

3IT01 MATHEMATICS III

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 variation of parameters, solution in series (without particular integral).
2. **PARTIAL DIFERENTIAL EQUATIONS OF FIRST ORDER:** Lagrange's method and standard forms, Charpit's method, Method of separation of variables – application to the solution of wava equation in one dimension, Laplace's equation in two dimensiona, diffusion equation in one dimension.
3. **TRANSFORM CALCULUS:** Laplace Transform with its simple properties, applications to the solution of ordinary and partial differential equations having constant coefficients with special refence to the wava and diffustio equation, Fourier transform and inverse Fourier transforms in complex and Sine-Cosine form with application to solution of partial differential equations with constant coefficients.
4. **NUMERICAL METHODS:** Solution of Algebraic and transcendental equations, interpolation finlle differences, inverse interpolation and integration, numerical solution of differential equations and partial differential equations, solution of difference equations.
5. **MATRICES:** Eigen values and Eigen vectors, diagonalisation, Cayley Hamitton equation, Triangularisation of matrices.

Recommended Bools:

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.

3IT02 DIGITAL ELECTRONICS

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

Octal, Hexadecimal number'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, ECL, HTL, MOS, and CMOS logic circuit and their realization. Speed and delay in logic circuit and their realization. Speed and delay in logic circuits, integrated circuit logic and noise immunity.

Standard forms of Boolean functions. Minterm and Maxterm designation of functions. Simplification of functions on Karnaugh maps, Incompletely specified functions, Combinatorial Design using Multiplexers. Cubical representation of Boolean function 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 Flop:- RS, J-K, D, T Flip Flops & their characteristics & operation.

General characteristic of sequential circuits. Clock, pulse and level mode sequential circuits Analysis and design of sequential circuits. Synthesis of states and circuits, determination of classes of indistinguishable states and simplification by implicant tables. Mealy and Moore machines, state assignment and memory element input equations, Partitioning and state assignment.

Recommended Books:

1. Sandiege Modern Digital Design, Mc0Graw Hill.
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: Pracial Digital Logic & Testing, Prentice Hall of India.

3IT03 DATA STRUCTURE AND ALGORITHMS

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 tables.

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. Brassard: 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. Trembley : Data Structures in C, PHI
7. Trembley & Sorenson: An Introduction to Data Structures, Mc-Graw Hill International.
8. Baase; Computer Algorithms, Pearson Educations

3IT04 ELECTRONIC DEVICES & CIRCUITS

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, Phototransistors. Solar cells Thermistors, LDR.
3. **TRANSISTORS:** Transistor characteristics, Current components, Current gains: alpha and beta. Operating point. Hybrid model, h-parameter equivalent circuits. CE, CB and CC configuration. DC and AC analysis of CE, CC and CB amplifiers. Ebers-Moll model. Biasing & stabilization techniques. Thermal runaway, Thermal stability. Equivalent circuit 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 AC coupled amplifiers. Frequency response, midband gain, gains at low and high frequency. Analysis of DC and differential amplifiers, Miller's Theorem. Cascading Transistor amplifiers, Darlington & cascade ckt. 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.

Recommended Books:

1. J. Millman & C.C. Halkias _ Integrated Electronics; Tata Mc-Graw Hill
2. Millman Grable – Microelectronics, Mc-Graw Hill.

3IT05 OBJECT ORIENTED PROGRAMMING IN JAVA

1. OOP FUNDAMENTALS:

- (a) Structured vs object oriented approaches.
- (b) Data abstraction Information hiding and encapsulation.
- (c) Object and classes.
- (d) Polymorphism, single and multilevel Inheritances.

2. JAVA PROGRAMMING:

- (a) Introduction to Java, byte code 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 overloading methods, Abstract classes, Using final with Inheritance.
- (e) Package and Interfaces: Defining package, concept of CLASSPATH, access protection, importing package. Defining and implementing interfaces.

Recommended Books:

- 1. Grady Booch – Object Oriented Analysis & Design with Applications (Benjamin Cummings, 2nd Ed)
- 2. Patrick Naughton. Herbert Schildt – Java 2 : The complete Reference (McGraw-Hill, 3rd Ed.)
- 3. James Rambaugh – Object Oriented Modelling and Design (PHI, IGNOU Ed.)
- 4. Partrick Naughton – The Java Handbook (McGraw-Hill)

3IT06(a)LINE COMMUNICATION

1. **TRANSMISSION LINES:** types of transmission lines, general transmission line equation, line constant, equivalent circuits, infinite line, and reflection on a line, SWR of line with different type of terminations. Distortion less and dissipation less lines, Coaxial cables, Transmission lines at audio and radio frequencies, half wave and other lengths, Smith chart and its application. Transmission line applications, Stub matching. Measurement of parameters of transmission line, measurement of attenuation, Insertion loss, reflection coefficient and standing wave ratio.
2. **ATTENUATORS & FILTERS:** Elements of telephone transmission networks, symmetrical and Asymmetrical two port networks. Different Attenuators, Π -section, T-section attenuators, Filters, constant K-section, Ladder type, Π -section, T-section filter, m-derived filter sections, Lattices filter section.
3. **CARRIER TELEPHONY:** Multi-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 & cancellers, cross talk.
5. **BASIC OF AUTOMATIC TELEPHONY:** Trucking 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 TELEMCOMMUNICATION:** Voice frequency telegraphy, Facsimile & telex services.

Recommended Books:

1. W.Fraces – Telecommunications (BPB Publication).
2. T. Vishvanathan – Telecommunication switching systems & Networks (PHI).
3. J.D. Rlder – Network Liner & Fields, Prentice Hall of India.

