processing Lab	-	-	3	-	60	40	100
7EC9	Antenna Lab	-	-	3	-	60	40	100
7EC10	Practical Training Seminar-II	-	-	2	-	60	40	100
7ECDC	**Discipline & Extra Curricular activities:**							50
	GRAND TOTAL	17	5	10	-	-	-	1000

***I.A. - Internal Assessment**

Teaching and Examination Scheme for BE (4 Year Course)
in
Electronics & Communication Engineering

Year:IV Semester: VIII

Code	Subject	Hrs./week			Exam Hrs.	Maximum Marks		
		L	T	P	Hrs	*I.A.	Exam	Total
A. THEORY PAPERS								
8EC1	Computer Networks	3	1	-	3	20	80	100
8EC2	Radar & TV Engineering	3	1	-	3	20	80	100
8EC3	Optical Communication	3	1	-	3	20	80	100

8EC4	Elective (any one of the following)	3	1	-	3		20	80	100
8EC4.1	Image Processing and Pattern Recognition								
8EC4.2	VHDL Design								
8EC4.3	Microcontrollers and Embedded Systems								
8EC4.4	Operating Systems								
B.Practical & Sessional:									
8EC5	Computer Network Programming Lab	-	-	3	-		45	30	75
8EC6	Industrial Economics & Management	-	-	2	-		45	30	75
8EC7	System Design and Advanced Communication Lab	-	-	3	-		60	40	100
8EC8	Project	-	-	3	-		120	80	200
8EC9	Seminar	-	-	4	-		60	40	100
8ECDC	**Discipline & Extra Curricular activities:**								50
	GRAND TOTAL	12	4	15	-		-	-	1000

***I.A. - Internal Assessment**

Semester III

3EC1 MATHEMATICS-III

1. **DIFFERENTIAL EQUATIONS:** ordinary differential equation of second order with variable co-efficients Homogeneous form,Exact form solution when a part of c.f. is known, change of dependent varible, change of independent varible. Variation of parameters. Solution in series(without particulars integral). Partial differential equations of first order-Lagrange's method &standard froms.charplt's method.

2. NUMERICAL ANALYSIS: Finite difference- Lagrange's method& standared forms, Charplt's method, forward and backward differences, Interpolation formulae. Stirling's formula Lagrange's Interpolation formula. Differentiation Numercal Integration-Trapezoidal rule, simsion's one thrid and three-eighth rules. Numerical solution of ordernary differ- ential equations of frist order- picard's method,Euraler's and modified Euler's methods. Miline's method and Runga-Kutta fourth order method.

3. STATISICS AND PROBABILITY: Elementry thyeory of probability Baye's theorem with simple applications. Expected value,theoritical probability distributions-Binomial, Poisson and Normal distributions.

4. FOURIER SERIES: Expansion of simple function in fourier series. Half Range series, Change of Intervals, Harmonic Analysis.

Recommended Books

1.Chandrika Prasad-
(a) Mathematics for Engineers: Prasad Mudralays
(b) Advanced Mathematics for Engnineers: Prasad Mudralaya
2. B.S. Grewal- Higher Engineering Mathematics; Khanna pub.
3. M.Ray, J.C. chaturavedi & H.C. saxena- A text book of differential equation; Students Friends & Co.
4. J.N. kapur & H.C. saxena- Mathematics statistics : S.chand & co. 5.Gaur & kaul - Enginiering Mathematics Vol.I & II:JPH 6. Johnson - Probability and Statisitics for Engineers Pearson Education.

3EC2 ELECTRONIC DEVICES& CIRCUITS

1. **BEMICONDUCTOR PHYSICS:**Mobility and conductivity, charage densities in a semiconductor. Fermi dirac distribucation, carrier concentration of fermi level in semiconductor Generation and recombination of charges diffusion and continuity equation Mass action Law, Hall effect.
   2. DIODE CIRCUITS: Diode as a ckt element, load line concept, clip- ping and clamping circuits, voltage multipliers.

3. DEVICES:Construction, characteristics and working principles of the following devices:junction diodes, BJT, JFET, MOSFET, UJT,photo diodes, LEDs, Photo transistors. Solar cells. thermistors, LDR.

4. TRANSISTORS: Transistor characteristics, current components, Current gains: alpha and beta. Operating point. Hybrid model, h-para meter equivalent circuits. CE, CB and CC configuration. DC and AC analysis of CE, CC and CB amplifiers. Ebers-Moll model. Biasing & stabilization techniques. Thermal runaway, thermal stability. Equivalent circuits and biasing of JEFT's Low frequency CS and CD JFET amplifiers FET as a voltage variable resistor.

5. SMALL SIGNAL AMPLIFIERS AT LOW FREEQUENCY: Analysis of BJT and FET, DC and RC coupled amplifiers. Frequency response. midband gain, gains at low and high frequency. analysis of DC and differential amplifiers, Miller's Theorem. Cascading Transistor amplifiers, Darlington & cascade ckts. Emitter & source followers.

Recommended Books

1. J Millman & C.C. Halkias - Integrated Electornics; Tata Mc-Graw Hill. Pearson Education.
2. Rebert Boylestad & L. Nashelsky - Electronic Devices and Circuit Theory.
3. Sedra Smith-Micro Electronic Circuits. Oxford Press, India.
4. Floyd-Electronic Devices, Pearson Education.
5. Shur - Physics of Semiconductor Devices. Prentice Hall of India.
6.

3EC 3-CIRCUIT ANALYSIS

1. **NETWORK THEOREMS:** Thevenin's, Norton's, reciprocity, Superposition, Compensation, Miller's Tellegen's and maximum power transfer theorems. Network with dependent sources.
2. **TRANSIENT ANALYSIS:** Impulse, step, ramp and sinsuoidal response Analysis of first order and second order circuits. Time domain & transform domain (frequency, Laplace) analysis. Initial and final value theorems.
3. **LINER NETWORK RESPONSET TO NON-SINUSOIDAL INPUTS:** Complex periodic waves and their analysis by Fourier analysis. Different kind of symmetry. Power in circuit.

4. **COUPLING ELEMENTS & COUPLED CIRCUITS:** Conductively coupled circuits. Inductively coupled circuits-mutual inductance, coefficient of coupling and mutual. Inductance between portions of same circuits and between parallel branches. Transformer equigvalent. inductively and conductively coupledcircuits.
5. **NETWEORK FUNCTIONS:** Terminals and terminal pair, driving point imedance transfer functions, poles and zeros. Procedure of Finding network functions for general two terminal pair networks. Stability & causality.
6. **TWO PORT NETWORKS:** Two por; parameters and their interrelations - z-parameters y-paraneters, h-parameters, ABCD parameters. Equivalence of two ports, transformer equivalent, interconnection of two port network. Image parameters Attenuation & phase shift in symmetrical T and networks.
7. **NETWORK SYNTHESIS:** Hurwitl polynomial, positive real function, RL & RC networks synthesis, Foster First & Second form, Caller forms.

Recommended Books:

1. Kuo, Franklin F - Netwrok analysis and sysnthesis, II Ed, 1999, Jhon Wiley & sons.
2. Desoer, C. And Duh, E.S-E.s. Basic circuit theory, Mc Graw Hill.
3. Van Valkenburg, M.E. - Network Analysi, Prentice Hall, India.
4. Schaum's Outling series on circuit analysis.
5. Hayt; W, and Kinmmerly - Engineering circuit analysis, Mc Graw Hill, Inc.
6. Sudhakar, A and Chyam Mohan S.P. - Circuits and Networks, Tata Mc Graw Hill. India.

3 EC 4 ELECTRONIC MEASUREMENTS & INSTRUMENTATION

1. **THEORY OF ERRORS:** Accuracy & precision, Repeatabilit, Limits of errors, Systematic & random errors Modeling of errors, Probable error & standard deviation, Gaussian error analysis, Combinatio of errors.
2. **ELECTRONIC INSTRUMENTS FOR MEASURING BASIC PARAMETERS:** Electronic Voltmeter, Electronic Multimeters, Digital Voltmeter. Commpnent Measuring Instruments. Q meter, Vectro Impendence meter, RF Power & Voltage Meausrements. Measurements of frequency Concept of noise. S/N improvement Introduction to shielding & grounding.
3. **OSCILLOSCOPES:** CRT Construction, Basic CRO circuits, CRO Probes & Transducers. Oscilloscope Techniques of Measurement of frequency, Phase Angle and. Time Delay, Special purpose oscilloscopes: Multibeam, multitrace, storage & sampling Oscillocopes. Curve tracers.
4. **SIGNAL GENERATION:** Sinewave generators, Frequency synthesised signal generators, Sweep frequency generators, Special wave form generators.
5. **SIGNAL ANALYSIS:** Measurement Technique, Wave Analysers. Frequency-selective wave analyser, Heterodyne wave analyser, Harmonic distortion analyser, Spectrum analyser.
6. **TRANSDUCERS:** Classification Selection criteria, Constructional and Operational features. Strain gauges displacement, velocity, acceleration, force, torque flow, pressure and temperature transducers. Signal conditioning.
7.

Recommended Books:

1. H.S. Kalsi - "Electronic Inst. & Measurement, Tata Me. Hill.
2. W.D. Cooper - "Electronic Inst. & Measurement Techniques, Prentice Hall of India.
3. A.K. Sawhney - "Electrical & Electronic Measurement & Inst., Dhanpat Raj & Sons.
4. F.E. Terman & J.M. Pettit - "Electronic Measurements McGraw Hill Book Co.

5. S. Talbar & Upadhyay-Electronic Instrumentation, Dhanpat Rai Sons.
6.

3 EC 5 DATA STRUCTURES & ALGORITHMS

1. **PERFORMANCE MEASUREMENT:** Space complexity and Time complexity, bit oh, omega and theta notations and their significance.
2. **ARRAY & MATRICE :** Row and Column Major mapping & representation, irregular 2D array, Matrix operations, Special matrices: diagonal, tridiagonal, triangular, symmetric. Sparse matrices representation and its transpose.
3. **STACKS:** ADT, representation in array & linked lists, basic operation, Application of stacks in parenthesis matching, towers of Hanoi etc.
4. **QUEUES:** ADT, representation in array & linked lists, applications, circular queue.
5. **TREES:** Binary Tree, representation in array & linked lists, basic operation on binary trees, binary tree traversal (preorder, postorder, inorder). Single source shortest path algorithm. minimum cost spanning tree.
6. **SEARCH TREES:** Binary search tree. indexed-binary search tree, basic operation, AVL tree, B-tree.
7. **GRAPHS:** Representation of unweghted graphs. BFS, DFS, Files.
8. **SORTING:** Bubble sort. Insertion sort, merge sort, selection sort, shell quick sort, heap sort.
9.

Recommended Books:

1. Harowitz & Sawhni: Data structure in Pascal (BPB Publication)
2. Harwitz & Swhni: Data structure in C & C++ (BPB Publication)
3. Langran, Augensteln & Tenenbaun Data structures using C & C++, Prentice Hall of India.
4. Trembly & Sovensen: Data structures (Mc Graw Hill international)
5. Kruse, Leung & Tondo: Data Structures & Program Design in C.Pearson Education.

Data Structure by Binman.

3 EC 6.1 ELECTRICAL TECHNOLOGY

1. **DC GENERATORS:** Generated voltage. Types of DC generators. No load and load characteristics. Parallel operation.
2. **DC MOTORS:** Production of forgue. Back emf. Torque current and forque speed characteristucs, Starting speed control and electrical breaking of DC motors. Losses and efficiency.
3. **AC MACHINES:** General equation of induced emf.
4. **INDUCTION MOTORS:** Construction, Basic principles. Torque slip curves, Effect of rotor resistance cogging, Grawling, Starting, speed control and breaking of induction motors. Losses and efficiency, Single-phase Induction motor: Starting methods.
5. **SYNCHRONOUS MACHINES:** Basic principles starting of synchronous motors, OC and SC and zero power factor characteristics. Single Phase synchronous motor.
6. **SPECIAL MACHINES:** High frequency transformers, small transformers, small transformers for electronic circuits. Two phase servo motors and small DC machines for low power application.
7. **TRANSMISSION AND DISTRIMUTION SYSTEM:** General idea of transmission and distribution system, electrical equipment of a sub station, interface of power lines with telecommunication circuits, Conductors and insulators for transmission lines.
8. **PROTECTION:** Basic types of faults caused and consequences of faults in power system, over current realy and elementary idea of static relays and their and advantages and limitations.

Recommended Books:

1. H. Cotton - advance Electrical Technology; Wheeler Pub. London.
2. A. Langsdorf - AC Machinery; Tata Mc_Graw Hill.
3. Ravindra Nath & M. Chandra-Power System Protection & Switchger; New Age International, New Delhi.
4. Nagrath Kothari - DC Machines; Tals Mc_Graw Hill.
5. Hughes - Electrical Technology; Peason Education.
6. Electrical Mer EXton Fur; oxford.

