

# UNIVERSITY OF RAJASTHAN, JAIPUR

## B.E. Information Technology

### (Four Year Semester Scheme)



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### Distribution of Marks

**BRANCH : Information Technology**  
**Year: IInd BE**

### Semester III

Code	Subject	Hrs/week			Exam	Maximum Marks		
		L	T	P	Hrs	*I.A.	Exam	Total
<b>A. THEORY PAPERS</b>								
3IT01	Mathematics III	3	1	-	3	20	80	100
3IT02	Digital Electronics	3	-	-	3	20	80	100
3IT03	Data Structure & Algorithms	3	1	-	3	20	80	100
3IT04	Electronic Devices & Circuits	2	1	-	3	20	80	100
3IT05	Object Oriented Programming in JAVA	2	1	-	3	20	80	100
3IT06	Elective (any one of the following) 1. Line Communication 2. Electronic Measurements & Instrumentation 3. Medical Electronics	3	-	-	3	20	80	100

	4. Electrical Technology 5. Circuit Analysis				
B.Practical & Sessional					
3IT0 7	Humanities & Social Sciences	- - 2	-	30	20 50
3IT08	Data Structure Lab	- - 3	-	60	40 100
3IT09	Digital Electronics Lab	- - 3	-	60	40 100
3IT010	Electronic LAB-I	- - 3	-	60	40 100
<b>Discipline &amp; Extra Curricular activities:</b>					50
<b>GRAND TOTAL</b>		17 4 11	-	-	- 1000

**BRANCH : Information Technology**

**Semester IV**

**Year: IInd BE**

Code	Subject	Hrs/week			Exam	Maximum Marks		
		L	T	P	Hrs	*I.A.	Exam	Total
<b>A. THEORY PAPERS</b>								
4IT01	Software Engineering-I	3	1	-	3	20	80	100
4IT02	Discrete and Integrated Electronics	3	-	-	3	20	80	100
4IT03	Microprocessor & Interfaces	3	-	-	3	20	80	100
4IT04	Telecom Engg. Fundamentals	3	-	-	3	20	80	100
4IT05	Discrete Mathematical Structures	3	1	-	3	20	80	100
4IT06	Elective (any one of the following) 1. Statistics & Probability Tehory 2. Neuro Computing and Fuzzy System 3. Computer Aided Network 4. Analog & Digital Communication 5. Fundamentals of	3	-	-	3	20	80	100

	Information Technology							
B.Practical & Sessional								
4IT07	Microprocessor Lab.	-	-	3	-	60	40	100
4IT08	Electronics Lab II	-	-	3	-	45	30	75
4IT09	Object Oriented Programming	-	-	3	-	60	40	100
4IT010	Advanced Programming Lab	-	-	3	-	45	30	75
<b>C.Discipline &amp; Extra Curricular activities:</b>								50
<b>GRAND TOTAL</b>		18	2	12	-	-	-	1000

**BRANCH : Information Technology**

**Semester V**

**Year: IIIrd BE**

Code	Subject	Hrs/week			Exam	Maximum Marks		
		L	T	P	Hrs	*I.A.	Exam	Total
<b>A. THEORY PAPERS</b>								
5IT01	Software Engg-II	3	1	-	3	20	80	100
5IT02	Wireless Communication	3	-	-	3	20	80	100
5IT03	Computer Architecture	3	-	-	3	20	80	100
5IT04	Information Theory & Coding	3	-	-	3	20	80	100
5IT05	Data Base Management System	3	-	-	3	20	80	100
5IT06	Elective (any one of the following) 1. Optimization 2. Theory of Computation 3. Logical & Functional Programming 4. Optical Communication 5. Optical Communication	3	-	-	3	20	80	100
B.Practical & Sessional								
5IT07	Communciation Lab	-	-	3	-	45	30	75
5IT08	Software Engineering Lab.	-	-	3	-	45	30	75
5IT09	System Analysis & Design	-	-	2	-	45	30	75

	Lab						
5IT010	Data Base Lab	-	-	3	-	45	30 75
5IT011	Practical Training Seminar	-	-	2	-	30	20 50
<b>C.Discipline &amp; Extra Curricular activities:</b>							50
<b>GRAND TOTAL</b>		18	1	13	-	-	- 1000

**BRANCH : Information Technology**

**Semester VI**

**Year: IIIInd BE**

Code	Subject	Hrs/week			Exam	Maximum Marks		
		L	T	P	Hrs	*I.A.	Exam	Total
<b>A. THEORY PAPERS</b>								
6IT01	Computer Graphics	3	-	-	3	20	80	100
6IT02	Micro Electronics	3	1	-	3	20	80	100
6IT03	Design & Analysis of Algorithms	3	1	-	3	20	80	100
6IT04	Introduction to System Programming	2	1	-	3	20	80	100
6IT05	Computer Networks	3	-	-	3	20	80	100
6IT06	Elective (any one of the following) 1. Management Information System 2. advanced Computer Architecture 3. Microwave & Satellite Communication 4. Digital Signal Processing	3	-	-	3	20	80	100
<b>B. Practical &amp; Sessional</b>								
6IT0 7	Internet Programming Lab	-	-	3	-	45	30	75
6IT08	Graphic Lab	-	-	3	-	60	40	100
6IT09	Micro Electronics Lab	-	-	3	-	45	30	75
6IT010	Window & Visual Programming Lab	-	-	3	-	60	40	100

<b>C.Discipline &amp; Extra Curricular activities:</b>							50
<b>GRAND TOTAL</b>		17	3	12	-	-	1000

**BRANCH : Information Technology**  
**Year: IVth BE**

**Semester VII**

Code	Subject	Hrs/week			Exam Hrs	Maximum Marks		
		L	T	P		*I.A.	Exam	Total
<b>A. THEORY PAPERS</b>								
7IT01	E-Commerce	3	-	-	3	20	80	100
7IT02	Internet Technologies	2	1	-	3	20	80	100
7IT03	Operating Systems	3	-	-	3	20	80	100
7IT04	Multimedia Systems	3	-	-	3	20	80	100
7IT05	Network-Programming	3	-	-	3	20	80	100
7IT06	Elective (any one of the following) 1. ATM Networks 2. Digital Speech & Language Processing. 3. Principles of Programming Language 4. Neural Networks	3	-	-	3	20	80	100
<b>B. Practical &amp; Sessional</b>								
7IT07	Practical Training	-	-	2	-	60	40	100
7IT08	Networks Programming Lab.	-	-	4	-	45	30	75
7IT09	Multimedia Lab	-	-	3	-	45	30	75
7IT010	Shell Programming	-	-	3	-	30	20	50
7IT011	Minor Project	-	-	2	-	30	20	50
<b>C.Discipline &amp; Extra Curricular activities:</b>								50
<b>GRAND TOTAL</b>		17	1	14	-	-	-	1000

**BRANCH : Information Technology**  
**Year: IVth BE**

**Semester VIII**

Code	Subject	Hrs/week	Exam	Maximum Marks
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		L	T	P	Hrs	*I.A.	Exam	Total
<b>A. THEORY PAPERS</b>								
8IT01	Data Mining & Warehousing	3	1	-	3	20	80	100
8IT02	Information System Securities	3	1	-	3	20	80	100
8IT03	Real time System	3	1	-	3	20	80	100
8IT06	Elective (any one of the following) 1. Simulation & Modeling 2. Distribution Systems 3. Artificial Inteligence 4. Image Processing & Pattern Recognition	3	-	-	3	20	80	100
<b>B.Practical &amp; Sessional</b>								
8IT0 5	Project	-	-	2	-	120	80	200
8IT06	Seminar	-	-	4	-	-	-	100
8IT07	OPerating System Lab	-	-	3	-	45	30	75
8IT08	Industrial Economics & Management and Writter & Oral Communication	-	-	3	-	60	40	100
8IT09	Information System Design Lab.	-	-	4	-	60	40	100
<b>C.Discipline &amp; Extra Curricular activities:</b>								50
<b>GRAND TOTAL</b>		12	2	18	-	-	-	1000



### Semester III

#### 3IT 1 MATHEMATICS III

3L+1T

M.M. : 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 (with-our 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 dimention, Laplace's equation in two dimentions, diffusion equation in one dimention.
  3. Transform Calculas - Laplace Transform with its simple properties, applications to the solution of ordinary and partial differential equations having constant coefficients with special reference to the waves 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 trancedental 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 vectors, diagnolisation, 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

### **3IT 2 DIGITAL ELECTRONICS**

3L

M.M. : 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 OR and Exclusive NOR gates. RTL, DTL, ITL, 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 of 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 & Operations.

General characteristic of sequential circuits. Clock, pulse and level mode sequential circuits. Analysis and design of 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. Sandlege Modern Digital Design, Megrawhill.
2. Morris 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 PHI

## **3IT 3 DATA STRUCTURE AND ALGORITHMS**

3L+1T

M.M. : 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 structure such as Records. Files, Sets, Graphs, pointers

Recursion, Sorting internal and external searching. Hashing, Symbol table.