3IT06(b) ELECTRONIC MEASUREMENTS & INSTRUMENTATION

1. **THEORY OF ERROR:** Accuracy & precision, repeatability, limits of errors, systematic & random errors and modeling of errors, probable error & standard deviation, Gauss law error analysis, combination of error.
2. **ELECTRONIC INSTRUMENTATION:** Transistor voltmeter – with transistor, with FET input stage, balanced bridge TVM. Digital voltmeter-ramp type, integrating type and potentiometer type DVM. Measurement of time phase, frequency using digital Instruments, Q meter, vector impedance meter and vector voltmeter, RF power and voltage measurement.
3. **SIGNAL GENERATION ANALYSIS:** The sine wave generator, frequency synthesized signal generator, sweep frequency generator, pulse, square and function generators, wave analyzer, harmonic distortion analyzer and spectrum analyzer. Instrumentation amplifier, chopper stabilized and carrier amplifiers. Phase sensitive detectors.
4. **TRANSDUCERS AS INPUT ELEMENTS TO INSTRUMENTATION SYSTEMS:** Classification, selection criterion of transducers, constructional & operational features, strain gauges, displacement, velocity, acceleration, force, flow and pressure transducers, temperature measurement and photosensitive devices.
5. **DISPLAY DEVICES AND RECORDERS:** Classification of display devices and systems. Cathode ray tube light emitting diodes. Incandescent, electroluminescent and liquid-crystal displays. Recorders. Storage CRO.

Recommended Books:

1. Cooper, W.D. and Heifrick, A.D. – Electronic instrumentation and Measurement techniques, (PHI)
2. Sawhney, A.K.- Measurements...(Dhanpat Rai & Sons)
3. Thomas H.E. and Clark, C.A.- Handbook of Electronic instruments and Measurement Techniques, (PHI)

3IT06(c) MEDICAL ELECTRONICS

1. **INTRODUCTION OF HUMAN PHYSIOLOGY:** Nerve physiology. Functions of nerves and my neural 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 reflexes. Myoelecteical control of paralyzed muscles.
2. **ECG, EMG AND EEG:** Principal & Means of recording non-electrical biological parameters. Signals form microelectrodes and self-bridge. Use of field electric devices as electrometers, driven shield, photon coupled amplifier. Artifacts.
3. **MEASUREMENT OF BILOGICAL EVENTS:** Electronic methods of measuring blood pressure. Skin & systemic body temperature, pulse rate and coronary care monitoring.
4. **BIOMEDICAL INSTRUMENTS:** Electronic pace makers. Implant able power sources. Defibrillators. Micro power transmitter for telemetering bio-signals. Special characteristics of CRO in bio-medical applications. Surgical and therapeutic diathermy units. Physiological simulators. Basic diagnostic X- ray units. Introduction to patient monitoring and intensive care unit. Interference and patient safety. Anesthetic explosion and fires.
5. **MISCELLANEOUS:** Introduction to heart Lung machines, CT scanners, Ultrasound sonography and Doppler measurements, NMR & PET. Scans. Use of lasers in medical applications.

Recommended Books:

1. Webster, J.G.- Medical Instrumentation. Application and Design, John Wiley and Sons.
2. Jacobson, B. Webster, J.G.- Medical and Clinical Engineering, Prentice Hall, International.
3. Cromwell – Biomedical Instrumentation and Measurements, et a1, Prentice Hall, International.
4. R.S. Khandpur – Handbook of Biomedical Instrumentation, Tata McGraw Hill.
5. Car – Introduction to Biomedical Equipments, Pearson Education.

3IT06(d) ELECTRICAL TECHNOLOGY

1. **ELECTRIC DRIVES:** Specifications, Rating of machines, short term, continuous and special ratings, Types of motor enclosures and their respective field of applications. Characteristics load. Review of starting and running characteristics of various D.C. and A.C. Industrial motors. Relative study of efficiency, power factor, size and cost. Starting and speed control of D.C. and A.C. motors. Electric braking: Plugging, rheostat braking and regenerative braking.
2. **ENERGY SOURCES AND POWER GENERATION:** Methods of bulk energy generation. Thermal, Hydro and Nuclear power generation. Elementary ideas of wind and solar power generation.
3. **TRANSMISSION AND DISTRIBUTION SYSTEM:** general idea of transmission and distribution system, electrical equipment of a sub-station Interference of power lines with telecommunication circuit. Conductors and insulators for transmission lines. Introduction to underground cables.
4. **PROTECTION:** Causes and consequences of dangerous currents. Basic Idea of an over current relay. Carrier current protection of transmission lines. Basic apparatus used in power line carrier system. Principle of operation of directional comparison and phase comparison carrier protection. Elementary idea of static relays and their advantages and limitations. Elementary idea of air, vacuum and sulphur and hexafluoride circuit breakers and their comparison.

Recommended Books:

1. H. Cotton – Advanced Electrical Technology; Wheeler Pub, London.
2. A. Langsdorf – AC Machinery; Tata Mc-Graw Hill.
3. Ravindra Nath & M.Chandra – Power System Protection & Switchgear, New Age International, New Delhi.
4. Nagrath Kothari – DC Machines, Tata Mc-Graw Hill.
5. Hughes – Electrical Technology, Pearson Education.

3IT06(e) CIRCUIT ANALYSIS

1. **COMPUTER AIDED CIRCUIT ANALYSIS:** Introduction to circuit simulation, node-incidence matrix, modified node-voltage analysis. Different types of analysis during simulation – DC, AC and transient. Introduction to SPICE and ICAP simulation environment.
2. **NETWORK THEOREMS:** Thevenin's Norton's Reciprocity, Superposition, Compensation, Miller's Tellegen's and maximum power transfer theorems. Networks with dependent sources.
3. **TRANSIENT ANALYSIS:** Impulse, step, ramp and sinusoidal response analysis of first order and second order circuit. Time domain & transform domain (frequency, Laplace) analysis. Initial and final value theorems.
4. **LINER NETWORK RESPONSE TO NON-SINUSOIDAL INPUTS:** Complex periodic waves and their analysis by Fourier analysis. Different kind of symmetry. Power in a circuit.
5. **COUPLING ELEMENTS & COUPLED CIRCUITS:** Conductively coupled circuits. Inductively coupled circuits- mutual inductance, coefficient of coupling and mutual inductance between portions of same circuit and between parallel branches. Transformer equivalent to inductively and conductively coupled circuits.
6. **NETWORK FUNCTIONS:** Terminals and terminal pairs, driving point impedance transfer functions. Poles and zeros. Restrictions on pole-zero location in s-plane. Poles, zeros and frequency response: pole, zero and impulse step response. Procedures of finding network functions for general two terminal pair networks. Stability & causality. Hurwitz polynomial, positive real functions.
7. **TWO-PORT NETWORKS:** Two-port parameters and their interrelations-z-parameters, y-parameters, h-parameters, ABCD parameters. Equivalence of two ports, transformer equivalent, interconnection of two-port networks. Image parameters. Attenuation & phase shift in symmetrical T & pi networks.