3 EC 6.2 ELECTRONIC MATERIALS & PROCESSES

1. **CONDUCTOR MATERIALS:** Electrical properties of conductive and resistive materials. Important characteristics and electronic applications of specific conductor & resustabce meterlals.
2. **DIELECTRIC BEHAVIOUR OF MATERIALS:** Polarisation phenomena, spontaneous polarisation, dielectric constant and loss, pieze and ferro electricity.
3. **MAGNETIC BEHAVIOUR OF MATERIALS:** Dia, para, perroferrimagnetism; soft and hard magnetic materials and their applications.
4. **SEMI CONDUCTORS:** Crystal growth, zone refining, Degenerate and nondegenerate semiconductors. Direct and indirect band gap semiconductors. Electronic properties of silicon. Germanium Arsenide, gallium phosphide & Sillion carbide.
5. **SUPERCONDUCTORS:** Type and Type II superconductors and their applications.
6. **SUPERCONDUCTORS:** Type I and Type II Type superconductors and their applications.
7. **PCBs :** Printed Circuit Bords - Types, Manufacturing of copper clad liminates, PCB Manufacturing process, Manufacture of single and double sided boards. Surface mount devices-advantages & limitations.

Recommended Books:

1. S.O. Kasap-Principle of electric Engineering materials and devices, Mc Graw Hill.
2. B.D. Indu-Electrical Engineering Materials, Jain Brothers.
3. Robert M Rose, Lawrence A shepard and John Wulf - Structures and Properties of Materials Volume IV, electronic Properties, Wiely Eastern Ltd.
4. S.P. Seth and P.V. Gupta-A course of Electrical Engineering Materials, Dhanpat Rai & Sons.
5. C.S. Indulkar & S. Thiruvengadam An Introduction to Electrical Engineering Materials, S.Chand & Co.
6. N. Grover & K.S. Jamwal-Electronic compenets & Materials, Dbanpat Rai & Co.
7. Mattx for electronic engineer Tones

3 EC 6.3 ENVIRONMENTAL ENGINEERING

1. **PROTECTION OF ENVIRONMENT:** Importance of clelan environment. Control of environmental pollution with respect to air, land and water.
2. **WATER POLLUTION:** Fresh Water: Causes of water pollutionin surface wather and underground water Water: Adverse effects of formestic wastes and Industrial effluent. Wast water management in electronic industry.
3. **NOISE POLLUTION:** Introductin, sources of noise, decible unit of sound measurement, adverse effects on human beings and their invironment, Control of noise pollution.

4. **AIR POLLUTION:** Definition. Sources of air contaminants, thier cources of emissionand III effect on man, animals, vegetation and non living materials, permissible limits as pwer Indian standards. Air quality management in electronic industry.
5. **ENVIRONMENTAL IMPACT ASSESSMENT:** Difinition an dneed. introduction to environmental impact assessment methodology.
6. **CURRENT ISSUES IN ENVIRONMENTAL ENGINEERING:** Global warming, ozone deptetion, acid rain, oli pollutin; raiation hazard and control and role of non-conventional sources of energy in environmental protection.

Recommended Books

1. Dhameja S.K. -Environmental Engineering and Management, S.K> Kataria and Sons, New Delhi, 2000.
2. Bhatai H.S. -A text book in Environmental Pollution and control, Galgotia Publication Pvt. Ltd., 1998.
3. Center L.W. -Environmental Impact Assessment, Mc Graw Hill, 1996.
4. Rao M.N. and rao H.V.N.-Air Pollution, Tata Mc Graw hill, 1990.

3EC 6.4 OPTIMIZATION TECHNIQUES

1. **INTRODUCTION:** Introduction, Engineering application of optimization. Statement of an optimization problem, Classification of optimization problems.
2. **CLASICAL OPTIMIZATION TECHNIQUES:** Single variable and multivariable optimization with and without constraints.
3. **LINEAR PROGRAMMING:** Single and multivariable optimization, Graphical Interpretation, Pivotal reduction of general systems of equations. Simplex method.
4. **NON LINEAR PROGRAMMING:** Unimodel function. Quadratic interpolation method.
5. **UNCONSTRAINED OPTIMIZATION TECHNIQUES:** Direct search method. Random search method. Univariate method and pattern search method. Basic idea of Hooke & Jeaves, Simplex, Powell and Newton methods.

Recommended Books:

1. S.S. Rao: Optimization-Theory & Application. Wiley Eastern.
2. A.L. Fox: Optimization methods for Engineering Design, Addision Wesley.
3. A.O. Converse: oPTIMIZATION, hALT Pinchort Inc.
4. D.H. Burley: Studies in Optimization International text Book Co.
5. H.A. Taha: Operation Research and Introduction. Mcmillan Co.

3 EC7 Electronics Workshop

2P M.M:75

1. Indentification, Study & Testing of various electronic components: (a) Resistance-Various types, Colour coding.
   (b) Capacitors-Various types, Coding.
   (c) Inductors (d) Diodes (e) Transistors (f) SCRs (g) ICs (h) Photodiode (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 and desoldering practice.
5. ,6 (a) To Design and fabricate PCB for a Regulated power supply.
   (b) Assemble the Regulated power supply using PCB and test it.

7,8.To study and plot the characleristics of follwing Opto-Electronic devices-
(a) LED (b) LDR (c) Photovoltatic cell (d) Opto-coupler

(e) Photo diode (f) Photo transistor.

9.To study the specifications and working of a Transistor radio kit and perform measurements on it.

10. To study the specifications and working of a Tape Recorder kit.

11,12. Coil winding and testing.

3EC8 COMPUTER PROGRAMMING LAB
COMPUTER PROGRAMMING IN C

1. Write a program to find the greatest between four numbers.
2. Write a program to prepare mark sheet of students using structures.
3. Write a C program to read several different names and addresses, rearrange the names in alphabetical order and print name in alphabetical order using structures.
4. Write a program to implement concatenation of two strings using pointers.
5. Write a program to create a singly link list of ten students names and implement add node, delete node and is empty list operations.
6. Write a program to search a pattern in a given string.
7. Write a program to print the following output using FOR loop. 1
   22
   333
   4444
   55555

```
    1
   2 2
  3 3 3
 4 4 4 4
5 5 5 5 5
```

8. Write a Program to read add, subtract and multiply integer matrices.
9. Factorial computation and sine function computation.
10. Reversing the digits of an integer.
11. Character to number conversion.
12. Smallest divisor of an integer.

3EC 9 ELECTRONICS LAB I

1. Study the following devices: (a) Analog & digital multimeter
   (b) Function/Signal generators
   (c) Regulated d.c. Power supplies (constant voltage and constant current operations)
   (d) Study of analog CRO, measurement of time periods, amplitude, frequency & phase angle using Lissajous figures.
2. Plot V-I characteristics of P-N junction diode & calculate cut-in voltage, reverse.
3. Plot V-I charactristic of zener diode and study zener diode as voltage regulator. Observe the effect of load changes and determine load limits of teh 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. Characterising a given passive network using Y & Z parameters.
10. Plot input and output characteristics of BJT in CB. CC and CC configurations. Find their h-parameters.
11. Study half wave rectifier and effects of filters on wave. Also calculate ripple factor.
12. Study bridge rectifier and measure the effect of filter network on D.C. voltage output & ripple factor.

3EC 10 ELECTRONIC MEASUREMENT & INSTRUMENTATION LAB

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 LCR bidge.
4. Measurement of the distance with the help of ultrasonic transmitter & receiver.
5. Measurement of displacement with the help of LVDT.
6. Draw the characteristics of the following temperature transducers: (a) RTD (P1-100) (b) Themistor (c) Thermocouple
7. Draw the characteristics between temperature & voltage of a K type thermocouple.
8. Measure the speed of a Table Fan using stroboscope.
9. Measurement of strain/force with the help of strain gauge load cell.
10. Study the working of Q-meter and measure Q of coils.
11. To study the working & performance of digital counter & measure- (a) Frequency (b) Time Interval (c) Time Period
12. To study the working of spectgrum analyzer and determine the bandwidth of different signals.

Semester IV

4 EC 1 ADVANCED MATHEMATICS

1. **TRANSFORM CALCULUS:** Laplace transform with its simple properties, applications to the solution of ordineary and partial differential equalitions having constant co-efficients with special reference to teh wave and diffusion equations. Fouren transform: Complex form of Fourier Transform and its inverse. Fourier sine and cosine transform and their inverse. Applications of Fourier Transform to solution of partial differential equations having constant co-efficient with special references to heat equation and wave equation.
2. **COMPLEX VARIABLES:** Analytic functions, Cauchy-Riemann equations. Elementary conformal mappoing with simple application, Line integral in complex domain, Cauchy's theorem Cauchy's integral formula. Tylor's series Laurent's series poles, Residure, Evaluation of simple definite real integral using the theorem of residues. Simple contour integration.
3. **CALCULUS OF VARIATIONS:** Functioinal. strong and weak variations simple variation problems, the Euler's equation.

Recommended Books:

1. Chandrika Prasad. (a) Mathematics for Engineers; Prasad Mudralays
   (b) Advance Mathematics for Engineer; Prasad Mudralaya
2. B.S. Grewl - Higher Engineering Mathematics; Khanna Pub.
3. Gaur & Kaul-Ingineering Mathematic Vol. I & II; JPH

4 EC 2 APPLIED ELECTRONICS

1. **FEEDBACK AMPLIFIERS:** Classification, Feedback concept. Transfer gain with feedback, General characteristics of negative geedback amplifiers. Analysis of voltage-series, voltage-shunt, current series and current-shunt feedback amplifier, Stability criterion.
2. **OSCILLATORS**: 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.
3. **HIGH FREQUENCY AMPLIFIERS:** Hybird Pimodel. conductances and camacitances of hybrid-Pi model, high frequency analysis of CE amplifier, gain-bandwidth product. Emitter follower at high frequencies.
4. **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, DTLK, ECL, C-MOS & MOSFET, Interfacting logic families to one another.

Recommended Books:

1. J.Millman & C.C. Halkias-Integrated Electronics; Tata Mc-Graw Hill
2. Robert Boylestand & L. Nashelsky - Electronic Devices and Circuit Theory; Pearson Equaction
3. Sedra Smith - Microelectronic Circuits, Oxford Press, India.

4 EC 3-DIGITAL ELECTRONICS

1. **NUMBER SYSTEMS & CODES:** Radix and Radix conversion, sign & magnitude representation, complement notation, arithmetic shift weifhted codes, BCD codes, excess-3 codes, gray codes, standard ASC II & EBCDIC codes. Fixed point arithmetic: BCD addition, subtraction, multiplication & division in sign & magnitude notation & complement notation. BCD arithmetic: BCD addition, subtraction, multiplication & division Introductin to floating point arithmetic.
2. **BOOLEAN ALGEBRA AND DIGITAL LOGIC GATED:** 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.
3. **MINIMIZATIOIN TCHNIQUES:** 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.
4. **COMBINATIONAL SYSTEMS:** Combinational logic cir4cuit design. half and full adder. subractor. Binary serial and parallel adders. BCD adder. 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.
5. **SEQUENTIAL SYSTEMS:** Latches, flip-flops, R-S, D, J-K. Master Slave flip flops. Conversions of flip-flops. Counters: Asynchronous (ripple), synchronous and synchronous decade counter, Modulus counter, skipping state counter, counter design. Ring counter. Counter applications. Registers: buffer register shift register.

Recommended Books:

1. A.P. Malvino & D.P. Leach-Digital Principles & Applications, Tat aMc-graw Hill, Delhi.
2. Morris Mano-Digital Circuit & Logic Design; Prentice Hll of India.
3. Tocci-Digital Systems, Pearson Education

4. Gree-Digital electronics, Pearson Education
5. Msno-Digital Desigh, Pearson Education
6. Bartee-Digital Computer Fundamentals, Tata mcGraw Hill
7.

4 EC 4 ELECTROMAGNETIC FIELD THEORY

1. **INTRODUCTION:** Vector Relation in rectangular, cylindrical, spherical and general curvilinear coordinate system. Concept and physical interpretation of gradient. Divergence and curl, Green's & Stoke theorems.
2. **ELECTROSTATICS:** Electric field intensity & flux density. Electric field due to various charge configurations. The potential functioins and displacement vector. Gauss's law. Polsson's and Laplace's equation and their solution. Uniqueness theorem. Continuity equation. Capacitance and electrostatics energy. field determination by method of Image Boundary conditions. Field maping and concept of field celld.
3. **MAGNETOSTATICS:** Magnetic field intensity, flux density & magnetization, Faraday's Law. Bio-Savort's aw, Ampere's law, Magnetic scalar and vactor potential, self & mutual inductance, Energy storeg in magnetic field, Boundry conditions, Analogy between electric and magnetic field, Field maping and concept of field cells.
4. **TIME VARYING FIELDS:** Displacement currents and equation of continuity. Maxwell's equations. Uniform plane wave in free space dielectrics and conductors, skin effect slnusoidal time variations, reflection & refraction of UPW, standing wve ration. Pointing vedor and power considerations.
5. **RADIATION:** Retarted Potentrals and concepts of readiation, Radiation from a smal current element Radiation resistance.
6. **EMI AND EMC:** Introduction to Electromagnetic Interference and Electromagnetic compatibility, EMI coupling modes, Methods of eliminating Interference shielding, grounding, conducted EMI. EMI testing: emission testing, susceptibility testing.

