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### Distribution of Marks

Code	Subject	Hrs/week			Exam	Maximum Marks		
		L	T	P	Hrs	*I.A.	Exam	Total
<b>A. THEORY PAPERS</b>								
3CP1	Mathematics III	3	1	-	3	20	80	100
3CP2	Electronic Devices & Circuits	3	1	-	3	20	80	100
3CP3	Data Structure & Algorithms	3	1	-	3	20	80	100
3CP4	Switching Theory and Logic System Design	3	-		3	20	80	100
3CP5	Discrete Mathematical Structures	3	1	-	3	20	80	100
3CP6	Elective (any one of the following)	3	-		3	20	80	100
3CP6.1	Computer Aided Network Analysis							
3CP6.2	Electronic Measurements & Instrumentation							
3CP6.3	Medical Electronics							
3CP6.4	Electrical Technology							
3CP6.5	Circuit Analysis							
<b>B. Practical &amp; Sessional</b>								
3CP 7	Humanities & Social Science	-	-	2	-	30	20	50
3CP8	Electronics Lab I	-	-	3	-	60	40	100
3CP9	Data Processing Lab	-	-	3	-	60	40	100
3CP10	Digital Electronics Lab	-	-	2	-	60	40	100
<b>C.</b>	<b>Discipline &amp; Extra Curricular activities:</b>							50
	<b>GRAND TOTAL</b>	18	4	10	-	-	-	1000

\*1.A

Internal

Assessment

**II BE (IV Semester) :**

Code	Subject	Hrs/week	Exam	Maximum Marks
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		L T P	Hrs	*I.A.	Exam	Total
<b>A. THEORY PAPERS</b>						
4CP1	Statistics & Probability Theory	3 1 -	3	20	80	100
4CP2	Principles of Programming Languages	3 - -	3	20	80	100
4CP3	Telecom Engg. Fundamentals	3 - -	3	20	80	100
4CP4	Software Engineering I	3 1 -	3	20	80	100
4CP5	Computer Graphics	3 - -	3	20	80	100
4CP6	Elective (any one of the following)	3 - -	3	20	80	100
4CP6.1	Line Communication					
4CP6.2	Management Information System					
4CP6.3	Neuro Computing & Fuzzy Logics					
4CP6.4	Analog & Digital Communication					
<b>B. Practical &amp; Sessional</b>						
4CP7	Object Oriented Programming Lab	- - 3	-	60	40	100
4CP8	Communication Lab	- - 3	-	60	40	100
4CP9	Data Structures Lab	- - 3	-	45	30	75
4CP10	Electronics Lab-II	- - 3	-	45	30	75
<b>C.</b>	<b>Discipline &amp; Extra Curricular activities:</b>					50
<b>GRAND TOTAL</b>		18 2 12	-	-	-	1000

### III BE (V Semester)

Code	Subject	Hrs/week	Exam	Maximum Marks		
		L T P	Hrs	*I.A.	Exam	Total
<b>A. THEORY PAPERS</b>						
5CP1	Software Engineering II	3 1 -	3	20	80	100
5CP2	Data Base Management System	3 - -	3	20	80	100
5CP3	Microprocessors and Interface	3 - -	3	20	80	100
5CP4	Computer Architecture	3 - -	3	20	80	100
5CP5	Theory of Computation	3 - -	3	20	80	100
5CP6	Electives: (any one of the following)	3 - -	3	20	80	100
5CP6.1	Logical & Functional Programming					
5CP6.2	IC Technology					
5CP6.3	Advances Data Structures					
5CP6.4	Information Theory & Coding					
5CP6.5	Optical Communication					
<b>B. Practical &amp; Sessional</b>						
5CP7	System Analysis & Design Lab	- - 2	-	45	30	75

5CP8	Computer Graphics Lab	- - 3	-	45	30	75
5CP9	Microprocessors Lab-I	- - 3	-	45	30	75
5CP10	Unix Shell Programming Lab	- - 3	-	45	30	75
5CP11	Practical Training Seminar	- - 2	-	30	20	50
<b>C.</b>	<b>Discipline &amp; Extra Curricular activities:</b>					50
	<b>GRAND TOTAL</b>	18 1 13	-	-	-	1000

### III BE (VI Semester)

Code	Subject	Hrs/week			Exam	Maximum Marks		
		L	T	P	Hrs	*I.A.	Exam	Total
<b>A. THEORY PAPERS</b>								
6CP1	System Software Engineering	3	-	-	3	20	80	100
6CP2	Digital Signal Processing	3	-	-	3	20	80	100
6CP3	Design & Analysis of Algorithms	3	1	-	3	20	80	100
6CP4	Computer Networks	3	-	-	3	20	80	100
6CP5	Optimization Techniques	3	1	-	3	20	80	100
6CP6	Electives: (any one of the following)	3	-	-	3	20	80	100
6CP6.1	E-Commerce							
6CP6.2	Simulation & Modeling							
6CP6.3	Data Mining & ware Housing							
6CP6.4	Microwave & Satellite Communication							
<b>B. Practical &amp; Sessional</b>								
6CP7	Internet Programming Lab	-	-	3	-	45	30	75
6CP8	Data Base Application Lab	-	-	3	-	60	40	100
6CP9	Software Engineering Lab	-	-	3	-	60	40	100
6CP10	Digital Hardware Design Lab	-	-	3	-	45	30	75
<b>C.</b>	<b>Discipline &amp; Extra Curricular activities:</b>							50
	<b>GRAND TOTAL</b>	18	2	12	-	-	-	1000

### IV BE (VII Semester)

Code	Subject	Hrs/week			Exam	Maximum Marks		
		L	T	P	Hrs	*I.A.	Exam	Total
<b>A. THEORY PAPERS</b>								
7CP1	Operating System	3	-	-	3	20	80	100
7CP2	Asynchronous Transfer Mode Networks	3	-	-	3	20	80	100
7CP3	Internet Technologies	3	1	-	3	20	80	100
7CP4	Artificial Intelligence	3	-	-	3	20	80	100

7CP5	Micro Electronics	3 1 -	3	20 80 100
7CP6	Electives: (any one of the following)	3 - -	3	20 80 100
7CP6.1	Neural Networks			
7CP6.2	Mulmedia Systems			
7CP6.3	Digital Speech and Language Processing			
7CP6.4	Real Time Systems			
<b>B. Practical &amp; Sessional</b>				
7CP7	System Programming Lab-I	- - 3	-	30 20 50
7CP8	TCP/IP Programming Lab	- - 3	-	45 30 75
7CP9	Microprocessor Lab-II	- - 3	-	45 30 75
7CP10	Minor Project	- - 1	-	30 20 50
7CP11	Practical Training Seminar	- - 2	-	60 40 100
<b>C.</b>	<b>Discipline &amp; Extra Curricular activities:</b>			50
	<b>GRAND TOTAL</b>	18 2 12	-	- - 1000

Code	Subject	Hrs/week	Exam	Maximum Marks
		L T P	Hrs	*I.A. Exam Total
<b>A. THEORY PAPERS</b>				
8CP1	Compiler Construction	3 1 -	3	20 80 100
8CP2	Advanced Computer Architecture	3 1 -	3	20 80 100
8CP3	Computer Aided Design for VLSI	3 1 -	3	20 80 100
8CP4	Electives: (any one of the following)	3 1 -	3	20 80 100
	1. Expert Systems			
	2. Distributed Systems			
	3. Image Processing & Pattern Recognition			
	4. Fault Tolerant Systems			<b>Practical &amp; Sessional :</b>
8CP5	Project	- - 2	-	120 80 200
8CP6	Seminar	- - 2	-	60 40 100
8CP7	Microsoft & X-Window Programming Lab	- - 3	-	45 30 75
8CP8	Micro Electronics Lab	- - 3	-	45 30 75
8CP9	System Programming Lab II	- - 4	-	60 40 100
<b>C.</b>	<b>Discipline &amp; Extra Curricular activities:</b>			50
	<b>GRAND TOTAL</b>	12 4 14	-	- - 1000

# Semester III

## **3CP1. MATHEMATICS-III**

3L+1T

MM:100

Ex. Hr. :3

1. **Differential Equations** : Ordinary differential equations of second order with variable coefficients-homogeneous form, exact form, solution when a part of C.F. is known, change of dependent variable, change of independent variable. Variation of parameters, solution in series (without particular integral).
2. **Partial differential equations of first order** : Lagrange's method and standard forms, Charpit's method. Method of separation of variables-application to the solution of wave equation in one dimension, Laplace's equation in two dimensions, diffusion equation in one dimension.
3. **Transform Calculus** : Laplace Transform with its simple properties, applications to the solution of ordinary and partial differential equations having constant coefficients with special reference to the wave and diffusion equation. Fourier transforms and inverse Fourier transforms in complex and Sine-Cosine form with application to solution of partial differential equations with constant coefficients.
4. **Numerical Methods** : Solution of Algebraic and transcendental equations, interpolation-finite differences, inverse interpolation, numerical differentiation and integration, numerical solution of differential equations and partial differential equations, solution of difference equations.
5. **Matrices** : Eigen values and Eigen values and Eigen vectors, diagonalisation, Cayley Hamilton equation, Triangularisation of matrices.

### **Recommended Books :**

1. S.S. Shastri :Introductory Methods of Numerical Analysis, PHI
2. Chandrika Prasad :Mathematics for Engineers
3. Chandrika Prasad :Higher Mathematics for Engineers
4. Grewal :Mathematics for Engineers
5. Schaum :Outline series on Matrix Algebra
6. Gokhroo et al. :Higher Engg. Maths-III (3CP1)

## **3CP2. ELECTRONICS DEVICES & CIRCUITS**

3L+1T

MM:100

Ex. Hr. :3

1. **Diode Circuits** : Diode as ckt element.load line concept,slipping and clamping circuits. Voltage multipliers.
2. **Devices** :Constructin,characteristics and working principles of the following devices:Junction diodes,BJT,FJET,MOSFET,UJT,photo diodes, LEDs. photo tranistors. Solar cells. Thermistors, LDR.
3. **Transistors** : Transistor characteristics, current components, current gains :alpha and beta. Operating point. Hybrid model, h-parameter equivalent circuits, Ce,CB and CC configuration. DC and AC analysis stabilization techniques. Thermal runaway. Thermal stability. Equivalent circuits and biasing of JFET's & MOSFET's. Low frequency CS and CD JFET amplifiers. FET as a voltage variable reistor.

4. **Small signal amplifiers at low frequency** : 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 and cascade ckts. Emitter and source followers.
5. **Oscillators** : Concept of Feedback classification, Criterion for oscillation. Tuned collector. Hartely, Colpitts, RC-Phase shift, Wein bridge and crystal oscillators, Astable, Monostable and bistable multivibrators, Schmit trigger.

### **Recommended Books :**

1. J. Millman & C.C. Halkias : Integrated Electronics, McGraw Hill
2. Millman Grabel : Microelectronics, McGraw Hill.

### **3CP3. DATA STRUCTURE AND ALGORITHMS**

3L+1T

MM:100

Ex. Hr. :3

Elementary and structured data types

**Linear Structures** : Arrays and Records. Stacks, Queues and Linked Lists, Strings, Prefix, infix, postfix expressions, Expression evaluation.

**Non-linear Structures** : Generalized linked lists, Trees, Graphs, and their traversals.

Binary Trees, Binary Search Tree, AVL tree, Multiway trees, B tree, Trie and dictionary.

Built in data structures such as Records, Files, Sets, Graphs, pointers Recursion, Sorting : internal and external, searching : Hashing, Symbol tables.

Problem solving and algorithm development, analysis of algorithms.

### **Recommended Books :**

1. Aho A.V., J.E. Hopcroft, J.D. Ulman : Data Structures and Algorithms, Addison Wesley.
2. Brastrad : Algorithms, PHI.
3. Horowitz and Sawhni : Algorithms Design and Analysis, CS Press.
4. Kruse R.L. : Data structure and Program Design. PHI.
5. Horwitz and Sawhni : Data structures in PASCAL, BPB.
6. Tanenbaum : Data structures in C, PHI
7. Trembley & Sorenson : An Introduction to Data Structures, Mc-Graw Hill International
8. Baase : Computer Algorithms, Pearson Education.

### **3CP4. SWITCHING THEORY & LOGIC SYSTEM DESIGN**

3L+1T

MM:100

Ex. Hr. :3

Introduction to number systems and their conversion. Arithmetic with bases other than ten. Negative numbers, binary coded decimal number and excess-3 code representation.

Octal, Hexadecimal numbers, r's and (r-1)'s complement.

Introduction to Boolean Algebra, Binary connectives, Evaluation Truth Functions, Truth-Functional calculus as a Boolean Algebra, Duality, Fundamental theorems of Boolean Algebra and simplifications of Boolean expressions.

Introduction to switching devices. Positive and Negative logic of OR, AND, NOR, NAND. Exclusive NOR gates. RTL, DTL, DCTL, TTL, RCTL, ECL, HTL, MOS and CMOS logic circuit and their realization. Speed and delay in logic circuits, integrated circuit logic and noise immunity standard forms of

Boolean functions. Minterm and Maxterm designation of functions. Simplification of functions on Karnaugh maps, Incompletely specified functions.

Combinatorial Design using Multiplexers.

Cubical representation of boolean functions and determination of prime implicants. Selection of an optimal set of prime implicants, multiple output circuits and map minimization of multiple output circuits. Tabular determination of multiple output prime implicants.

Flip Flops :R-S, J-K, D, T Flip Flops & their characteristics and operation. General characteristic of sequential circuits. Clock, pulse and level mode sequential circuits. Analysis and design of a sequential circuits. Synthesis of state diagrams, Finite memory circuits, equivalence relations equivalent states and circuits, determination of classes of indistinguishable states and simplification by implicant tables. Mealy and Moore machines, state assignment and memory element input equations. Partitioning and state assignment.

#### **Recommended Books :**

1. Sandiege :Modern Digital Design, McGraw Hill.
2. Moris Mano :Digital Design, PHI
3. H, Taub, D.Schilling :Digital Integrated Electronics, McGraw Hill
4. Hill & Peterson :Switching Theory and Logic Design, John Wiley
5. Parag K. Lala :Practical Digital Logic Design & Testing Prentice Hall of India.