Recommended Books:

1. Kuo, Franklin F – Network analysis and synthesis, II Ed, 1999, John Wiley & Sons.
2. Desoer, C. And Kuh, E.S.- E.S. Basic circuit theory, Mc Graw Hill.
3. Van Valkenburg M.E- Network Analysis. Prentice Hall, India.
4. Schaum's Outline series on circuit analysis.
5. Hayt, W. And Kemmerly – Engineering circuit analysis, Mc Graw Hill. Inc.
6. Sudhakar, A and Chyarn Mohan, S.P.- Circuits and Networks, Tata Mc Graw Hill. India

4IT01- SOFTWARE ENGINEERING-1

1. **SYSTEM ANALYSIS:** Characteristics Problems in system Development, project planning, system development life cycle (SDLC), Computer system Engineering, system analysis, modeling the architecture, system specification.
2. **SOTWARE PROJECT MANAGEMENT:** Objective, resources & their estimation, LOC & FP estimation, COCOMO estimation model, risk analysis, software project scheduling.
3. **SOTWARE DEVELOPMENT:** Life cycle (SWDLC), SWDLC models, software engineering approaches.
4. **REQUIREMENTS ANALYSIS:** Requirement analysis tasks, Analysis principles, software prototyping specifications, data dictionary, finite state machine model (FSM) models.
5. **STRUCTURED ANALYSIS: DATA & Control flow diagrams control & flow specification, behavioral modeling, and extension for date intensive applications.**
6. **OBJECT ORIENTED ANALYSIS:** Object oriented concepts, object oriented analysis modeling, data modeling.
7. **SOTWARE DESIGN:** Designing fundamentals, Effective modular design, data architectural & procedural design , design documentation.
8. **OBJECT ORIENTED DESIGN:** OOD concepts & methods, class & object definitions, refining operations, class & object relationships, object modularization.
9. **USER INTERFACE DESIGN:** Human factors, styles of human computer interaction, human computer interface design guidelines & standards.

RECOMMENDED BOOKS:

1. **Pressman: A practitioner`s approach** ,McGrawHill International
2. **A. Behhforooz & F.J. Hudson: Software Engineering Fundamentals** Oxford University press.

4IT02 - DISCRETE & INTEGRATED ELECTRONICS

- 1. RELAXATION OSCILLATORS:** Theory, operation & performance of astable, monostable & bistable multivibrators, Different triggering ckts . Theory of Schmitt trigger. Comparison of performance of various circuit configurations of multivibrators & their field of application.
- 2. SWEEP CIRCUIT:** Free running & triggered modes. Theory & common circuits of voltage & current time base generators.
- 3. MODULATION & DE MODULATION CIRCUITS:** Linear & square law types modulators & demodulators.
- 4. LINEAR IC`S:** Characteristics of Linear IC`s, Biasing consideration in linear ic`s power requirement & power supplies for Linear IC`s.
- 5. OPERATIONAL AMPLIFIERS:** Differential amplifier – stage characteristics & error signals. FET input stages multistage operational amplifiers. High frequency & high power amplifier. Analysis of various stages of operational- amplifiers.
- 6. APPLICATIONS OF OP-AMP`S:** General applications of op-amp in non-linear circuits, Biquad ckts, Design parameters, Q & onrange zero. Design of Biquad using op-amp. Butterworth`s, chebychev approximation & realization. Active networks based on passive ladder structures, Antonion`s GIC & Burton`s FDNR. Effects of real OP-AMPS on active filters. Switched capacitor filters & active R high frequency filters.
- 7. OTHER LINEAR IC`S:** four-quadrant multiplier & its simple applications. CMOS Multiplexers, voltage regulator IC`s with feedback current linearities, positive & negative voltage IC regulators.
- 8. LINEAR & DIGITAL PLL:** Basic theory of first, second and higher order loop, lock in & lock out processes, racking performance, noise in linear PLL, measurement of PLL parameter. Digital PLL with intermedial analog signals, All digital & software based PLL.

RECOMMENDED BOOKS:

- 1. J. Milman & C.C. Halkias :** Integratd Electronics Tata Mc –Graw Hill
- 2. Milman Grabel Micro** electronics, Tata Mc –Graw Hill
- 3. Jacob** Application & Design with analog IC`s (PHI)
- 4. Sedra Smith** Microelectronics Oxford university press.
- 5. Coughlin Drisol** Operational Amplifier & linear IC`s – Pearson Education.

4IT03 –MICROPROCESSORS & INTERFACES

1. **INTRODUCTION TO MICROCOMPUTER SYSTEMS:** Microprocessor, micro controller, & microcomputer devices. Machine & assembly language, bus concept.
2. **ARCHITECTURE:** Comparative study of 8085A, 8086 & 8088 (Pinout, internal architecture, timing diagrams), instruction format & addressing modes.
3. **ASSEMBLY LANGUAGE & PROGRAMMING IN 8085:** Instruction set, program structure (sequential, conditional, iterative) Macros & subroutines, stack, counter & timing delay, interrupt structure & its programming.
4. **DEVICES & INTERFACING:** System buses: STD & ISA memory (static, dynamic & various PROM) Architecture characteristics & interfacing of the following devices. DMA Controller 8257, interrupt controller 8259A, USART 8251, PPI 8255, Timer 8254 & keyboard display controller 8279, level converter MC 1488 & MC 1489. Communication buses: centronics , IEEE-4888, current loop, RS-422A & RS-423A.
5. **INTRODUCTION TO 8051 MICROCONTROLLER:** Architecture & programming model , internal RAM & register , I/O ports, interrupt system & instruction set.