Recommended Books:

1. Griffiths-Introduction to Electrodnamics. (2/e Prentice Hall of India.
2. V.V. Sarwate-Electromagnetic Fields and Waves, Willey Eastern Ltd.
3. J.D. Kraus-Electromagnetics, Mcgraw Hill.
4. E.C. Jordan and K.G. Balmain-Electromagnetic Waves and Radiating Systems, PHI.
5. W.H. Hayt Jr.=Engineering Electromagnetics, Tata Mcgraw Hill.
6. Cheng-Field and Wave Electromagnetic, Pearson Education.
7. Sadikn ioxtad
8.

4 EC 5 TELECOMMUNICATION ENGINEERING

1. **TRANSMISSION LINES:** Types of transmission lines, general transmission line equation, line constant, equivalent circuits, infinite line, reflection on a line, SWR of line with different type of terminations. Distortionless and dissipationless lines. Coaxial cables, Transmission lines at audio and radio frequenceies. Losses in transmission line. Characteristics of quarterwave. half wave and other lengths, Smith chart and it application. Transmission line applications, Impedance matching Networks, Single & double stub matching. Measurement of parameters of transmission line, measurement of attenuation, insertion loss, reflection coefficient and standing wave ratio.
2. **ATTENUATORS & FILTERS:** Elements of telephone transmission networks, symmetrical and Asymmetrical two port networks. Different Attenuators. pi-section. T-section filter, m-derived filter sections. Lattics filter section.
3. **CARRIER TELEPHONY:** Mulu-channel systems; frequency division & time division multiplexing, ower time carrier communication.

4. **TELEPHONE TRANSMISSION:** Teleplhone Instrument; Rotary dial singing. Echo suppressors & cancellors, cross talk.
5. **BASICS OF AUTOMATICTELEPHONY:** Truking concepts. Grade of service. Traffic definitions. Introduction to switching networks, classification of switching systems. Principle of Electronic Exchange. EPABX and SPC Exchange. STD. ISD.
6. **RECENT TRENDS IN TELECOMMUNICATION:** Voice frequency6 telegraphy. Fascimile & telex services.

Recommended Books:

1. W. Fraser-Telecommunications (BPB Publication)
2. I. Vishvanathan- Telecommunication switching systems & Networks. Prentice Hall of India.
3. Cole- Introduction to Telecommunication. Pearson Educatino
4. Floyd-Telecommunication Switching Traffic and Networks, Pearson Education.
5.

4 EC 6.1 OBJECT ORIENTED PROGRAMMING

1. **OOP FUNDAMENTLS:** Concept of class and object, attributed, public private and protected members, derived classes, single & multiple inheritance.
2. **PROGRAMMING IN C++:** Enhancements in C++ over C in data types operators and functions. Inline functions, constructors and destructors. Friend function, function and operator overloading Working with class and derived classes. Single, multiple and multilevel inheritances and their combinations, virtual functions, pointers to objects. Input flags and formalling operatioins. Working with text files.
3. **JAVA:** Variation from C++ to JAVA. Introductin to Java bytecode, virtual lmachine, application & applets of Java, Integer, floating point, characters, boolean, literals, and array declarations.
4. **OPERATORS AND CONTROL STATEMENTS:** Arithmetic operators, bit wise operators, relational operators, boolean logic operators, the assignment operators, : operators, operator precedence. Switch and loop statements.
5. **PACKAGE AND INTERFACES:** Packages, acces protection, Importing & defining packages. Defining and implementing interfaces.

Recommended Books:

1. Folk-File Structre: An Object Oriented Approach to C++, Pearson Education.
2. Patric Naughton: Java 2, Tat Mc-Graw Hill.
3. C Gottfried: Programming in C, Schaum Series, Tata Mc-Grtaw Hill.
4. Balaguruswamy: Object Oriented Programming in C++, Tata Mc-Graw Hill.
5. Booch G: Object Oriented Analysis & Design, Benamin-Commings.
6. Rumbaugh J.Et. al.: Object Oriented Modelling & Design, Prentice Hall of India.
7. Deitel: Java: Haw to Programme, Pearson Education.
8. Kelley: A Book on C, Pearson Education.

EC 6.2 DATA BASE MANAGEMENT SYSTEM

1. Need purpose and goals of DBMS. Three scheme architecture. Introduction to Relation data model, relational algebra.
2. **DATABASE DESIGN:** Conceptual Data Base design. Theory of normalization Primitive and composite data types, concept of physical and logical databases, data abstraction and data Independence, data aggregation. relational calculus. SQL: DDL and DML. Constraints assertions, views data base security. Data models-ER and object oriented models.
3. **APPLICATION DEVELOPMENT USING SQL:** Host language Interface, embedded SQL programming, 4 GL's, Forms management and report writers. Stored procedures and triggers.

4. **INTERNAL OF RDBMS:** Physical data organization in sequential, indexed, random and hashed files. Inverted and multilist structures. Query optimisation. Join algorithm, statistics and cost base optimization. Transaction processing, concurrency control, and recovery management. Transaction model properties and state serialisability. Lock base protocols, two phase locking.

Recommended Books:

1. H.F. Korth and silberschatz: Database Systems Concepts, Mc-Graw Hill.
2. R.Elmasri and S.B. Navathe: Fundamentals of Data base Systems, Benjamin Cummins.
3. C.J. date: Introduction to database System, Pearson Education.

4EC 6.3 COMPUTER GRAPHICS

1. Introduction to interactive computer graphics, picture analysis, over-view of programmier's model of interactive graphic. Fundamental problems in gemoetry.
2. **BASIC RASTER GRAPHICS:** Scan conversion, filling and clipping.
3. **GEOMETRIC MANIPULATION:** Transformation, Matrices, Homogeneous coordinates. Elementary 3-D graphics; Plane projections, vanishing points, specification of 3-D view. Visibility; Image and object precisio, z-buffer algorithms, area based algorithms. floating horizon. Curves and Surfaces: Parametric Representation, Bezier and B-Spline curves.
4. **RENDERING:** Ray tracing, antialiasing, Gourard and Phong Shading.

Recommended Books:

1. D.Rogers and Adams: Mathematical Elements of Computer Graphics, Mc-Graw Hill.
2. J.Foley, A Van dam, S.Feiner, J.Hughes: Computer Graphics-Princxiples and Practice. Addison Weslev.
3. D.Hearn and Baker: Computer Graphics. Prentice Hall of India.

4 EC 6.4 AUTOMOBILE ENGINEERING

1. **THE AUTOMOBILE:** History of development, types; Resistance to motion and power requirement for propulsion, acceleration and gradient.
2. **AUTOMOTIVE ELECTRICAL SYSTEM:** Battery constructior Charging and testing, Lighting and Wiring system, Electrical instruments head lamp, electric horn, fule, level indicator, ammeter, magneto and coil ignition system, distributor, spark plug, electronic ignition system.
3. **TRANSMISSION SYSTEM:** Clutch, single plate, multiplate, cone cluthc, semi-cetrifugal, electromagnetic, vacuum and hydraulic clutches, fluid coupling. Gear boxes; sliding mesh, constnat mesth, synchromesh and coicyclic gear boxes. Automatic transmission system, Front wheel drive, real axle drive, Hotchkiss and torque tube drive, real axis types Differential, two wheel and four wheel drives.
4. **RUNNING SYSTEMS:** Types of wheels and tyres. Tyre construction tyre inflation pressure, tyre wear and their causes, repair of the type and the tube, steering system, steering gear boxes, steering linkages, steering mechanism, under and over steering. Steering geometry: effect of camber, caster, king pin inclination, toe in and doe out, power steering integral and linkage types, suspension system, object and the requirements suspension spring, fron and rear suspension systems, independent suspension systems, shock absorber.
5. **BREAKS:** Classification and function, mechanical, hydraulic vacuum air and self energizing brakes, brakes shoes and lining materials.

Recommended Books:

1. Crouse and Anglin-Automobile Mechanics, Tata Mc-Graw Hill.
2. B.B. Gupta-Automobile Engineering.

4 EC 7 ADVANCED PROGRAMMING LAB

Use Unix commands:

1. Exercising vi & emacs advanced commands
   2-5.Experiments (four experiments) using Unix advanced commands and their combinations.
   Programming in C++.
   6. Array order reversal.
   7. Finding the maximum number in a set.
   8. Removal of duplicates form an ordered set.
   9. Sorting techniques-selection, isertiln, exchange, bubble sort etc.
   10. Pattern searching and text processing programs.
   11-12. Program involving recursion.

Features like types and varialbe declarations. Functions, files, pointers, lists, sets, unions etc. are to be highlighted.

4 EC 8 ELECTRONICS LAB II

1. Plot gain-frequency characteristics of BJT amplifier with and without negative geed back in the emitter circuit and determine bandwidths, gain bandwidth products and gains at 1 kHz with and without negative feed-back.
2. Study of series and shunt voltage regulator and measurment of line land load regulation and ripple factor.
3. Plot and study the characteristics of samll signal amplifier using FET.
4. Study of pusth pull amlifier. Measure variation of outpt at power & distortion with load.
5. Study Wein bridge oscillator and observe the effect of variation in R & C on oscillator frequency
6. Study transistor phase shift oscillator and observe the effect of variation R & C on oscillator frequency and compare with theoretical value.
7. ,
8. Study the following oscillators and observe the effect of variation of C on oscillator frequency: (a) Hartley (b) Colpitts
9. Design Fabrication and Testing of k-derived filters (LP/HP)
10. Design Fabrication and Testing of k-derived filters (LP/HP)
11. Study of a Digital Storage CRO and store a transieng on it.

4EC 9 DIGITAL ELECTRONICS LAB

1. Study and perform the following experiments.
2. (a) Operation of digital multiplexer and demultiplexer. (b) Binary to decumal encoder. (c) Characteristics of CMOS integrated ciruits.
3. ,
4. Compound logic functions and various cominational circuits based on AND/NAND and OR/NOR Logic blocks.
5. Digital to analog and analog to digital convertors.
6. Various types of counters and shift registers.
7. BCD to binary conversion on digital IC trainer.
8. Voltage comparator circuit using IC-7 10.
9. Schmitt transistor binary circuit.
10. ,
11. Voltage waveforms at different points of transistor (a) Astable (b) Monostable (c) Bistable Multivibrators and the frequency variation with different parameters.

4EC10 Humanities and Social Science

1. **Form of Government:** Democracy Dictatorship.
2. **India:** Brief history of Indian Constitution, History of Indian National Movement, After independence socio-economic growth.
3. **Society:** Social groups-concept and types socialization-Concept and types theory, social contral concept and types means, social problem concept and types.
4. **The Fundamentals of Economics:** The logic of economics, fundamentals, defintions of economics, basic terminology.
5. **Microeconomics:** Consumer's behaviour, utility, demand, supply, elasticity of demand and supply, elasticity of demand and supply. Theory of production, production function, factors of production.
6. Macroeconomics: National Income, business cycles aggregate term, inflation, economic growth, International Trade, Exchange rates.
7. **Indian Economy:** Basic features, infrastructure, occupation, natural and human resources, unemployment (Industrial Sector, India and Gloablisation)

Semester V

5 EC 1 SIGNALS AND SYSTEMS

1. **INTRODUCTION:** Signals: Continuous time and discrete time systems, Properties of systems. Linear and their block diagrams. Discrete time systems described by difference equations.
2. **FREQUENCY DOMAIN REPRESENTATION OF SYSTEMS:** Fourier series. Sampling function, normalized power, power spectral density, Fourier transform. Convolution, Power & energy transfer through a network. Band limiting of waveforms Correlation & auto correlation orthogonality, distinguishability. The continuous time Fourier transform for periodic and aperiodic signals, Properties of CTFT. Discrete time Fourier transform for periodic and aperiodic signals. Properties of DTFT. The convolution and modulation property.
3. **Z-TRANSFORM & LAPLACE TRANSFORM:** Introduction, The region of convergence for the Z-transform. Application of Laplace transform to system analysis.
4. **SAMPLING:** Mathematical theory of sampling. Sampling. Sampling the orem. Ideal & Real sampling. Interpolatioin technique for the reconstruction of a signal from its samples. Aliasing. Sampling in fraq. domain. Sampling of discrete time signals.

Recommended Books:

1. Ziemer-signals and Systems, Pearson Education.
2. A.V. Oppenheim, A.S. Willsky and I.J. Young-"Signals & Systems", Prentice Hall of India Ltd.
3. Tabub & Schilling-"Principles of Communication System", Tata Mc-graw Hill.
4. Prokins & Manolakis-Digital Signal Processing: Principles algorithms *Applications, Prentice Hall Pvt. Ltd.

5 EC 2 THEORY & APPLICATIONS OF INTEGRATED CIRCUITS

1. **OPERATIONAL AMPLIFIERS:** Basic differential amplifier analysis, Various stages of Opamp, Op-amp parameters, Analysis of type 741 Op-amplifiers.