### **3CP5. DISCRETE MATHEMATICAL STRUCTURES**

3L+1T

MM:100

Ex. Hr. :3

1. **Graph Theory** : Graphs-Directed and Undirected, Eulerian chains and cycles. Hamiltonian chains and cycles. Trees, chromatic number, connectivity and other graphical parameters. Applications Polya's Theory of enumeration and its applications.
2. **Combinatorial Mathematics** : Basic Counting Principles, Permutations and combinatorics, Inclusion and Exclusion Principles, recurrence relations, Generating functions, applications.
3. **Sets and functions** : Sets, relations, functions, operations, equivalence relations, relation of partial order, partitions, binary relations.
4. **Monoids and Groups** : Groups, Semigroups and Monoids, cyclic semigroups and sub monoids, Subgroups and cosets. Congruence relations on semi groups. Morphisms, Normal sub groups, Elementary applications in coding theory.
5. **Transforms** : Discrete Fourier and Inverse Fourier Transforms in one and two dimensions. Discrete Cosine Transform.

#### **Recommended Books :**

1. Kolman b, Busby R. : Discrete Mathematical Structure for Computer Science, PHI.
2. Knuth, D.E. :The Art of Computer Programming, Volume I, Narosa
3. Gibbons, A.: Algorithmic Graph Theory, Cambridge University Press
4. Liu :Introduction to Discrete Mathematics, McGraw Hill
5. Krishnamurthy :Combinatorics, EWP
6. Liu :Introduction to Combinatorics, McGraw Hill
7. Graham, Knuth, Pratschnik :Concrete Mathematics
8. Deo : Graph Theory, PHI

### **3CP6.1:COMPUTER AIDED NETWORK ANALYSIS (Elective)**

1. **Introduction** : Description and types of spice,types of analysis and limitations of SPICE.
2. **Circuits Descriptions** : Elements values, nodes, circuits elements, source output variables SPICE commands,formats for circuits files and output files,graphic input files.
3. **DC Circuits Analysis** : Resistors,modeling and elements,operating temperature,independent voltage and current sources. Types of outputs and DC analysis.
4. **Transient Analysis** : Capacitors and inductors, modeling and transient source transient current and voltage sources. Transient output variables and commands. Transient response. voltage and current controlled switches.
5. **AC circuit analysis** : Voltage and current output variables.independent AC sources AC analysis magnetic elements transmission lines. multiple analyses.
6. **Advanced spice commands and analysis** : Commands for behavioral modeling,fourier analysis, noise analysis, monte carlo analysis,device and lot tolerance,sensitivity/worst case analysis.
7. **Semi conductor diodes and BJT** : Characteristics,DC and small signal AC analysis,Diode model statement parameters, BJT mode statements, parameters and circuits.
8. **Field Effect Transistors** : JFET, parameters and amplifiers,MOSFET :parameters and amplifiers, Gallium Arsenide MESFETS.
9. **OP AMP Circuits** : DC linear, AC linear and non-linear macro model.
10. **Digital Logic Circuits** : Digital devices and nodes,digital primitives, digital gates and timing models for standard,transtate and bi-directional transfer gates. Flip flops and latches,pull up and pull down, delay line, stimulus devices, digital input and output.
11. **Difficult areas** : Large circuits,running multiple circuits,large outputs, long transient runs, convergence problems, analysis accuracy,negative component values,power switching circuits floating nodes, nodes with less than two connections, voltage source and inductor loops and noise.

### Recommended Books :

1. Muhammad H. Rashid :Spice for circuits and electronics using PSICE, II Ed., Prentice Hall, India.
2. Connant :engineering Circuit Analysis with PSPICE and PROBE, McGraw Hill International.

### 3CP6.2 ELECTRONIC MEASUREMENTS & INSTRUMENTATION

(Elective)

1. **Theory of Error** : Accuracy and precision, repeatability, limits of errors,systematic and random errors and modelling of errors, probable error and standard deviation, Gaussian error analysis, combination of error.
2. **Electronic Instrumentation** : Transistor voltmeter-with transistor, with FET input stage,balanced bridge TVM. Digital voltmeter-ramp type,integrating type and potentiometric type DVM. Measurement of time phase, frequency using digital instruments. Q meter, vector impedance meter and vector voltmeter, RF power and voltage measurement.
3. **Signal Generation Analysis** : The sine wave generator, frequency synthesized signal generator sweep frequency generator, pulse, square and function generators wave analyzer harmonic distortion analyzer and spectrum analyzer. Instrumentation amplifier chopper stabilized and carrier amplifiers. Phase sensitive detectors.
4. **Transducers as Input Elements to Instrumentation Systems** : Classification selection criterion of transducers constructional and operational features. strain gauges,displacement,

velocity, acceleration force torque flow and pressure transducers, temperature measurement and photosensitive devices.

5. **Display Devices and Recorders** : Classification of display devices and systems. Cathode ray tube, light emitting diodes. Incandescent, electroluminescent and liquid crystal displays. Recorders. Storage CRO.

#### **Recommended Books :**

1. Cooper, W.D. and Helfrick, A.D. :Electronic Instrumentation and Measurement Techniques, (PHI)
2. Sawhney, A.K. :Measurements (Dhanpat Rai & Sons)
3. Thomas H.E. and Clark, C.A. :Handbook of Electronic Instruments and Measurement Techniques, (PHI)

#### **3CP6.3. MEDICAL ELECTRONICS (Elective)**

3L

MM:100

Ex. Hr. :3

1. **Introduction of Human Physiology** : Nerve physiology. Functions of nerves and myoneural junctions. Membranae and action potential of nerves. Function of skeletal and smooth muscle and its rhythmic contraction, cardiac muscle. Blood flow system, Arterial pressure Mechanism of respiration. CNS function of spinal cord and cord reflexes. Myo-electrical control of paralyzed muscles.
2. **ECG,EMG and EEG** : Principle & Means of recording non-electrical biological parameters. Signals from micro-electrodes and slat bridge Use of field electric devices as electrometers, driven shield, photon coupled amplifier. Artifacts.
3. **Measurement of biological events** : Electronic methods of measuring blood pressure, skin & systemic body temperature, pulse rate and coronary care monitoring.
4. **Biomedical Instruments** : Electronic pace makers. Implantable power source. Defibrilators. Micropower transmitter for telemetering biosignals. Special characteristics of CRO in bio-medical applications Surgical and therapeutic diathermy units. Physiological simulators. Basic diagnostic X-ray units. Introduction to patient monitoring and intensive care unit. Interference and patient safety. Anaesthetic explosion and fires.
5. **Miscellaneous** : Introduction to heart Lung machines, CT scanners Ultrasound sonography and Doppler measurements, NMR & PET Scans. Use of lasers in medical applications.

#### **Recommended Books :**

1. Webster, J.G. :Medical Instrumentation, Application and Design, John Willey and Sons.
2. Jacobson, B. Wester, J.G.:Medical and Clinical Engineering Prentice Hall, International.
3. Cromwell :Biometical Instrumentation and Measurements. et al. Prentice Hall, International.
4. R.S. Khandipur :Handbook of Biomeideal Instrumentation. Tata McGraw Hill.
5. Carr:Introduction to Biomedical Equipmens, Pearson Education.

#### **3CP6.4 ELECTRICAL TECHNOLOGY (Elective)**

3L

MM:100

Ex. Hr. :3

1. **Electric Drives** : Specifications, Rating of machines, short term continuous and special ratings. Types of motor enclosures and their respective field of applications. Characteristics load. Review

of starting and running characteristics of various D.C. and A.C. industrial motors Relative study of efficiency, power factor, size and cost. Starting and speed control of D.C. and A.C. motors. Electric braking :Plugging, Rheostatic braking and regenerative braking.

2. **Energy Sources and power Generation** : Methods of bulk energy generation. Thermal, Hydro and Nuclear power generation. Elementary ideas of wind and solar power generation.
3. **Transmission and Distribution System** : General idea of transmission and distribution systems, electrical equipment of a sub-station. Interference of power lines with telecommunication circuits. Conductors and insulators for transmission lines. Introduction to underground cables.
4. **Protection** : Causes and consequences of dangerous currents. Basic idea of an over current relay. Carrier current protection of transmission lines. Basic apparatus used in power line carrier system. Principle of operation of directional comparison and phase comparison carrier protection. Elementary idea of static relays and their advantages and limitations. Elementary idea of air, vacuum and sulphur hexafluoride circuit breakers and their comparison.

### References :

1. H.Cotton :Advanced Electrical Technology; Wheeler Pub., London.
2. L.Alangsdorf :AC Machinery; Tata McGraw Hill
3. Ravindra Nath & M.Chandra :Power System protection & Switchgear New Age International, New Delhi.
4. Nagrath Kothari :DC Machines :Tata McGraw Hill.
5. Hughes :Electrical Technology, Pearson Education.

### 3CP6.5 CIRCUIT ANALYSIS (Elective)

3L

MM:100

Ex. Hr. :3

1. **Computer Aided Circuit Analysis** : Introduction to circuit simulation node-incidence matrix, modified node-voltage analysis. Different types of analysis during simulation-DC, AC and transient. Introduction to SPICE and ICAP simulation environment.
2. **Network Theorems** : Thevenin's Norton's Reciprocity. Superposition, Compensation, Miller's. Tellegen's and maximum power transfer theorems, networks with dependent sources.
3. **Transient Analysis** : Impulse, step, ramp and sinusoidal response analysis of first order and second order circuit. Time domain and transformer domain (frequency, Laplace) analysis. Initial and final value theorems.
4. **Linear Network Response to non-sinusoidal inputs** : Complex periodic waves and their analysis by Fourier analysis. Different kind of symmetry. Power in a circuit.
5. **Coupling elements & coupled circuits** : Conductively coupled circuits, Inductively coupled circuits-mutual inductance, coefficient of coupling and mutual inductance between portions of same circuit and between parallel branches. Transformer equivalent to inductively and conductively coupled circuits.
6. **Network Functions** : Terminals and terminal pairs, driving point impedance transfer functions. Poles and zeros. Restrictions on pole-zero location in s-plane. Poles, zeros and frequency response :pole, zero and impulse/step response. Procedures of finding network functions for general two terminal pair networks. Stability and causality Hurwitz polynomial, positive real functions.
7. **Two-port Networks** : Two-port parameters and their interrelations, z-parameters, y-parameters, h-parameters. ABCD parameters Equivalence of two ports, transformer equivalent, interconnection of two-port networks. Image parameters. Attenuation and phase shift in symmetrical T & pi networks.

## References :

1. Kuo, Franklin F. :Network analysis and synthesis, II Ed., 1999,John Wiley & Sons.
2. Desoer,C. and Kuh,E.S.:E.S. Basic Circuit Theory,McGraw Hill.
3. Van Valkenburg, M.E. : Network Analysis Prentice Hall,India.
4. Schaum's Outline series on circuit analysis.
5. Hayt,W. and Kimmerly : Engineering Circuit Analysis, McGraw Hill, Inc.
6. Sudhakar.A. and Shyam Mohan S.P. :Circuits and Networks. Tata McGraw Hill, India.

## 3CP7 HUMANITIES AND SOCIAL SCIENCES

2P

MM :50

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 control :concept and types means. Social problem :concept and types.
4. **The Fundamentals of Economics** :The logic of economics fundamentals definitions of economics,basic terminology.
5. **Micro Economics** : Consumer's behaviour,utility, demand, supply, elasticity of demand and supply. Theory of production,production function,factors of production.
6. **Macro Economics** :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 Globalisation).

## 3CP8. ELECTRONICS LAB-I

3P

MM :100

1. Study the following devices :
  - (a) Analog & digital multimeters
  - (b) Function/Signal generators
  - (c) Regulated D.C. power supplies (constant, voltage and constant current operations).
2. Study of analog CRO,measurement of time period,amplitude,frequency and phase angle using Lissajous figures.
3. Application of diode as clipper and clamper.
4. Plot V-I characteristic of zener diode & study zener diode as voltage, reverse Saturation current and static & dynamic resistances.
5. Plot V-I characteristic of zener diode & study zener diode as voltage regulator. Observe the effect of load changes and determine load limits of the voltage regulator.
6. Plot frequency response curve for audio amplifier and to determine gain bandwidth product.
7. Plot drain current-drain voltage and drain current-gate bias characteristics of field effect transistor and measurement of I & Vp.
8. Plot gain :frequency characterstic of two stage RC coupled amplifier and calculate its bandwidth and compare it with theoretical value.
9. Plot gain :frequency characterstic of two stage RC coupled amplifier and calculate its bandwidth and compare it with theoretical value.

10. Plot input and output characteristics of BJT in CB, CC and CE configurations. Find their h-parameters.
11. Study half wave rectifier and effect of filter network on D.C. voltage output and ripple factor.
12. Study bridge rectifier and measure the effect of filter network on D.C. voltage output and ripple factor.

### **3CP9. DATA PROCESSING LAB**

3P

MM :100

1. Simple array and simple sorting.
2. Addition multiplication and transpose of sparse matrices represented in linked list form.
3. Polynomial addition,multiplication (8th degree polynomials).
4. Implementation of stack and que using array and linked lists.
5. Implementation of circular que using linked list.
6. Infix to postfix/prefix conversion.
7. Quick sort, merge sort and searching algorithms (fibonacci search).
8. Binary tree traversals.
9. Generation of spanning trees for a given graph using bfs and dfs algorithms.
10. AVL tree implementation (creation,insertion,deletion).
11. Symbol table organization (Hash Table).

### **3CP10. DIGITAL ELECTRONICS LAB**

2P

MM :100

1. Experimental study of characteristics of CMOS integrated circuits.
2. Interfacing of CMOS to TTL and CMOS.
3. Study of various combinatorial circuits based on : AND/NAND Logic blocks and OR/NOR Logic blocks.
4. Study of following combinational circuits :Multiplexer; demultiplexer and Encoder. Verify truth tables of various logic functions.
5. To study various waveforms at different points of transistor dbistable multivibrator and its frequency variation with different parameters.
6. To study transistor astable multivibrator.
7. To design a frequency driver using IC-555/timer.
8. To study Schmit trigger circuit.
9. To study OP-AMP as Current to voltage and voltage to current converter comparator.
10. BCD to binary conversion on digital/IC trainer.
11. Study various Flip flps and construct Parallel-in-Serial Out register.

Testing of digital IC by automatic digital IC trainer.