Problem solving and algorithm development, analysis of algorithms

### **Recommended Books :**

1. Aho A.V., J.E. Hopcroft, J.D. Ullman : 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. Horowitz and Sawhni : Data Structures in PASCAL, BPB
6. Tanenbaum : Data Structures in C, PHI
7. Trembley & Sercenson : An Introduction to Data Structures, Mc-Graw Hill International
8. Baase : Computer Algorithms, Pearson Education

### **3IT 4 ELECTRONIC DEVICES & CIRCUITS**

3L+1T

M.M. : 100

Ex. Hr: 3

1. **Diode Circuits** : Diode as a ckt. element, load line concept, clipping and clamping circuits. Voltage multipliers.
2. **Devices** : Construction, characteristics and working principles of the following devices : Junction diodes, BJT, JFET, MOSFET, UJT, photo diodes, LEDs, Photo transistors, Solar Cells, Thermistors, LDR.
3. **Transistors** : Transistors 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 of CE, CC and CB amplifiers. Ebers-Molf model. Biasing & 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 resistor.
4. **Small Signal Amplifiers at Low Frequency** : Analysis of BJT and FET, DC and RC couple amplifiers. Frequency response, midband gain, gains at low and high frequency. Analysis of DC and differential amplifiers, Miller's Theorem. Cascading Transistors amplifiers. Darlington & cascade ckts. Emitter & source followers.
5. **Oscillators** : Concept of Feedback Classification, Criterion for oscillation, Tuned collector, Hartley, Colpitts, RC-phase shift, Wein bridge and crystal oscillators, Astable, Monostable and bistable multivibrators. Schmitt trigger

#### **Tax/References :**

1. J. Millman & C.C. Halkas : Integrated Electronics, Tata Mc-Graw Hill
2. Millman Grabel - Microelectronics, Mc-Graw Hill

### **3IT 5 OBJECT ORIENTED PROGRAMMING IN JAVA**

2L+1T

M.M. : 100

Ex. Hr: 3

1. **OOP FUNDAMENTALS** :
  - a. Structured V/s object oriented approaches.
  - b. Data abstraction information hiding and encapsulation.
  - c. Objects and classes.
  - d. Polymorphism, single and multilevel inheritances.
  - e. **JAVA PROGRAMMING** :

- a. Introduction to Java, bytecode and virtual machine.
- b. Program Elements : Primitive data types, variables, assignment, arithmetic, short circuit logical operators, arrays. Decision and control statements.
- c. Objects and classes : Objects, constructors, returning and passing objects as parameter. Nested and inner classes.
- d. Single and Multilevel Inheritance, Extended classes, Access Control, usage of super. Overloading and overriding methods. Abstract classes. Using final with inheritance.
- e. Package and Interfaces : Defining package, concept of CLASSPATH, access protection, importing package. Defining and implementing interfaces.
- f. Exception Handling : Exception handling fundamentals, Exception types, Uncaught exceptions, try, catch and multiple catch statements. Usage of throw, throws and finally.
- g. String Handling : String constructors, special string operations, character extraction, searching and comparing strings, string Buffer class.
- h. Applet : Applet Fundamentals, using paint method and drawing polygons.

### Reference Books :

1. Grady Booch - Object Oriented Analysis & Design with Applications (Benjamin Cummings, 2nd Ed.)
2. Patrick, Naughton, Herbert Schidt - Java 2 : The complete Reference (Mc Graw-Hill, 3rd Ed.)
3. James Rambaugh - Object Oriented Modelling and Design (PHI, IGNOU Ed.)
4. Patrick Naughton - The Java Hand book (Mc Graw-Hill)

### 3IT 6.1 LINE COMMUNICATION (Elective)

3L M.M. : 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. Distortioless 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, Slub matching. Measurement of paramenters 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, y-section & T-section attenuators, Filters, constant K-section, Ladder type, y-section, T-section, m-derived filter sections, Lattices filter section.

3. **CARRIER TELEPHONY** : Multi-channel systems : Frequency division & time division multiplexing power line carrier communication
4. **TELEPHONE TRANSMISSION** : Telephone Instrument; Rotary dial and Touch tone dial types, two wire/four wire transmission; Echo & singing, Echo suppressors & cancellors, crosstalk.
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 & telex services.

#### **Recommended Books :**

7. W. Fraees-Telecommunications (BPB Publication)
8. T. V. lahevention-Telecommunication switching systems & Networks (PHE)
9. J.D. Ryder - Network lines & field, Prentice Hall of India.

### **3IT 6.2 ELECTRONIC MEASUREMENTS & INSTRUMENTATION (Elective)**

3L

M.M. : 100

Ex. Hr: 3

10. **THEORY OF ERROR** : Accuracy & precision, repeatability, limits of errors systematic & random errors and modeling of errors, probable error & standard deviation, Gaussian error analysis, combination of error.
11. **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.
12. **SIGNAL GENERATION ANALYSIS** : The sine wave generator frequency synthesized signal generator, sweep frequency, generators, pulse, square and function generators, wave analyzer, harmonic distortion analyzer and spectrum analyzer. Instrumeration amplifier, chopper stabilized and carrier amplifiers. Phase sensitive detector.
13. **TRANSDUCERS AS INPUT ELEMENTS TO INSTRUMENTATION SYSTEM** : Classification, selection criterion of transducers, constructional & operational feature strain gauges,

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

14. **DISPLAY DEVICES AND RECORDERS** : Classification of display devices and systems. Cathode ray tube, light emitting diodes. incandescent, electro-luminescent and liquid crystal display. Recorders, Storage CRO.

**Recommended Books :**

15. Coper, W.D. and Helfrick, A.D. - Electronic Instrumentation and Measurement techniques, (PHI).  
16. Sawhney, A.K.-Measurements..... (Dhanpat Rai & Sons)  
17. Thomas H.E. and Clark, C.A. - Handbook of Electronic Instruments and Measurement Techniques (PHI)

**3IT 6.3 MEDICAL ELECTRONICS (Elective)**

3L

M.M. : 100

Ex. Hr: 3

18. **Introduction of Human Physiology** : Nerve physiology. Functions of nerves and myoneural junctions. Membrane 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. Myoelectrical control of paralyzed muscles.
19. **ECG, EMG and EEG** : Principle & Means of recording non-electrical biological parameters signals from micro-electrodes and salt bridge, use of field electric devices as electro meters, driven shield, photon coupled amplifier. Artifacts.
20. **Measurement of biological events** : Electronic methods of measuring blood pressure and systemic body temperature, pulse rate and coronary care monitoring.
21. **Biomedical Instruments** : Electronic pace makers. Implantable power sources. Defibrillators. Micropower transmitter for telemetering bio-signals. Special characteristics of CRO in bio-medical application, Surgical and therapeutic diathermy units. Physiological simulators. Basic diagnostic X-ray units. Introduction to patient monitoring and intensive care unit. Interference and patient safety. Anesthetic explosion and fires.
22. Miscellaneous Introduction to heart Lung machines, CT scanners, Ultrasound & sonography and Doppler measurements, NMR & PET. Scans use of lasers in medical applications.

**Recommended Books :**

23. Webster, J.G. - Medical Instrumentation, Application and Design, John Wiley and Sons.

24. Jacobson, B. Webster, J.G. - Medical and Clinical Engineering, Prentice Hall, International.
25. Cromwell - Biomedical Instrumentation and Measurements, et al, Prentice Hall, International.
26. R.S. Khandpur - Handbook of Biomedical Instrumentation, Tata Mc-Graw Hill.
27. Carr - Introduction to Biomedical Equipments, Pearson Education.

### **3IT 6.4 ELECTRICAL TECHNOLOGY (Elective)**

3L

M.M. : 100

Ex. Hr: 3

28. **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.
29. **Energy Sources and Power Generation** : Methods of bulk energy generation - Thermal, Hydro and Nuclear power generation. Elementary ideas of wind and solar power generation.
30. **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.
31. **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.

#### **Recommended Books :**

32. H. Cotton - Advanced Electrical Technology; Wheeler Pub., London
33. A. Langsdorf - AC Machinery; Tata Mc-Graw Hill.
34. Ravindra Nath & M. Chandra - Power System Protection & Switchgear, New Age International, New Delhi
35. Nagrath Kothari - DC Machines, Tata Mc-Graw Hill.
36. Hughes - Electrical Technology, Pears Education.

### **3IT 6.5 CIRCUIT ANALYSIS (Elective)**

3L

M.M. : 100

Ex. Hr: 3

37. **Computer Aided Circuit Analysis** : Introduction to circuit simulation, mode-incidence matrix, modified non-voltage analysis Different type of analysis during simulation - DC, AC and transient. Introduction to SPICE and ICAP simulation environment.
38. **Network Theorems** : Thevens, Norton's Reciprocity, Superposition, Compensation, Miller's Tegen's and maximum power transfer theorems. Networks with dependent sources.
39. **Transient Analysis** : Impulse, steps and sinusoidal response analysis of first order and second order circuits. Time domain & transform domain (frequency, Laplace) analysis. Initial and final value theorems.
40. **Linear Network Response to non-sinusoidal inputs** : Complex periodic waves adn their analysis by Four analysis. Different kind of symmetry. Power in a circuit.
41. **Coupling elements & coupled Circuits** : Conductively coupled circuits Inductively coupled circuits - mutual inductance, coefficient of coupling and mutual inductance between portion of same circuit and between parallel branches. Transformer equivalent and unductiely and conductively coupled circuits.
42. **Network Functions** : Terminal and Terminal pairs. driving point impedance transfer functions. Poles and zeros Restrictions on pole-zero locations in s-plane. Poles, zeros and fequency response : pole, zero and impulse/step response. Procedures of finding network functions for general two terminal pair networks. Stability & causality. Hurwitz polymonial, positive real functions.
43. **Two-port Networks** : Two-port parameters and their interrelations-z-paramenteres, y-parameters, h-parameters. ABCD parameters. Equivalence of two ports, transformer equivalent, interconnection of two-port networks. Image parameters. Attenuation & phase shift in symmetrical T & pi networks.

#### **REFERENCES :**

44. Kuo, Franklin F.- Network analysis and sysnthesis, II Ed., 1999, John Wiley & Sons.
45. Desoer, C. and Kuh, E.S. - E.S. Basic circuit theory, Mc Graw Hill.
46. Van Valkenburg, M.E. - Network Analysis, Prentice Hall, India.
47. Schaum's Outline series on circuit analysis.
48. Hayt., W. and Kimmerly - Engineering circuit analysis, Mc Graw Hill, Inc.
49. Sudhakar, A and Chyam Mohan, S.P. - Circuits and Networks, Tata Mc Graw Hill, India.

#### **3IT 7 HUMANITIES AND SOCIAL SCIENCES**

50. **FORM OF GOVERNMENT** : Democracy, Dictatorship.

51. INDIA : Brief history of Indian Constitution. History of Indian National Movement, After Independence: socio-economic growth.
52. SOCIETY : Social groups-concept and types, socialization-concept and types theory, social control : concept and types means, social problem : concert and types.
53. THE FUNDAMENTALS OF ECONOMICS : The logic of economics, fundamentals, definitions of economics, basic terminology.
54. MICROECONOMICS : Consumer's behaviour, utility, demand, supply, elasticity of demand and supply. Theory of production, production function, factors of production.
55. MACROECONOMICS : National Income, business cycles, aggregate term, inflation, economic growth, International Trade, exchange rates.
56. INDIAN ECONOMY : Basic features. Infrastructure, occupation, natural and human resources, unemployment, (Industrial Sector, India and Globalisation).

### **3IT 8 DATA STRUCTURES LAB**

57. Simple array and simple sorting.
- 58.
59. Addition, multiplication and transpose of sparse matrices represented in array form.
60. Addition, multiplication and transpose of sparse matrices represented in linked list form.
61. Polynomial addition, multiplication (8th degree polynomials).
62. Implementation of stack and queue using linked list.
63. Infix to postfix/ prefix conversion.
64. Quick sort, merge sort and searching algorithms, (fibonacci search).
65. Binary tree traversals.
66. Generation of spanning trees for a given graph using bfs & dfs algorithms.
67. AVL tree implementation (creation, insertion, deletion).
68. Symbol table organization (Hash Table).