2. **OPERATIONAL AMPLIFIER APPLICATIONS:** Comparators, Limiters, Voltage to frequency & Frequency to voltage converters; Oscillators: Phase shift, Wien bridge, Quadrature, square wave, triangular wave, sawtooth oscillators. Voltage controlled oscillators. Active Filters: Low pass high pass, band pass and band reject filters.
3. **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 synchronizor and frequency synthesizer, Building blocks of PLL, LM 565 PLL, Introduction to digital PLL.
4. **LINER IC's:** Four quadrant multiplier & its applications, voltage reference, basic blocks of liner IC voltage regulators, Three terminal voltage regulators. Positive and negative voltage regulators, Switching regulator.

Recommended Books:

1. R.A. Gayakwad-Op-amplifiers & Linear ICs, Prentice Hall of India.
2. Taubay-Operational Amplifiers.
3. K.R. Botkar-Integrated Circuits. Pearson Education.

5 EC 3 COMPUTER ARCHITECTURE

1. **REGISTER TRANSFER LANGUAGE:** Data movement amount registers, Data movement from/to memory, arithmetic and logic micro operations. Concept of bus and timings in register transfer.
2. **CPU ORGANISATION:** Addressing Modes, Instruction Format, CPU organization with large registers, stacks and handling of interrupts & subroutines Instruction pipelining.
3. **ARITHMATIC ALGORITHM:** Array multiplier, Booth's algorithm, Adition/Subtraction for sign Magnitude and 2's complement numbers.
4. **MICROPROGRAMMED CONTROL UNIT:** Basic Organization of micro-programmed controller, Horizontal & Vertical formats, Address sequencer.
5. **MEMORY ORGANISATION:** Concept of RAM/ROM, basic cell of RAM, Associative memory, Cache memory organization, Vertical memory organization.
6. **I/O ORGANISATION:** Introduction to Peripherals & their interfacing Strobe based and handshake-based communication, DMA based data transfer, I/O processor.

Recommended Books:

1. Heuring-Computer System Design and Architecture, Pearson Education.
2. M. Morrismanno- 'Computer Architecture & Organization', Mc-Graw Hill.
3. J.P. Hayes- 'Computer Organization and Architecture. Pearson Education'.
4. Staling-Computer Organization and Architecture, Pearson Education.
5. Batee-Computer Architecture, Tata Mc-Graw Hill.

5 EC 4 COMMUNICATION THEORY

1. **RANDOM VARIABLES & PROCESS:** Probability & probability density function, Random variables, average value, and variance of a random variable, Techebycheffs inequality, Gaussian probability density and Rayleigh probability density, mean, variance and probability density of sum of random variables, Correlation between random variables Central limit theorem, Autocorrelation and spectral density, Power spectral density of a sequence of random pulses land digital data.
2. **NOISE & ITS MATHEMATICAL REPRESENTATION:** External and internal sources of noise, Theory of thermal and shot noise. Freq domain representation of noise. Spectral component of noise. Effect of a filter on the power spectral density of noise. Superposition of noises. Noise in Mixing. Noise in reactive circuits. Noise figure and noise temperatjre. Techniques of improvements of S/N ratio, Measurement of noise.

3. **AMPLITUDE MODULATION:** Frequency translation, Recovery of base band signal, Spectrum & power relations in AM systems. Methods of generation & demodulatin of AM_DSB, AM-DSB/SC and AM-SSB signals. Modulation & dector circuits for AM systems. AM transmitters & receivers. Calculation of signal-to-noise ratio in SSB-SC, DSB with carrier, Noise calculation of square law demodulator & ennelope detector, Super heterodyne receivers.
4. **FREQUENCY MODULATION:** Phase & freq. modulation & their relationship, Spectrum & band width of a sinusoidally modulated FM signal, phasor diagram, Narrow band & wide band FM. Generation & demodulation of FM signals. FM transmitters & receiver. Calculatioin of S/N ratio in FM demodulators. Comparison of AM, FM 7 Pre emphasis & demphasis. Threshold in FM, PLL demodulator.

Recommended Books:

1. H.Taub & D.L. Schilling-"Principles of Communication Systems", Tata Mc-Graw Hill.
2. G.Kennedy-"Electronic Communication Systems:, John Wiely & Sons.
3. Simon Haykin-"communication Systems". John Wiely & Sons.
4. B.P. Lathi-"Communication Systems:, John Wiley.
5. Modern Digital Analog communication Systems.
6. Louch-Digital & analog Communication, Pearson Education.
7. Tomasi-Electronic Communication. Pearson Education.

5 EC 5 MICROWAVE ENGINEERING-I

1. **INTRODUCTION:** Introduction of Microwaves and their applications. Microwave signal propagation. Transit time effect.
2. **WAVE GUIDES:** Rectangular Waveguides: Solution of Wave equation modes in Flectangular waveguides, circular waveguides: Basic idea of TE and TM modes, field patterns. TEM mode of propagation.
3. **WAVEGUIDE COMPONENTS:** Scattering matrix representation of network, Frectangular cavity and circular cavity resonators. Waveguide Tees, Magic Tees, Magic, Tees. Hybridrings, Waveguide corners, Bends and twiests, Directional couplers, Circulator's and lsolators.
4. **KLYSTRONS:** Construction and operation of two cvity & vultica vity klystrons. Velocity modulation and electron bunching (analytical treatment). applegate diagram and applications of two cavity klystrons. Construction, working and operation of Reflex klystron. Applications and practical considerations. Velocity modulation, power output and frequency characteristics of a Reflex klystron. Electron admittance.
5. **TRAVELLING WAVE TUBES (TWT):** Construction, operation and practical considerationof helix type TWT. Introduction to CW power, pulsed dual mode TWT, Coupled cavity TWT Applications of TWT.
6. **MAGNETRON:** Types of Magnetron, Construction, operation, analysis and practical consideration of cavity or travelling wave magnetron. Introductior to coxial frequency angle and voltlage tunable magnetrons, Backward cross field oscillator, Forward Wve cross field amplifier.

Recommended Books:

1. S.Y. Laio-'Microwave devices and Circuits', Prentice-Hall of India.
2. H.J. Reich-'Microwave Principles', East-West Press.
3. R.E. Collin-'Foundations for microwave Engineering', Mc-Graw Hill.
4. Sisodia V.L. Gupta-'Microwave Engineering', New Age.

5 EC 6.1 MEDICAL ELECTRONICS

1. **HUMAN BODY SUBSYSTEMS:** Brief description of neural, muscular, cardiovascular and respiratory systems; their electrical, mechanical and chemical activities.
2. **TRANSDUCERS AND ELECTRODES:** Principles and classification of transducers for Biomedical applications, Electrode theory, different types of electrodes, Selection criteria for transducers and electrodes.
3. **CARDIOVASCULAR SYSTEM MEASUREMENTS:** Measurement of blood pressure, blood flow, cardiac output, cardiac rate, heart sounds, Electrocardiograph, phonocardiograph, plethysmograph, Echocardiograph.
4. **INSTRUMENTATION FOR CLINICAL LABORATORY:** Measurement of pH valve of blood, ESR measurement, haemoglobin measurement, $_{O2}$ and $_{CO2}$ concentration in blood, GSR measurement.
5. **MEASUREMENT OF ELECTRICAL ACTIVITY IN NEUROMUSCULAR SYSTEM AND BRAIN:** Neuron Potential, muscle potential, brain potentials, electroencephalography. electromyography.
6. **MEDICAL IMAGING:** Diagnostic X-rays CAT, MRI, theromography ultrasonography, medical ue of isotopes, endoscopy.
7. **PATIENT CARE, MONITORING AND SAFETY MEASURES:** Elements of Intensive care monitoring basic hospital systems and components, physiological effect of electric current shock hazards from electrical equipment, safety measures, Standards & practices.
8. **COMPUTER APPLICATIONS AND BIOTELEMETRY:** Real time computer application, data acquisition and processing, revote data recording and management.
9. **THERAPEUTIC AND PROSTHETIC DEVICES:** Introduction to cardiac pacemakers, defibrillators, muscile stimulators, diathermy, heart lung machine, Hemodialysis, Applications of Laser.

Recommended Books:

1. Webster, J.G.-Medical Instrumentation, Application and Design, John Wiley and sons.
2. Jacobson, B.Webster, J.G.-Medical and clinical Engineering, Prentice Hall of India.
3. Cromwell-Blomedical Instrumentation and Measurment, Prentice Hallof India.
4. R.S. Khandpur-Handbook of Biomedical Instrumentation, Tata Mc-Graw Hill.
5. Carr-Introduction to Biomedical Equipment Technology, Pearson Education.

5 EC 6.2-PRINCIPLES OF PROGRAMMING LANGUAGES

1. Importance of progrmming languages, brief history and features, good programming language.
2. The computer organization, hardware and firmware, translator and software simulated compulers, syntax, semantice and virtual computers. Hierachies of computers, Binding and binding time.
3. Elementary and structured data types, their specifications and implementation. Type checking and type conversion, vectors and arrays, records character string, variable size data structures, sets input output files.
4. Evolution of the concept of data type, abstractions, encapsulation and infcrmation hiding, sub programs, type, definition and abstract data types, Imlicit and explicit sequence control sequence control within experssion and between statements. Subprogram sequence control, Recursive sub programs.
5. Name and referencing environments, Static dynamic and blick structure. Local data and local referencing environments.
6. Dynamie and static scope of shared data. Block structure, parameters, and their trnsmission.
7. Brief overview of FORTRAN and PASCAL languages.

Recommended Books:

1. Sebesta:-Concepts of programming Language, Pearson Education
2. V.Rajaraman, Fundamentals of Computers, Prentice Hall of India.

3. Ghezzi:-Programming Language Concepts. Addison Wesley
4. Kernighan, Ritchie:- The C Programming Language, Prentice hall of India.
5. Troustrup:- Programming in C++

5 EC 6.3-AUDIO VIDEO SYSTEMS

1. **AUDIO SYSTEMS:** Importnat types of microphones and speakers, Monophonic, sterephionic and quadraphonic audio systems.
2. **DISC AND MAGNETIC RECORDING & REPRODUCTION:** Monophonic and stereophonic disc recording and reproducing systems, Magnetic recording & playback Biasing & equalisation, Recording medium, Magnetic heads-replay & erase heads, Audio cassettes, Tape speed, Maximum usable frequency, Tape transport mechanism, Distortion & noise aspects, HI-FI stero system.
3. **VIDEO CASSETTE RECORDERS:** Video recording requirements Video tape formats. Modulation-up conversion and down conversion of video signal, Servo systems, Functional Block diagram of VCR, Vodep doc recprdomg & playback.
4. **COMPACT DISC RECORDING & REPRODUCTION:** Compact disc advantages, Specifications, CD player optical reuirements, CD technology & manufactruing, CDRO, CD video.
5. **VIDEO CAMERAS:** Image conversion principle, Plumbicon, Sidicon camera tubes, Three tube colour camera, Block diagram of colour camera tube.
6. **TV ENGINEERING:** Scanning process, Interlaced acanning, Composite video signals, Principle of black & white TV colour TV receivers, Primary colours, Chrominance & luminance signals. Colour TV Systems-NTSC, SECAM, PAL, Transmission & reception using PAL systems.

Recommended Books:

1. S.P. Bail & R. Bali-Audio Video systems, Khanna Book Publishing Co. Delhi.
2. Ajay Sharma-Audio and Video Systems, Dhanpat Rai & Co.
3. R.G. Gupta-Audio and Video Systems Tata Mc-Graw Hill.

5 EC 6.4 ADVANCED DATA STRUCTURES

1. **ADVANCED TREES:** Definitions and operations on weight balanced trees (Human trees), 2-3 trees and Red-Black trees. Augmenting Red-Black trees to dynamic order statistics and interval tree applications. Operations on disjoint sets and its Union-Find problem. Implementing sets, discitionerics, priority queues and concatenable queues using 2-3 trees.
2. **MERGEABLE HEAPS:** Mergeable Heap operations, bionomial trees, Implementing bionomial heaps and its operations, 2-3-4 trees and 2-3-4 heaps, Structure and potential function of Fobonaccl heap. Omplementing Fibonacci Heap.
3. **GRAPH THEORY DEFINITIONS:** Definitions of Isomrpl ismrphism, Components, Corciots, Fimda, emta; Corciots, Cut-sets, Cut-Vertices, Planer and dual graphes, Spanning trees, Kuratovskl's two graphs.
4. **GRAPH THEORETIC ALGORETHMS:** Algorithms for connectedness, finding all spanning tress in a weighted graph and planarity testing. Breadth first and depth first search, topological sort, strongly connected components and, articulation point, Single source shortest path and all pair shortest path algorithms. Min-Cut Max-Flow theorem of hetwoek flows, Ford-Fulerson Max Flow algortms.

Recommended Books:

1. Narsingh Deo- Graph Theory with Applications to Engineering and Computer Sicience, Prentice Hall of India.
2. Cormen- Introduction to Algorithms, Prentice Hall of India.
3. Aho A.V., Hopcrpft J.E. and Ullman J.D.-The Design and Analysis of Computer Algorithms, Addition-Wesley.

4. Horwitz and Sawhni-fundamentals of Data Structures, Galgotia Book source.
5. Wilson-Introduction to Graph Theory, Pearson Education.