RECOMMENDED BOOKS:

1. **Gaonker** – 8085 programming, Penram Press.
2. **A.P.Mathur**- Introduction to microprocessors, (TMH)
3. **Antanakos** Introduction to intel family microprocessors, pearson education
4. **Gilmore**- microprocessor`s principles & applications (TMH)
5. **B.Ram**- Fundamentals of microprocessors, & microcomputers Dhanpat Rai Pub.
6. **Ray & Bhurchandi** Intel microprocessors.(TMH)

4IT04 TELECOMMUNICATION ENGINEERING FUNDAMENTALS

1. **TELECOMMUNICATION_NEED IN APPLICATION:** Information Explosion in industry, government & military applications estimated bandwidth need & electromagnetic spectrum of telecommunication.
2. **COMMUNICATION MODEL:** Transmission system in communication, Introduction to WAN, MAN & LANs, broadband & narrowband ISDN, protocol & protocol architecture introduction to TCP/IP protocol architecture
3. **DATA TRANSMISSION:** Concepts & terminology, Frequency, spectrum & bandwidth, time domain & frequency domain analysis & digital data transmission, audio & video signals, Transmission impairments, Guided transmission media twisted pair, UTP cables coaxial & optical fiber cables, wireless, microwave & satellite transmission.
4. **DATA ENCODING:** Amplitude, frequency, & phase modulation techniques. NRZ-L , NRZ-I, Bipolar AMI, Manchester & differential Manchester encoding techniques, scrambling technique ASK,FSK,PSK technique. Pulse code & pulse amplitude modulations, Delta modulations.
5. **MULTIPLEXING:** Frequency division multiplexing, Synchronous time division multiplexing statistical time division multiplexing.
6. **SWITCHING NETWORKS:** Circuit switching networks, space & time division switching, routing in circuit switched networks. Control signaling packet switching principles. Fixed flooding & adaptive routing strategies – X25 Interface, packet format & X.28 protocol.
7. **FRAME RELAY:** Frame relay protocol architecture- Frame relay call control & congestion control
8. **MAC SUBLAYER:** Channel allocation problem, pure & slotted ALOHA protocols, persisted & non- persisted CSMA collision free protocol, Digital cellular radio CDMA.

RECOMMENDED BOOKS:

1. **William Stallings-** Data & computer communication(PHI 5 Ed)
2. **James Martin-** Tele communication & the computer(PHI 3 Ed)
3. **A.S. Tanenbaum-** computer networks(PHI 3 Ed)

3IT05 – DISCRETE MATHEMATICAL STRUCTURE

1. **GRAPH THEORY:** Graphs – Directed and Undirected, Eulerian chains and cycles. Hamiltonian chains and cycles. Trees, chromatic number, connectivity and other graphical parameters. Applications. Polya's Theory of enumeration and its applications.
2. **COMBINATORIAL MATHEMATICS:** Basic Counting Principles, Permutations and combinatory, Inclusion and Exclusion Principles, recurrence relations, Generating functions. Applications.
3. **SETS AND FUNCTIONS:** Sets, relations, function, operations, equivalence relation, relation of partial order, partitions, binary relations.
4. **MONOIDS AND GROUPS:** Groups, Semi groups and Monoids, Cyclic semi groups and sub monoids, Subgroups and cosets. Congruence relations on semi groups. Morphisms, Normal sub groups Elementary applications in coding theory.
5. **TRANSFORMS:** Discrete Fourier and Inverse Fourier Transforms in one and two dimensions, Discrete Cosine Transform.

Recommended Books:

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

4IT06(a) STATISTICS & PROBABILITY THEORY

1. **INTRODUCTION:** Sample space, Events, Algebra of Events, Bayes' Rule, Bernoulli Trials.
2. **PROBABILITY DISTRIBUTION AND PROBABILITY DENSITIES:** Bernoulli Binomial, Poisson, Normal, Rectangular and exponential distributions and their PDFs. Moments and MGFs for ABOVE DISTRIBUTIONS.
3. **DISCRETE RANDOM VARIABLES:** Random Variables and their event space, probability mass function, Distribution Functions, Probability Generating Function.
4. **EXPECTATIONS:** Moments, Computation of Mean Time to failure.
5. **BERNOULLI & POISSON PROCESSES.**
6. **QUEUING THEORY:** Pure birth, Pure Death & Birth-Death Processes, mathematical Models for M/M/1, M/M/1/N, M/M/S and M/M/S/N queues.
7. **DISCRETE PARAMETER MARKOV CHAINS:** M/G/1 Queuing Model, Discrete Parameter Birth-Death Process.
8. **NETWORK OF QUEUES:** Open Queuing Networks.
9. **CORRELATION & REGRESSION:** Linear regression, Method of least squares, Normal regression and correlation Analysis.

Recommended Books:

1. K.S. Trivedi: Probability & Statistics with reliability queuing and Computer Science Application (PHI).
2. J.E. Freund & R.E. Walpole: Mathematical Statistics.
3. Taha : Operational Research.
4. Kapoor & Saxena – Statistics & Probability

4IT06(b) NEURO COMPUTING AND FUZZY LOGICS :

1. **ARTIFICIAL NEURAL NETWORKS:** basics: Trends in computing, patterns and data Pattern recognition task: Association, classification, grouping. Feature pattern recognition. Biological & artificial networks: characteristics, performance, terminology, models mp neuron, perceptron and Adeline. Topology for ANN Basic learning law and methods: Hebbs law, perceptron law LWS law correlation law instar law and their comparison activation dynamics model, synaptic dynamics model, learning methods: Hebbian 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, fuzziness, uncertainty, types of sets and algebraic operations m-1, m-, probabilistic, L-fuzzy, intuitional fuzzy, rough sets, Cartesian product, mth power, m algebraic sum, bounded sum, bounded difference, algebraic product, triangular norms and the co norms, averaging operators like fuzzy and fuzzy-or, compensatory and non compensatory and the selection criteria fuzzy manures of fuzziness and extension principle : Fuzzy measure, possibility measure entropy and distance, extension principle, operation for type-2 fuzzy sets, algebraic operation with fuzzy members, special extended operations, extended operations for LR representation of fuzzy sets. Fuzzy relations, fuzzy graphs and fuzzy analysis: Fuzzy relations on sets and fuzzy sets, composition of fuzzy graphs and special fuzzy graphs and relations, properties of min max composition, fuzzy graphs and special fuzzy relations. Fuzzy function over a crisp interval, integration of a crisp function over a fuzzy interval fuzzy differentiation.
3. **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. B. Yagna Narayana- Artificial Neural Networks, prentice Hall India.
2. H.J. Zimmernann- Fuzzy set Theory and it's application 2nd Ed, Allied publisher India.