### **3IT 9 DIGITAL ELECTRONICS LAB**

69. Experimental study of characteristics of CMOS integrated circuits.
70. Interfacing of CMOS to TTL and TTL to CMOS.
71. Study of various combinational circuits based on : AND/ NAND Logic block and OR/ NOR Logic blocks.
72. Study of the following combinational circuits : Multiplexer, demultiplexer and Encoder. Verify, truth tables of various logic functions.
73. To study various waveforms at different points of a transistor bistable multivibrator and its frequency variation with different parameters.

74. To study transistor astable multivibrator.
75. To design a frequency divider using IC-555 timer.
76. To study Schmit trigger circuit.
77. To study OP-AMP as Current to voltage & voltage to current converter, comparator.
78. BCD to binary conversion on digital IC trainer.
79. Study various Flip flops and construct Paraliel-in-sertal out register.
80. Testing of digital IC by automatic digital IC trainer.

### **3IT 10 ELECTRONICS LAB-I**

Study the following devices :

- a. Analog & digital multimeters.
  - b. Function/ Signal generators
  - c. Regulated d.c. - power supplies (constant voltage and constant current operations)
81. Study of analog CRO, measurement of time period, amplitude, frequency & phase angle using Lissajous figures.
  82. Application of diode as clipper and clamper.
  83. Plot V-I characteristic of P-N junction diode & calculate cut-in voltage, reverse. Saturation current and static & dynamic resistances.
  84. Plot V-I characteristic of zener diode and study zener diode as voltage regulator. Observe the effect of load changes and determine load limits of the voltage regulator.
  85. Plot frequency response curve for audio amplifier and to determine gain bandwith product.
  86. Plot drain current - drain voltage and drain current - gate bias characteristics of field effect transistor and measure of  $I_{dss}$  &  $V_p$
  87. Plot gain - frequency characteristic of two stage RC coupled amplifier & calculate Its bandwith and compare it with theoretical value.
  88. Plot gain - frequency characteristic of emitter follower & find out its input and output resistances.
  89. Plot input and output characteristics of BJT in CB, CC and CE configurations. Find their h-parameters.
  90. Study half wave rectifer and effects of filters on wave. Also calculate ripple factor.
  91. Study bridge rectifier and measure the effect of filter network on D.C. voltage output & ripple factor.



## **4IT 1 SOFTWARE ENGINEERING -I**

3 L + 1 T

M.M. : 100

Ex. Hr: 3

92. **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.
93. **Software Project Management** : Objectives, Resources and their estimation, LOC and FP estimation, effort estimation, COCOMO estimation model, risk analysis, software project scheduling.
94. **Software Development** : Life Cycle (SWDLC), SWDLC models, software engineering approaches.
95. **Requirements Analysis** : Requirement analysis tasks, Analysis principles, Software prototyping and specification, data dictionary, finite state machine (FSM) Models.
96. **Structured Analysis** : Data and control flow diagrams, Control and process specification, behavioral modelling, extension for data intensive applications.
97. **Object Oriented Analysis** : Object oriented concepts, Object oriented Analysis Modelling, Data modelling.
98. **Software Design** : Design fundamentals, Effective modular design : Data, architectural and procedural design, design documentation.
99. **Object Oriented Design** : OOD concepts and methods, class and object definitions, refining operations, class and object relationships, object modularisation.
100. **User Interface Design** : Human factors, styles of human computer interaction, human computer interface design guidelines and standards.

### **Recommended Books :**

101. Pressman : Software Engineering - A practitioner's Approach, Mc Graw Hill International.
102. A. Behforooz and F.J. Hudson : Software Engineering Fundamentals Oxford University Press.

## **4IT 2 DISCRETE & INTEGRATED ELECTRONICS**

3 L

M.M. : 100

Hr: 3

103. **RELAXATION OSCILLATORS** - Theory, operation and performance of astable, monostable and bistable multivibrators. Different triggering circuits. Theory of Schmitt trigger. Comparison of performance of various circuit configurations of multivibrators and their field of applications.

104. **SWEEP CIRCUIT** - Free running and triggered modes. Theory and common circuits of voltage and current time base generators.
105. **MODULATION & DEMODULATION CIRCUITS** - Linear and square law types modulators and demodulators.
106. **LINEAR ICs** - Characteristics of Linear ICs. Biasing consideration in Linear ICs. Power requirement and power supplies for Linear ICs.
107. **OPERATIONAL AMPLIFIERS** - Differential amplifier-stage characteristics and error signals. FET input stages. Multistage operational amplifiers, High frequency and High power amplifiers. Analysis of various stages of OP AMPS.
108. **APPLICATION OF OP AMPS** - General applications of op maps in non linear circuits. Biquad circuits. Design parameters. Q and on range zero. Design of Biquads using Op maps. Butterworths, Chebychev approximation and realization. Active networks based on passive ladder structures. Antonion's GIC and Burton's FDNR. Effects of real OP AMPS on active filters. Switched capacitor filters and active R high frequency filters.
109. **OTHER LINEAR IC'S** - Four quadrant multiplier and its simple applications. CMOS multiplexers. Voltage regulator IC's with feed back current linearitis. Positive and negative voltage IC regulators.
110. **LINEAR & DIGITAL PLL** - Basic Theory of first, second and higher order loop. Lock in and Lock out processes. Tracking performance, noise in linear PLL systems. Important application of linear PLL, Measurement of PLL parameters. Digital PLL with intermedial analog signals, ALL digital and software based PLL.

## REFERENECEES

111. J. Millman & C.C. Halkias - Integrated Electrines - Tata Mc-Graw Hill.
112. Millman Grabel - Microelectronics, Mc-Graw Hill.
113. Jacob - Application and Design with Analog ICs- Prentice Hall of India.
114. Sendra Smit-Microelectronics - Oxford University Press.
115. Coughlin- Drisol - Operational Amplifiers and Linear ICs - Pearson Education.

## 4IT 3 MICROPROCESSORS AND INTERFACES

3 L

M.M. : 100

Ex. Hr: 3

116. **Introduction to Micro Computer Systems** : Microporcessors, microcontroller and microcomputer devices, Machine and assembly language, Bus concept.

117.       **Architecture** : Comparative study of 8085 A, 8086 and 8088 (Pinout, internal architecture, timing diagrams), Instruction format and addressing modes.
118.       **Assembly Language and Programming in 8085** : Instruction set, Program structures (sequential, conditional, iterative), Macros and subroutines, Stack, Counter and timing delay, interrupt structure and its programming.
119.       **Device and Interfacing** : System buses, STD and ISA Memory (static, dynamic & various PROM), Architecture characteristics 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 232 C, RS 422 A & RS 423 A.
120.       **Introduction to 8051 Microcontroller** : Architecture and Programming Model, Internal RAM and Registers, I/O Ports, Interrupt System and Instruction set.

#### **Recommended Books :**

121.       Gaonkar - 8085 Programming, Penram Press.
122.       A.P. Mathur - Intro to Microprocessors - Tata Mc-Graw Hill.
123.       Antanakos - Introduction to Intel Family Microprocessors, Person and Education.
124.       Gilmore - Microprocessors Principles and Applications, Tata Mc-Graw Hill.
125.       B. Ram - Fundamentals of Microprocessors & Micro Computers, Dhanpat Rai Pub.
126.       Ray and Bhurchandi - Intel Microprocessors, Tata Mc-Graw Hill.

#### **4IT 4 TELECOMMUNICATION ENGINEERING FUNDAMENTALS**

3 L

M.M. : 100

Ex. Hr: 3

127.       **Telecommunication Need in Applications** :Information Explosion in industry, government and military applications estimated bandwidth need and electromagnetic spectrum of telecommunication.
128.       **Communication Model** :Transmission system in communication, introduction to WAN, MAN and LANs, broadband and narrowband ISDN, Architecture. Protocols and protocol architectures. Layered Architecture. Introduction to TCP/IP protocol Architecture.
129.       **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, twisted pair, UTP cables.

Coaxial and optical fiber cables, wireless microwave and satellite transmission

130. **Data Encoding** : Amplitude, frequency and phase modulation techniques, NRZ-L, 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.
131. **Multiplexing** : Frequency Division Multiplexing, Synchronous Time Division Multiplexing, Statistical Time Division Multiplexing.
132. **Switching Networks** : Circuit switching Networks. Scope and time division switching, routing in circuit switched networks. Control signaling Packet Switching principles. Fixed, flooding and adaptive routing strategies - X 25 interface, packet format and X 28 protocol.
133. **Frame Relay** : Frame Relay protocol Architecture - Frame Relay, Call Control and congestion control.
134. **MAC Sublayer** : Channel allocation problem, pure and slotted ALOHA protocols, persistent and Non-persistent CSMA, Collision free protocols, Digital cellular radio, CDMA

#### **Recommended Books :**

135. William Stallings - Data and Computer communication - (PHI, 5th Ed.)
136. James Martin - Tele communication and the computer - (PHI, 3rd Ed.)
137. A.S. Tanenbaum- Computer Networks - (PHI, 3rd Ed.)

#### **4IT 5 : Discrete Mathematical Structures**

3 L + 1 T

M.M. : 100

Ex. Hr: 3

138. **Graph Theory** : Graphs - Directed and Undirected, Eulerian chains and cycles Hamiltonian chains and cycles, Trees, chromatic number, connectivity and other graphical parameters Applications. Polyá's Theory of enumeration and its applications.
139. **Combinatorial Mathematics** : Basic Counting Principles, Permutations and combinatorics, Inclusion and Exclusion Principles, recurrence relations. Generating functions, Application.
140. **Sets and Functions** : Sets, relations, functions, operations, equivalence relations, relation of partial order, partitions, binary relations.
141. **Monoids and Groups** : Groups, Semigroups and Monoids cyclic semi groups and sub monoids, Subgroups and cosets. Congruence relations on semi groups. Morphism, Normal sub groups. Structure of cyclic groups, permutation groups, dihedral groups elementary applications in coding theory.
142. **Transforms**: Discrete Fourier and Inverse Fourier Transforms in one and two dimensions, discrete Cosine transform.