5 EC 6.5 COMPUTER ORIENTED NUMERICAL & STATISTICAL METHODS

1. **MATRIX COMPUTATION:** Algebra of matrix, Inverse of a matrix, Rank of a matrix, Matrix inversion b7 Gauss elimination, Computer programs for matrix inversion.
2. **SOLUTION OF LINER EQUATIONS:** Cramer's rule. Gauss elimination, Gauss Jordan elimination and Gauss Seidal iterative method and their computer programming in C.
3. **SOLUTION OF NON-LINER EQUATIONS:** Interval bisection method, Secant method, Regula-Falsi method, Curve fitting, Method of least squares and their computer programming in C.
4. **SOLUTION OF DIFFERENTAIAL EQUATIONS:** Euler's method, Modified Euler's method, Runge Kutta method of fourth order, Solution of partial differential equation with special reference to heat equation. Laplace equation and wave equation Milne's and their computer programming in C.

Recommended Books:

1. V.Rajaraman-Computer Oriented Numerical Methods, Prentice Hall of India.
2. B.S. Grewal-Higher Engineering Mathematics
3. J.L. Bansal-Numerical Analysis
4. Balasubramanyam-Numerical Methods.
5. E.V. Krishnamurthy-Numerical Methods.
6. Gaur and Kaul-Higher Engineering Mathematics.

5 EC 7 ELECTRONIC ENGINEERING DESIGN

To design the following circuits, asemple these on bread board, test them and make measurements.

1. Study of op-amp in inverting and non-inverting modes.
2. Use of op-amp as scalar, summer and voltage follower.
3. Use of op-amp as differentiator and integrator.
4. Study op-amp characteristics and get data for input bias current, measure the output-offset voltage and reduce it to zero and calculate slew rate.
5. ,
6. Active filters using op-amp 741. (i) Band pass (ii) Band reject
7. ,
8. (i) Astable (ii) Monostable (iii) Bistable multivibrators using IC-555 timer
9. ,
10. Triangular & square wave generator using 555 timer.
11. Audio amp, Using bipolar junction transistor.

5 EC 8 MICROWAVE ENGINEERING LAB

1. Study of various microwave components and instruments like frequency meter, attenuator, detector etc.
2. Study of characteristics of microwave source like Gunn diode/Reflex Klystron.
3. Measurement of Frequency and wavelength.
4. Measurement of voltage standin wave ratio (small as well as large values) To measure power absorbed by a Microwave load using a bolometer in Wheatstone Bridge.
5. To measure power absorbed by a Microwave load using a bolometer in Wheatstone Bridge.
6. To verify that a microwve diode has a square-law characteristics for small signals.
7. Measurement of Impedance in a wave guide.
8. To become aware of the need for turning of a mismatched load, To become familiar with the concept of admittance in a wave guide, To discover the use of slotted line tuner to achieve a match.
9. To observe the action of directional coupler.

10. To study of the Horn antenna and to measure it basic characteristics, beam width, and gain.
11. Study of spectrum analyzer & its use it to observe the response of (i) A high frequency amplifier (ii) Low pass high pass, band pass, band reject filters.

5 EC 9 COMMUNICATION LAB-I

1. Study of various types of calbles & connectors.
2. Harmonic analysis of a square wave of a modulated wave form.
3. ,
4. Observe the amplitude modulated wave form & measure modulation index, Demodulation of the AM signal, Generation of DSB O-SC signal.
5. To modulate a high frequency carrier with sinusoidal signal to obtain Fm signal, Demodulation of the FM signal.
6. To observe the following in transmission line demonstrator kit: (a) The propagation of pulse in non reflecting Transmission line. (b) The effect of losses in Transmission line. (c) Transmission with standing waves on a Transmission line. (d) The resonance characteristics of a half-wave length long x-mission line. (e) Frequency response. (f) Impedeance measurement.
7. (a) To observe the operation of taking and holding samples of signals. (b) To study the effect of sampling time (sampling pulse width). (c) To study the effects of changing the sampling frequency.
8. To Study & observe the operation of a superher receiver
9. To study & observe the ampulitude response of automatic gain controller (AGC action).
10. Performance characteristics of radio receivers.

Semester VI

6 EC 1-MICROWAVE ENGINEERING-II

1. **MICROWAVE MEASUREMENT:** Detection of microwaves, Microwave power measurement, Impedance measurement, Measurement of scattering parameters, Frequency measurement, VAWR measurements.
2. Introduction to microstrip lines, Parallel striplines. Coplaner striplines, Shielded striplines, Slot lines.
3. **MICROWAVE SEMECONDUCTOR DEVICES:** Construction, Operation and Practical applications of PIN diode, Varactor and Tunnel diode, Gunn diode, IMPATT, TRAPTT diodes, BJT, JEET, MESFET, CCD, MASER and LASER.
4. **MONLITHIC MICROWAVE INTEGRATED CIRCUITS:** Introduction, Materials, MMIC Growth, MOSFET fabrication thin film formation, Hybrid integrated circuit fabrication, Advanctages & Difficulties of MICs.
5. Introduction to Microstrip filters, Directional coupler (Branch line & parallel coupled), Hybrid rings, Power dividers, Microstrip phase shifter.

Recommended Books:

1. S.Y.Liao-'Microwave Devices and ckts', Prentice Hall of India.
2. K.C. Gupta-'Microwaves', New Age International.
3. R.E. Collin-'Foundations for Mocrowave Engg', Mc-Graw Hill.
4. T.C. Edwards-'Foundation for Micostrip circuit Design', John Wiley & Sons.
5. B.Bhat & S.K. Koul-'Stripline like Transmision Lines for Microwave Integrated Circuits, Wiley Eastern Limited.

6 EC 2 MICROPROCESSORS AND MICROCNTROLLERS

1. **INTRODUCTION CPU:** Address bus, data bus and control bus, Input/Output devices, buffers, encoders, laches and memories.
2. **8085 MICROPROCESSOR ARCHITECTURE:** Internal data operations and registers, pins and signals, peripheral devices and memory organisation, interrupts.
3. **8085 MICROPROCESSOR INSTRUCTIONS:** Classification, format and timing Instruction set, Programming and debugging, 8 bit and 16 bit instruction.
4. **8085 MICROPROCESSOR INTERFACING:** 8259, 8257, 8255, 8253, 8251 chip and their applications. A/D conversion, memory, keyboard and display inteface.
5. **INTRODUCTION TO 8051 MICROCONTROLLER:** Memory timers and interrupts. Instruction set and pin details, Interiacing and applications.

Recommended Books:

1. R. Gaonkar- Microprocessor Architecture, Programming and Applications, Wiely Eastern Ltd.
2. NTEL- Microcontroller Handbook.
3. Ayle- 8051 Microcontrollers, Penram Press.
4. the 8051 Microcontrollers & Embeded System, Pearson Education.
5. PIC Microcontrollers, Pearson Education.

6 EC 3 INDUSTRIAL ELECTRONICS

1. **SEMICONDUCTOR POWER DEVICE:** Basic characteristics of Power Diode, Diac, SCR, Triac, Power Transistor, MOSFETs, IGBT, and GTO.
2. **RECTIFIERS, INVERTERS AND CHOPPERS:** Working principles of single and three phase bridge rectifiers, Voltage and current source inverters, Choppers: Principle of operation, Step up, Step down and reversible choppers.
3. **INDUSTERIAL APPLICATIONS:** (i) 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. Stepper Motors: Variable reluctance, Permanent magnet and hybrid stepper motors. (ii) POWER SUPPLIES: Switch Mode Power Supply: Fly back conveter, forward/buck converter, Boost converter and buck-boost converter. Uninterruptible power supply. (iii) High frequency electronic ballast, Induction and dielectric heating control. (iv) Introduction or Programable Logic Controller.

Recommended Books:

1. Biswanath Paul, Industrial Electronics and Control, Prentice Hall of India.
2. S.N. Biswas, Insustrial Electronics, Dhanpat Rai & Co.
3. Zbar, Insustrial Electronics: A text Lab Manual, Tata Mc-Graw Hill.
4. Morris, Industiral Electronics, Tata Mc-Graw Hill.

6 EC4 DIGITAL COMMUNICATION

1. **NOISE EFFECTS IN COMMUNICATION SYSTEMS:** Resistance noise, Noise in reactive circuits, Noise figure & noise temperature in cascaded circuits.
2. **PULSE MODULATION SYSTEMS:** Sampling theorem, Gneration and demodulation of PAM, PWM, PPM, Wuantization of signals, Quantization error, PCM, Companding and multiplexing of PCM signals, Delta and adaptive delta modulation, Bit, word and frame synchronization, Matched filter detection.

3. **DIGITAL MODULATION TECHNIQUES:** Various techniques of phase shift, amplitude shift and frequency shift keying, Minimum shift keying, Calculation of error probabilities for PSK, ASK, FSK & MSK techniques.
4. **INFORMATION THEORY & CODING:** Amount of 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, Ortogonal signal tranmission, Coding of Information, Hamming code, Single Parity-Bt code, Linear Block code Cyclic codes, BCH codes, Reed-solomon codes.

Recommended Books:

1. H.Taub & D.L. schilling-"Principles of communication System", Tata Mc-Graw Hill.
2. Simon Haykin-"Communication Systems", John Wiley & Sons.
3. B.P. Lathi-"Communication Systems", Tata Mc-Graw Hill.
4. Proakis-"Digital Communication" Tata Mc-Graw Hill.
5. Sklar-"Digital Communication" Pearson Education.
6. P. Chakarbarti-"Principles of Digital Communication" Danpatrai & Sons.

6 EC5 SUSTE, EMGOMMEEROMG

1. **CONCEPTS OF OPEN AND CLOSED LOOP SYSTEMS:** Example and application of open loop and colse loop systems. Brief idea of multivariable control system, Brief idea of Z-transform and digital control systems.
2. **REPRESENTATION OF PHYSICAL SYSTEMS (ELECTRO MECHANICAL):** Differential equations. Determination of transfer function by block diagram reduction technique & signal flow graph method.
3. **TIME RESPONSE ANALYSIS OF FIRST ORDER & SECOND ORDER SYSTEMS:** Transient response analysis, Steady state error & error specification in frequency domain and their co-relation with time domain.
4. **FREQUENCY DOMAIN METHODS:** Bode plot, Design specification in frequency domain and theri co-relation with time domain.
5. **STABILITY OF THE SYSTEM:** Absolute stability and relative stability Routh's stability criterion, Hurwitz criterion, Root locus method of analysis, Polar plots, Nyquist stability criterion. M and N loci, Nicholas charls.
6. **STATE VARIABLE ANASYSIS:** Concepts of state, state variable and state model, State models for liner continuous time systemes. Brief idea of state variable analysis in discrete time domain. Transfer function Solution of state equation, Concepts of controllability & observability.

Recommended Books:

1. I J Nagrath and M Gopal: Control Systems Engineering, New Age Publication.
2. K Atsuhiko Ogata: Modern Control Engineering, Prentice Hall of India.
3. M. gopal: Control Systems, Tata Mc-Graw Hill.
4. B.C.Kuo: Automatic Control Systems, Prentice Hall of India.
5. Bekn: Digital contorl mpten
6. R.T. stef: Design of F.B. conrol myoter.

6 EC 6.1 NEURAL NETWORKS

1. **INTRODUCTION:** Biological basic for NN, background and brief history, classifications of NN models.
2. **IMPLEMENTATION:** (a) Back Propagation Model: Topology, calculations, training. (b) Self-organization Model: Topology, network Initiallzation, training calculations, testing.

3. **SYSTEMS CONSIDERATIONS:** Various problems, developing a system specifications, various roles of neural networks, NN software, Implementation issues.
4. **DEVELOPMENT ENVIRONMENT AND HARDQARE IMPLEMENTATIONS:** NN modeling languages, specifying NN models, the transputer, using transputers.
5. **A PERFORMANCE METRICS & NETWORK ANALYSIS:** Percentage correct, average sumsquare error, normalized error, network analysis, divide by three problem, square-within-a square problem. analyzing weights in trained Networks.
6. **CASE STUDIES:** Issues in radar Signal Processing optical Character recognition.

Recommended Books:

1. freeman/Skapura-Networks, Pearson Education.

6 EC 6.2 SOFTWARE ENGINEERING

1. **SYSTEM ANALYSIS:** Characteristics. Problems in system Devetopment. System Level Project Planning. system Development Life Cycle (SDLC). Computer System Engineering. System Analysis. Modelling the Architecture, System Specification.
2. **SOFTWARE PROJECT MANAGEMENT:** Objectives, Resources and their estimation, LOC and FP estimation, effort estimation, COCOMO estination model, Risk analysis, Software project scheduling.
3. **SOFTWARE DEVELOPMENT:** Life Cycle (SWDLC), SWDLC models, Software engineering approaches.
4. **REQUIREMENTS ANALYSIS:** Requirement analysis tasks, analysis principles, Software prototyping and specification, Data dictionary, Finite state machine (FSM) models.
5. **STRUCTURED ANALYSIS:** Data and control flow diagrams, Control and process specification, Behavorial modelling, Extension ofr data intensive applications.
6. **OBJECT ORIENTED ANALYSIS:** Object oriented concepts, Object oriented analysis modelling, Data modelling.
7. **SOFTWARE DESIGN:** Design fundamentals, Effective modular design: Data, architectural and procedural design, Design documentation.
8. **OBJECT ORIENTED DESIGN:** OOD concepts and methods, Class and object definitions, Refining operations, Class and object relationships, Object modularisation.
9. **USER INTERFACE DESIGN:** Human factors, Styles of human computer interaction, Human computer interface design guidelines and standards.