4IT06 (C) COMPUTER AIDED NETWORK ANALYSIS

1. **INTRODUCTION:** Description and types of spice, types of analysis and limitations of SPICE.
2. **CIRCUIT DESCRIPTIONS:** Elements values, nodes, circuit's elements, sources, output variables, SPICE commands, formats for circuit's files & output files, graphics input files.
3. **DC CIRCUITS ANALYSIS:** Resistors, modeling and elements, operating temperature, independent voltage & current sources. Types of outputs and dc analysis.
4. **TRANSIENT ANALYSIS:** Capacitors & inductors, modeling and transient sources, transient current and voltage sources. Transient output variables and commands: Transient response voltage & current controlled switches.
5. **AC CIRCUIT ANALYSIS:** Voltage & current output variables, independent ac sources, ac analysis, magnetic elements, transmission lines, multiple analyses.
6. **ADVANCED SPICE COMMANDS & ANALYSIS:** Commands for Behavioral modeling Fourier analysis, noise analysis, Monte Carlo analysis, device & lot tolerance, sensitivity Worst case analysis.
7. **SEMI CONDUCTOR DIODES AND BJT:** Characteristics, dc & small signal ac analysis. Diode model, statements, parameters. BJT model, statements, parameters and circuits.
8. **FIELD EFFECT TRANSISTORS:** JFET, Parameters and amplifiers, MOSFET, parameter and amplifiers, Gallium arsenide MESFETS.
9. **OP AMP CIRCUITS:** DC linear, ac linear and non linear Marco model.
10. **DIGITAL LOGIC CIRCUITS:** Digital devices and nodes, digital primitives, digital gates and timing models for standard, tristate and bi-directional transfer gates. Flip flops and 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 two connections, voltage source and inductor loops and noise.

Recommended Books:

1. Muhammad H. Rashid – Spice for circuits and electronics using PSPICE II Ed., Prentice Hall India.
2. Conant – Engineering Circuit Analysis with PSPICE and PROBE, Mc Graw Hill International.

4IT06(d) ANALOG & DIGITAL COMMUNICATION

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 basic of performance criteria such as bit transmission signaling rate, error probability, S/N ratio, bandwidth requirement. ISI & EYE diagrams.
3. **DIGITAL MODULATION TECHNIQUES:** Data transmission using techniques such as PSK, FSK, QFSK, (QAM), MSK inter system comparison.
4. **INTRODUCTION TO COMMUNICATION CHANNELS:** Transmission line Primary and secondary line constant, telephone lines and cables, public, switch telephone network (Electronic exchange). Introduction to fiber optic communication principle of light communication in fiber, losses in fiber, 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 system, Dhanpat RAi & Co.
3. P. Chakrebati : Digital communication systems, Dhanpat Rai & Co.
4. H. Taub & D.L. Schilling principles of communication systems , Tata mc-Graw Hill.

4IT06(e) FUNDAMENTALS OF INFORMATION TECHNOLOGY

1. **APPLICATIONS SOFTWARE:** Software, common features of software, examples and features of word processing, spreadsheets, database, financial software, Software for Cyberspace; Communication, E-mail, Web browsers. Specially software: desktop publishing presentation graphics, project management, computer-aided design, drawing & painting groupware, multimedia authoring software problems, Ethics & Intellectual property rights.
2. **PROCESSORS:** Microchips, 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: compression standards. The future of secondary storage.
4. **TELECOMMUNICATIONS:** 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 & Extranets. 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. Factor affecting communication among devices. The future of communication.
6. **INFORMATION SYSTEM:** Trends forcing change in the workspace. Organization: Departments, tasks, management level & types of information. System analysis & design: Introduction of six phases of system 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.

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- 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 & Hutchinson. Tata McGraw Hill.
2. Information Technology – Curtin, Foley, Sen & Morin , Tata McGraw Hill.

51T01 SOFTWARE ENGINEERING – 11

1. **REVIEW OF CONCEPTS:** SWDLC models, requirement analysis, structured, analysis, data oriented analysis & object oriented analysis.
2. **CODING FUNDAMENTALS:** programming languages (features of programming languages selection of programming languages.) programming style & quality (style rules, program quality), programming example (design, analysis, main data structure, high level programming structures, description of design and development process).
3. **SOFTWARE TESTING:** software testing fundamentals, test case design, white – box testing, basis path testing, control structure testing, black box testing and testing for specialized environments, architectures and application.
4. **DEBUGGING:** program errors, debugging process (information gathering, fault isolation, fault confirmation documentation, fixing fault, testing), debugging example.
5. **SOFTWARE CONFIGURATION MANAGEMENT:** SCM process, object in software configuration, version control. Change control, configuration audit, status reporting, CSM standards.
6. **SOFTWARE QUALITY ASSURANCE:** quality concepts, quality movement, SQA activities and formal approaches to SQA.
7. **WEB ENGINEERING:** attributes of web – based application: web process and formulating analyzing web- based systems.

Recommended Books:

1. roger s, pressman – fifth edition, mc-graw hill publication.
2. all behforooz and Frederick j. Hudson oxford press 1996.
3. lan sommerville – software engineering, pearson education India.

51TO2 WIRELESS COMMUNICATION

1. **INTRODUCTION:** Cellular revolution, Global Cellular Network, Broadband and troubles 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 Wireless 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 Handover.
6. **BROADCAST 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. IEEE802.11-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. Blue tooth –user scenarios; physical layer, MAC 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 communication, principles & practices.

5IT03 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, Introduction Format. CPU organization with large registers, stacks and handling of interrupts & subroutines instruction pipelining.
3. **ARITHMETIC ALGORITHM:** Array multiplier, Booth's algorithm, Addition/Subtraction for signed/unsigned numbers and 2's complement numbers.
4. **MICROPROGRAMMED CONTROL UNIT:** Basic organization of micro-programmed Controller, Horizontal & Vertical formats, Address sequencer.
5. **MEMORY ORGANISATION:** Concept of RAM/ROM, basic cell of RAM. Associative memory, Cache memory organization, Vertical memory organization.
6. **I/O ORGANISATION:** Introduction to Peripherals & their Interfacing. Strobe based and handshake based communication, DMA based data transfer, I/O processor.