## **Semester IV**

### **4CP1. STATISTICS & PROBABILITY THEORY**

3L+IT

MM:100

Ex. Hr. :3

1. **Introduction** : Sample space, Events, Algebra of events, Bayes' Rule, Bernoulli Trials.
2. **Probability Distribution and Probability Densities** : Bernoulli, Binomial, Poisson, Normal, rectangular and exponential distributions and their PDFs. Moments and MGFs for above distributions.
3. **Discrete Random Variables** : Random Variables and their event space, probability mass function. Distribution Functions. Probability Generating Function.
4. **Expectations** : Moments, Computation of mean Time to failure.
5. **Bernoulli & Poisson Processes**.
6. **Queuing Theory** : Pure birth, Pure Death and Birth-Death Processes, mathematical Models for M/M/I, M/M/N, M/M/S and M/M/S/N/ queues.
7. **Discrete Parameter Markov Chains** : M/G/I Queuing Model, Discrete Parameter Birth-Death Process.
8. **Network of queues** : Open Queuing Networks.
9. **Correlation & Regression** : Linear regression, Method of least squares, Normal regression and correlation Analysis.

### References :

1. K.S.Trivedi : Probability & Statistics with RELIABILITY Queuing and Computer Science Application (PHI)
2. J.E. Freund & R.E. Walpole : Mathematical Statistics
3. Taha : Operational Research
4. Kapoor & Saxena : Statistics & Probability
5. Gokhroo et al. : Advanced Engg. Statistics (4CP1)

### **4CP2. PRINCIPLES OF PROGRAMMING LANGUAGES**

3L

MM:100

Ex. Hr. :3

Importance of programming languages. brief history and features. good programming languages.

The computer organization hardware and firmware translator and software simulated computers. Syntax semantics and virtual computers. Hierarchies of computers. Binding and binding time.

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.

Evolution of the concept of data type, abstractions, encapsulation and information hiding, sub-programs, type, definition and abstract data types. Implicit and explicit sequence control, sequence control within expression and between statements. Subprogram sequence control, Recursive subprograms, exception and exception handlers. Coroutines and scheduled subprograms, task and concurrent exception.

Name and referencing environments, Static dynamic and block structure. Local data and local referencing environments.

Dynamic and static scope of shared data. Block structure, parameters, and their transmission, task and shared data stored requirement for major run-time elements. Program and system controlled storage management. Static and stack based storage management. Fixed size and variable size heap storage management.

Programming environments for Batch-processing,interactive,embedded systems. Problem in syntax,translation and Semantics.

Brief overview of FORTRAN and PASCAL languages.

### **Recommended Books :**

1. V.Rajaraman :Fundamentals of Computers
2. Ghezzi :Programming Language Concepts,Addison Wesley.
3. Kernighan,Ritchie :Programming in C
4. Stroustrup :Programming in C++
5. Pratt :Programming Languages
6. Ravi Shetty:Programming Languages

### **4CP3. TELECOM ENGINEERING FUNDAMENTALS**

3L

MM:100

Ex. Hr. :3

1. **Telecommunication Need and Applications** : Information Explosion in industry,government and military applications estimated bandwidth need and electromagnetic spectrum of telecommunication.
2. **Communication Model** : Transmission system in communication introduction to WAN, MAN and LANs. broadband and narrowband ISDN Protocols and protocol architectures. Layered Architecture. Introduction to TCP/IP protocol Architecture.
3. **Data Transmission** :Concepts and terminology, Frequency spectrum and bandwidth. Time domain and frequency domain analysis/and digital data transmission. audio and video signals. Transmission impairments Guided transmission media,audio and video signals. Transmission impairments. Guided transmission media,twisted pair,UTP cables. Coaxial and optical fibre cables, wireless microwave and satellite transmission.
4. **Data Encoding** :Amplitude,frequency and phase modulation techniques, NRZ-I, Bipolar AMI, manchester and differential manchester encoding techniques. Scrambling techniques. ASK, FSK and PSK techniques. Pulse code and pulse Amplitude Modulations. Delta Modulations.
5. **Multiplexing** :Frequency Division Multiplexing,Synchronous Time Division Multiplexing,Statistical Time Division Multiplexing.
6. **Switching Networks** : Circuit switching Networks,space and time division switching,routing in circuit switched networks. Control signalling Packet Switching principles. Fixed,flooping and adaptive routing strategies-X.25 interface,packet format and X.28 protocol.
7. **Frame Relay** : Frame Relay protocol Architecture-Frame Relay Call control and congestion control.
8. **MAC Sublayer** : Channel allocation problem,pure and slotted ALOHA protocols,persisted and Non-persisted CSMA, Collision free protocols,Digital cellular adio,CDMA.

### **Recommended Books :**

1. William Stallings :Data and Computer Communications (PHI, 5<sup>th</sup> Ed.)
2. James Martin :Telecommunication and the Computer (PHI,3<sup>rd</sup> Ed.)
3. A.S. Tanenbaum :Computer Networks (PHI,3<sup>rd</sup> Ed.)

#### **4CP4. SOFTWARE ENGINEERING-I**

3L+1T

MM:100

Ex. Hr. :3

1. **System Analysis** : Characteristics, Problems in system Development, 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 estimation model, risk analysis, software project scheduling.
3. **Software Development** : Life Cycle (SWDLC), SWDLC models software engineering approaches.
4. **Requirement 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 behavioural modeling, extension for data intensive applications.
6. **Object Oriented Analysis** : Object oriented concepts, Object oriented Analysis Modeling, Data modeling.
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 modularization.
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 Approach, McGraw Hill International
2. A. Behforooz and F.J. Hudson: Software Engineering Fundamentals Oxford University Press

#### **4CP5. COMPUTER GRAPHICS**

3L

MM:100

Ex. Hr. :3

Introduction to interactive computer graphic, picture analysis, overview of programmer's model of interactive graphics. Fundamental problems in geometry.

Basic Raster Graphics : Scan conversion, filling and clipping, Text Generation & Thickening.

Geometric manipulation : Transformation, Matrices, Homogeneous coordinates.

Elementary 3-D graphics; Plane projections, vanishing points, specification of 3-D view.

Visibility; Image and object precision, z-buffer algorithms, area based algorithms, floating horizon.

Curves and Surfaces : Parametric Representation, Bezier and B-Spline curves Rendering : Ray tracing, antialiasing. Gouraud and Phong Shading.

#### **Recommended Books :**

1. J.Foley, A. Van dam, S.Feiner,J.Hughes :Computer Graphics Principles and Practice. Addison Wesley.
2. D.Rogers and Adams :Mathematical Elements of computer Graphics McGraw Hill.
3. D.Hearn and Baker :Computer Graphics PHI.

#### **4CP6.1. LINE COMMUNICATION (Elective)**

3L

MM:100

Ex. Hr. :3

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 frequencies,Losses in transmission line, Transmission equalizers. Characteristics of quarterwave,half wave and other lengths. Smith chart and its application. Transmission line applications. 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, Lattices filter section.
3. **Carrier Telephony** : Multi-channel systems; Frequency division and time division multiplexing,power time carrier communication.
4. **Telephone Transmission** : Telephone Instrument;Rotary dial and Touch tone dial types,two wire/four wire transmission:Echo & singing, Echo suppressors and cancellers.cross talk.
5. **Basic Of Automatic Telephony** : Trunking concepts.Grade of service,Traffic definition,Introduction to switching networks,classification of switching systems. Electronic Exchange,EPABX and SPC Exchange,principle of STD, ISD.
6. **Recent Trends in Telecommunication** : Voice frequency telegraphy, Fascimile and telex services.

#### **Recommended Books :**

1. W.Fraces-Telecommunications (BPB Publication)
2. T.Vishvanathan-Telecommunication Switching Systems & Networks (PHE)

#### **4CP6.2. MANAGEMENT INFORMATION SYSTEMS**

3L

MM:100

Ex. Hr. :3

1. **Introduction** :MIS concept,Definition,Role & Impact of MIS,process of management,organisation structure and behaviour.
2. **Basic of Management Information System** :Decision Making,Information concepts,system concepts and control types of system, handling system complexity, system development model.
3. **Development of Management Information System** :Requirement and implementation of MIS. Choice of Information Technology for Management Information System.
4. **Applications of management Information System** :Application in manufacturing sector; using for Personnel Management. Financial Management Production Management material management,marketing Management Application in Service Sector.
5. **Enterprise Resoure Planning (ERP)** : EMS,ERP, Benefits implementation, EMS & MIS.
6. **Case Studies** : Application of SAP<sup>TM</sup> technologies in manufacturing sector.

### Recommended Books :

1. W.S.Jawadekar :Management Information System, (Tata McGraw Hill)
2. Loudon & Loudon-Management Information Systems, Pearson Education Asia.

### 4CP6.3. NEURO COMPUTING AND FUZZY LOGICS

3L

MM:100

Ex. Hr. :3

1. **Artificial Neural Networks : basics** : Trends in computing, patterns and data Pattern recognition tasks : Association, classification, grouping feature pattern recognition. Biological & artificial neural networks characteristics, performance,terminology models; mp neuron, preceptron and adaline. Topology for ANN, Basic learning law and Methods: Hebb's law, preceptron law, LWS law, correlation law,instar law and their comparison. Activation dynamics modek,synoptic dynamics model,learning methods :Hebbian, differential Habbian, competitive,differential competitive, error correction, reinforcement,stochiastic learning and learning functions. Stability and convergence.
2. **Fuzzy Mathematics** :Basic definitions and operations :crispness. vagueness, fuzzyness, uncertainty, degree of truth, convexity and cardinality of sets, and or, intersection, union, complement. Types of sets and algebraic operations :m-1, probablistic, L-fuzzy intuitional fuzzy, rough sets. Cartesian product, mth power, m algebraic sum, bounded sum, bounded difference, algebraic product, triangular norms and conorms,averaging operators like fuzzy and fuzzy-or,compensatory and non compensatory and the selection criteria. Fuzzy measures of fuzzyness and extension principle. Fuzzy measure,possibility measure,entropy and distance,extension principle, operations for type-2 fuzzy sets,algebraic operations with fuzzy members special extended operations,entended operations for L.R. representations of fuzzy sets Fuzzy relations, fuzzy graphs and fuzzy analysis. Fuzzy relations properties of min max composition. fuzzy graphs and special fuzzy relations. Fuzzy function over a crisp interval,integration of a crisp function over a fuzzy interval fuzzy differentiation.
3. **Applications in pattern recognition** :Models for pattern recognition data pattern space feature space and feature selection classification and classification space clustering methods and cluster validity.

### Recommended Books :

1. B.Yagna Narayan :Artificial neural networks,Prentice hall,India.
2. H.J.Zimmernann :Fuzzy set theory and it's Applications, 2nd Ed., Allied Publishers,India.

### 4CP6.4 ANALOG & DIGITAL COMMUNICATION

3L

MM:100

Ex. Hr. :3

1. **Modulation of Signals** :Principles of Analog modulation techniques like AM, FM, PM, SSB, Generation & detection. Frequency division multiplexer. Pulse modulation :Pulse transmission over band-limited signals,sampling theory,pulse amplitude modulation.
2. **Digital Communication** : PCM,DCPM,DM,ADM, comparison of above systems on the basis of performance criteria such as bit transmission,signalling rate, error probability, S/N ratio, bandwidth requirement. ISI & Eye diagrams.

3. **Digital modulation techniques** :Data transmission using techniques such as PSK, FSK, QFSK (QAM), MSK Inter system comparison.
4. **Introduction to communication channel** :Transmission line :Primary and secondary line constant,telephone lines and cables,public switch telephone network (Electronic exchange). Introduction of fibre optic communication :Principles of light communication in fibre,losses in fibre,dispersion,light source and photo detector,connectors and splicers.
5. **Introduction to Coding Tech.** :Information theory,channel capacity,Shannon's theorem,source coding,error control coding,error detection and correction,block code,cycle code,line code channel throughput and efficiency.

### References :

1. G.Kennedy :Electronic Communications Systems, Tata McGraw Hill.
2. P.Chakrabarti :Analog Communication Systems,Danpat Rai & Co.
3. P.Chakrabarti :Digital Communication Systems,Danpat Rai & Co.
4. H.Taub & D.L.Schilling :Principles of Communication Systems, Tata McGraw Hill.

### 4CP7. OBJECT ORIENTED PROGRAMMING LAB

3P

MM :100

#### Programs in C++ Java

1. Write a program to perform the complex arithmetic.
2. Write a program to perform the rational number arithmetic.
3. Write a program to perform the matrix operations (Transpose, addition, subtraction, multiplication, issymmetric).
4. Implement Morse code to text conversion and vice-versa.
5. To implement lower of Hanoi problem.

#### **Program in Java**

6. To implement spell checker using dictionary.
7. To implement a Color selector from a given set of colors.
8. To implement a shape selector from a given set of shapes.
9. By mapping keys to pens of different colours,implement Turtle graphics.
10. To implement a calculator with its functionality.
11. To implement a graph and display BF/DFS order of nodes.
12. To implement a graph and display BF/DFS order of nodes

### 4CP8 COMMUNICATION LAB

3P

MM:100

Ex. Hr. :3

1. Harmonic analysis of a square wave of modulated wave form
2. Observe the amplitude modulated waveform and measures modulation index . Demodulation of the AM signal
3. To modulate a high frequency carrier with sinusoidal signal to obtain FM signal .Demodulation of the FM signal
4. To observe the following in a transmission line demonstrator kit :
  - i. The propagation of pulse in non-reflecting Transmission line .
  - ii. The effect of losses in Transmission line .

- iii. The resonance characteristics of a half wave length long x-mission line.
5. To study and observe the operation of a superheterodyne receiver
6. To modulate a pulse carrier with sinusoidal signal to obtain PWM signal and demodulate it .
7. To modulate a pulse carrier with sinusoidal signal to obtain PPM signal and demodulate it.
8. To observe pulse amplitude modulated waveform and its demodulation.
9. To observe the operation of a PCM encoder and decoder .To consider reason for using digital signals x-missions of analog signals.
10. Produce ASK signals , with and without carrier suppression, Examine the different processes required for demodulation in the two cases.
11. To observe the FSK wave forms and demodulate the FSK signals based on the properties of (a) tuned circuits (b) on PLL.