Recommended Books:

1. Pressman: Software Engineering- A practitioner's, Mc-Graw Hill International.
2. A.Behforooz and F.J. Hudson: Software Engineering Fundamentals. Oxford University Press.
3. Sommerwille: Software Engineering, Pearson Education.

6EC 6.3 PARALLEL COMPUTATION AND ACRCHITECTURE

1. **INTRODUCTION:** Synchronous and asynchronous paradigms of parallel computating.
2. **HARDWARE TAXONOMY:** Flynn's classification, Handler's classification, Software taxonomy: Kung's taxonomy, SPMD.
3. **ABSTRACT PARALLEL COMPUTATIONAL MODELS:** Combinational circuits, sorting networks, PRAM models, interconnection RAMs.
4. Parallel programming languages.
5. **PERFORMANCE METRICES:** Laws governing performance measurements, metrics-speed up, efficiency, utilization, communication overheads, single/multiple program performances, benchamarks.
6. Processor arrays.
7. **BASIC ALGORITHMS:** Fast Fourier transform, Liner system solution, sorting etc.

Recommended Books:

1. Quinn- M.Parallel Computing Theory and Practice, Mc_graw Hill.
2. Hwang K. Briggs, F.A.-Computer Architecture & Parallel Processing, Mc-Graw Hill.
3. Kumar, V., Grama, A.Gupta A. and Karypis, G-An Introduction to Parallel Computing, Addison Wesley.
4. Hwang, K.-Advanced Computer Arcitecture-Parallelism, Scalability and Programmability, Mc_Graw Hill.

6 EC 6.4 DESIGN AND ANALYSIS OF ALGORITHMS

1. **BACKGROUND:** Review of algorithms complexity and order notations, Sorting methods, namely Heap sort, Radix sort, Bucket sort and counting sorts.
2. **DIVIDE AND CONQUER METHOD:** Binary search, Merge sort Quick sort and Strasen's Matrix Multiplication.
3. **GREEDY METHOD:** Matrix Chain multiplication, longest common subsequence and 0/1 Knapsack problelm.
4. **DYNAMIC PROGRAMMING :** Matrix chain multiplication, longest common subsequence and 0/1 Knapsack problem. lower bound theory-comparison nees for sorting/searching.
5. **OTHER TECHNIQUES:** Backtracking-Eight queen problem, graph coloring and Maze problem. Branch and Bound-Travelling salesman problem and 0/1 knapsack problem, lower bound theory-comparison tree for sorting/searching.
6. **PROBLEM CLASSES NP-HARD AND NP-COMPLETE:** Definitons of P.NP. NP-Hard and NP-complete problems, Decision problems, Cook's theorem Prowing NP-complete problems-Statisfiability problem and Vertex cover problem. Approximation algorithms for vertex cover and subset sum problem.
7. **INTRODUCTION TO ASSIGNMENT AND MULTICOMMODITY FLOW PROBLEMS AND ITS VARIANTS:** Formulation of assignment problem, quadratic assignment and biquadratic Formulations of Multicommodity Flow (MCH) problems Min-Cost Multicommodity Flow problem, Max-flow Multicommodity flow problem. integer Multicommodity flow problems, Intorduction to flow shop scheduling and Network capacity problems (No algorithms).

Recommended Books:

1. Aho A.V. J.E. Hopcroft, J.d. Ullman: Design and Analysis of Algorithms, Addison Wesley.
2. Rivest and Cormen, Introduction to Algorithms, Prentice Hall of India.
3. Brassard, algorithmics, Prentice Hall
4. Current Literature.

6 EC 7 COMMUNICATION LAB-II

1. To modulate a pulse carrier with somispod signal to obtain PW VI signal & demodulate it.
2. To modulate a pulse carrier with sinusold signal to obtain PPM signal & demodulate it.
3. To observe pulse amplitude modulated wave from & its emodulation
4. Introduction to digital signaling.
5. (a) To identify & solve the aliasing problem (b) to boserve the Transmission of two signals of two signals over a single channel usingsampling methods.
6. To observe the operation of a PCM encoder & decoder. To consider reason for using digital signal x-missions of analog signals.
7. To investigate the characteristics of quantisation noise & the effect of injected noise on the performance of a PCM system.

8. To observe the performance of a delta modulation system & derive from it a delta sigma modulation systme, To observe and compare the operation of the two systems, with particular references to the limiting characteristics.
9. Produce ASK signals, with and without carrier suppression, Examine the different processes requrred for demodulation in the two cases.
10. To observe the FSK wave forms & demodulate the FSK signals based on the properties of (a) A tuned circuits (b) on a PLL
11. Observe & examine the PSK signals.

6 EC 8 MICROPROCESSOR LAB

1. Study the hardware, functions, memory structure and operation of 8085 microprocessor kit.
2. Program to perform mieger division: (i) S-bit by 8-bit (ii) 16-bit by 8-bit.
3. Transfer of a block of data in memory to another place in memory in the direct and reverse order.
4. Searching a number in an array and finding its party.
5. Sorting of array in: (i) Ascending (ii) Descending order
6. Programme to perform following conversion: (i) BCD to ASCH (ii) BCD to Hexadecimal.
7. Programme to multiply two 8-bit numbers.
8. Programme to generate and sum 15 faboicci numbers.
9. Programme for rolling display of message "INDIAN".
10. To inseft a number at correct place in a sorted array.
11. Serial and Parallel data transfer on output port 8155 & 8255 & designing of disco light, running light, and sequential lights on off by above hardware.
12. Generation of different wave form on 8253/8254 programmable timer.

6 EC 9 ELECTRONICS CAD LAB

Design & simulation of following circuits with the help of software:

1. Amplifiers. (a) single stage (b) Multistage
2. Oscillators(any tow) (a) Colpitts (b) Hartiey (c) R-C phase shift (d) Wein bridge oscillator
3. Any two of filter using operational amplifier. (a) Low pass (b) High Pass (c) Band pass (d) Band stop (e) Notch filter
4. Using op-amp- (a) Differentiator & Integrators (b) Voltage Follower (c) Adder
5. ,
6. Following circuits using 555 timer. (a) Astable multivibrator (b) Bistable multivibrator (c) Monostable multivibrator (d) Tringular wave generator.
7. Two part Parameter evaluation of active & passive ckts.
8. Switching time of a transistor/logic gates.

6 EC 10 INDUSTRIAL ELECTRONICS LAB

1. Study the characteristics of SCR. 1.1 Observe the terminal configuration. 1.2 Measure the breakdown voltage. 1.3 Measure latching and holding current. 1.4 V-I characteristics.
2. Perform experiment on triggering circuits for SCR 2.1 R-triggering circuit. 2.2 R-C triggering circuit. 2.3 UJT triggering circuit.
3. Study and obtain the characteristics of Diac.
4. Study and obtain the waveforms for single-phase half-wave controlled converter.
5. Study and obtain the wave forms for single-phase half controlled symmetrical and asymmetrical bridge converters.
6. Study and obtain the waveforms for single-phase fully controlled bridge converter.
7. Study and obtain the waveforms for voltage-commutated chopper.
8. Study and obtain the wave forms for current-commutated chopper.
9. Perform experiment of single phase PWM inverter.

10. Perform experiment on buck, boost and buck-boost regulators.
11. 12 Perform experiment on Motor control-open loop & closed loop.

Semester VII

7 EC1-ANTENNA & WAVE PROPAGATION

1. **ANTENNA:** Antenna fundamentals and definitions, Radiation from a current element in free space, Quarter & half wave antenna Reciprocity theorem, Resonant and non-resonant Antenna effective length and aperature, gain, beam width, directivity, radiation resistance, efficiency, polarization, impedance, and directional characteristics of antennae, antenna temperature. VLF, LF, MF and HF antennas, Effect of ground on antennas, antenna loading. Antenna Arrays: Tow element array, N-element linear arrays, Broadside, end fire, collinear and combination arrays, Multiplication of patterns, Binomial arrays. Long wire, V and Rhombic antennas, Folded dipole, yagi-Uda antenna, Frequency independent antennas, Log-periodic antennas. UHF and Microwave antennas-Antenna with parabolic reflectors, Horn and Lens antennas, Helical antennas, Square and Circular loop antennas, Fundamentals of Slot and Microstrip antennas. Antennae Measurements: Antennae impedance, radiation pattern, gain, directivity, polarization and phase measurements.
2. **RADIO WAVE PROPAGATION:** mechanism of radio wave propagation, Reflection, refraction interference and diffraction of radio waves. Theory of ground wave, space wave and sky wave propagation. Plane earth reflection, reflection factors for horizontal and vertical polarisations. Duct propagation and tropospheric scattering, Various lonospheric layers, Characteristics of ionosphere and its effects on wave propagation. Critical frequency, virtual height, skipzone & maximum usable frequency. Multiple hop transmission. Oblique & vertical incidence transmission. Effect of earth's magnetic field, solar activity and meteorological conditions on wave propagation.

Recommended Books:

1. J.D. Kraus, 'Antennas', Mc-Graw Hill.
2. C.A. Balanis, 'Antenna Theory', Harper & Row.
3. K.D. Prasad, 'Antenna and Wave Propagation', SATYA Prakashan, New Delhi.
4. E.C. Jordan and K.g. Balmain, 'Electromagnetic waves and Radiating Systems', Prentice hall of India.
5. R.e. Collin, 'Antennas & Radio Wave Propagation', Mc-Graw Hill.

7 EC2 DIGITAL SIGNAL PROCESSING

1. **SAMPLING:** Discrete time processing of Continuous-time signals, continuous-time processing of discrete-time signals, changing the sampling rate using discrete-time processing.
2. **TRANSFORM ANALYSIS OF LTI SYSTEMS:** Introduction, The frequency response of LTI systems, System functions for systems characterized by LCCD (Linear constant Coefficient Differnece) equations, All-pass system, Minimum-Phase systems, Linear systems with linear phase.
3. **STRUCTURES FOR DISCRETE-TIME SYSTEMS:** Block diagram and signal flow graph representation of LCCD (LCCD-Linear constant Coefficient Difference) equations, Basic structures for IIR and FIR systems. Transposed forms.
4. **FILTER DESIGN TECHNIQUES:** Introduction, Design of Discrete-Time IIR filter from Continuous-time filters, filter design by impulse invariance, Bilinear transformation, Design of FIR filters by Windowing-examples of FIR filter design by the kaiser window method.
5. **THE DISCRETE FOURIER TRANSFORM:** The discrete fourier series (DFS) Properties of the DFS, The discrete Fourier transform (DFT), Properties of the DFT, Implementing LTI systems using the DFT,

Efficient computation of the DFT, The Goertzel Algorithm, Decimation-in-Time and decimation-in frequency FFT Algorithms, Implementation of the DFI using convolution.

Recommended Books:

1. Schafer, Buck-Discrete Time signal Processing, Pearson Education Asia.
2. Prokis & Monolakis-Digital Signal Processing: Principles, Algorithms & Application, Prentice hall of India.
3. S.K. Mitra-Digital Signal Processing. Tata Mc-Graw Hill.
4. Rabiner & Gold-Theory & Applications of Digital Signal Processing, Prentice Hall of India.
5. Lathi-Signal Processing & Linear System, Oxford Univ Pren

7 EC3 WIRELESS COMMUNICATION

1. **PROPAGATION PHENOMENA:** Fundamentals of fading multipath channels: Spread Spectrum signals: Direct-sequence spread spectrum signals, p-n sequences, Frequency-hopped spread spectrum signals, Code-division multiplexing.
2. **LINE OF SIGHT MICROWAVE COMMUNICATION:** Link Engineering, Frequency planning, Free space loss, Fresnel zone clearance bending of radio beam, Effective earth radius, Building blocks of Tx-Rx.
3. **MULTIPLE ACCESS TECHNIQUES:** FDMA, TDMA and CDMA with reference to mobile radio and satellite systems.
4. **CELLULAR WIRELESS NETWROKS:** TDMA based networks,GSM: Introduction, overview of the GSM systems, GSM codec, channel coding and interleaving, radio link ontrol, CDMA based netwroks, cordless systems and WLL, Mobilie IP, Wirless access protocol. Wireless LAN's Technology, IEEE 802.11 standards and blue tooth.
5. **SATELLITE COMMUNICATION:** Elements of satellite communication: frequency bands, transmission and multiplexing, Modulation, multiple access, Satellite orbit and description-orbital period and velocity, effects of orbital inclination, azimuth and elevation, coverage angle and slant range, geostationary orbit, satellite description, Earth Station-antenna, high-power amplifier, low-noise amplifier, up converter, down converter, monitoring and control, reliability, Satellite Link: basic link analysis, elementary idea of demand assignment multiple access (DAMA).