## References:

143. Kolman B., Busby R: Discrete Mathematical Structures for Computer Science, PHI.
144. Knuth, D.E.: The Art of Computer Programming, Vol. I, Narosa.
145. Gibbons, A: Algorithmic Graph Theory, Cambridge University Press.
146. Liu-Introduction to Combinatorics, Mc-Graw Hill.
147. Krishnamurthy: Combinatorics, EWP
148. Liu: Introduction to Discrete Mathematics, Mc-Graw Hill.
149. Graham, Knuth, Pratschnik: Concrete Mathematics.
150. Deo: Graph Theory, PHI

### 4IT6.1 Statistics & Probability Theory (Elective)

3 L

MM : 100

Ex Hr: 3

2. **Introduction:** Sample space, Events, Algebra of Events, Baye's Rule, Bernuolli Trials.
3. **Probability Distribution and Probability Densities:** Bernuolli, Binominal, Posisson, Normal Rectangular and exponential distribution and their PDFs. Moments and MGFs for above distributions.
4. **Discrete Random Variables:** Randon Variables and their event space, probability mass functions, Probability Generating Function.
5. **Expectations:** Moments, Computation of Mean Time to failure.
6. Bernoulli & Poisson Processes.
7. **Queuing Theory:** Pure Death & Birth-Death Process, mathematical Models for M/M/1, M/M/1/N, M/M/S and M/M/S/N queues.
8. **Discrete Parameter Markov Chains:** M/G/I Queuing Model, Discrete Parameter Birth-Death Process.
9. **Network of queues:** Queuing Networks.
10. **Correlation & Regression:** Linear regression, Method of least squares, Normal regression and Analysis.

## Recommended Books:

1. K.S. Trivedi: Probability & Statistics with reliablity queuing and Computer Science Application (PHI)
2. J.E. Frend R.E. Walpole: Mathematical Statistics
3. Taha: Operational Research.
4. Kapoor & Saxsena - Statistics & Probability.

### 41t6.2 Neuro computing and Fuzzy Systems (Elective)

3 L

MM : 100

Ex. Hr : 3

1. **Artificial Neural Networks:Basic:** Trends in computing, patterns and data Pattern recognition tasks: Association, classification, grouping, feature pattern

- recognition. Biological & artificial neural network: Characteristics, perforamneec, terminology. Models: mp neuron, perceptron and adaline. Topology for ANN. Basic learning laws and methods. Hebbs law, perceptron law, LWS law, correlation law, instar law and their comparision. Activation dynamics model, synapotic dynamics model, learning methods: Habbian, differential Habbian, competitive, differential competitive, error correction, reinforcement, stochastic 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 alge-braic operations: m-1, m-, probabilistic, L-fuzzy, intutional fuzzy/rough sets cartesian product, mth power, algebraic sum, bounded sum, bounded difference algebraic product, trianglar norms and conorms, averaging operators criteria like fuzzy and fuzzy-or, compensatory and non compensatory and the selection criteria Fuzzy measures of fuzzness and extension principles. Fuzzy measure, possibility measure, entropy and distance, extension principle, operations for type-2 fuzzy sets, algebraic operations with fuzzy members, special extended operations, extended operations for LR representations of fuzzy sets. Fuzzy relations, fuzzy graphs and fuzzy analysis. Fuzzy relations on sets and fuzzy sets, composition of fuzzy graphs and fuzzy relations, properties of min max composition, fuzzy graphs and special fuzzy relations. Fuzzy function over crisp interval, integration of a crisp function ver a fuzzy interval fuzzy differentiation.
  3. **Application 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. Artificial Neural Networks-B.Yagna Narayana-Prentice Hall India 1999
2. Fuzzy Set Theory and It's Applications 2nd Ed-H.J. Zimmemann Allied Publishers India 1999. 41T6.3 Computer Aided Network Analysis (Elective)

3 L

MM : 100

Ex Hr : 3

1. **Introduction:**Description and types of spice, types of analysis and limitations of SPICE.
2. **Circuit Descriptions:**Elements value, mode, circuit elements, sources output, SPICE commands, formats for circuit files & output files, graphic input files
3. **DC circuit analysis:**Resistors, modeling of elements, operating tem-perature, independent voltage & current sources Types of outputs and dc analysis.
4. **Transient analysis:**Capacitors & inductors, modeling of trainsient sources, transient current & voltage sources. Transient output variables and commands. Transient response. Voltage & current controlled switches.
5. **Ac circuit analysis:**Voltage and current out at variables, independent ac sources, ac analysis magnetic elements, transmission lines, multiple analysis.

6. **Advanced Spice Commands & analysis:** Commands for behavioral modeling, fourier analysis, noise analysis, monte carlo analysis, device & io, tolerances, sensitivity/worst case analysis.
7. **Semi conductor Diodes and BJT:** Characteristics, Dc & Small signal ac analysis Diode model, statement, parameters, BJT model, statements, parameters and circuits.
8. **Field Effect Transistors:** JFET, parameters and amplifiers, MOSFET, Parameters and amplifiers. Gallium arsenide MOSFETS.
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, tristate and bidirectional transfer gates. Flip flops & latches, pull up and pull down, delay line, stimulus devices digital input & 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 tow connections, voltage source and inductor loops and noise.

### Recommended Books

1. Spice for circuits and electronics using PSPICE II ED-Muhammad H. Rashid-Prentice Hall India 2000
2. Engineering Circuit Analysis with PSPICE and PROBE Conant Mc Graw Hill International 1993.

### 4IT6.4 Analog & Digital Communication (Elective)

3 L

MM : 1000

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, signaling rate, error probability, S/n ratio, bandwidth requirement, ISI and EYE diagrams.
3. **Digital modulation techniques:** Data transmission using techniques such PSK, FSK, QFSK (QAM), MSK, Inter system comparison.
4. **INTRODUCTION TO COMMUNICATION CHANNELS:** 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 TECHNIQUES:** 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.

### Recommended Books:

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

### **4IT6.5 FUNDAMENTALS OF INFORMATION TECHNOLOGY (Elective) AN OVERVIEW OF THE REVOLUTION IN COMPUTERS & COMMUNICATION:**

The digital age, overview of development in computer technology, communication technology, connectivity & interactivity, The ethics of Information Technology.

1. **APPLICATIONS SOFTWARE:**Software, common features of software, examples and features of word processing, spreadsheets, database, financial software for Cyberspace, Communication, E-mail, Web browsers. Speciality software, desktop publishing, presentation graphics, project management, computer-aided design, drawing and painting, groupware, multimedia authoring software, Software, Software problem Ethics & intellectual property rights.
2. **PROCESSORS:**Microprocessors, miniaturization & mobility. The CPU & main memory, Binary system, parity bit, machine language, Components of microcomputer system unit. Future trends Computers. Obsolescence & the environment. Energy consumption & "Green PCs".
3. **STORAGE DEVICES:**Storage fundamentals Criteria for rating secondary storage devices. Diskettes, hard disks, optical disks, Flash-memory cards. Magnetic tape. Online secondary storage devices, Compression & decompression standards. The future of secondary storage.
4. **TELECOMMUNICATION:**Practical uses of communications & connectivity. Telephone related communications services: Fax & voice mail, Video/Voice communications Videoconferencing & picture phones. Online information services. The internet & The World wide web. Shared resources: Workgroup computing, EDI. Internets. New Internet Technologies: Phone, Radio, TV & 3-D. Cyberethics: Netiquette, controversial material & censorship. Privacy issues.
5. **COMMUNICATION TECHNOLOGY:**Telecommuting, virtual offices & mobile workspace. Analog & digital signals, modems & other technological basics. Communication channels. Communication Networks. Local Networks, Factors affecting communication among devices. The future of communication.
6. **INFORMATION SYSTEMS:**Trends forcing change in the workplace. organizations, department, tasks, management level & types of information. Systems analysis & design.
7. **SOFTWARE DEVELOPMENT:**Programming concepts, Clarifying the problem needs. Design of program. Coding Testing, Documentation & maintenance of program. Generations of programming languages. Examples & features of some programming languages used today.

8. **SOCIETY & THE DIGITAL AGE:**Information superhighway, Security issues. Safeguarding computers & communications Quality-of-line & economic issues. Benefits of Information revolution.

### **Recommended Books:**

1. Using Information Technology- Williams. Sawyer & Huthcinson. Tata Mc-Graw Hill.
2. Information Technology- Curtin, Forley, Sen & Morin, Tata McGraw Hill.

### **4IT7 MICROPROCESSORS LAB**

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 (H) 16-bit by 8-bit.
3. Transfer of block data in memory to another place in memory in the direct 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 Hexadecimal
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.

### **4IT8 ELECTRONICS LAB-II**

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 1kHz 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 transistor phase shift oscillator and observe the effect of variation in R & C on oscillator frequency and compare with theoretical value.
7. Study the Hartley oscillator and observe the effect of variation of C on oscillator frequency.

8. Study the colpitts oscillator and observe the effect of variation, of C on oscillator frequency.
9. Study op-amp in inverting and non-inverting modes & Use op-amp as scalar, summer and voltage follower.
10. Use of op-amp characteristics and get data for input bias current, measure the output-offset voltage and reduce it to zero and calculate stewart rate.
11. Study a digital CRO and store a transient on it.

#### **4IT9 OBJECT ORIENTED PROGRAMMING LAB**

##### **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 calculate GCD of given numbers.
6. To implement Tower of Hanoi problem. **Program in Java**
7. To implement spell checker using dictionary.
8. To implement a Color selector from a given set of colors.
9. To implement a shape selector from a given set of shapes.
10. By mapping keys to pens of different colours, implement Turtle graphics.
11. To implement a calculator with its functionality.
12. To implement a graph and display BFS/DFS order of nodes.