### **4CP9 DATA STRUCTURES LAB**

3P

MM:100

Ex. Hr. :3

#### **MS WORD**

1. To be familiar with features of MS Word by creating a text document with different fonts, sizes ,indentation and justification.
2. To create a table of data about students in a class regarding name,age,sex and % marks obtained in five subjects. Then generate histograms and pie charts, using MS-Paint .MS-Word for different parameters and put in a common file . MS EXCEL/LOTUS
3. Create following using a spread sheet software :
  - i. Meter readers diary page containing following fields : Name & Address ,meter ,number ,previous ,reading,current reading ,consumption ,remarks of lock,no meter, defective etc.
  - ii. Ledger Page Containing following fields in addition,type of connection,rate ,charges, bill no. date ,amount paid,date ,status (due/over) .Amount.
  - iii. Customer bill page containing relevant information for current month and last months status.
  - iv. Status Report for station power input,consumption record,theft. anticipated collection ,actual collection ,Revenue loss.
4. Make a telephone directory containing name,address (with Pin code) and phone number and print it according to names, telephone numbers and postal zones. DBASE/FOXPRO
5. Create an advanced booking system for a cinema hall
6. Create a database for a Namkeen Bhandar to handle product purchase scheduler ,preparation scheduler,payment,collection ,daily wastage and business status. **VISUAL BASIC**
7. Given the density of material and dimensions of a round bottom flask calculate its capacity and weight.
8. Write a program to compute binomial coefficient of rth term.
9. Intensity of light at a point is given by  $I=I^0 \cos^2 \theta$  Calculate and plot the intensity of light at different points on floor due to a 1000 watt lamp at a height of 4 meters .
10. Write a program to show a moving projectile on a monitor and trajectory covered and to be covered by it. **POWER POINT**
11. Prepare power points slides on a given topic including table and charts .
12. Improve the slides by adding buttons ,connecting to websites , use animation and running other executable programs .

### **4CP10 ELECTRONICS LAB-II**

3P

MM:100

Ex. Hr. :3

1. Plot gain-frequency characteristics of BJT amplifier with and without negative feedback in the emitter circuit and determine bandwidths, gain bandwidth products and gains at 1 kHz with and without negative feedback.
2. Study of series and shunt voltage regulators and measure line and load regulation and ripple factor.
3. Plot and study the characteristics of small signal amplifier using FET.
4. Study of push pull amplifier. To study variation of output power & distortion with load
5. Study Wein bridge oscillator and observe the effect of variation in R & C on oscillator frequency.
6. Study the transistor phase shift oscillator and observe the effect of variation in R & C on oscillator and observe the variation of on oscillator frequency
7. Study the Colpitts oscillator and observe the effect of variation of C on oscillator frequency
8. Study op-amp in inverting and non-inverting models & Use op-amp as scalar, summer and voltage follower.
9. Use of op-amp as differentiator and integrator.
10. 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.
11. Study a digital CRO and store a transient on it.

## Semester V

### 5CPI SOFTWARE ENGINEERING -II

3L

MM:100

Ex. Hr. :3

1. **REVIEW OF CONCEPTS** : SWDLC models, Requirement Analysis, Structured Analysis, Data Oriented Analysis & Object Oriented Analysis
2. **CODING FUNDAMENTALS** : Programming Languages (Features of Programming Languages, Selection of Programming Languages.) Programming Style & Quality (Style Rules, program Quality), Programming Example (Design, Analysis, Main Data Structure, High Level Programming Structures, Description of Design and Development Process).
3. **SOFTWARE TESTING** : Software Testing Fundamentals. Text Case Design, White-Box Testing, Basis Path testing, Control Structure Testing, Black Box, Testing and Testing for Specialized Environments, Architectures and Applications.
4. **DEBUGGING** : Program Error, Debugging Process (Information Gathering, Fault Isolation, Fault Confirmation, Documentation, Fixing fault, Testing) Debugging Example.
5. **SOFTWARE CONFIGURATION MANAGEMENT** : SCM Process, Objects in Software configuration, Version control, Change control, Configuration audit, Status reporting, SCM standards.
6. **SOFTWARE QUALITY ASSURANCE** : Quality Concepts, Quality Movement, SQA Activities and Formal Approaches to SQA.
7. **WEB ENGINEERING** : Attributes of Web-Based Applications. Web process and formulating and Analyzing Web-Based Systems.

#### *Recommended Books :*

1. Roger S. Pressman- Software Engineering, fifth Edition, Mc-Graw Hill Publications.
2. Ali Behforooz and Frederick J. Hudson- Software Engineering. Oxford Press.
3. Ian Sommerville-Software Engineering, Pearson Education India.

### 5CP2 DATA BASE MANAGEMENT SYSTEMS.

1. **INTRODUCTION TO DATABASE SYSTEMS:** Overview and History of DBMS .File System vs DBMS .Advantage of DBMS Describing and Storing Data in a DBMS . Queries in DBMS .Transaction management and Structure of a DBMS.
2. **ENTITY RELATIONSHIP MODEL :** Overview of Data Design Entities ,Attributes and Entity Sets, Relationship and Relationship Sets. Features of the ER Model -Key Constraints ,Participation Constraints ,Weak Entities, Class Hierachies ,Aggregation,Conceptual Data Base ,Design with ER Model-Entity vs Attribute ,Entity vs Relationship Binary vs Ternary Relationship and Aggregation vs ternary Relationship Conceptual Design for a Large Enterprise
3. **RELATIONSHIP ALGEBRA AND CALCULUS :** Relationship Algebra Selection and Projection,Set Operations, Renaming ,Joins, Division,Relation Calculus ,Expressive Power of Algebra and Calculus.
4. **SQL QUERIES PROGRAMMING AND TRIGGERS:** The Forms of a Basic SQL Query ,Union ,Intersect and Except,Nested Queries ,Correlated Nested Queries ,Set-Comparision Operations, Aggregate Operators ,Null Values and Embedded SQLm Dynamic SQL,ODBC and JDBC, Triggers and Active Databases,
5. **SCHEMA REFINEMENT AND NORMAL FORMS:** Introductions to Schema Refinement ,Functional Dependencies ,Boyce-Codd Normal Forms, Third Normal Form, Normalization-Decomposition into BCNF Decomposition into 3-NF
6. **INTERNET DATABASES:** Databases and the web ,Architecture Application,Server and Server Side Java,XML-DTDs, XML-QL
7. **OBJECT ORIENTED DATABASE SYSTEMS:** Object ,Object Identity and Reference Types,Inheritance and Data Design for ORDBMS.

*Recommended Books :*

1. Raghu Rama Krishnan : Database Managment Systems ,2nd ed: Tata Mc-Graw Hill
2. Elmasri -Fundamentals of Data Base Systems ,pearson Educations.
3. Silverschatz Korth and Sudarshan -Database Systems Concepts, 4th ed. Tata Mc-Graw Hill.
4. Gordon C- Everest -Database Management Objectives Systems Functions and Administration. Tata Mc-Graw Hill.

### **5CP3 MICROPROCESSOR AND INTERFACES**

1. **INRODUCTION TO MICROCOMPUTER SYSTEMS :**Microprocessor, microcomputer and microcomputer devices. Machine and assembly language Bus concept.
2. **ARCHITECTURE :** Comparative study of 8085-A 8086 (Pinout ,internal architecture ,timing diagrams ). Instruction format and addressing modes.
3. **ASSEMBLY LANGUAGE AND PROGRAMMING IN 8085:** Instruction set, Program Strucures (sequential, conditional ,iterative ) Macros and subroutines,Stack counter and timing delay.Interrupt structure and its programming.
4. **DEVICES AND INTERFACING :** System buses : STD and ISA Memory(static, dynamic & various PROM). Architecture, chatracteristics and interfacing of the following devices. DMA Controller 8257, Interrupt Controller 8259A, USART 8251, PPI 8255, Timer 8254 and keyboard display controller 8279; Level converters MC 1488 and MC 1489. Communication buses:Centronics, IEEE-488, Current loop,RS 232C, RS 422A & RS423A.
5. **INTRODUCTION TO 8051 MICROCONTROLLER :**Architecture and Programming model,Internal RAM and Registers, I/O Ports, Interrupt System and Instruction set.

### **Recommended Books :**

1. Gaonkar-8085 Programming, Penram Press.
2. A.P. Mathur-Introduction to Microprocessors, Tata Mc-Graw-Hill.
3. Antanakos-Introduction to Intel Family Microprocessors, Pearson Education.
4. Gilmore-Microprocessors Principles and Applications, Tata Mc-Graw Hill.
5. B.Ram-Fundamentals of Microprocessors & Micro Computers,Dhanpat Rai Pub.
6. Ray and Bhurchandi-Intel Microprocessors, Tata-Mc-Graw Hill.

### **5CP4 COMPUTER ARCHITECTURE**

3L

MM :100

1. **REGISTER TRANSFER LANGUAGE** :Data movement around registers. Data movement from/to memory,arithmetic and logic micro operations. Concept of bus and timing in register transfer.
2. **CPU ORGANISATION** :Addressing Modes,Instruction Format. CPU organization with large registers, stacks and handling of interrupts & subroutines Instruction pipelining.
3. **ARITHMETIC ALGORITHM**:Array multiplier, Booth's algorithm. Addition subtraction for signed unsigned numbers 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. J.P.Hayes -'Computer Architecture & organization', Mc-Graw Hill.
2. Heuring-Computer System Design and Architecture,Pearson Education.
3. M.MORRISMANN-'Computer System Architecture', Prentice Hall of India.
4. Bartee-Computer Architecture, Tata Mc-Graw Hill.
5. Stallings-Computer Organization and Architecture,Pearson Education.

### **5CP5. THEORY COMPUTATION**

3L

MM :100

1. **MATHEMATICAL NOTATIONS AND TECHNIQUES** :Sets, Logic, Function, Relations and Languages. Inductive Proofs and Recursive Definitions.
2. **REGULAR LANGUAGES AND FINITE AUTOMATA** : Regular Languages and Regular Expressions,Finite Automata,Kleen's Theroem, Properties of Regular Languages Pumping Lemma, Non-Determinism Finite Automata with Output and Decision Problems.
3. **CONTEXT-FREE LANGUAGESAND PUSHDOWN AUTOMATA** :Context-Free Grammars, Union, Conccatation of CFG. Derivation Trees,Ambiguity,Simplified and Normal Forms.Pushdown Automata, Deterministic PDA, PDA for given CFG and CFG for given PDA Pumping Lemma for Context\_Free Languages and Decision Problems moving Context-Free Language.

4. **TURNING MACHINES** :Definition, Turing Machines as Languages Acceptor,Combining Turing Machines, Variations of Turing Machines Nondeterministic Turing Machines. Universal Turing Machines Recursively Enumerable and Recursive languages. Unrestricted Grammers and Turing Machines. Context-Sensitive Grammers and Linear-Bounded Automata. The Chomasky Hierarchy.

#### **Recommended Book:**

1. John E.Hopcroft,Rajeev Motwani and J.D. Ulman, Introduction to Automata theory Languages and Computation, Pearson Education Asia.
2. John C. Martin, Introduction to Languages and the Theory of Computation, TMH.
3. Cohen, Introduction to Computer Theory, Pearson Education Asia.

### **5CP6.1 LOGICAL AND FUNCTIONAL PROGRAMMING**

3L

MM :100

1. **PROPOSITIONS** :Fully parenthesized propositions, Evaluation of constant propositions, Evaluation of proposition in a state. Precedence rules for operators, Tautologies, Propositions a sets of states and Transforming English to prepositional form.
2. **REASONING USING EQUIVALENCE TRANSFORMATIONS** :The laws of equivalence,rules of substitution and transitivity, formal system of axioms and Inference rules.
3. **NATURAL DEDUCTION SYSTEM** : Introduction to deductive proofs, Inference rules, proofs and subproofs,adding flexibility to the natural deduction system and developing natural deduction system proofs.
4. **PREDICATES** : Extending the range of a state,Quantification,Free and Bound Identifiers Textual substitution, Quantification over other ranges and some theorems about textual substitution and states.
5. **LOGIC PROGRAMMING** : Introduction to prepositional and predicate calculus, First-order predicate calculus, Format logical systems, PROLOG programming-Facts, Rules and queries, Implementations, Applications, Strengths and Weaknesses.
6. **FUNCTIONAL PROGRAMMING** :Introduction to lambda calculus-Syntax and semantics, Computability and correctness. Features of Functional Languages-Composition of functions,Functions as first-class Objects, no side effects and clean semantics,LISP Programming-Data types and structures,Scheme dialect,primitive functions,functions for constructing functions and functional forms. Applications of functional languages and comparison of functional and imperative languages.

#### **Recommended Books :**

1. Appleby-Programming Languages, Tata Mc-Graw Hill.
2. Sebesta-Concepts of Programming Languages, Pearson Education.
3. David Gries-The Science of programming,Narosa Publication House.

### **5CP6.2 IC TECHNOLOGY**

3L

MM :100

1. **INTRODUCTION TO TECHNOLOGIES** :Semiconductor Substrate-Crystal defects. Electronic Grade Silicon. Czochraslki 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,Analytical solution of ficks law,Correction to simple theory, Diffusion in SiO<sub>2</sub>Ion Implantation and Ion Implantation Systems, Growth mechanism and Deal-Grove Model of Oxidation, Linear and Parabolic Rate Coefficient,the structure of SiO<sub>2</sub> Oxidation techniques and system, Oxide Properties.
3. **CHEMICAL VAPOUR DEPOSITION 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-Vapor Phase epitaxy, Defects in Epitaxial growth, Metal Organic Chemical Vapor Phase, 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 conserdation for IC Processing NMOS IC Technology, COMOS IC Technology, Biploar IC Technology.

### Recommended Books :

1. S.M.Sze-VLSI Technology,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.

### 5CP6.3 ADVANCED DATA STRUCTURES

3L

MM :100

1. **ADVANCED TREES** :Definitions Operations on Weight Balanced Trees (Huffman Trees),2-3 Trees and Red-Black Trees. Augmenting Red-Black Trees to Dynamic Order Statics and Interval Tree Applications. Operations on Disjoint sets and its union-find problem Implementing Sets. Dictionaries, Priority Queues and Concatenable Queues using 2-3 Trees.
2. **MERGEABLE HEAPS** : Mergeble Heap Operations,Binomial Trees Implementing Binomial Heaps and its Operations, 2-3-4. Trees and 2-3-4 Heaps. Structure and Potential Function of Fibonacci Heap Implementing Fibonacci Heap.
3. **GRAPH THEORY DEFINITIONS** :Definitions of Isomorphism Components. Circuits,Fundamental Circuits, Cut-sets. Cut-Vertices Planer and Dual graphs,Spanning Trees, Kuratovski's two Graphs.
4. **GRAPH THEORY ALGORITHMS** :Algorithms for Connectness, Finding all Spanning Trees in a Weighted Graph and Planarity Testing Breadth First and Depth First Search, Topological Sort, Strongly Connected Components and Aritculation Point. Single source shortest path and all pair shortest path algorithms. Min-Cut Max-Flow theorem of Network Flows. Ford-Fulkerson Max Flow Algorithms.