Recommended Books:

1. Reppaport-Wireless Communication, Pearson Education.
2. William Stallings- Wireless communication & Networks, LPE, Pearson Education, Asia.
3. Tri. T. Ha.- Digital Satellite Communications, Mc-Graw Hill International.
4. Dr.Kamilo Feher-Digital Wireless Communication, Prentice Hall of India.
5. William C.Y. Le-Mobile Cellular Telecommunications, Mc-Graw Hill Interational Edition.
6. Richharia M-Satellite Communication System, Mac Millan.

7 EC4 IC TECHNOLOGY

1. **INTRODUCTION TO TECHNOLOGIES:** 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.
2. **DIFFUSION & ION IMPLANTATION:** Ficks diffusion Equation in One Dimension Atomic model, Analytic Solution of Ficks law, correction to simple theory, Diffusion in $_{SiO2}$ lon Implantation and lon Implantation Systems Oxidation. Growth mechanism and Deal-Grove Model of oxidation, Linear, and Parabolic Rate coefficient, the structure of SiO_2 Oxidation techniques and system Oxide properties.
3. **CHEMICAL VAPOUR DEPOSTTION AND LAYER GROWTH:** CVD for deposition of dielectric and polysilicon- 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.

4. **PATTERN TRANSFER:** Introduction to photo/optical lithography, Contact/proximity printers, Projection printers, Mask generation, photoresists, Wet etching, Plasma etching, Reaction ion etching.
5. **VLSI PROCESS INTEGRATION:** Junction and Oxide Isolation, LOCOS methods, Trench Isolation, SOI Metallization, Planarization. Fundamental consideration for IC Processing, NMOS IC Technology, CMOSIC Technology, Bipolar IC Technology.

Recommended Books:

1. S.M. Sze-VLSI Technology, Tata Mc-Graw Hill.
2. D. Nagchoudhary-principles of Microelectronic Technology, Wheeler Publishing.
3. Stephen A Campbell-The Science and Engineering of Microelectronic Fabrication, Oxford University Press.
4. Hong Xiao-Introduction to Semiconductor Manufacturing, Prentice Hall India.
5. Kang- CMOS circuit design, Tata Mc-Graw Hill.
6. Razoni-Design of CMOS Analog Integrated Circuit.

7 EC5 VLSI DESIGN

1. **INTRODUCTION TO MOS TECHNOLOGY:** Basic MOS transistors, Enhancement Mode transistor action, Depletion Mode transistor action nMOS and CMOS fabrication.
2. **BASIC ELECTRICAL PROPERTIES OF MOS CIRCUITS:** I_{ds} versus V_{ds} relationship, Aspects of threshold voltage, Transistor Transconductance gm. The nMOS inverter, Pull up to Pull-down ratio for a nMOS Inverter and CMOS Inverter (Bn?Bp MOS transistor circuit Model, Noise Margin).
3. **CMOS LOGIC CIRCUITS:** the inverter, Combinational Logic, NAND Gate NOR gate, Compound Gates, 2 input CMOS Multiplexer, Memory latches and registers, Transmission Gate, Gate delays, CMOS-Gate Transistor sizing, Power dissipation.
4. Basic physical design of simple Gates and Layout issues, Layout issues for inverter, Layout for NAND and NOR Gates, Complex Logic gates Layout, Layout optimization for performance. Introduction to VHDL, Prolog & other design tools, VHDL Code for simple Logic gates, flip-flops, and shift registers.

Recommended Books:

1. Stephen Brown and Zvonlo Veranesic-Fundamentals of Digital Logic with VHDL Design, Tata Mc-Graw Hill.
2. Neil H.E. Weste, Kamran Eshraghian-Principles of CMOS VLSI Design.
3. Douglas A. Pucknell, Kamran Eshraghian-Basic VLSI Design.
4. Michael John, Sebastian Smith-Application specific Integrated Circuit.
5. Behzad Razavi-Design of Analog CMOS Integrated Circuits, Mc-Graw Hill.

7 EC6.1 MULTIMEDIA SYSTEMS

1. **MEDIA AND DATA STREAMS:** Medium, Properties of Multimedia, Data stream characteristics of continuous media information units.
2. **MUSIC AND GRAPHICS:** Audio formats, MIDI, Speech Image format, Graphics format, disthering, computer Image Processing.
3. **VIDEO AND ANIMATION:** Basic concepts, computer-based Animation, JPEG, MPEG, H.261, DVI, Hybrid coding, CD-ROM Technology. Compact disk digital audio.
4. **MULTIMEDIA OPERATING SYSTEMS:** Real time, Process management Rate monotonic algorithm, Earliest deadline first algorithm and Multimedia file systems.
5. **DOCUMENTS:** Hypertext, Hypermedia, MHEG.

6. **SYNCHRONIZATION:** Intra and Inter object synchronization. Live and Synthetic synchronization, Lip synchronization requirements, pointer synchronization requirments, Elementary media synchronization.

Recommended Books:

1. Ralf Steinmetz & Klara Nahrstedt: Multimedia computing Communication & Application, Pearson Education Asia.
2. Prabhat K. Andleigh-Multimedia System Design, Prentice Hall, Kiran Thaukrar.

7 EC6.2 ADVANCED MICROPROCESSORS

1. **8086/8088 MICROPROCESSOR:** Hardware specifications, architecture, address spaces, clock generator, bus controller and arbiter, Minimum and maximum mode. System Bus Timing. Assembly language programming, addressing mode and instructions of 8086/8088, linking and execution of programs. MACRO programming, assembler directives and operators.
2. **I/O INTERFACES:** Serial Communication interfaces DMA and diskette controllers, CRT Controller 8275, A/D, D/A converter interfacing.
3. **MULTIPROCESSOR CONFIGURATIONS:** 8086/8088 base Multiprocessor systems, 8087 Numeric data processor. 8089 I/O processors.
4. **80386, 80486 MICROPROCESSORS:** Architecture, Register set, Instruction set and memory management of 80386, 80486 processors.
5. **RECENT ADVANCES in MICROPROCESSOR ARCHITECTURE:** Pentium II and III architecture, pipelining, SIMD features, branch handling on-chip cache and buffers, MMX technology.

Recommended Books:

1. Dougtas V.Hall- Microprocessors & Interfacing: Programming and Hardware, Tata Mc-Graw Hill.
2. Yu-Cheng Liu, Glenn A.Gibson- Microprocessor systems: The 8086/8088", Prentice Hall of India.
3. A.K. ray, K.H. Bhurchand- Advanced Microprocessor and Peripherals, Tata Mc-Graw Hill.
4. Barry B. Brey- The Intel Microprocessors: Architecture, Programming & Interfacing, Pearson Education Asia.
5. Antonalces J.L- The pentium Microprocessors, Pearson.

7 EC 6.3 REMOTE SENSING

1. **CONCEPTS AND FUNDAMENTALS OF REMOTE SENSING:** Introduction, Energy sources and radiation principles, electromagnetic energy, Electromagnetic spectrum, Energy interactions in the atmosphere, Energy interactions with earth surface features, Remote sensing systems, Spectral reflectance curves, Data acquisition and interpretation, Image characteristics, Multispectral scanning system, Thernal scanning, Hyper-spectral scanning systems, reference data, Radar technologies and terrain interactions. Global positioning system. Introduction of microwave sensing.
2. **EARTH RESOURCE AND ENVIRONMENTAL SATELLITES:** Introduction to various sensing platforms, SPOT satellite, Landsat satellite, JERS satellite, Indian remote Sensing Satellites, Geostationary Environmental satellite, Polar orbiting NOAA Environmental satellite, Future satellite systems, Various satellite Radar systems like JERS-1, ERS-1, SIR-A mission, Radarsat, Almaz-1, Seasat.
3. **INTRODUCTION TO VISUAL IMAGE INTERPRETATION:** Introduction and fundamentals of visual image interpretation. Introduction to Digital Image processing, Image rectification and restoration, Image enhancement Contrast mainpulation, Spatial feature manipulation, Multi miage mainpulation, image classification Supervised and unsupervised classification data merging and GIS integration, Scal effects.

4. **INTRODUCTION TO GEORGRAPHICAL INFORMATION SYSTEM:** Introduction various GIS operation of GIS to water resource, enviornmental impact assessment and urban & regional planning.

Recommended Books:

1. Floyd F. Sabins-Remote Sensing Principles and Interpretation.
2. Thomas M.Lillesand & Ralph W-Remote Sensing and Image Interpreation.
3. C.P. Lo, Albert K.W. Yeung-Concepts and Techniques of Geographic Information Systems. PIII (EEE).
4. Jensen-Remote Sensing of Environment, Pearson Education Asia.

7 EC 6.4 AI & EXPERT SYSTEMS

1. **INTRODUCTION TO AI KNOWLEDGE:** Importance of AI. knowledge Base System Knowledge organization & manipulation, Conceptual Introduction to LISP and other AI programming Languages.
2. KNOWLEDGE REPRESENTATION: Syntax Semantics, Inference Rules, Nondeductive Inference methods, and representation using rules, forward chainging and backward chainin. Fuzzy Logic & Natural languages computations, Probailistic Reasoning, Object Oriented Representations.
3. **KNOWLEDGE ORGANIZATION & MANIPULATION:** Search & control strategies, matching techniques, knowledge organization & management, Genetic Algorithms based search techniques.
4. **KNOWLEDGE SYSTEMS ARCHITECTURE:** Rule based, non-production, uncertainty knowledge system building tools.
5. **KNOWLEDGE ACQUISITION:** General concepts, learning by induction.

Recommended Books:

1. AI & ES- Dan W.Patterson, Prentice Hall of India.
2. Luger- Artificial Intelligence, Pearson Education.
3. Jockson- Introduction Expert Systems, Pearson Education Rich & Knigh- Artifical Intelligence, Tata Mc-Graw Hill.

7 EC8 DIGITAL COMMUNICATION AND SIGNAL PROCESSING LAB

Introduction to Modelling and simulation using MAT LAB.

1. **RANDOM NUMBERS:** Meaning and Generation. 1.1 To generate Random Number sequence uniformly distributed in the interval (0,1).
   1.2 To generate RN sequences with arbirary distributions, means and variances:
   (a) Rayleigh distribution
   (b) Binomial & Poission distribution.
   (c) Normal distributions: N(0,1)
   (d) Gaussion distributions: N(m_x, sigma x^2)
   1.3 To plot the probability density functions and find mean and variance.
2. **SIGNALS AND SYSTEMS:** 2.1 To generate elementary signal like unit impulse, unit step, exponential and ramp.
   2.2 To carry out convolution in both continuous time and discrete tme systems.
   2.3 To design & simulate FIR filters.
   2.4 To find autocorrelation between signals and sequences.
3. **DIGITAL MODULATION:** 3.1.2 To transmit & receive signals in the presence of Additive white gaussian noise (AWGN) using ASK & PSK.

7 EC 9 ANTENNA LAB

1. To study the characteristic of the following: (a) End-fed vertical antennas.
   (b) Altering the effective length of an antenna.

(c) Practical top loaded antennas.
(d) Directional antenna with driven elements.
(e) Parastic arrays.
(f) Folded antenna elements

2. Study the importnat characteristics of antenna land experimental measure the Radiation resistance, Radiation Pattern on polar plots and calculate the Beam width and gain of main lobe and band width for the following types of antenna. (a) Half wave dipole
(b) Folded dipole
(c) Yagi UDA multiple element folded dipole
(d) Hertz Antenna
(e) End fire and broad side antenna
(f) Phase array antenna
(g) combined collinear array
(h) Loop antenna
(i) Ground plane antenna
(j) Log periodic antenna
(k) Rhombus antenna
(l) Slot antenna
3. Demonstration of modeling of wire antenna using appropriate design software.
4. Simulation of antenna arrays using appropriate software.
5. Design and testing of microstrip rectangular patch antenna lusing appropriate software.
6. (a) to construct a basic transmitter, receiver and line of sigth microwave radio link using micostrip components.
(b) To investigate the transmission characteristics of the link and to measure the gain of the microstrip patch antennas using in the above setup. Draw the antenna radiation digram.

Semester VIII

8 EC1 COMPUTER NETWORKS

1. **QUEUING THEORY:** Pure birth, pure death & Birth-date processes. Mathematical models for M/M/I, M/M/infinite, M/M/m, M/M1/K and M/M/m/m queues. Little's formula. M/G/I Queuing model basics.
2. **INTRODUCTION TO NETWORKS:** Network Hardware & Software, Basic idea of dtat communication services.
3. OSI & TCP/IP Protocol architecture, ATM protocol architecture.
4. **PHYSICAL LAYER:** NRZ, Multilevel Binary & Bi-phase encoding, scrambling techniques. ISDN system architecture, packet & circuit switching. Boradband ISDN.
5. **DATA LINK LAYER:** Framing Simplex protocol. Simplex stop & wait protocol, Sliding window protocol, One bit sliding window, go back to n protocol, selective repeat, HDLC, Data link layer in internet & ATM.
6. **MEDIUM LAYER:** Static & dynamic channel allocation, ALOHA, slotted ALOHA, CSMA, IEEE standards 802.2 to 802.6 High speed LAN-FDDI, fast Ethemet.
7. **NETWORK LAYER:** Organization & service provider routing, adaptive & Non-adaptive routing algorithms, Congestion control algorithms, Network layer in the Internet.