#### **4IT10-ADVANCED PROGRAMMING LAB (C++/JAVA)**

1. Implementations of Sparse matrix using linked lists and perform addition and multiplication. (C++)
2. Polynomial additions multiplication using linked list. (C++)
3. Simulation of processor scheduling & program switching using priorities QUEUE with aging facilities. (C++) (li>Simulate a lift operation graphically. Optimize the cycle time of lift and waiting time for customer on floor. (C++)
4. Simulate a travelling guide which displays major cities of Rajasthan on screen and connecting roads, provide a facility to display shortest path between two cities and also a traveling salesman route. (JAVA)
5. Generate symbol table and perform lexical analysis of C program. (JAVA)
6. Write a program to draw Circle/Rectangle/Triangle/Ellipse on screen and perform different transformation operation (Shift, rotate, resize) on the object created. (JAVA)
7. Draw a rectangular box of size 4:3:2 and generate its different views. (JAVA)
8. Animate a car on the screen such that when car moves its wheels rotates.(JAVA)
9. Write a program to draw histogram, Pie Chart, X-Y graph (line-graph) (C++)
10. Simulation of digital clock (display as 7-segment LED) (JAVA)
11. Make a paint brush type software. (C++)



## Semester V

### 5IT 1 SOFTWARE ENGINEERING-II5

1. **Review of Concepts:** SWDLC models, requirement Analysis, Structured Analysis, Data Oriented Analysis & Object Oriented Analysis.
2. **Coding Fundamentals:** Programming Languages (Features of Programming Language, selection of programming language), programming Style & Quality (Style, Rules, Programme Quality), Programming Example (Design, Analysis, Main Data Structure, High Level Programming Structures, Description of Design and Development Process).
3. **Software Testing:** Software Testing Fundamentals, Test Case Desing, White Box testing Basis path Testing contgrol Structure Testing, Black box Testing and Testing for Specialized Environments, Architectures and Applications.
4. **Debugging:** Program Errors, 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:** Atributes of Web-based applications. Web E Process and Formulating Analyzing Web Based Systems.

#### Recommended Books:

1. Roger S. Pressman-fifth Edition, Mc-Graw hill Publications.
2. Ali Behforooz and frederick J. Hudson Oxford Press 1998.
3. Ian Sommerville-Software Engineering, Pearson Education India.

### 5IT2 WIRELESS COMMUNICATION

1. **Introduction:** Cellular revolution, Global Cellular Network, Broad band and trouldes with wireless.
2. **Cellular Wireless networks:** Principles of Cellular networks, First generation analog Second generation TDMA and Third generation systems.
3. **Cordless Systems And Wireless Local Loops:** Cordless systems, Wireless local loop and IEEE 802. 16 Fixed Broadband Wireless Access standard.
4. **Mobile Ip and Wireless Access Protocol:** Mobile IP, Wirelss Application Protocol, Internet Control Message Protocol and Message Authentication.
5. **Satellite Systems:** Application Basics-GEO, LEO and MEO Introduction to Mobile Satcom. routing, Localization and Handove.

6. **Broad Cast Systems:**Overview, Cyclic repetition of data, Digital audio broadcasting-mobile object transfer protocol. Digital video broadcasting.
7. **Wireless Lan:**Infrared vs radio transmission, Infrastructure and ad hoc networks, IEEE 802. 11-System architecture, protocol architecture, Physical layer, Medium access control layer and MAC management. HIPER LAN-protocol architecture, physical layer channel access control sublayer, information bases and networking. Bluetooth-User scenarios, Physical layer, MAC Layer, Networking, Security and Link Management.

### **Recommended Books:**

1. William Stallings, Wireless Communications and Networks, Pearson Education.
2. John Schiller, Mobile Communications, Pearson Education.
3. Sandeep Singhal and Thomas Bridgman, The Wireless Application Protocol, Pearson Education.
4. Millman C.Y. Lee, Mobile Cellular Telecom.
5. T.S. Rappaport, Wireless Communications, Principles & Practices.

## **5IT3 COMPUTER ARCHITECTURE**

1. **Register Transfer Language:**Data Movement around registers, Data movement from/to memory arithmetic and logic micro operations. Concept of bus and timings in register transfer.
2. **CPU Organisation:**Addressing Modes, Instruction Format, CPU organisation with large registers, stacks and handling of interrupts & subroutines Instruction pipelining.
3. **Arithmetic Algorithm:**Array multiplier Booth's algorithm, Addition/subtraction for signed/unsigned number and 2's complement number.
4. **Microprogrammed Control Unit:**Basic organization of micro programmed controller, Horizontal & Vertical formats, Address sequencer.
5. **Memory organization:**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 transfer, I/O Processor.

### **recommended Books:**

1. J.P. Hayer-Computer Architecture & Organization, Mc-Graw Hill.
2. Heuring-Computer System Design and Architecture, Pearson Education.
3. M.Morrismano-Computer System Architecture Prentice Hall of India.
4. Bartee-Computer Architecture, Tata Mc-Graw Hill.
5. Stallings-Computer Organization and Architecture Pearson Education.

## **5IT4 INFORMATION THEORY & CODING**

1. **Elements of Information Theory:** Measure of Information, Average Information, Entropy, Information rate. Communication channel, 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. Herbert Taub, Donald L. Schilling-"Principles of Communication System", Tata Mc-Graw Hill.

### SIT5 DATA BASE MANAGEMENT SYSTEMS

1. **Introduction to Database Systems:** Overview and history of DBMS, File System vs DBMS, Advantages 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 Hierarchies, Aggregation, Conceptual Database 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. **Relational Algebra and Calculus:** Relational Algebra Selection and Projection, Set Operations, Renaming, Joins, Division, Relational Calculus, Expressive Power of Algebra and Calculus.
4. **SQL Queries, Programming And Triggers:** The forms of a basic SQL, Query, Union, Intersection and Except, Nested Queries, Correlated Nested Queries, Set Comparison, Operations, Aggregate Operators, Null Values and Embedded SQL. Dynamic SQL ODBC and JDBC. Triggers and Active Databases.
5. **Schema Refinement and Normal Forms:** Introduction to schema Refinement Functional Dependencies, Boyce Codd Normal Forms. Third Normal Form. Normalization-Decomposition into BCNF. Decomposition into 3-NF.
6. **Internet Databases:** Database and the Web, Architecture Application Server and Server Side Java, XML-DTD'S, XML-QL.

7. **Object Oriented Database Systems:** Object, Object identity and Reference Types. Inheritance and Data Base Design for ORDBMS.

#### **Recommended Books:**

1. Raghu Rama Krishnan-Database Management Systems, 2<sup>nd</sup>ed. Tata Mc-Graw Hill.
2. Elmassari-Fundamentals of Data base Systems, Pearson Education.
3. Silverschatz Korth and Sudarshan-Database System Concepts, 4<sup>th</sup>ed. Tata Mc-Graw Hill.
4. Gordon C. Everest-Database Management Objectives, System Functions and Administration Tata Mc-Graw Hill.

#### **5IT6.1 OPTIMIZATION TECHNIQUES (Elective)**

1. **Introduction:** Introduction, Engineering application 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, Simple 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 machine.
5. **Dynamic Programming:** Introduction, Principle of Optimal Formulation and solution of Dynamic Programming problems. Travelling Salesman's problem, Application 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. Metha - Operations Research (Theory & Applications) Galgotia.
4. Vanger - Principles of Operations Research, Prentice Hall of India.

#### **5IT6.2 THEORY OF COMPUTATION (Elective)**

1. **Mathematical Notations and Techniques-** Sets, Logic, Functions, Relations and Languages, Inductive Proofs and Recursive Definitions.
2. **Regular Languages and Finite Automata:** Regular Languages and Regular Expressions, Finite Automata, Kleen's Theorem. Properties of Regular Languages Pumping Lemma. Non Determinisims. Finite Automata with Output and Decision Problem.
3. **Context Free Languages And Pushdown Automata:** Context Free Gammars, Union, Concatenation of CFG, Derivation Trees, Ambiguity, Simplified and

Normal Forms, Pushdown Automata, Deterministic PDA, PDA for given CFG and CFG for given PDA. Pumping Lemma Context Free Languages and Decision Problems involving Context Free Languages.

4. **Turing Machines:** Definition, Turing Machines as language Acceptor, Combining. Turing Machines, Variations of Turing Machines Nondeterministic Turing Machines, Universal Turing Machines, Recursive Enumerable and Recursive Languages. Unrestricted Grammars and Turing Machines Context Sensitive Grammars and Linear Bounded Automata. The Chomsky Hierarchy.

### Recommended Books

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

### SIT6.3 LOGICAL AND FUNCTIONAL PROGRAMMING (Elective)

1. **Propositions:** Fully parenthesized. Evaluation of constant propositions, Evaluation of proposition in a state, Precedence rules for operators, Tautologies, Propositions a sets of states and Transforming English to propositional form.
2. **Reasoning using Equivalence Transformations:** The laws of equivalence, rules of substitution of 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 propositional and predicate calculus. First Order Predicate calculus, Formal 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. Sebasta-concept Programming Languages, Pearson Education.
3. David Gries-The Science of Programming, Narosa publication House.

## 5IT6.4 ADVANCED DATA STRUCTURES

1. **Advanced Trees:**Definitions and Operations on Weight Balanced Trees (Huffman (Trees), 2-3 Trees and Red Black Trees. Augmenting Red Black Trees to Dynamic Order Statistics and Interval Tree Applications, Operations on Disjoint Sets and its Union find Problem. Implementing Sets, Dictionaries, Priority Queues and Concatenable Queues using 2-3 Trees.
2. **Mergeable heaps:**Mergeable Heap Operations, Binomial TRees, Implementing Binomial heaps and its Operations. 2-3-4 trees and 2-3-4 Heaps. Structures 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 Connectendness, Finding all Spanning Trees in a Weighted Graph and Planarity Testing. Breadth First and Depth First Search. Topological Sort, Strongly Connected Components and Articulation Point. Single Source Shortest path and All Pair Shortest Path Algorithms Min Cut Max Flow theorem of network. Flows Ford Fulkerson Max Flow Algorithms.

### Recommended Books:

1. Narsingh Deo-Graph Theory with Applications to Engineering and Computer Science Prentice hall of India.
2. Basse-Computer Algorithms, Pearson Education.
3. Cormen-Introduction to Algorithms, Prentice hall of India.
4. Aho A.V. hopcripft 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.

## 5IT 6.5 OPTICAL COMMUNICATION (Elective)

1. **Optical Fibres:**Basic optical laws and definitions, Principles of light propagation in fibres, Ray theory, Optical fiber modes and configurations, Step index and graded index. fibers monomode and multimode fibres, Fibre materials, fiber fabrications, fiber and optic cables.
2. **Signal 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 diodes photo dector noise, detector response time, Avalanchemultiplication noise. Photo diode materials optical receivers.
5. **Power Launching & Coupling:**Source to fiber coupling, fiber to fiber joints, fiber splicing, fiber connector.

6. **Optical Fiber Communications 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.