Recommended Books:

1. J.P. Hayes – “Computer Architecture & Organization:”, Mc-Graw Hill
2. Huring – Computer System Design and Architecture, Pearson Educaton.
3. M. MorisManno – “Computer System Architecture”, Prentice Hall of India
4. Barte – Computer Architecture. TMH
5. Stallings – Computer Organization and Architecture, Pearson Educaton.

5IT04 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 convolution codes. Decoders for convolution 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 – “Principals of Communication System” TMH.

5IT05 DATA BAE MANAGEMENT SYSTEMS

1. **INTRODUCTION TO DATABASE SYSTEMS:** Overview and History of DBMS, File System vs DBMS. Advantages of DBMS, Describing and 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 Constrains, Weak Entities. Class Herarhies, Aggregation, Conceptual Data Base Design with ER Model – Entity vs Attribute, Entity vs Relationship. Binary vs Ternary Relationship and Aggregation vs Ternary Relationship. Conceptual Desing for a Large Enterprise.
3. **RELATIONAL ALGEBRA AND CLACULUS:** Relational Algebra Selection and Projection. Set Operations, Renaming, Joins, Division, Relational Calculus. Expressive Power of Algeavra and Calculus.
4. **SQL QUERIES, PROGRAMMING AND TRIGGERS:** The Forms of a Basic SQL Query, Union, Intersect and Except. Nested Queries, Correlated Nested Queries, Set-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:** Databases and the Web, architecture-Architecture-Application Server and Server Side Java. XML-DTDs. XML-QL
7. **OBJECT ORIENTED DATABASE SYSTEMS:** Object. Object Identity and Reference Types Inheritance and Data Base Design for ORDBMS.

Recommended Books:

1. Raghu Rama Krishnan – Database Management Systems. 2nd Ed., Tata Mc-Graw Hill.
2. Elmasari – Fundamentals of Data Base Systems, Pearson Education.
3. Silverschatz Korth and Sundarshan – Database System Concepts, 4th Ed., Tata Mc-Graw Hill.
4. Gordon C. Everest – Database Management Objectives, System Functions and Adiministration, Tata

5IT06 (A) OPTIMIZAITON TECHNIQUES

1. **INTRODUCITON:** Introduction Engineering applications of optimization, Statement and classification of optimization problem, Single variable and multivariable optimization with and without constraints.
2. **LINEAR PROGRAMMING:** Formulation of Linear Programming problem, Graphical Approach, General Linear Programming problem, Simplex Method, Duality in linear Programming and transportation problems.
3. **PROJECT SCHEDULING:** Project scheduling by PERT and CPM Network Analysis
4. **SEQUENCING THEORY:** General Sequencing problem n-jobs through 2 machine & 3 machine and 2-jobs through m machines.
5. **DYNAMIC PROGRAMMING:** Introduction Principle of Optimality. Formulation and solution of Dynamic Programming problems. Traveling 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 – Optimizaiton –Theory & Application, Wiley Eastern.
3. S.K. Jain & D. M. Mehta – Operations Research (Theory & Applications) Galgotia.
4. Vagner – Principles of Operations Research, Prentice Hall of India.

5IT06 (B) THEORY OF COMPUTATION

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-Determinism, Finite Automata with Output and Decision problem.
3. **CONTEXT-FREE LANGUAGES AND PUSHDOWN AUTOMATA:** Context-Free Grammers, 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 for 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, Recursively Enumerable and Recursive Languages. Unrestricted Grammers and Turing Machines. Context-Sensitive Grammers and Linear-Bounded. Automata. The Chomasky Hierarchy.

Recommended Books:

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

5IT06 (C) LOGICAL AND FUNCTIONAL PROGRAMMING

1. **PROPOSITIONS:** Fully parenthesized propositions, Evaluation of Constant propositions, Evaluation of proposition in a state precedence rules for operators. Tautologies, Propositions a sets of sates and Transforming English to prepositional form.
2. **REASONING USING EQUIVALENCE TRANSFORMATIONS:** The laws of equivalence, rules of substitution and transitivity, formal system of axioms and inference rules.
3. **NATURAL DEDUCTION SYSTEM:** Introduction to deductive proofs, Inference rules, proofs and sub proofs, adding flexibility to the natural deduction system and developing natural deduction system proofs.
4. **PREDICATES:** Extending the range of a state, Quantification, Free and Bound Identifiers Textual substitution, quantification over other ranges and some theorems about textual substitution and states.
5. **LOGIC PROGRAMMING:** Introduction to prepositional and predicate calculus – Syntax and sementics, Computability and correctness, Features of Functional Languages – Composition of functions, Functions as first-class Objects, no side effects and clean semntics, 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, TMH.
2. Sebesta – Concept of Programming Languages, Pearson Education
3. David Gries – The Science of Programming, Narosa publication house

5IT06(D) 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 Trees 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, Structure and Potential Function of Fibonacci Heap, Implementing Fibonacci Heap.
3. **GRAPH THEORY DEFINITIONS:** Definitions of isomorphism, Components, Circuits, Fundamental Circuits Cut-Sets, Cut-Vertices, Spanner and Dual graph, Spanning Trees, Kuratowski's two Graphs.
4. **GRAPH THEORY ALGORITHMS:** Algorithms for Connectedness, 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 Application to Engineering and Computer Science. Prentice Hall of India.
2. Base – Computer Algorithms, Pearson Education.
3. Cormen – Introduction to Algorithms, Prentice Hall of India.
4. Aho A.V. Hopcroft J.E. and Ullman J.D. – The Design and Analysis of Computer Algorithms, Pearson Education.
5. Horowitz and Sahni – Fundamentals of Data Structures. Galgotia Book Source.

5IT06 (E) OPTICAL COMMUNICATION

1. **OPTICAL FIBERS:** Basic Optical laws and definitions, Principles of light propagation. IN fibers, Ray theory, Optical fiber modes and configurations, Step index and graded Index fibers, Monomode and multimode fibers, Fiber materials, fiber fabrication, Fiber optic cables. \
2. **SIGNAL DEGRADATION IN OPTICAL FIBERS:** 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 detector noise, detector response time, Avalanche multiplication noise. Photo diode materials. Optical receivers.
5. **POWER LAUNCHING & COUPLING:** Source to fiber coupling, fiber to fiber joints, fiber splicing, fiber connectors.
6. **OPTICAL FIBER COMMUNICATIONS SYSTEMS:** Principal components, Design considerations & Applications, Wavelength division multiplexing.