Recommended Books:

1. Tancnbaum - Computer Networks, Pearson Education of Asia.
2. Gallager - Data Networks, Prentice Hall of India.
3. Stallings - Data & computer Communication, Pearson Education Asia.

4. Trivedi- Probability and Statistics with reliability, Queuing and Computer Science Applications, Sc. Application, Prentice hall of India.
5. Forouzan- Data Communication and Networking, Tata Mc-Graw Hill.

8 EC2 RADAR & TV ENGINEERING

1. **RADAR:** (a) Radar Blick diagram, frequencies and applications, Radar range equation, Continous wave (CW) & FM radar; Moving target indicator (MTI) : Delay line cancellors, blind velocity Pulse Doppler Radar.
   Tracking radar sequential lobbing, Concial scan and monopulse radar, Types of display, Radar receivers, Noise figure.
   (b) **NAVIGATIONALAIDS:** Principle of operation of Radar direction finder & range system, LORAN system, DME, TACAN, Aircraft landing systems.
2. **TV ENGINEERING:** (a) **INTRODUCTION:** Theory of scanning standards, Principles of Monochrome and colour T.V. system (PAL, SECAM, NTSC). Composite video signal analysis.
   (b) **TRANGMISSON:** Monochrome & colour T.V. cameras, Image orthicon, plumbicon, vidicon and CCD camera tubes, Picture, colour and sound carriers. Vestigial side band transmission. Encoding picture information. Chrominance modulation. Compatibility of colour and monochrome T.V. systems. Block diagram of T.V. transmitters. TV transmitting antennas.
   (c) **RECEPTION:** Types of Monochrome and colour picture tubes, set-up adjustments, Decoding picture information. 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 theri diagnosis T.V. receiving antennas.

Recommended Books:

1. M.I.Skolink - 'Introduction to Radar System', Mc-Graw Hill.
2. N.S. Nagaraja - 'Elements of Electronic navigation', Tata Mc-Graw hill.
3. R.R. Gulati - Monochromic and Colour Television, Wiley Eastem.
4. Dhake - television Engineering. Tata Mc-Graw Hill.

8 EC3-OPTICAL COMMUNICATION

1. **OPTICAL FIBERS:** Basic optical laws and definitions, Principles of light propagation in fibres, Ray theory, Optical fiber modes and configurations, Step index and graded index fibers, Monomode and multimode fibers, Fiber materials, fiber fabrication, Fiber optic cables.
2. **SIGNAL DEGRADATION IN OPTICAL FIBERS:** Attenuation, signal distortion in optical fibers, dispersion-intra modal & inter modal, Dispersion shifted and flattened fiber.
3. **OPTICAL SOURCES:** LED's- Structure, Materials, Characteristics, Modulation, Power and efficiency, Laser Diodes-Basic concepts, Structure, properties and modulation.
4. **OPTICAL DETECTORS:** PIN and avalanche photo diodes, photo detector noise, detector response time, Avalanche multiplication noise. Photo diode materials. Fundamental of Optical Receiver Operation.
5. **OPTICAL FIBER COMMUNICATION SYSTEMS:** Source to fiber coupling, fiber to fiber joints, fiber splicing, fiber connectors. Principal components. Link design calculation, Application, Wavelength division multiplexing.
6. **OPTICAL FIBER MEASUREMENTS:** Measurements of Fiber attenuation. Dispersion, refractive index profile, Numerical aperture & diameter.

Recommended Books:

1. Gerd Keiser-Optical Fiber Communications, Tata Mc-Graw lHill.

2. J.N. Senior-Optical Fiber Communications, Prentice Hall of India.
3. J.Gowar-Optical Communications system, Prentice hall of India.
4. J.Wilson & Hawkes-Opto Electronics-An Introduction, Prentice Hall of India.
5. Joseph C. Palais-Fiber Optic Communications, LPE, Pearson Education Asia.

8 EC4.1-IMAGE PROCESSING AND PATTERN RECOGNITION

1. **INTRODUCTION:** Imaging in ultraviolet and visible band Fundamental steps in image processing. Components in image processing.
2. **DIGITAL IMAGE FUNDAMENTALS:** Image perception in eye light and electromagnetic spectrum, Image sensing and acquisition using sensor array. Image sampling and quantization-Representing digital images, Spatial and gray-level resolution, Aliasing and Moirc patterns, Zooming and Shrinking digital images. relationship between pixels. Camera Model.
3. **IMAGE ENHANCEMENT IN SPATIAL DOMAIN:** Gray-level transformation- image negatives, log transformation, power-low transformation, Histogram equalization and matching, Smoothing spatial and sharpening filters.
4. **IMAGE RESTORATION:** Image restoration model. Noise Models- Spatial and frequency properties of noise, probability density functions. Noise-only spatial filter-Mean filter, order-statistics filter and adaptive filters. Frequency domain filters-Band reject filters, Band pass filters and Notch filters.
5. **IMAGE COMPRESSION:** Compression Fundamental-Coding Redundancey, Intesrpixel redundancy, Psychovisual redundancy and Fidelity criteria. Image Compression models-Source encoder and decoder, Channel encoder and decoder, Lossy compression compression standards.

Recommended Books:

1. Rafael C. Gonzalez-Digital Image Processing, Pearson Edcation Asia.
2. Kenneth R. Castleman-Digital Image Processing, Pearson Education Asia.
3. Nick Effard-Digital Image Processing, Pearson Education Asia.
4. Jain A.K.-Digital Image Processing, Prentice hall of India.
5. Sonka, Hlavac & Boyle-Image Processing. analysis and machine Vision, Thomas Learning.

8 EC4.2 VHDL DESIGN

1. **COMBINATIONAL CIRCUIT BUILDING BLOCKS:** Multiplexer, Decoders, encoders, Code Converters, VHDL Code for Combinational Circuits.
2. **SEQUENCIAL CIRCUITS;** VHDL code for Flip-Flops. shift registers, Counters.
3. **SYNCHRONOUS/ASYNCHRONOUS SEQUENCIAL CIRCUITS:** Mealy & Moore type FSMs, VHDL Code for Mealy & Moore Machines, VHDL Codes for Serial Adder, Vending Machine.
4. **DIGITAL SYSTEM DESIGN:** Bulding Block circuits, Memory organization, SRAM, Design examples of divider, Multiplier, Shifting & Sorting Operations, Clock Synchronization. CPU organization and design concepts.

Recommended Books:

1. Stephen Brown and Zvonki Vranesic-Fundamentals of Digital Logic circuit VHDL Design, Tata Mc-Graw Hill.
2. Z.Navabi-Analysis and Modeling of Digital Systems, Tata Mc-Graw Hill.
3. D.L.Perry-VHDL 3rd cd., Tata Mc-Graw Hill.
4. Morris Mano-Digital Logic & Computer Design, Prentice Hall of India.

8 EC4.3 MICROCONTROLER AND EMBEDED SYSTEMS

1. **THE 8051 MICROCONTROLLER:** Introduction, The 8051 microcontroller hardware. I/O pins, Port, External memory. Counters and Timers, Serial data. Interputs.
2. **8051 ASSEMBLY LANGUAGE PROGRAMMING:** Addressing modes, External data moves, push and pop opcides, Logical operations, Byte level and bit level logival operations. Arithmetic operations, Jump and call instructions, Interrupts & returns.
3. **REAL WORLD INTERFACING:** Interfacing of LCD, ADC to 8051.
4. **INTRODUCTION TO REAL TIME OPERATING SYSTEMS:** Round robin with interrupts, RTOS Architecture, Task and task states, Semphores and shared data.
5. **BASIC DESIGN USING RTOS:** Encapsulating Semaphores and Queues, Saving Memory Space, Saving power.

Recommended Books:

1. K.N. Ayala-The 8051 Microcontroller. Penram International.
2. M.A. Mazidi and J.G. Mazidi-The 8051 Microcontroller and Embedded Systems, Pearson Education Asia.
3. David simon-An Embedded software Primer. Pearson Education Asia.
4. J.W. Valvano Brooks/Cole-Embedded Microcomputer Systems Thomson LearningTM

8 EC4.4 OPERATIONG SYSTEMS

1. **PROCESSES:** Processes and inter process communication, process scheduling techniques.
2. **MEMORY MANAGEMENT:** Fixed and variable partitioning, swapping in Multiprogramming, virtual memory, Page replacement algorithms, Segmentation, Paging, Demand Paging.
3. **FILE SYSTEMS:** File attributes, directories, implementation of File systems, file security and protection.
4. **INPUT AND OUTPUT:** Software and hardware, disk scheduling terminals.
5. **DEADLOCKS:** Condition for deadlocks, deadlock detection, Recovery, Avoidance and prevention.
6. **OS SECURITY:** Security requirement, pasword, Security Kernels, fault-tolerant systems. Cryptography. OS Penetration. Worms & Viruses.
7. **NETWORK OPERATING SYSTEMS:** Network file systems, layered protocols and Unix, client server model, remote procedure calls, group communication, Overview of Unix, Shell, files, Directories, Processes, I/O, System calls. Memory management.

Recommended Books:

1. Andrew S.Tanenbaum-Modern Operating Systems, Prentice Hall of India.
2. J.Peterson, A.Silberschatz-Operating Systems Concepts.
3. H.M.Deitel-An Introduction to Operating System, Addision wesley.

8 EC5 COMPUTER NETWORK PROGRAMMING LAB

1. **PRELIMANARIES:** Study and use of common TCP/IP protocols and term viz. telnet rlogin ftp, ping, finger, Socket, Port etc.
2. **DATA STRUCTURES USED IN NETWORK PROGRAMMING:** Representation of undirectional. Directional weighted and unweighted graphs.
3. **ALGOTITHMS IN NETWORK:** Computation of shortest path for one source-one destination and one source-all destination.
4. **SIMULATION OF NETWROK PROTOCOLS:** (i) Simulation of M/M/l and M/M/1/N queues. (ii) Simulation of pure and slotted ALOHA. (iii) Simulation of link state routing algorithm.
5. **DEVELOPMENT OF CLIENT SERVER APPLICATION:**

(i) Develop 'telnet' client and server which uses prot other than 23. (ii) Write a finger application which prints all available information for five users currently logged on and are using the network for longest duration. Print the information in ascending order of time.

Recommended books:

1. Comer-Internet working with TCP/IP, VOL. I, II, III, Pearson Education Asia.
2. Stevens-Unix Network Programming Vol I and II, Pearson Education Asia.

8 EC6 INDUSTRIAL ECONOMICS & MANAGEMENT

1. **MONEY CREDIT AND FINANCE:** Function of money, types: coins, notes, cheques, Bill of Exchange. The banking mechanism and government control. The Reserve bank of India, nationalized baks, money market. Hire purchase finance. The stock exchange and issuing houses.
2. **MANAGEMENT:** Evaluation of management thought, principles and functions of management, motivation, Types of business forms and organization.
3. **FINANCE AND FINANCIAL STATEMENTS:** Needs of fincance, kinds of capital sources, working capital cycle. Financial statements: basic concepts, balance sheet, profit and loss account sources and uses of funds statement-working capital, cash and total resource basis. Ratio analysis, liquity ratios, capital structure rations. profitability rations, turnover rations.
4. **INTEREST AND ANNUITY:** Capital recovery annuity, present worth annuity, sinking fund annuity, compound amont annuity.Nominal and effective rate of interest, Depreciation need of depreciation, methods of depreciation.
5. **QUALITY:** Conception quality of desing, quality of conformance, value of quality & cost of quality, Evaluation of TQM concepts and philosophy, TQM and traditional management. Introduction to ISO-9000, ISO-14000, Just in Time, BPR.
6. **PROJECT PLANNING:** Network analysis, PERT & CPM, Project evaluation.

Labour Leigislation.
Plant location, investment decisions.
Concept of industrial economics and its importance. Industiral & cost theory,
Optimum size, Market structure.

Recommanded Books:

1. Prassana Chandra-Financial Management, TMH.
2. Zaidi-Statistical Process, TMH.
3. Buffa-Operation Management, WE.

8 EC7 SYSTEMS DESIGN & ADVANCED COMMUNICATION LAB

PART-I

Schematic design and make PCB layout of following ckts.

1. FET Amplifier in common drain mode.
2. Mod-13 asynchronous counter.
3. 3-bit DAC with Op-amp.

PART-II

Design of following ckt using appropriate software like VHDL/FPGA.

1. 3-input NAND gate.
2. Half adder.
3. D-Latch.
4. Serial in-serial out shift register.

PART-III

To perform of following experiments based on Fiber Optic Trainer.

1. To set up Fiber Optic Analog link.
2. To set up fiber Optic Digital link.
3. Measurement of Propagation loss and numerical aperture. 12 Characterization of laser diode and light emitting diode.