### Recommended Books :

1. Narsingh Deo-Graph Theory with Application to Engineering and Computer Science,Prentice Hall of India.
2. Baase-Computer Algorithms,pearson Education.
3. Cormen-Introduction to Algorithms,Prentice Hall of India.
4. Aho A.V.,Hopcrptt J.E. and Ullman J.D.-The Design and Analysis of Computer Algorithms, Pearson Education.
5. Horowitz and Sawhni-Fundamentals of Data Structures Galgotia Book Source.

#### **5CP6.4 INFORMATION THEORY & CODING**

1. **ELEMENTS OF INFORMATION THEORY** :Measure of Information,Average Information,Entropy,Information rate. Comunication channel,Discrete,Discrete and continuous channel,Shannon-Hartley theorem and its implications, Channel capacity, Gaussian channel, Bandwidth-S/N tradeoff.
2. **INTRODUCTION OF CODING** :Types of errors, Types of codes, Error control coding. Methods of controlling errors.
3. **LINEAR BLOCK AND BINARY CYCLIC CODES** : Matrix decryption of linear block codes, Error detection and error correction capabilities of linear block codes. Hamming codes,structure of cyclic codes,encoding using an (n-k) bit shift register,syndrome calculation,its error detection & correction,Special classes of cyclic codes :BCH.
4. **BURST AND CONVOLUTIONAL CODES** :Burst and random error correcting codes, Encoders for convolutional codes, Decoders for convolutional codes,performance of convolutional codes,performance of block codes in error correction & detection. Comparison of error rates in coded and uncoded transmission.

#### **Recommended Books :**

1. K. Sam Shanmugam-"Digital and Analog Communication System", John Wiley Sons.
2. Herbor Taub Donald Schilling- "Principal of Comunication System". Tata Mc-Graw Hill.

#### **5CP6.5 OPTICAL COMMUNICATION**

1. **OPTICAL FIBERS** : Basic optical laws and definitions. Principles of light propagation in fibers. 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. **SIGNALS DEGRADATION IN OPTICAL FIBERS** :Attenuation signal distortion in optical fibers,Pulse broadening. Dispersion modified SM fibers.
3. **OPTICAL SOURCES**: LEDs - Structure, Materials, Characteristics, Power & efficiency. Laser Diodes - Basic concepts, Structure, properties and modulation.
4. **OPTICAL DETECTORS** :PIN and Avalanche photo diode,photo detector noise,detector response time. Avalanche multiplication noise. Photo diode materials. Optical receivers.
5. **POWER LAUNCHING & COUPLING** :Source to fiber coupling, fiber to fiber joints,fiber splicing,fiber connectors.
6. **OPTICAL FIBER COMMUNICATION SYSTEMS** : Principal components. Design considerations & Applications, Wavelength division multiplexing.

#### **Recommended Books :**

1. Gerd Keiser-Optical Fiber Communications, Tata Mc Graw Hill.
2. J.N.Senior-Optical Fiber Communication,Prentice Hall of India.
3. J.Gowar-Optical Communication Systems, Prentice Hall of India.
4. J.Wilson & Hawkes-Opto Electronics-An Introduction,prentice Hall of India.

### **5CP7 SYSTEM ANALYSIS AND DESIGN LAB**

3P

MM :75

**Each of the experiment is designed for two lab. Classes.Experiment 1-4 can be carried in Turbo Analyst or any other Software Engineering Tools.Remaining Systems can be designed in C++/Java/Foxpro.**

1-2 Perform system modeling using Turbo-Analyst Tool for A Book Store Management System. System handles user enquiry about available books and manages inventory. Billing for customers, and reorder placement for books.

3-4 Perform system modeling using Turbo-Analyst Tool for Library Management System,which handles issue and return of books,imposes fine for late return of books, and handles inquiries about book availability.

5-6 Design of complete system for Book Store Management mentioned in 1-2.

7-8 Design complete system for Library Management System which only deals with issue and return of books.

9-10 Design a System for Electricity Billing System.

11-12. Design a Bus Reservation System for making reservation in five 40-seated 2x2 buses for live different routes. Customers can opt for window seats and front seats.

### **5CP8 COMPUTER GRAPHICS LAB**

3P

MM :75

1. .Simulate a low resolution raster screen and implement on it-
  - i. mid point algorithm for scan converting lines at any angle with pixels of constant and variable intensity.
  - ii. mid point ellipse scan conversion.
  - iii. mid point circle scan conversion.
2. Draw simple geometric figures (ellipse,rectangle,triangle) and implement the fill, translation and resizing operations.
3. On a low resolution raster screen implement-
  - i. Thick line algorithm accommodating line style,pen style and pattern.
  - ii. Cohen-Southerland line clipping algorithm.
  - iii. Southerland-Holdgman polygon clipping algorithm.
4. Write a program to perform 2D incremental rotation with/without shear of a geometrical object, at desired speed.
5. Program a 3D clipping algorithm for parallel and perspective projection (say of a house).
6. Write a program to accept an arbitrary geometry matrix,basis matrix and list of control points, and to draw the corresponding curve.
7. Implement a procedure to draw text centered in an opaque rectangle with thin border. Let the user specify colours (text, borders, background), Type (Font, letter size and screen position) and text string. If can't fit in one line,break it at appropriate places to make multiline text, implement both the multiline text and multiscan text.
8. Write an interactive program allowing user to create, Interactively manipulate and refine piecewise continuous cubic curve represented as beta spline and Hermite Bezier.

9. Write a program to display on a grey background distinct squares coloured as orange, red, green, blue, cyan, magenta & yellow. Each square has  $n \times n$  pixels. Where  $n$  is an input, find out value of  $n$  to unambiguously identify each square-
  - a. from a distance of 24 inch.
  - b. from a distance of 48 inch.
  - c. study the effect of changing background colour on above.
10. Implement a ray tracer for spheres and polygons.
11. Write a program to interpolate linearly between two colour in RGB,HSV and HSL schemes.
12. Write a program to draw a robot capable of moving in a room and animate it to pick an object from one point and place at other.

### **5CP9 MICROPROCESSORS LAB-I**

3P

MM :75

1. Study the hardware functions memory structure and operation of 8085 microprocessor kit.
2. Program to perform integer division:(i) 8-bit by 8-bit (ii) 16-bit by 8-bit.
3. Transfer of a block data in memory to another place in memory in the forward and reverse order.
4. Searching a number in an array and finding its parity.
5. Sorting of array in: (i) Ascending (ii) Descending order.
6. Programme to perform following conversion:(i) BCD to ASCII (ii) BCD to Haxadecimal.
7. Programme to multiply two 8-bit numbers.
8. Programme to generate and sum 15 fibonacci numbers.
9. Programme for rolling display of message "INDIAN".
10. To insert 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 waveform on 8253/8254 programmable timer.

### **5CP10 UNIX SHELL PROGRAMMING LAB**

3P

MM :75

- 1.2 Write a shell script to create a file in \$USER/class/batch directory.Follow the intructions-
  - (i) Input a page profile to yourself,copy it into other existing file;
  - (ii) Start printing file.at line 5;
  - (iii) Print all difference between two file,copy the two files into files;
  - (iv) Print lines matching 3 word pattern. (e.g.name is Mr.);
- 3-4 Write shell scripts for-
  - (i) Showing the count of users logged in.
  - Printing 3-column list of files in your home directory.
  - Listing your job with below normal priority.
  - Continue running your job after logging out.
5. Write a shell script to change data format. Show the time taken in execution of this script.
6. Write a shell script to print file names one per line in a directory showing serial number of the file. (Hint: use for loop)
7. Write a shell script to sort a list of file either in alphabetic order or largest file first according to user response.
8. Write a shell script to print the name and the time of login sorted by time (Hint:use awk)
9. Write a shell script to count the lines. Words and characters in its input (Note :Don't use we)

10. Write a shell script to print end of a glossary file in reverse order using array. (Hint: use awk tail)
11. Modify call command to accept more than one month (e.g. \$cal oct not)
12. Write a shell script to check whether Ram logged in,continue checking every 60 seconds until success.

## Semester VI

### 6CP1 SYSTEM SOFTWARE ENGINEERING

3L

MM :75

1. **OVERVIEW** :Comparison of machine language,assembly language and high level languages, External and internal representation of instructions and data. Data allocation structures,search structures and addressing modes. Activities and system software for program generation,translation and execution.Editors for source code and object code/executable code files.
2. **ASSEMBLERS** :Assembly language specification.Machine dependent and independent features of assembler.Classification of assemblers. Pass structure of assemblers (problem and associated for IBM-PC.
3. **LOADER AND LINKERS** :Functions and classification. Machine dependent and independent features of loaders, Design of bootstrap,absolute and relocatable loaders, Design of linker. Case study of MS-DOS linker.
4. **MICRO PROCESSORS** :Macro definition,call and expansion. Macro processor algorithm and data structure.Machine independent features (parameters,unique labels,conditional expansion,nesting and recursion).Pass structure and design of microprocessor and macro assembler,Case study of MASM macroprocessor.
5. **HIGH LEVEL LANGUAGE PROCESSOR** :HLL specification: Grammers and parse trees, expression and precedence.Lexical analysis:Classification of tokens,scanning methods,character recognition,lexical ambiguity. Syntactic analysis:Operator precedence parsing,recursive descent parsing.Symbol Table Management:Data structure for symbol table, basing functions for symbols,overflow technique,block structure in symbol table.

#### **Recommended Books :**

1. D.M. Dhamdhare-System programming & operating system. Tata McGraw Hill.
2. L.L. Beck-System Software,Pearson Education
3. J.J. Donovan-System programming Tata McGraw Hill.

### 6CP2 DIGITAL SIGNAL PROCESSING

3L

MM :75

1. **INTRODUCTION** :Signal-continuous time and Discrete time systems,Properties of systems.Linear time invariant systems-continuous time and discrete time.Properties of LTI systems and their block diagrams
2. **FREQUENCY DOMAIN REPRESENTATION OF SYSTEMS**: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. **SAMPLING**:Sampling theorem.Aliasing. Sampling in frequency domain.Sampling of Discrete time signals.

4. **Z-TRANSFORM:**Introduction The region of convergence for the Z-transform. The Inverse Z-transform. The Inverse Z-transform. Two dimensional Z-transform. Properties of Z-transform.
5. **DISCRETE AND FAST FOURIER TRANSFORM:**Introduction Properties of DFT & DFS. Linear convolution using the DFT Decimation in time & frequency FFT Algorithms.
6. **REPRESENTATION OF DIGITAL FILTERS:**Introduction,Signal flow graph representation of digital networks. Basic structure for IIR & FIR systems.

### Recommended Books :

1. Salivahanan and Vallavaraj-Digital Signal Processing, Tata Mc-Graw Hill.
2. Nagrath-Signals and Systems, Tata Mc-Graw Hill.
3. Oppenheim A.V.-Signals and Systems,PHI.
4. Oppenheim A.V.-Digital Signal Processing,PHI.
5. Lathi-Signals and Linear System, Oxford.

### 6CP3-DESIGN AND ANALYSIS OF ANGORITHMS

3L

MM :75

1. **BACKGROUND :**Review of Algorithm Complexity and Order Notations,Sorting Methods-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 :**Knapsack Problem, ob Sequencing, Optimal Merge Patterns and Minimal Spanning Trees.
4. **DYNAMIC PROGRAMMING :**Matrix Chain Multiplication.Longest Common Subsequence and 0/1 Knapsack Problem.
5. **BRANCH AND BOUND :**Travelling Salesman Problem and Lower Bound Theory.
6. **PATTERN MATCHING ALGORITHMS :**KMP Matcher and Boyer Moore Algorithms.
7. **PROBLEM CLASSES NP, NP-HARD AND NP-COMPLETE :**Definitions of P,NP-Hard and NP-Complete Problems. Decision Problems. Cook's Theorem. Proving NP-Complete Problems-Satisfiability problem and Vertex Cover Problem.Approximation Algorithms for Vertex Cover and Set Cover Problem.
8. **INTRODUCTION TO ASSIGNMENT PROBLEMS:**Formulation of Assignment Problem,Quadratic Assignment and Biquadratic Assignment Problems. Branch and Bound Method for Solving Assignment Problems (not of Quadratic or Biquadratic Assignment Problem).
9. **FORMULATIONS OF MULTICOMMODITY FLOW (MCF) PROBLEMS:**Min-Cost Multicommodity Flow Problem,Max-Flow Multicommodity Flow Problem, Integer Multicommodity Flow Problems. Introduction to Flow Shop Scheduling and Network Capacity Assignment Problems (No algorithms).

### Recommended Books :

1. Aho A.V. J.E. Hopcroft, J.D. Ullman :Design and Analysis of Angorithms, Pearson Education.
2. Rivest and Cormen,Introduction to Algorithms,Prentice Hall of India.
3. Baase,Computer Algorithms,pearson Education.
4. Brassard,Algorithmics,Prentice Hall.
5. Bazaraa, Linear Programming & Network Flows,John Wiley & Sons.