### **5IT7 COMMUNICATION LAB**

1. Harmonic analysis of a square wave of modulated waveform.
2. Observe the amplitude modulated waveform & measure modulation index.  
Demodulation of the AM Signal.
3. To modulate a high frequency carrier with sinusoidal signal to obtain FM signal  
Demodulation of the AM Signal.
4. To observe the following in a transmission line demonstrator kit.
  - a. The observe the following in a transmission line demonstrator kit.
  - b. The effect of losses in Transmission line.
  - c. Transmission with standing waves on a Transmission line.
  - d. The resonance characteristics of half wave length long x-mission line.
5. To study & observe the operation of a superhet receiver.
6. to modulate a pulse carrier with sinusoidal signal to obtain PWM signal & demodulate it.
7. To modulate a pulse carrier with sinusoidal signal to obtain PPM signal & demodulate it.
8. To observe pulse amplitude modulated waveform & its demodulation.
9. To observe the operation of a PCM encoder & decoder. To consider reason for using digital signal x-missions of analog signals.
10. Produce ASK signals, with and without carrier suppression. Examine the different process required for demodulation in the two cases.
11. To observe the FSK wave forms & demodulate the FSK Signals based on the properties of (a) A tuned circuits (b) on a PLL.

### **5 IT8 SOFTWARE ENGINEERING LAB**

#### **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 variable/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, using system interrupts.
13. Write a program to test Keyboard/Monitor serviced without using system interrupts.

### **5IT9 SYSTEM ANALYSIS AND DESIGN LAB**

**Each of the experiment is designed for two lab. Classes. Experiment 1-4 can be carried in Turbo Analysis 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 manage 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 Books 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 five different routes. Customers can opt for window seats and front seats.

### **5IT10 DATA BASE LAB**

**Each experiment is designed for two lab classes. Student can use any DBMS tool (MS Access) ORACLE/PSQL/Fox Pro at back 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 installments 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-executive who record thier daily appointments in the system. When Manager wants to conduct a meeting of Executive on a particular day System finds a free time slot of 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.



## Semester VI

### 6IT1 COMPUTER GRAPHICS

1. **Introduction:**Interactive computer graphic, picture analysis, overivew of programmer's model of interactive graphics, Fundamental problems in geometry.
2. **Basic Raster Graphics:**Scan conversion, filling and clipping, Text Generation & Thickening.
3. **Geometric Manipulation:**Transformation, Matrices, Homogeneous, Coordinates.
4. **Elementary 3-D Graphics:**Plane projections, vanishing points, specification of 3-D view.
5. **Visibility:**Image and object precision, z-buffer algorithms, area based algorithms, floating horizon.
6. **Curves and Surfaces:**Parametric Representation Bezier and B-Spline curves.
7. **Rendering:**Ray tracing antialiasing Gourard and Phons Shading.

#### Recommended Books:

1. J.Foley, A. Van dam, S.Feiner, J. Hughes, L Computer Graphics-Principles and Practice, Pearson Education, Asia.
2. D.Rogers and Adams: Mathematical Elements of Computer Graphics, Mcgraw Hill.
3. D.Heam and Baker: Computer Graphics, PHI

### 6IT2 MICROELECTRONICS

1. **Introduction:**
  - a. Circuits and Models: Introduction to VLSI, circuits ASICs and Moore's Law. Microelectronic Design, Styles, four phases in creating Microelectronics chips computer Aided Synthesis and Optimization.
  - b. Algorithms Review of Graph Definitions and Notations Decision and Optimization Problems, Shortest and Longest Path Problems, Vertex Cover, Graph, Coloring, Clique covering and partitioning Algorithms

Boolean Algebra and Representation of Boolean Functions, binary Design diagrams. Satisfiability and cover problems.

2. **Hardware Modeling:** Introduction to Hardware Modeling Language. Distinctive features of Hardware Languages, Structural and Behavioural HDLs, Logic Network, State Diagrams. Data flow and Sequencing Graphs. Compilation and Behavioural Optimization Techniques.
3. **Architectural Synthesis:** Circuits 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 a circuits and General Circuits.
4. **Scheduling Algorithms:** Model for Scheduling Problems, Scheduling without Resource, Constraints-Unconstrained Scheduling ASAP Scheduling Algorithms Latency. Constrained Scheduling. ALAP scheduling. Under Timing Constraints and Relative Scheduling with Resource Constraints Integer Linear Programming Model, Multiprocessor Scheduling, Heuristic Scheduling Algorithms (List Scheduling). Force Directed Scheduling.
5. **Two Level Combination Logic Optimization:** Logic Optimization Principles-Definitions, Exact Logic Minimization, Heuristic, Logic Minimization, and Testability Properties Operations on Two level logic Cover-positional Cube Notation, Functions with Multivalued inputs and list oriented manipulation. Algorithms for logic minimization.
6. **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 Operator Behavioural Modeling-process variable Assignment, Signal Assignment and Wait Statements. Assertion Loop, if, case and next Statement Block and concurrent Assertion statements structural specifications of Hardware-inverter, Nand Gate Models, Comparator and Test Bench Modeling.

### Recommended Books:

1. Giovanni De Michell-Synthesis and Optimization of Digital Circuits, McGraw Hill Inc.
2. Zainalabedin Navabi-VHDL Analysis and Modeling of Digital System, McGraw Hill Inc.
3. J.Bhaskar-VHDL Primer, Adision Wesley.
4. Brassard-Algorithms, Prentice Hall.

### 6IT3 DESIGN AND ANALYSIS OF ALGORITHMS

1. **Background:** Review of Algorithm Complexity and Order Notations, Sorting Methods Heap Sort, Radix Sort, Bucket Sort and Counting Sorts.
2. **Divide and Conquer Methods:** Binary Search, merge sort, Quick sort and Strassen's matrix multiplication.

3. **Greedy Method:**Knapsack Problem, Job 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 Moors Algorithms.
7. **Problem Classes NP, NP-Hard and Np-complete:**Definitions of P, NP, NP-Hard and NP-complete problems, Decision, Problems, Cooks 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 Methods 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 Algorithms, Pearson Education.
2. Rivest and Cormen, Introduction to Algorithms, Prentice Hall of India.
3. Baase, Computer Algorithms Pearson Education.
4. Brassard, Algorithms Prentice Hall.
5. Bazaraa, Linear Programme & Network Flows, John Wiley & Sons.

#### **6IT4 INTRODUCTION TO SYSTEM PROGRAMMING**

1. **Overview:**Comparison of machine language, assembly language and high level languages, External and internal representation of instruction 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 activities) Design of a two pass assembler. Design of one pass assembler 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. **Macro Processors:**Macro definition, Call and expansion, Macro processor algorithm and data structure machine independent features (parameters, unique, conditional expansion, nesting and recursion) Pass structure and design of macro processor and macro assembler. Cases 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. Syntacitcanalysis Operator precedence parsing recursive descent parsing Symbol Table Management Data Structure for symbol table hashing functions for symbols overflow technique, block structure in symbol table.

#### **Recommended Books:**

1. D.M. Dhamdhare-System Programming & Operating system. Tata Mc Graw Hill.
2. L.L. Beck System Software, Pearson, Education.
3. J.J Donovan-System Programming Tata Mc-Graw Hill.

### **6IT5 COMPUTER NETWORKS**

1. **Computer Networks and The Internet:**What is Internet? Network Protocols Network, Edge, Access Networks and Physical Media. Protocol Layers and their services models, Internet Backbones, NAP's and ISPs.
2. **Application Layer:**Protocol and Service 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 Message.
3. **Transport Layer:**Transport Layer Service and Principles, Multiplexing and Demultiplexing applications, connectionless Transport. UDP Segment structure and UDP Checksum. Principles of Reliable Data Transfer-Goback 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 routing & OSPF algorithm. Router Components; Input Prot, 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 format. Section overhead, Line overhead and path overhead. Virtual Tributries 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 McGraw Hill.
3. Garcia and Widjaja-Communication Networks, Tata McWraw Hill.

## 6IT6.1 MANAGEMENT INFORMATION SYSTEM

1. **Introduction:**MIS concept, Definition, role & Impact of MIS, Process of management, organization structure & behaviour.
2. **Basic of Management Information System:**Decision Making, Information concepts, System concepts & 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. **Application of Management Information system:**Application in manufacturing sector using for personal management, Financial management, Production Management, Material Management, Marketing Managemnet Application in Service Sector.
5. **Enterprise Resource Planning (ERP):**EMS, ERP, Benefits implementation, EMS & MIS.
6. **Case Studies:**Application of SAP<sup>TM</sup>technologies in manufactruing sector.

### Recommended Books:

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

## 6IT6.2 ADVANCED COMPUTER ARCHITECTURE

1. **Parallel Processing**Generation of Computer system 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, Archictural 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 Arary Processors:**SIMD array processor, SIMD interconnection networks, parallel algorithms for array processor, 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, McGraw Hill.
2. Subrata Das-Advanced Computer Architecture, Vol 1 & II.
3. Hayes-Advanced Computer Architecture, Tata McGraw Hill.

## 6IT6.3 MICROWAVE AND SATELLITE COMMUNICATION

1. **Microwave Propagation:**EM wave radiation and its reception, polarization, Attenuation and Absorption. Effect of earth's 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 principles and range equations, effect of noise, radar display, system, introduction to pulse Radar. MTI 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 Statellite:**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-"Antenna & Wave Propagation, Sayta Prakashan."
3. Tri Ha-"Digital Satellite Communication".

### **6IT6.4 DIGITAL SIGNAL PROCESSING**

1. **INTRODUCTION:-**Signals-continous time and Discrete time systems, Properties of systems. Linear time inveriant systems-continuos time and discrete time. Propertises 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. Propertises 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. 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. Baisc structure for IIR & FIR systems.

#### **Recommended Books:**

1. Salivahanan and Vallavaraj-Digital Signal Processing Tata Mc-Graw Hill.
2. Nagrah-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 Systems. Oxford.

### **6IT7 INTERNET PROGRAMMING LAB**

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 flip on mouse over.
  2. Link to separate HTML file for academic, sports 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.
5. 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.
6. Enhance the above query through password protection.
7. & 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.
8. Enhance the above page for making a payment through electronic billing system.
9. Associate guest book in your web page.
10. Setup a counter to count the number of visitors on your web page.

### **6IT8 GRAPHICS LAB**

1. Simulate a low resolution raster screen and implement on it-
  - i. Midpoint algorithm for scan converting lines at any angle with pixels of constant and variable intensity.
  - ii. mid point ellipse scan conversion.
  - iii. midpoint 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-Sutherland line clipping algorithm. (iii) Sutherland Holdgram polygon clipping algorithm. (iii) Sutherland Holdgram 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 a opaque rectangle with thin boarder. Let the user specify colour (text, boarders, back ground). Type (Front, letter size and screen position) and Text string can't fit in one line, break it at appropriate places to mae multi line text. implement both the multiline text and multiscan text.
8. Write an interactive program allowing user to create, interactively manipulate and refine piecewise continous cubic curve represented as beta spline and Hermite Bezier.
9. Write a program to display on a grey back ground distince 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 sphere and polygons.
11. Write a program to interpolate lineraly between two colours 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 form one point and place at other.