Recommended Books:

1. Gerd Kelser – Optical Fiber Communications, TMH
2. J.N. Senior – Optical Fiber Communication, Prentice Hall of India.
3. J. Gowar – Optical Communication Systems, Prentice Hall of India.
4. J. Wilson & Hewkes – Opto Electronics – An Introduction, Prentice Hall of India

6IT1 COMPUTER GRAPHICS

1. **INTRODUCTION:** Interactive computer graphic, picture analysis, overview of programmer's model of interactive graphics, Fundamental problems in geometry.
2. **BASIC RASTER GRAPHICS:** Scan conversion, filing and clipping, Text Generation & Thickening.
3. **GEOMETRIC MANIPULATION:** Transformation, Matrices, Homogeneous, and Coordinates.
4. **ELEMENTARY 3-D GRAPHICS:** Plane projections, vanishing points, and 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 Phong shading.

Recommended Books:

1. J. Foley, A. Van dam, S. Feiner, J. Hughes, 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. **INTRODUCITON:** (a) Circuits and Models: Introduction to VLSI circuits ASICs and Morre's Law. Mocroelectronic Design, Styles, Four phases in creating Microelectronics chips computer Aided Synthesis and Optimizaiton.

(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 Decision diagrams. Satisfiability and cover problems
2. **HARDWARE MODELING:** Introduction to Hardware Modeling Language Distinctive feature of Hardware Languages, Structural and Behavioural HDLs, Logic Network, State Diagrams. Data Flow and Sequencing Graphs. Compilaiton and Behavioural Optimizaiton Techniques.
3. **ARCHITECTURAL SYNTHESIS:** Circuit Specifications for Architectural Synthesis Resources and constraints. Fundamental Architectural Synthesis. Problems Temporal Domain Scheduling Spatial Domain Binding Hierarchical Models and Synchronization Problem. Area and Performance estimation – Resource Dominated 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 Covers-positional Cube Notation, Function with Multivalued inputs and list oriented manipulation. Algorithms for logic minimization.
6. **INTRODUCITON 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

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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, Addison 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 MEHTOD:** 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:** Traveling Salesman Problem and Lower Bound Theory.
6. **PATTERN MATCHING ALGORITHMS:** KMP Matcher and Boyer-Moore Algorithms.
7. **PROBLEM CLASSES NP, NP-HARD AND NP-COMPLETE:** Definitions of P, NP, NP-Hard and NP-Complete, Problems. Decision Problems, Cook's Theorem. Proving NP-Complete Problems – Satisfiability Problem and Vertex Cover Problem. Approximation Algorithms for Vertex Cover and Set Cover Problem.
8. **INTRODUCTION TO ASSIGNMENT PROBLEMS:** Formulation of Assignment Problem, Quadratic Assignment and Biquadratic Assignment Problems. Branch and Bound Method for Solving Assignment Problems (not of Quadratic or Biquadratic Assignment Problem).
9. **FORMULATIONS OF MULTICOMMODITY FLOW (MCF) PROBLEMS:** Min-Cost Multicommodity Flow Problem. Max-Flow Multicommodity Flow Problem, Integer Multicommodity Flow Problems, Introduction to Flow Show 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 Commen, Introduction to Algorithms, Prentice Hall of India.
3. Baase, Computer Algorithms, Pearson Education.
4. Brassard, Algorithms, Prentice Hall
5. Bazaraa, Linear Programming & Network Flows, John Willey & Sons.

6IT04 INTRODUCTION TO SYSTEM PROGRAMMING

1. **OVERVIEW:** Comparison of machine Language, Assembly language and high level languages, External and Internal representation of instructions and data. Data allocation structures, search structures and addressing modes. Activities and system software for program generation, translation and execution. Editors for source code and object code/executable code files.
2. **ASSEMBLERS:** Assembly language specification. Machine dependent and Independent features of assembler, Classification of assemblers. Pass structure of assemblers (Problem and Associated activities). Design of a two pass assembler. Design of a one pass assembler for IBM-PC.
3. **LOADER AND LINKERS:** Functions and classification. Machine dependent and Independent feature 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 labels, conditional expansion, nesting and recursion). Pass structure and design of macro processor.
5. **HIGH LEVEL LANGUAGE PROCESSOR:** HLL specification: Grammers and parse trees, expression and precedence. Lexical analysis: Classification of tokens, scanning methods, character recognition, lexical ambiguity. Syntactic analysis: Operator precedence parsing, recursive descent parsing, Symbol Table Management: Data Structure for symbol table hashing function for symbols, overflow technique; block structure in symbol table.

Recommended Books:

1. D.M. Dhamdhare – System Programming & Operating System, TMH
2. L.L. Beck – System Software, Pearson Education
3. J.J. Donovan – System Programming, TMH

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 service models, Internet Backbones, NAPs and ISPs.
2. **APPLICATION LAYER:** Protocols and Services provided by Application Layer, Transport protocols, The word wide web – HTTP, Message formats, User Server Interaction, and Web caches, FTP commands and replies. Electronic Mail SMTP, Mail Message Formats and MIME and Mail Access Protocols. DNS – The Internet's Directory Service, DNS records and Messages.
3. **TRANSPORT LAYER:** Transport-Layer services and Principles, Multiplexing and Demultiplexing applications, connectionless Transport – UDP Segment Structure and UDP Checksum. Principles of Reliable Data Transfer – Go back 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 Port, Switching fabric and Output Port. IPV6 packet Format.
5. **POINT-TO-POINT PROTOCOL (ppp):** Transition States, PPP Layers – Physical Layer and Data Link Layer, Link Control Protocols – LCP packets and options. Authentication PAP and CHAP, Network Control Protocol (NCP).
6. **SONET/SDH:** Synchronous Transport Signals, Physical Configurations-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 Tributaries and Types of VTs.