## **6CP4 COMPUTER NETWORKS**

3L

MM :75

1. **COMPUTER NETWORKS AND THE INTERNET:**What is Internet? Network Protocols, Network Edge. Access Networks and Physical Media. Protocol Layers and their service models, Internet Backbones, NAPs and ISPs.
2. **APPLICATION LAYER:**Protocols and Services provided by Application Layer; Transport protocols. The world wide Web-HTTP, Message formats, User Server Interaction, and Web caches,FTP commands and replies.Electronic Mail.SMTP,Mail Message Formats and MIME and Mail Access Protocols,DNS-The Internet's Directory Service,DNS records and Messages.
3. **TRANSPORT LAYER:**Transport-Layer services and Principles, Multiplexing and Demultiplexing applications,connectionless Transport-UDP Segment Structure and UDP Checksum.Principles of Reliable Data transfer-Gobacka to N and selective repeat. Connection Oriented Transport-TCP Connection and Segment structure,Sequence Numbers and acknowledgement numbers Telnet Round trip time and timeout. TCP connection management.
4. **NETWORK LAYER AND ROUTING:**Network service model,Routing Principles:Link state routing Algorithm. A distant Vector counting & OSPF algorithm.Router Components:Input Port,Switching fabric and Output Port. IPV6 Packet Format.
5. **POINT-TO-POINT PROTOCOL (PPP):**-Transition States, PPP Layers-Physical Layer and Data Link Layer.Link Control Protocols-LCP packets and options. Authentication PAP and CHAP Network Control Protocol (NCP).
6. **SONET/SDH** :Synchronous Transport Signals Physical configuration-SONET Devices,Sections,Lines and Paths. SONET Layers-Photonic Layer, Section Layer, Line Layer, Path Layer and Device-Layer Relationship. SONET Frame-frame format, section overhead. Line overhead and Path overhead. Virtual Tributaries and Types of VTs.

### **Recommended Books :**

1. J.F.Kurose and K.W.Ross-Computer Networking,Pearson Education Asia.
2. B.A.Forouzan-Data Communications and Networking,Tata Mc-Graw Hill.
3. Garcia and Widjaja-Communication Networks,Tata Mc-Graw Hill.

## **6CP5 OPTIMIZATION TECHNIQUES**

3L

MM :75

1. **INTRODUCTION** : Introduction,Engineering applications of optimization,Statement and classification of optimization problem, Single variable and multivariable optimization with and without constraints.
2. **LINEAR PROGRAMMING** :Formulation of linear Programming problem, Graphical Approach, General Linear Programming problem, Simplex Method, Duality in Linear Programming and Transportation Problems.
3. **PROJECT SCHEDULING** :Project scheduling by PERT AND CPM. Network Analysis.
4. **SEQUENCING THEORY** :General Sequencing problem n-Jobs through 2 machines & 3 machines and 2-Jobs through m-machines.
5. **DYNAMIC PROGRAMMING:**Introduction,Principle of Optimality Formulation and solution of Dynamic Programming problems. Travelling Salesman's problems.Applications to Transportation problem and Linear programming problems.

## **Recommended Books :**

1. H.A. Taha.-Operation Research and Introduction Mcmillan Co.
2. S.S. Rao-Optimization-Theory & Application Wiley Eastern.
3. S.K.Jain & D.M.Mehta-Operations Research (Theory & Application) Galgotia.
4. Vagner-Principles of Operations Research,Prentice Hall of India.

### **6CP6.1 E-COMMERCE (Elective)**

3L

MM :75

1. **INTRODUCTION** : Scope of electronic commerce, trade cycle, electronic markets, electronic data interchange, Internet commerce and e-commerce in perspective.
2. **BUSINESS STRATEGY IN AN ELECTRONIC AGE** :Value chain - supply chains, Porter's value chain model and inter - organizational value chains. Competitive Advantage - Competitive strategy, Porter's Model, First Mover advantage and competitive advantage using e-commerce Business strategy-Introduction to Business Strategy, Strategic Implications of it of IT Technology, e-commerce Implementation and evaluation.
3. **CASE STUDY** :e-commerce in passenger-Air Transport,choices, Airline booking systems, competition and customer loyalty, Web booking systems and competitive outcomes.
4. **BUSINESS TO BUSINESS ELECTRONIC COMMERCE**:Inter organizational Transactions, The credit Transaction Trade cycle. A variety of transactions, Electronic markets - markets and electronic markets,usage of electronic markets, Advantages and disadvantages of electronic markets.
5. **ELECTRONIC DATA INTERCHANGE (EDI)** : Definition and benefits of EDI. EDI technology, standards, communications, implementation, agreements and securities. EDI trading patterns and transactions.
6. **BUILDING AN E-COMMERCE SITE** :Introduction to object behaviour,components, active scripting. Object models, Infrastructure objects,service objects and data objects,choosing the objects. Building a scalable application,Adding the configure method,connecting to the database.Accessing and versioning the database. Building the catalog object with example. Creating shopping basket-Holding state,creating the tables for a shopping basket,modifying the object model and making the basket accessible.
7. **J2EE ARCHITECTURE OVERVIEW** :Enterprise components. Information technology in the enterprises. Introduction to enterprise objects and enterprise component model. The J2EE model features J2EE components - container architecture. Enterprises Java and J2EE architecture.

## **Recommended Books :**

1. David Whiteley - E-Commerce Strategy,Technology and Application, Tata McGraw Hill.
2. Mathew Reynolds - Beginning E-commerce with Visual Basic ASP, SQL Server 7.0 and MTS, Shroff Publishers & Distributors Pvt. Ltd.
3. Perrone & Chaganti - Building Java Enterprises System with J2EE, Techmedia.
4. Kalakota - Frontiers of Electronic Commerce, Pearson Education.

### **6CP6.2 SIMULATION AND MODELING**

3L

MM : 100

1. **THE NATURE OF SIMULATION:**Simulation Model - Static,Dynamic, Deterministic Stochastic Continuous, Discrete Models.
2. **DISCRETE EVENT SIMULATION:**Time Advance Mechanism, Components and Organization of a Discrete Event Simulation Model, Selected Illustrative Examples of Simulation Application Models.
3. **SIMULATION SOFTWARE:**Modeling of Complex Systems, Use of a Simulation Language such as GPSS, SIMSCRIPT, SLAM, GASP, SIMULA.
4. **EVALUATION OF SIMULATION OUTPUT :**Random Variables and their properties Estimation Methods, Goodness of Fit, Confidence Intervals, Variance Reduction Techniques, Validation of Simulation Models.

### **Recommended Books :**

1. Kelton W.D. and Law A.M. -Simulation Modeling and Analysis, II Edition, Mc-Graw Hill.
2. G.A.Korn-Interactive Dynamic System Simulation, Mc Graw Hill.

### **6CP6.3 DATA MINING & WAREHOUSING**

3L

MM : 100

1. **INTRODUCTION :**Concept of Data Mining and Warehousing, Web Warehousing Future Systems Profiles, Web Warehousing for Business Application and Consumers. Introduction to Knowledge Management, Databases. Data Warehouses and Knowledge Bases.
2. **TRADITIONAL WAREHOUSING :**Theory of Data Warehousing, Barriers to Successful Data Warehousing. Really Bad Data Warehousing Approaches. Data Warehouse (Mart) Functional Model, Layers of Warehouse Environment.
3. **WEB-BASED QUERY AND REPORTING :**Delivering Information over the Web. query and Reporting Tools and Business Value. Architectural Approaches to Delivering Query Capabilities over the Web. Case study approach.Due diligence in the development of solutions.
4. **WEB BASED STATISTICAL ANALYSIS AND DATA MINING :**Analytical Tools,Business value from Analytical Tools, Example of Analytical Tools in Action-Humble spread sheet. Determining the Business value that Analytical Tools will deliver. Statistical Products overview-Statistical Analysis Applications-Correlation Analysis. Factor Analysis,Regression Analysis. Data Discovery Tools Overview, Data Discovery Application. Comparison of the Products Architectural Approaches for Statistical and Data Discovery Tools Intelligent Miner for Relationship Marketing Product.
5. **SEARCH ENGINES AND FACILITIES:**Search Engines and the Web. Search Engine Architecture, Variations in the way that Search Facilities Work, Variations in Indexing Schemes Example - Excalibur Retrievalware product (Product Organization, Search Templates. Query Building Approach), Search Approach Index Building and Synchronization.
6. **WEB COMPONENTS AND COMMUNICATIONS:**Introduction to web architecture HTML as the Universal Document Display language. Hypertext Paradigm,using HTML to Point to Text and Non-Text Objects (Picture,Sound), MIME Format Stateless Web Communication,Browser Server Communication Methods (GET, PUT, POST, HEAD, DELETE Methods).

### **Recommended Books :**

1. Rob Mattison-Web Warehousing and Knowledge Management, Tata Mc-Graw Hill.
2. Shelley Powers-Dynamic Web Publishing, Techmedia.

### **6CP6.4 MICROWAVE AND SATELLITE COMMUNICATION**

3L

MM : 100

1. **MICROWAVE PROPAGATION** :Em wave radiation and its reception. Polarization, Attenuation and Absorption. Effect of earths curvature and environment, Electromagnetic spectrum and frequency range for microwave. Mode of propagation. Ground sky and line of sight propagation. Maximum usable frequency and skip distance. Troposcatter propagation.
2. **MICROWAVE SYSTEMS** : Microwave antenna, Block diagram of microwave links.Transmitter,receiver and repeater station equipments.
3. **RADAR AND NAVIGATIONAL AIDS** : Basic principle and range equations,Efect of noise, Radar display system; Introduction to Pulse Radar, Doppler Radar, Blind frequency,Radar Beacons, CW Radar and its applications & Navigational Aids.
4. **ELEMENTS OF SATELLITE COMMUNICATION**:Frequency bands, Transmission & Multiplexing, Modulation, Multiple Access, frequency reuses.
5. **COMMUNICATION SATELITE**:Orbital period & velocity. Orbital inclination, Elevation, Geostationary Satellite, Earth station, Antenna & amplifiers, up & down converters, Satellite links, Interference, FDM and TDM multiple access. Satellite packet communication.

#### **Recommended Books :**

1. George Kenndy - "Electronic Communication System", Tata McGraw Hill.
2. K.D. Prasad- "Antena & Wave Propagation." Satya Prakashna.
3. Tri T Ha - "Digital Satellite Communication".

### **6CP7 INTERNET PROGRAMMING LAB**

3P

MM : 75

1. Create a biodata of self using HTML with a photograph on the page and containing marks in a table.
2. Develop your web page with the following properties. (1) 2 Photographs display at the same place, which can flip on mouse over.  
(2) Link to separate HTML file for academics, soprts and other interests.
3. Enhance your Web page using style sheets, frames and setup a hyper link to your friends page.  
4 & 5 Make a form for submission of Querying about the interest rates of bank (use Text fields of HTML) and submit buttons of HTML.
6. Make a local query form, which takes in the input the range of marks through Text fields (of java) and display the list of students having marks in that range in another window.
7. Enhance the above query through password protection.
8. & 9. Build a shopping Cart page in which items of 10 types are picked and quantity and a bill is generated by the web page.
10. Enhance the above page for making a payment through electronic billing system.
11. Associate guest book in your web page.
12. Setup a Counter to count the number of visitors on your web page.

## **6CP8 DATABASE APPLICATION LAB**

3P

MM : 100

**Each experiment is designed for two lab classes. Student can use any DBMS tool (MS Access/ORACLE/PLSQL/Foxpro) at backend and C++/VC++/JAVA at front end. Database connectivity tools ODBC/DAO/JDBC WILL BE USED.**

1-2 Design a system for Hotel Management System. System provides facility for room reservation (for different category rooms), and Catering service billing. Customer's order for various food items are recorded during his stay at Hotel and Complete Bill (Including Room Rent and Food consumed) is generated when customer checkouts.

3-4 Design a Computer Terminal Booking System for booking of 5 named computer terminals for 12-hour duration each day. User may book Terminals after entering their User ID and password and they can book a terminal for maximum 5 hour/day (in continuous slot or fragmented slots). Terminal booking chart is generated for each day for each terminal.

5-6 Design a Loan Approval and Repayment System to handle Customer's Application for Loan and handle loan repayments by depositing instalments and reducing balances.

7-8 Design a Video Library Management System for managing issue and return of Video tapes/CD's and manage customer's queries.

9-10 Design a Time Management System for an Office with 10-executives who record their daily appointments in the system. When Manager wants to conduct a meeting of Executives on a particular day System finds a free time slot to conduct the meeting.

11-12. Design an Outdoor-Management System for a Hospital where several experts sit in outdoor room and system registers patients and sends them to appropriate expert. Each Expert can handle a limited number of patients a day.

## **6CP9 SOFTWARE ENGINEERING LAB**

3P

MM : 100

**Implement in C++/Java.**

1. Write a program to count non-blank lines with multi-line, single line, half line and documentation (only in Java) comments.
2. Write a program to count global, external variables and their size (i.e. no of characters) and goto statements.
3. Write a program to analyze whether every line of code can be statically determined or not.
4. Write a program to check if brackets and loops are properly indented or not if not then output indented program.
5. Write a program to count recursive and non-recursive program and how many places the functions are called.
6. Extend the program in Expt. 5 to determine the level of recursion and estimate the size of stack required.
7. Generate the function wise report consisting  
Function type-recursive/non-recursive  
parameter names and types  
Return types  
Global variables used  
Public/private/protected type variables/methods and over loaded methods. (In C++/Java only.)
8. Estimate the space required by the program.
9. Estimate the time required for execution in the program.
10. Implement a TSR program.
11. Write a program to test keyboard/Monitor services using system interrupts.
12. Write a program to test Keyboard/Monitor services without using system interrupts.

## 6CP10 DIGITAL HARDWARE DESIGN LAB

3P

MM : 75

### Using discrete ICs :

1. To implement 4-bit full adder.
2. To implement 4-bit comparator.
3. To implement 4-bit multiplier.
4. To construct 3 to 8 Mux using gates.
5. To implement BCD adder.
6. To develop Binary to 7-Segment display.
7. To implement 4-bit up-down binary/ripple counter.
8. To implement a sequence generator.
9. To design a digital Clock.
10. To study the interfacing of DAC & ADC Cards.
11. On a breadboard interface a static RAM to 8085.
12. On a breadboard interface a programmable device (8251/8255/8259) to 8085.

## Semester VII

### 7CP1 OPERATING SYSTEMS

1. **INTRODUCTION** :What is an operating system (OS)? Types of OS-Manifream, Server,Multiprocessor,PC,Real-Time, Embedded and Smart card OS. Concepts of process, Files and Shell. System calls.
2. **PROCESS AND THREADS** : Life cycle and implementations of process. Thread usage and implementation in user space and in kernel; Scheduler activation. Inter process communication-Race conditions,Critical regions,Mutual exclusion with busy waiting. Sleep and warkeup. Classical IPC problems-Dining philosophers problem, Readers and Writers problem and Sleeping barber problem.Scheduling in Batch,Interactive and Real-Time Systems.
3. **DEADLOCKS RESOURCES** : Preemptable and Non-preemptable resources, acquisition. Deadlock conditions and its modelling. Ostrich algorithm. Deadlock avoidance and Banker's algorithms. Deadlock prevention by attacking its conditions.
4. **MEMORY MANAGEMENT** :Concept of multiprogramming. Memory management with bit maps and linked list. Virtual memory -Page tables, TLBs and inverted page tables. Page Replacement Algorithms - Optimal LRU and working set page replacement algorithm, Belody's anomaly.
5. **INPUT OUTPUT MANAGEMENT** :I/O devices and device controllers; Interrupt handlers and device drivers,Disk hardware and disk arm scheduling algorithm.
6. **FILE SYSTEMS** :File naming,structure,types,access, attributes and operations. Directory systems. Implementation of files and directories and disk space management.