### **6IT9 MICROELECTRONICS LAB**

#### Programming C++

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

### **6IT10 WINDOWS AND VISUAL PROGRAMING**

1. To understand X-windows, X-lib, X-toolkit and X-ne 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 render and protocol information.
  3. Using X library of the server, write a program o create a new window of a given size, title, border, foregrour and background colors.
  4. To implement Keyboard event handing/ masking using X library.
  - 5,6,7 To implement mouse event handling/masking using X library and interface with windows managers and drawing applications.
- To implement various drag and drop based GUI components in Visual Basic. 9,10. To implement various drag and drop based GUI components in Visual Basic. 11,12. To implement various drag and drop based GIF components in Motif and Lesstif.



## Semester VII

### 7IT01 E-COMMERCE

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 technology e-commerce Implementation and evaluation.
3. **Case Study:** e-commerce in passenger-Air Transport, choices, Airliner 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 object and data objects, choosing the objects. Building a scalable application, Addition 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 architectuer.

#### ***Recommended Books:***

1. David Whiteley-E-Commerce Strategy, Technology and Applications, 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 Enterprise Systems with J2EE, Techmedia.
4. Kalakota-Frontiers of Electronic Commerce, Pearson Education.

### 7IT02 INTERNET TECHNOLOGIES

1. **Introduction:**Internet connection concepts-Server, client and parts, Domain Name Systems, Telephone, Cable and satellite connections-Dialup, ISDN, ADSL and leased line based connection, cable and DSS accounts, Web TV and Internets, ISP features.
2. **Intranets:**What is Intranet?-Internet vs LANs Components of a Internet- Workstations and client software, Server and Network operation, systems. Network Cards, Capling and Hubs, Steps for creating an Intranet Maintenance and connecting to Internet.
3. **E-Mail Technology:**Features and Concepts-Message readers, Address book, Attachment, Filtering and forwarding mails.
4. **Video Conferencing and Internet Telephony:**Voice vs Video conferencing, Video conferecing hardware and features of video conferencing software, digital telephony as ISDN application, H.23 protocols and multipoint 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, Navigation, Themes and Publishing. Analyzing web traffic-Log file data, analyzing log files and products for analyzing web traffic.

*Recommended Books:*

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

### **7IT03 OPERATING SYSTEMS**

1. **Introduction:**What is an operating system (OS)? Types of OS-Mainframe, 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 kernal; Scheduler activation. Inter process communication-Race conditions, Critical regions,Mutual exlusion with busy waiting, sleep and wakcup. Classical IPC problems - Dinning philosophers problem, Readers and Writers problem and Sleeping barber problem. Scheduling in Batch, Interactive and Real Time Systems.
3. **Deadulock Resources:**Preemptable and Non-pre emptable resources, resource aquation. 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 invested page tables. Page Replacement Algorithms-Optimal LRU and working sct 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. Dhamdhere Operating Systems-A Concept based approach, Tata Mc\_Graw Hills.
3. Achyut Gobble Operating Systems, Tata Mc-Graw Hills.
4. Stallings: Operating Systems Pearson.

### **7IT04 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. **Documents:**Hypertext, Hypermedia, MHEG.
5. **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 Thakrar.

### **7IT05 NETWORK PROGRAMMING**

1. **Review of Concept and Protocols in TCP/IP:**Introduction, internetworking concepts and architecture, ARP, RARP, Internet protocol (Datagram delivery, routing, (ICMP), CIDR, introduction of UDP and TCP, EGP, BGP, RIP, OSPF, HELLO, NAT, VPN, client server model, BOOTP, DHCP, NFS.
2. **Socket Programming:**Socket Fundamentals, Elementary TCP & UDP sockets, I/O multiplexing, socket options, elementary name and address conversion.
3. **Advanced Sockets:**Introduction to IPV6, IPV4 AND IPV6 interoperability Advanced name and address conversion, Daemon processes and inetd, Advanced I/O and non blocking I/O, Broadcasting, Threads and IP options.
4. **X/OPEN Transport Interface (XTI):**TCP client and servers, name and address functions, UDP client and servers, streams and virtual. Private Networks.

5. **Advanced Topics:**Interprocess communication-Introduction, POSIX IPC & System V IPC, Introduction to pipes & FIFOs, Doors and Sun RPC (Introduction only).

*Recommended Books:*

1. W.R. Stevens-Urx Programming, Vol.I, II 2<sup>nd</sup>ed., Pearson/Prantice Hall of India.
2. Douglas E. Comer-Internetworking with TCP/IP Vol. I, II, III Pearson/Prantice Hall of India.
3. W.R.Stevens-TCP/IP Illustrated Vol. I,II,III Pearson/Prantice Hall of India.

### **7IT06.1 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-ALL 1 to ALL 5 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. AOS 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 Mc Graw Hills.
2. Rainer handel-ATM Networks 2<sup>nd</sup>Edition, Pearson Education Asia,
3. Stallings-BLSDN & ATM with Frame Relay Pearson.

### **7IT06.2 DIGITAL SPEECH AND LANGUAGE PROCESSING**

1. **Introduction:**Knowledge in speech and language processing, Ambiguity, Models and Algorithms, Language, Through and understanding.
2. **Regular Expressions and Automata:**Regular expressions-basic Regular expression patterns, Disjunction, Grouping and Precedence, Finite-State Automata-Using and FSA to recognize sheeptalk, Using NFSA to accept strings.
3. **Morphology and Finite State Transducers:**Survey of English Morphology-Inflectional and Derivational Morphology, Finite-State morphology parsing-Lexicon and Morphotactics, Morphologicals 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:**Speech 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 of TTS, Prosody in TTS and Human, Processing of Phonology and Morphology.
  5. **HMMs and Speech Recognition:**Speech Recognition Architecture, Hidden Markov models, Viterbi 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.

### **7IT06.3 PRINCIPLES OF PROGRAMMING LANGUAGES**

1. Importance of programming languages, brief history and features, good programming language.
2. The computer organization, hardware and firmware, translator and software simulated computers. Syntax, semantics and virtual computers. Hierarchies of computers, Binding and binding time.
3. Elementary and structured data types, their specifications and implementation. Type checking and type conversion, vectors and arrays, records character string. variable size data structures, sets, input output files.
4. Evolution of the concept of data type, abstractions, encapsulation and 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 sub programs, exception and exception handlers. Coroutines and scheduled subprograms. task and concurrent exception.
5. Name and referencing environments, Static dynamic and block structure. Local data and local referencing environment.
6. Dynamic and static scope of shared data. Block structure, parameters, and their transmission. task and shared data Storage requirement for major run-time elements. Program and system controlled storage management. Static and stack based storage management. Fixed size and variable size heap management.
7. 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, Pearson Education.
4. Stroustrup:-Programming in C++, Pearson Education.
5. Pratt:-Programming Languages, Pearson Education.
6. Ravi Sethi:-Programming Languages, Pearson Education.

### **7IT06.4 NETWORKS S**

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 Applications-Data compression and Paint quality inspection. Back propagation simulation for signal propagation-BPN data structure, signal propagation algorithms and cror-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 intilization algorithms and signal propagation.
4. **Simulated Annealing:**Information theory and statistical mechanics concepts, Real and simulated Annealing. Boltzman machine-Basic Architecture and processing, learning in Boltzman machine-Basic Boiltzman Networks its data structure and algoritm.  
algoritum
5. **Counter Propagation Networks(CPN):** Counter propagation Network building Blocks-Input Layer,Instar,competitive Networks and outstar. CPN 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, Person Education Asia.
2. Simon Haykin-Neural Networks 2/e,Pearson Education Asia.
3. Yagya Narayan-Artificial Neural Networks,Prentice Hall India,1999.

### **71T08 NETWORK PROGRAMMING LAB**

1. Write an echo client and server using socket
2. Design a clock synchronization protocol.
3. Build a client for the protocol.
4. Build a domain name system client program.
5. Build a DHCP client.
6. Capture and decode ethernet frames.
7. Decode an IP header.
8. Build a packet analyzer.
9. Extract data from a TCP stream.
10. Observe concurrent TCP connections.
11. Extract data from a TCP stream
12. Observe concurrent TCP connections

#### Recommended Books :

1. Douglas E.Commer -Hands on Networking with Internet Technologies Person Education Asia
2. Douglas E.Commer - Internetworking with TCP/IP ,Vol.I,II,III ,Person Education Asia
3. Stevens -Unix Network Programming Vol.I&II ,Person Education Asia
4. Recommended Platform :OS -Linux with Forte Developer or JDK

#### **71T09 MULTIMEDIA LAB**

1. Play two audio files.One is having english spoken digits and another having hindi spoken digits .These files are played on a single system after sound robin mixing digits
2. Program a presentation of circle and rectangle with audio description i.e. size, colour of boundary and interior etc. played synchronously one after another
3. An animation sequence is mixed with audio words . Every action is synchronized with pronunciation of the current action .(Note : A bat can be displayed as hit/miss sequence of ball played
4. Present a Video file on 2 independent systems communicating through network without participation of server system of the network
5. To analyze a file having digram .Compress it in some format . Transfer the file to other system through floppy . Decompress and display the original digram : (Note :- Use bitmap format).
6. Make musical notes displayed on screen . That can be played with depressing the notes by mouse click.One by one.
7. Make a spelling checker in which PC speaks a word user enters this word through keyboard .On correct spelling PC gives applause , On wrong spelling it asks to retype the work, after 8-failures PC shows correct spelling
8. Make a math driller for primary school in which PC presents two or more numbers (Max. 10 nos). ask to perform addition, subtraction , multiplication ,division , searching max or minimum etc. User perform said operation and enters

result through keyboard .On correct answer PC applauses else it asks to retry  
.After 8 failure PC gives correct answer

### **71T10 SHELL PROGRAMMING**

1,2 Write a shell script to creat a file in/user /class /batch directory Follow the instruction

-

- i. Input a page profile to yourself, copt 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-

1. Showing the count of users logged in
  2. Printing 3- column list of files in your home directory .
  3. Listing your job with below normal priority
  4. Contiuue running your job after logging out.
- 
1. Write a shell script to change date format . Show the time taken in execution of this script
  2. Write a shell script to print file names one per line in a directory showing serial number of the file (Hint: use for loop
  3. Write a shell script to sort a list of file either in alphabatic order or largest file first ,according to user response .
  4. Write a shell script to print the name and the time of login sorted by time (Hint:Use awk).
  5. Write a shell script count the lines, words and characters in it's input (Note: Don't use wc>
  6. Write a shell script to print end of a glossory file, in reverse order , using array (Hint use awk,tail).
  7. Modify call command to accept more than one month (e.g. \$cal oct not-).
  8. Write a shell script to check whether Ram logged in , continue checking every 60 seconds until success



## **Semester VIII**

### **SIT01 DATA MINING & WARE HOUSING**

1. Introduction : Concept of Data Mining and warehousing ,Web Warehousing  
.Future Systems profiles, Web Warehousing for business applications , cousumers  
, Introduction to Knowledgement ,Databases , Data Warehouses and knowledge bases

. (5 Lect.)