### Recommended Books :

1. A.S.Tanenbaum-Modern Operating Systems,Pearson Education Asia.
2. D.M.Dhamdhare-Operating Systems-A Concept based approach, Tata Mc-Graw Hills.
3. Achyut godble -Operating Systems,Tata Mc-Graw Hills.

4. Stallings-Operating System,Pearson.

## **7CP2 ASYNCHRONOUS TRANSFER MODE NETWORKS**

1. **INTRODUCTION** :An overview of communication networks protocol layering, multiplexing and switching principles of Asynchronous Transfer Mode Precursor Technologies-X 25, Frame Relay and ISDN. Broad Band-ISDN (B-ISDN)-Configuration, Interfaces, reference model and services.
2. **ATM PROTOCOL STACK** :ATM reference model, Physical layer transmission convergence sublayer functions,physical medium dependent sublayer and physical layer standards for ATM.ATM layer-ATM cell header structure. ATM layer functions. ATM adaptation layer-AAL1 to AAL5 layers.
3. **TRAFFIC MANAGEMENT** :Concept of Traffic and service. Traffic and service characteristics of voice and video data. ATM Traffic descriptors and QOS parameters. Factors affecting QOS parameters and service categories. QOS classes.Elements of ATM Traffic management-Traffic contracting,policing and shaping.
4. **SWITCHING IN ATM** :Performance measures and Architectural issues in switch design.ATM switching Architecture.

### **Recommended Books :**

1. Sunil Kasera-ATM Networks Concepts and Protocols,Tata McGraw Hills.
2. Rainer Handel-ATM Networks 2nd Edition,Pearson Education Asia.
3. Stallings B-ISDN & ATM with Frame Relay-Pearson.

## **7CP3 INTERNET TECHNOLOGIES**

1. **INTRODUCTION** :Internet connection concepts-Server,client and parts, Doman Name Systems. Telephone, cable and satellite connections-Dialup,ISDN,ADSL and leased line based connection,cable and DSS accounts, Web TV and intranets, ISP features.
2. **INTRANETS** :What is Intranet? - Intranet vs LANs Components of an Intranet-Workstations and client software,Server and Network operating systems. Network Cards,Cabling and Hubs. Steps for creating an Intranet. Maintenance and connecting to Internet.
3. **E-MAIL TECHNOLOGY** :Features and Concepts-Meessage headers,Address book, Attachment, filtering and forwarding mails.
4. **VIDEO CONFERENCING AND INTERNET TELEPHONY** :Voice vs Video conferencing, Video conferencing hardware and features of video conferencing software, digital telophony as ISDN application, H.323 protocols and multi-point conferencing.
5. **WEB TECHNOLOGY** :Elements of the Web-Clients and Servers, Languages and protocols Web page and Web sites,special kinds of Web sites. Web Resources-Search Engines,Message boards,clubs, News groups and chat. Web page creation concepts-Planning, Navigotion,Themes and Publishing. Analyzing web traffic-Log File data,analyzing log files and products for analyzing web traffic.

### **Recommended Books :**

1. M.L.Yount-Internet :The Complete Reference, Tata Mc-Graw Hill Company.
2. Harley Hanh-The internet Complete Reference,Tata McGraw Hill Company.
3. Daniel Minoli-Internet & Intranet Engineering,Tata McGraw Hill company.

## **7CP4 ARTIFICIAL INTELLEGEENCE**

1. Problem definition, space search, Production systems, control strategies, Search techniques, production system characteristics, heuristic search techniques.
2. Knowledge representation and mapping, Predicate logic resolution, propositional logic, procedural and declarative knowledge, forward and backward reasoning, symbolic reasoning.
3. Game playing, minimax search, alpha-beta cutoffs, iterative deepening, planning system components, non-linear and hierarchical planning, reactive systems.
4. Natural language processing, syntactic processing and semantic analysis.
5. Learning in problem solving, learning from example, formal learning theory, explanation based learning.

### **Recommended Books :**

1. E. Rich, K Knight-Artificial Intelligence, Tata McGraw Hills.
2. S. Russell, P. Norving-Artificial Intelligence-A Modern Approach, Pearson Education, Asia.
3. Thomas Dean-Artificial Intelligence-Theory & Practice, Pearson Education, Asia.
4. Alison Caursey - The Essence of Artificial Intelligence, Pearson Education, Asia.

## **7CP5 MICRO ELECTRONICS**

1. **INTRODUCTION** :Circuits and Models :Introduction to VLSI circuits, ASICs and Moore's Law. Microelectronic Design Styles, four phases in creating Microelectronic Chips. Computer Aided Synthesis and Optimization. Boolean Algebra and Representation of Boolean Functions, Binary Decision Diagrams.
2. **HARDWARE MODELING** :Introduction to Hardware Modeling Languages Distinctive Features of Hardware Languages, Structural and Behavioral HDLs, Logic Networks, State Diagrams, Data Flow and Sequencing Graphs. Compilation and Behavioural Optimization Techniques.
3. **ARCHITECTURAL SYNTHESIS** :Circuit Specifications for Architectural Synthesis-Resources and Constraints Fundamental Architectural Synthesis Problems-Temporal Domain-Scheduling Spatial Domain-Binding. Hierarchical Models and Synchronization Problem. Area and Performance Estimation-Resource Dominated Circuits and General Circuits.
4. **SCHEDULING ALGORITHMS** :Model for Scheduling Problems, Scheduling without Resource Constraints-Unconstrained Scheduling (ASAP Scheduling algorithm) Latency, Constrained Scheduling : (ALAP scheduling), Scheduling Under Timing Constraints and Relative Scheduling. Scheduling with Resource constraints-Integer Linear Programming Model, Multiprocessor Scheduling, Heuristic Scheduling Algorithms (List Scheduling), Force Directed Scheduling.
5. **INTRODUCTION TO VHDL** :VHDL History and Capabilities, Program Structure of VHDL-Entity, Architecture and Package Declarations. Basic Language Elements-Identifier, Data Objects, Data Types and Operators. Behavioral Modeling-Process, Variable Assignment, Signal Assignment and Wait Statements Assertion, Loop, If, Case and Next Statements. Block and Concurrent Assertion Statements. Structural Specifications of Hardware-Inverter, NAND Gate Models, Comparator and Test Bench Modeling.

### **Recommended Books :**

1. Givonni De Micheli-Synthesis and Optimization of Digital Circuits, Mc-Graw Hill Inc.
2. Zainalabedin Navabi-VHDL Analysis and Modeling of Digital Systems, Mc-Graw Hill Inc.

3. J.Bhasker-VHDL Primer, Addison Wesley.
4. Brassard-Algorithms, Prentice Hall.

## **7CP6.1 NEURAL NETWORKS**

1. **INTRODUCTION TO ARTIFICIAL NEURAL NETWORKS** :Elementary Neurophysiology, Neural circuits for computation and Hebbian learning. Artificial neurons as processing elements, perceptron. Neural Network simulation and data structures.
2. **BACK PROPAGATION** :Back propagation network (BPN) approach and operation. Generalized data rule-updates of output layer weights and hidden layer weights. BPN implementation issue. Training data, network sizing, weights and learning parameters. BPN Application-Data compression and Paint quality inspection. Back propagation simulation for signal propagation-BPN data structure, signal propagation algorithms and error propagation.
3. **NEURAL NETWORK MEMORIES** :Introduction to Associative memory-Hamming distance, linear associator, Bi-directional Associative memory (BAM) Architecture, Processing, Mathematics and Energy Function. Hopfield Memory-Discrete Hopfield Memory. Continuous Hopfield Model Travelling sales person problem. BAM simulation-Bidirectional connections, data structures, initialization algorithms and signal propagation.
4. **SIMULATED ANNEALING** :Information theory and statistical mechanics concepts real and simulated Annealing. Boltzmann machine-Basic Architecture and processing, learning in Boltzmann machine and its practical consideration. Boltzmann simulator Modified Boltzmann Networks its data structure and algorithm.
5. **COUNTER PROPAGATION NETWORK (CPN)** :Counter propagation Network Building Blocks-Input Layer, Instar, competitive Networks and outstar. SPN Data Processing-Forward mapping, Training CPN and its complete implementation the CPN simulator-Data structure, Algorithms and complete simulator.
6. **SELF ORGANIZING MAPS (SOM)** -SOM data Processing, Data structure and learning algorithms.

### **Recommended Books :**

1. James A. Freeman-Neural Networks Algorithms Applications and Programming Techniques, Pearson Education Asia.
2. Simon Haykin-Neural Networks 2/e, Pearson Education Asia.
3. Yagya Narayan-Artificial Neural Networks, Prentice Hall India, 1999.

## **7CP6.2 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, computer Image Processing.
3. **VIDEO AND ANIMATION** :Basic concepts, Computer-based Animation, JPEG, MPEG, H 261, DVI, 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 requirements, Elementary media synchronization.

### **Recommended Books :**

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

### **7CP6.3 DIGITAL SPEECH AND ANGUAGE PROCESSING**

1. **INTRODUCTION** :Knowledge in speech language processing,Models and Algorithms,Language,Thought and understanding.
2. **REGULAR EXPRESSIONS AND AUTOMATA** :Regular expression-Basic Regular expression patterns, Disjunction,Grouping and Presedence,Funite-State Automata-Using an FSA to recognize sheeptalk,Using NFSA to accept strings.
3. **MORPHOLOGY AND FINIT STATE TRANSDUCERS** :Survey of English Morphology-Inflectional and Derivational Morphology. Finite-State morphology parsing-Lexicen and Morphotactics, Morphological parsing with Finite-State Transducers, Orthographic Rules and Finite-State Transducers. Combining FST lexicons and rules. Lexicon-Free FSTs and Human Morphological Processing.
4. **COMPUTATIONAL PHONOLOGY AND TEXT-TO-SPEECH** :Speed Sounds and Phonetic Transcription-Consonants;Place and Manner of articulation and vowels. Phoneme,Phonological Rules and Transducers. Advanced Issues in computational Phonology-Harmony,Templatic Morphology and Optimality theory. Machine Learning of phonological Rules,Mapping Text to Phones for TTS, Prosody in TTS and Human, Processing of Phonology and Morphology.
5. **HMMs AND SPEECH RECOGNITION** :Speech Recognition Architecture, Hidden Markov models, Viterb Algorithm and A\* Decoding,Acoustic Processing of Speech-Sound Waves, Waveform interpretation and spectra. Training a Speech Recognizer and Human Speech Recognition.

### **Recommended**

### **Books**

:

1. Daniel Jurafsky- Speech and Language Processing, Pearson Education Asia.

### **7CP6.4 REAL-TIME SYSTEMS**

1. **INTRODUCTION TO REAL-TIME APPLICATIONS** :Digital control-sampled data systems,comple control-law computations, High-level control-control hierarchy,guidance and control, real-time command and control. Signal processing - Processing Bandwidth demands, Radar system. Real-time data bases and Multimedia application.
2. **HARD VERSUS SOFT REAL-TIME SYSTEMS** :Jobs and processors.Release times, deadlines and timing constraints. Hard and soft timing constraints -Hard timings constraints and temporal Quality-of-service quarantees. Hard real-time systems-reasons for timing guarantee requirement and examples of hard timing constraints. Soft real-time systems.
3. **A REFERENCE MODEL OF REAL-TIME SYSTEMS** :Processors and resources. Temporal parameters of real-time workload-fixed,jittered,sporadic release times and exectution time Periodic task Model-periods,execution times andl phases of periodic tasks, Aperiodic and sporadic tasks.

Precedence graph and data dependency. Temporal dependency, AND/OR precedence constraints, conditional branches and pipeline relationship. Functional Parameters-preemptivity and criticality of jobs, optional execution, laxity type and laxity function. Resource parameters of jobs and parameters of resources-pre-emptivity of resources and resource graph. Scheduling hierarchy-Scheduler and schedules; Feasibility optimality and performance measures; Interaction among schedulers.

4. **COMMONLY USED APPROACHES TO REAL-TIME SCHEDULING** :Clock-Driven approach; Weighted round-robin approach; priority driven approach. Dynamic versus static systems. Effective release times and deadlines. Optimality of EDF and LST algorithms. Non optimality of EDF and LST algorithms. Challenges in validating timing constraints and their performance. Off-line versus on-line scheduling.
5. **CLOCK-DRIVEN SCHEDULING** :Assumptions for scheduling Static and timer-driven scheduler. General structure of cyclic schedules-frame major cycles, frame size constraints and job slices. Cyclic executives. Improving the average response time of aperiodic jobs-slack stealing and average response time. Scheduling sporadic jobs-acceptance test, EDF scheduling of the accepted jobs, implementation of acceptance test and optimality of cyclic EDF algorithm.

### **Recommended Books :**

1. W.S.Liu-Real-Time Systems, Pearson Education Asia.
2. Raymond A. Buhr-Introduction to Real-Time Systems, Pearson education Asia.
3. Alan Burns-Real-Time Systems and Programming Languages, Pearson Education.

## **7CP7 SYSTEM PROGRAMMING LAB-I**

### **Program Writing in C++/Java**

- 1,2. Develop a text editor, which performs file operations (e.g. Open, Close, Save etc.). displays text with line number and edits the text in insert, append and replace mode.
- 3,4. Extend the above editor to implement Find and Replace operation on strings and on regular expressions with Forward and Backward search. Also changes the background of the words, where pattern match.
5. Enhance the above editor with cut/paste, saving/inserting a part of the other file and one autocorrect feature (e.g. change first character of every statement to capital).
- 6,7 Write a program to display/modify memory contents of specified address range in RAM and Floppy/Harddisk.
- 8,9. Write a program to identify labels and 'Jumps' instructions in 8085 assembly language program and prepare symbol table.
10. Extend the above program to prepare Forward Reference Table (FRT).
- 11,12. Write an assembler to handle a subset of 8085 assembly language program (i.e. data movement, manipulation instructions).