2. Traditional Warehousing : Theory of Data Warehousing ,What is a data wherehousing ? Barriers of Successful Data Ware housing, Really bad Data Warehousing approaches, Data Warehouse (Mart) functional Model, Layers of warehouse Environment

(5 Lect>

3. Web-Based Query and Reporting : Delivering Information over the Web,Query and Reporting Tools and Business value . Arthiectural approaches to delivering query capabilities over the web . Cae study approach ,Due diligence in the development of solutions

(3 Lect.)

4. Web Based Statistical Analysis and Data Mining : Analytical Tools,What is Data Mining? Business value from 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 Discovery Applications ,Comparision of the Products ,Architechural Approaches for statistical and Data Discovery Tools , Intelligent Miner for Relationship Marketing Product. (6 Lect.)

5. **Search Engines and Facilities :**

Search Engines and the Web, Search Engine Acrchitechure ,Variations in the way that search facilities work, variations in Indexing Schemes Example -Excalibur Retrievalware Product (Product Organization ,Search Templates, Query Building Approaches ,Search Approaches , Index Building and synchronization . (8 Lect.)

6. **Web Components and Communications : I**

ntroduction to Web Architchure HTML as the Universal Document Displays 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 ). (6 Lect.)

*Recommended Books :*

1. Rob Mattison - Web Warehousing and Knolwdege Management ,Tata MC-GrawHill.
2. Shelley Powers- Dynamic Web Publishing , Techmedia .

## **SIT02 INFORMATION SYSTEM SECURITIES**

1. Introduction : Attacks ,services and mechanism ,security attacks, security services ,model for Internetwork security
2. Conventional Encrcyption : Principles, algorithms, cipher block modes of operation ,location of enercyption devices ,key distribution
3. Public Key Cypthography : Approaches to message authentication, secure Hash function & HMAC, public key cryptography principles ,algorithms ,digital signature ,key management .
4. Authentication Applications : Kerberose , X 509 Directory anthetication service .
5. IP Security : Overvies ,Architechure ,Authentication header .Encapsultaing security payload, Combining security associations ,key managment
6. Web Site : Requirement ,Secure Sockets Layer(SSL) & Transport Layer Security (TLS), Secure Electronic Transaction (SET) .
7. Intruders ,Viruses & Firewall : Intruders , Viruses & related threats Firewall Design Principles ,Trusted Systems.
8. E-Mail Security : Pretty Gard Privacy (PGP) & S/MIME.

#### Recomended Books :

1. Stallings -Network Security Essentials ,Pearson Eduction Asia , 2003
2. Nick Galbreath -Cryptography for database and Internet applications, Wiley-Dreamtech, 2002
3. Stallings - Cryptography & Network Security ,Pearson Eduction Asia , 2nd Ed.

### **8IT03 REAL-TIME SYSTEMS**

1. **Introduction to Real-Time Applications Digital control:** sample data systems ,complex control -law computations ,High -level control-control heirarchy ,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 constriants -Hard timings constraints and temporal Quality-of-Service gaurantees, Hard real-time systems -reasons for timing guarantee requirment and examples of hard timing constraints ,sotr 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 execution time, Periodic task Model- periods ,execution times and 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 ctriticality 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 hierachy-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

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

#### **8IT04.1 SIMULATION AND MODELING**

1. **The Nature of Simulation** : Simulation Model -Stating ,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** : Modelling 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 McGraw Hill.
2. G.A. -Interactive Dynamic System Simulation , Mc Graw Hill.

#### **8IT04.2 DISTRIBUTED SYSTEMS**

1. **Characterization of Distributed Systems** : Introduction and examples of distributed systems - Internet ,Internet mobile, ubiquitous computing : Resources 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 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- participation 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 synchronuous system. Cristian's method for synchronizing clocks, Berkeley algorithm and network time protocol .Global states and consistant cuts.
5. **Distributed -shared Memory** : Introduction to distributed -shared Memory (DSM) -Message passing versusu DSM, Implementation approaches to DSM, Design and implementation issue-structure and synchronization model.

Recommended Books :

1. George Couloris - Distrubuted Systems Concepts and Design , 3rd ed, Peason 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 .

### 81T04.3 ARTIFICIAL INTELLEGENCE

1. Problem definition, space search , production systems ,control strategies Search techniques , production systems characteristics, heuristic search techniques .
2. Knowledge representation and mappings , predicate logic resolution propositional logic, procedural and declarative knowledge ,forward and backward resoning ,symbolicresoning
3. Gac playing ,minmax search, alpha-beta cutoffs ,interactive deeping planning system components ,non-linear and hierachical planning ,reactive systems .
4. Natural language processing ,syntacting processing and sematic analysis .
5. Learning in problem solving ,learning from example ,formal learning theory ,explantion based learning .

Recommended Books :

1. E.Rich, K.Knight- Artificial Intelligence ,TMM
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 Causev,The Essence of Artificial Intelligence ,Pearson Education Asia.

## 81T04.4 IMAGE PROCESSING AND PATTERN RECOGNITION

1. **Introduction** : What is digital image processing ? Imaging in ultraviolet and visible band . Fundamental steps in image processing Components in image processing .
2. **Digital Image Fundamentals** :Image peception in eye ,light and electromegnetic spectrum ,Image sensing and acquisition using sensor array. Image sampling and quantization . 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 , Histrogram equalization and matching .Smoothing spatial and Sharpening filters .
4. **Image Resortation** : Image restoration model, Noise Models- Spatial and frequency properties of noise.noise probability density functions. Noise- only spatial filters -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 models-Source encoder and decoder , Channel encoder and decoder , Lossy compression and compression standards .

### Recommended Books :

1. Rafael C. Gonzalez- Digital Image Processing ,Pearson Education Asia.
2. Kenneth R. Castleman - Digital Image Processin ,Pearson Education Asia.
3. Nick Effard - Digital Image Processing ,Pearson Education Asia.
4. Jain - Digital Image Processing - PHJ

## 8IT07 OPERATING SYSTEM LAB

1. CPU simulator : Write a program to read mnemonics for 8085 CPU and produce appropriate machine language instruction
2. Tape Drive simulator : Write a program to declare 512 kb portion of RAM memory as a Magnetic Tape Drive on which sequential file can be stored and accessed .Files are to be written as blocks of fixed or variable size. Make appropriate assumption about start time , stop time, tape speed ,load point and last point of tape.
3. Flopy Disk Drive Simulator : Write a program to declare 512 kb portion of RAM memory as a double sided disk drive of 64 tracks 32 sectors per track of unformatted capacity . Format it to store at least 64 byte /sector of user data as sequential and /or random access files. Assume that both heads move together .
4. File Manager : Write a file manager for above disk drive . It should maitain file directory , record of used/free sectors ,good/bad(assumed) sectors .Create ,delete ,rename file/directories .
5. Memory Manager : Write a memory manager for 64 kb of RAM memory for use with 8085 CPU for segmented memory management (fixed/ varialbe size

- segments. ). At least one segment of 8kb must be reserved for O.S. and other may be given to users (max. 7 processes). Implement memory compaction ,garbage collection and best fit/worst fit allocation schemes .
6. Long Term Scheduler : Write a job analyzer to inspect incoming job, evaluate its system resource requirement and execution priority and schedule it for execution .
  7. Short Term Scheduler : Write a process scheduler allowing two different time quanta for CPU scheduling and I/O Scheduling in which process can change various states .
  8. Write a print scheduler which examine output file and schedules them for printing on a slow printer or fast printer to optimize the system throughput .
  9. Write a interput handler for 8085
  10. Write a system call handler for creating ,deleting and terminating (Normally/Abnormally) process .

### **SIT08 INDUSTRIAL ECONOMICS & MANAGEMENT AND WRITTEN & ORAL COMM.**

1. **Money,Credit and Finance** : Function of money, types: coins ,notes ,cheques ,Bill of Exchange ,The Banking mechanism and government control. The Reserve bank of India nationalized banks, money market. Hire purchase finance . The stock exchange and issuing house.
2. **Managment** : Evaluation of management ,thought ,principles and functions of management ,motivation . Types of business forms and organization.
3. **Finance and Financial Statements** : Needs of finance ,kinds of capital sources ,working capital cycle. Financial statements : basic concepts balance sheet, profit and loss account sources and uses of funds statement working capital ,cash and total resource basis ,Ratio analysis : liquidity ratios, capital structure rations, profitability rations, turnover rations .
4. **Interest and Annuity** : Capital recovery annuity ,present worth annuity ,sinking fund annuity ,compound amount annuity ,Nominal and effective rate of interest . Depreciation : need of depreciatio, methods of depreciation .
5. **Quality** : Conception ,quality of design ,quality of conformance ,value of quality & cost of quality . Evaluation of TQM concepts and philosophy .TQM and traditional managment .Introduction to ISO -9000,ISO-14000,Just in Time , BPR.
6. **Project Planning** : Network analysis , PERT & CPM ,Project evaluation . Labour Ligislation , Plant location .investment decisions. Concept of industrial economics and its importance . Industrial & cost theory, Optimum size ,Market structure .
7. Technical composition on topics like water conservation , Energy, Computers, Transport ,Travel ,Environment ,Enterpreneurship and latest trends in industry and engineering fields .This may also include description of objects , experiments and process .
8. Reading comprehension and ecis writing ,summarizing and report writing ,vocabulary and work power .
9. Oral presentations - Correct articulation remedial speech, Seminar & Project presentation ,use of OHP & other A/V aids .