### **Recommended Platform**

For 7CP7 and &C OS->Unix with Parte Design or JDK.

## **7CP8 TCP/IP PROGRAMMING LAB**

### **Write programs in C++**

1. Write a program which communicate between two computer systems.
2. Extend the above program to implement talk between two users.
- 3,4. Implement a simple file transfer service to transfer text files.

5. Implement socket program and perform loopback test on daytime port.
- 6,7. Write an 'echo client and server' software using socket.
- 8,9. Implement sliding windows protocols for flow control.
10. Write Programme To decide TCP segment header.
11. Write TCP/IP packet analyser.
12. Implement an IP routing table.

**Recommended Books :**

1. D.E. Comer-Hands on Networking with Internet Technologies, Pearson Education Asia.
2. Comer-Internetworking with TCP/IP, Vol.I,II & III Pearson.
3. Stervens-Unix Network Programming Vol I, II Pearson.

**7CP9 MICROPROCESSOR LAB-II**

**Assembly Level Programming 8086 or upward compatible machine.**

1. Write a program to produce a packed BCD byte from our ASCII encoded digits.
2. Write a program to add interest on the amounts deposited in a bank. The amount is stores as an array.The computed amount should be stores in another array.An amount above 4000 is entitled for 8% interest ad remaining are for 4%.
3. Write a program,which inputs a password and should an alarm if the password in incorect.
4. Compute the transmission message if the original message and generator polynomial is given. Use CRC-12 as a generator. (Note:- Refer to computer Networks by Tonenbaum).
5. Write a program to compute factorial of a single digit. Write a program to cinvert BCD numbers to binary,Hax and Octal.
6. Use registers to pass parameters to the procedure.
7. Use memory locations to pass parameters to the procedure.
8. Use pointers to pass parameters to the procedure.
9. Write a program which uses macro for addition of corresponding elements of 2 array.

**Recommended Platform**

8086 Kits,PC with Turbo assembly and/on turbo dabuggen.

**Semester VIII**

**8 CP1 COMPILER CONSTRUCTION**

1. **INTRODUCTION** :Compilation process and Analysis of the source program,Phases of a compiler,Syntax Definition and Syntax-directed translation. Parsing and simple expression translation.
2. **LEXICAL ANALYSIS AND PARSING** :Role of lexical analyser,Input buffering, Specification and recognition of tokens. The functions of the parser. Context-free grammer. Writing a grammer and top-down parsing.
3. **SYNTAX-DIRECTED TRANSLATION AND TYPE CHECKING** :Syntax-directed definition and construction of syntax trees. Bottom-up evaluation of S-attributed and L-attributed definitions and Top-down translation. Type systems and specification of type checker.
4. **RUN TIME ENVIRONMENT** :Source language issues, storage organization and allocation strategies. Symbol tables.

5. **CODE GENERATION AND OPTIMIZATION** :Intermediate language. Declaration and assignment statements. Issue in the design of a code generator. The target machine. Run-time storage management, Basic blocks and flow graphs. Principal source of code optimization.

#### **Recommended Books :**

1. A.V. Aho-Compilers principles, techniques and tools, Pearson Education Asia.
2. N.Wirth-Compiler Construction, Pearson Education Asia.
3. Charles N. Fischer-Crafting a Computer in C, Pearson Education Asia.

#### **SCP2 ADVANCED COMPUTER ARCHITECTURE**

1. **PARALLEL PROCESSING** :Generation of computer systems, trends towards parallel processing, parallelism in uniprocessor system, multiprogramming and time sharing parallel computers structures-pipeline, array and multiprocessor systems, data flow and new concepts, Architectural classification, schemes, applications.
2. **PIPELINING AND VECTOR PROCESSING** :Principle of linear pipelining, classification, reservation tables, interleaved memory organization, Instruction and arithmetic pipelines, Principles of designing pipelined processors, vector processing requirements.
3. **STRUCTURES AND ALGORITHMS FOR ARRAY PROCESSORS** :SIMD interconnection networks, parallel algorithms for array processors, associative array processing.
4. **DATA FLOW COMPUTER** :Data driven computing and languages, data flow computer architectures, introduction to VLSI computing structures.

#### **Recommended Books :**

1. Hawang & Briggs-Computer Architecture & Parallel Processing, Mc Graw Hill.
2. Subrata Das-Advanced Computer Architecture, Vol I & II.

#### **SCP3 COMPUTER AIDED DESIGN FOR VLSI**

1. **INTRODUCTION** :Why design ICs? Technology and economics for IC manufacturing. CMOS technology-circuit techniques, Power consumption, Design and testability. IC Design Techniques- Hierarchical design, Data abstraction and computer aided design.
2. **TRANSISTORS AND LAYOUT** :Fabrication process overview and Fabrication steps. Transistors-Structure, Model and Parasitic, Tub Ties and latchup, Advanced Transistor characteristics, leakage and subthreshold current, Advanced transistor structure and spice models. Wires and Vias-Wire parasitics and skin effect in copper interconnect. Design Rules- Fabrication Errors, Scalable design rules, SCMOs design rules and typical process parameters. Layout Design and Tools-Layout for Circuits, Stick Diagrams, Hierarchical Stick Diagrams, Layout Design and Analysis Tools and Automated Layout.
3. **SEQUENTIAL MACHINES** :Latches and FlipFlops-Categories of memory elements, Latches and Flip-Flops. Sequential Systems and clocking disciplines-One phase systems for Flip-Flops, Two-phase systems for Latches, Advanced clocking analysis and clock generation. Sequential system Design-structural specification, State Transition Graph, Tables and State assignment. Power optimization. Design validation and sequential testing.

4. **SUBSYSTEM DESIGN** :Subsystem Design Principles-Pipelining and Data paths. Combinational shifter, Adders ALUs and Multipliers. High Density Memory-ROM, Static RAM, Three-Transistor DRAM and one transistor DRAM.
5. **CHIP DESIGN** :Design Methodologies. Kitchen Timer chip-Timer specification and Architecture, Architecture Design. Logic design, layout design and Design Validation.

### **Recommended Books :**

1. Wayne Wolf-Modern VLSI Design, 3rd ed Pearson Education Asia.
2. Kiat-Sent Yeo-CMOS/BiCCMOSVLSI, Pearson Education Asia.
3. Neil H.E. Weste-Principles of CMOS VLSI Design, Pearson Education Asia.

### **8CP4.1 EXPERT SYSTEMS**

1. Nature of expertise and characteristics of Expert System. Knowledge representation techniques, symbolic representation, symbol structures in LISP, list processing, pattern matching.
2. Rule-Based System, Syntax of rules, forward and backward chaining, meta-rules, knowledge acquisition, heuristic classification and matching, rule-based explanation, frame base explanation, automatic programming.
3. Expert System Tools, Expert System Shells, High level programming language and their constraints, multiple paradigms programming environments.
4. Inductive Learning, rule generation and refinement, building decision and production rules.

### **Recommended Books :**

1. Peter Jackson-Expert Systems, Pearson Education Asia.

**Recommended Platform :**Linux.

### **8CP4.2 DISTRIBUTED SYSTEMS**

1. **CHARACTERIZATION OF DISTRIBUTED SYSTEMS** :Introduction and examples of distributed systems-Internet, Internet, mobile, ubiquitous computing; Resource sharing and world wide web challenges-Heterogeneity, Openness, Security, Scalability failure handling, Concurrency and transparency.
2. **SYSTEM MODELS** :Introduction to Architecture models Software layers, System architecture, variations on client-server model, interfaces and objects, design requirement for distributed architectures. Fundamental models-interaction models, failure model and security model.
3. **DISTRIBUTED OBJECT AND REMOTE INVOCATION** :Introduction to remote method invocation (RMI) and interfaces in distributed systems. Communication between distributed objects object model, distributed objects, distributed objects model and design issues for RMI, implementation of RMI and distributed garbage collection, remote procedures call and sun RPC case study. Events and notifications-participants in event notification and jini distributed event specification. Java RMI case study building client and server programs. Design and implementation of Java RMI.
4. **TIME AND GLOBAL STATES** :Introduction to clocks, events and process states. Synchronizing Physical clocks-synchronizing in a synchronous system, Cristian's method for synchronizing clocks, Berkeley algorithm and network time protocol. Global states and consistent cuts.

5. **DISTRIBUTED-SHARED MEMORY** :Introduction to distributed-shared Memory (DSM)-message passing versus DSM, Implementation approaches to DSM. Design and implementation issues-structure and synchronization model.

#### **Recommended Books :**

1. George Coulouris-Distributed Systems Concepts and Design, 3rd ed., Pearson Education Asia.
2. A.S. Tanenbaum-Distributed Systems Principles and Paradigms,Prentice Hall of India.
3. Darrel Ince-Developing Distributed and E-Commerce Applications,Addition Wesley.

### **SCP4.3 IMAGE PROCESSING AND PATTERN RECOGNITION**

1. **INTRODUCTION** :Imeging in ultraviolet and visible band. Fundamental steps in image processing. Components in image processing.
2. **DIGITAL IMAGE FUNDAMENTS** :Image perception in eye, light and electromegnetic spectrum,Image sensing and acquisition using sensor array.Image sampling and quantization-Representing digital images,Spatial and gray-level resolution,Aliasing and Moire patterns,Zooming and Shrinking digital images. Relationship between pixels.
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 RESORATION** :Image restoration model, Noise Models-Spatial and frequency properties of noise,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 Fundamentals-Coding Redundancy,Interpixel redundancy, Psychovisual redundancy and Fidelity criteria. Image Compression modeld-Source encoder and decoder, Channel encoder and decoder, Lossy compression and compression standards.

#### **Recommended Books :**

1. Refael C.Gonzalez-Digital Image Processing,Pearson Education Asia.
2. Kenneth R. Castleman-Digital Image Processing,Pearson Education Asia.
3. Nick Effard-Digital Image Processing,Pearson Education Asia.
4. Jain 0-Digital Image Processing, PHI.

### **SCP4.4 FAULT TOLERENT SYSTEMS**

1. **INTRODUCTION** :Impact of Scaling on Reliability-Supply voltage and power constraints, Threshold voltage control, Gate oxide reliability,Hot carrier degradation,Latchup suceptibility,Defects, Faults, Errors and reliability. Reliability Quality testing and measurement-AQL measurement, Burn-in-testing,  $I_{DDQ}$  and  $I_{DD}$  testing , Parametric testing. Mechanism for permanent Device Failures-Clip and assembly-related failures, Design and environment related failures.
2. **DIAGNOSIS, REPAIR AND RECONGIGURATIONS** :Diagnosis Algorithms-Stuck-at faults in read/write circuitry, Dominant 0/1 Bfs in read/write circuitry, SAFs and dominant-0 and doninant-1, BFs in address decoders,Sequential stuck-open addressing faults,SAFs, BFs and CFs

in the memory cell array, Coupling faults in an array of memory chips. Fault locations algorithm in DRAMs. Repair Algorithms-Tarr's greedy algorithms, Day's fault driven, Comprehensive redundancy algorithms, Kuo and Fuchs's branch-and-bound algorithms, Wey and Lombardi's graph-theoretic algorithm. Fast test and repair algorithms by Haddad et al. Neural Net approaches. Reconfiguration Techniques. Repair using FLASHEPROM Switches. Flexible Redundancy, Built-in Redundancy Analysis. Built-in self-repair Architectures-Hierarchical built-in-self repair and built-in self repair using neural nets.

3. **SINGLE EVENTS EFFECTS AND THEIR MITIGATION** :Particles causing Single-Event Effect-Terrestrial and space environment. Basic Mechanism for Non destructive Single-Event Effects-Charge deposition and collection. RAM Device operation-Dynamic RAM operation,Static RAM operation,Single-bit upsets and Multi bit upsets.
4. **ERROR CORRECTING CODES** :Single and double-bit Error detecting and correcting codes. Fault-Tolerant Design Techniques for RAMs-Bit scattering,Sparing. Complement,Embedded and Non-embedded ECC.

### **Recommended**

### **Books**

1. Kanad Chakraborty-Fault-Tolerance and Reliability Techniques for High Density Rams, Pearson Education Asia.

### **SCP7 MICROSOFT & X-WINDOWS PROGRAMMING LAB**

1. To understand x-windows, x-lib, x-toolkit and x network protocol and learn its command line argument.
- Programs** **in** **C/C++** **language.**
2. Write a program to establish connection with x server and get the sender and protocol information.
3. Using X library of the server,write a program to create a new window of a given size, title, border, foreground and background colors.
- 4,5 To implement keyboard event handling/marking using x library.
- 6,7 To implement mouse event handling/marking using x library and interface with windows managers and drawing applications.
8. To implement a multiple windows application.
- 9,10 To implement various drag and drop based GUI components in Visual Basic.
- 11,12 To implement various drag and drop based GUI components in Motif and Lesstif.

### **SCP8 MICRO ELECTRONICS LAB**

- Programming** **in** **C++**
- 1,2 To read a circuit in POS form and convert into SOP form.
  - 3,4. To implement ROBDD (Reduced Order Binary Decision Diagram).
  - 5,6. To implement sequencing graph for resource scheduling.
  - 7,8. To implement sequencing graph with register binding as per ASAP and ALAP schedule.
- Programming** **in** **VHDL**
- 9,10. To implement a test bench for nibble comparator.
  - 11,12. To implement program using generic configuration and packages.

### **SCP9 SYSTEM PROGRAMMING LAB –II**

- Program** **Writing** **in** **C/C++**
- 1,2. Write a program to identify data storage statements in an 8086 assembly language program and estimate the size of data segment.
  3. Write a program to identify macro definitions in an assembly language program.
  - 4,5. Extend the above program to implement simple and recursive macro expander.
  6. Write a program to process 'include' and 'define' macros in C language.

- 7,8. Write a program to parse source code strings of C-language and identify tokens in terms of keywords and identifiers.
9. Construct parse tree of arithmetic statements in C language program.
10. Write a program to optimize the source program for 'operator strength reduction', 'dead code elimination' and frequency reduction transformation.
- 11,12 Design a simple high level language containing arithmetic and logic operations pointers, branch and loop instructions. Write its lexical analyser using lex.