Recommended Books:

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

6IT6(A) MANAGEMENT INFORMATION SYSTEM

1. **INTRODUCTION:** MIS concept, Definition, Role & Impact of MIS, Process of Management, organization structure & behavior.
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. **APPLICATIONS OF MANAGEMENT INFORMATION SYSTEM:** Application in manufacturing sector using for Personal Management, Financial Management , Production Management, Material Management, Marketing Management Application in Service Sector.
5. **ENTERPRISE RESOURCE PLANNING (ERP):** EMS, ERP, Benefits implementation, EMS & MIS.
6. **CASE STUDIES:** Application of SAPtm Technology in manufacturing sector.

Recommended Books:

1. W.S. Jawadekar – Management Information System, TMH
2. Loudon & Loudon – Management Information system, Pearson Education Asia.

6IT06 (B) ADVANCED COMPUTER ARCHITECTURE

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

Recommended Books:

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

6IT06(C) MICROWAVE AND STELLITE COMMUNICATIONS

1. **MICROWAVE PROPAGATION:** EM wave radiation and its reception. Polarization, Attenuation and Absorption. Effect of earths curvature and environment, Electromagnetic spectrum and frequency, range for microwave. Mode of Propagation Ground, sky and line of sight propagation. Maximum usable frequency and skip distance. Troposcatter propagation.
2. **MICROWAVE SYSTEMS:** Microwave antenna, Block diagram of microwave links, Transmitter, receiver and repeater station equipments.
3. **RADAR AND NAVIGATIONAL AIDS:** Basic principle and range equations, 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 SATELLITE:** 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 Mc-Graw Hill.
2. K.D. Parasad – “ Antenna & Wave Propagation” Satya Prakashan
3. Tri T Ha – “ Digital Satellite Communication

6IT06(D) DIGITAL SIGNAL PROCESSING

1. **INTRODUCTION:** signals – continuous time and Discrete time systems, Properties of systems. Linear time invariant systems – continuous time and discrete time. Properties of LTI systems and their block diagrams.
2. **FREQUENCY DOMAIN REPRESENTATION OF SYSTEMS:** The continuous time Fourier transform for periodic and aperiodic signals. Properties of CTFT. Discrete time Fourier transform for periodic and aperiodic signals. Properties of DTFT. The convolution and modulation property.
3. **SAMPLING:** Sampling theorem. Aliasing. Sampling in frequency domain. Sampling of Discrete time signals.
4. **Z-TRANSFORM:** Introduction the region of convergence for the Z-transform. The inverse z-transform. Two dimensional Z-transform. Properties of Z-transform.
5. **DISCRETE AND FAST FOURIER TRANSFORM:** Introduction Properties of DFT & DFS. Linear convolution using the DFT. Decimation in time & frequency FFT Algorithms.
6. **REPRESENTATION OF DIGITAL FILTERS:** Introduction Signal flow graph representation of digital networks. Basic structure for IIR & FIR systems.

Recommended Books:

1. Salivahanan and Valiavaraj – Digital Signal Processing, TMH.
2. Nagrath – Signals and Systems, TMH.
3. Oppenheim A.V. – Signals and Systems, PHI
4. Oppenheim A.V. – Digital Signal Processing, PHI.
5. Lathi – Signals and Linear System Oxford.

7IT01 E-COMMERCE

1. **INTRODUCTION:** Scope of electronics 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, Airline booking systems, competition and customer loyalty, Web booking systems and competitive customers.
4. **BUSINESS TO BUSINESS ELECTRONIC COMMERCE:** Inter-organizational Transactions, The credit Transaction Trade cycle. A variety of transactions, Electronic markets – markets and electronic markets, usage of electronic markets, Advantages and disadvantages of electronic markets.
5. **ELECTRONIC DATA INTERCHANGE (EDI):** Definition and benefits of EDI. EDI Technology, standards, communications, implementation, agreements and securities. EDI trading patterns and transactions.
6. **BUILDING AN E-COMMERCE SITE:** Introduction to object behaviour, components, active scripting. Object models, Infrastructure objects, service objects and data objects, choosing the objects. Building a scalable application, adding the configure method, connecting to the database. Accessing and versioning the database. Building the catalog object with example. Creating shopping basket – Holding state, creating the tables for a shopping basket, modifying the object model and making the basket accessible.
7. **J2EE ARCHITECTURE OVERVIEW:** Enterprise components, Information technology in the enterprises, introduction to enterprise objects and enterprise component model. The J2EE model features, J2EE components – container architecture. Enterprises Java and J2EE architecture

Recommended Books:

1. David Whiteley – E-Commerce Strategy, Technology and Application, Tata McGraw Hill.
2. Mathew Reynolds – Beginning E-Commerce with Visual Basic ASP, SQL Server 7.0 and MTS, Shroft Publisher & Distributors Pvt. Ltd.
3. Perrone & Chaganti – Building Java Enterprise Systems with J2EE, Techmedia.
4. Kalkota – Frontiers of Electronic Commerce, Pearson Education.

7IT02 INTERNET TECHNOLOGIES

1. **INTRODUCTION:** Internet connection concepts – Server, Client and Ports, Domain Name Systems, Telephone Cable and Satellite Connections – Dialup, ISDN, ADSL and leased line based connection, cable and DSS accounts, Web TV and intranets. ISP features.
2. **INTRANETS:** What is Internet? – Internet vs LANs Components of an Internet – Workstations and Client software Server and Network operating systems. Networks cards, Cabling and Hubs. Steps for creating and Internet. Maintenance and connecting to Internet.
3. **E-MAIL TECHNOLOGY:** Features and Concepts – Message headers, Address book, Attachment, filtering and forwarding mails.
4. **VIDEO COFERENCING AND INTERNET TELEPHONY:** Voice vs Video conferencing, Video conferencing hardware and features of video conferencing software. Digital telephony as ISDN application. H.323 protocol and multi-point conferencing.
5. **WEB TECHNOLOGY:** Elements of the Web-Clients and Servers, Languages and protocols Web page and Web Sites, special kinds of Web sites. Web resources – Search Engines, Message boards, clubs, News groups and chat. Web page creation concepts – planning, navigation, themes and publishing. Analyzing web traffic – Log file data, analyzing log files and products of 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 McGraw Hill Company
3. Daniel Minoli – Internet & Internet Engineering, Tata McGraw Hill Company.

7IT03 OPERATING SYSTEMS

1. **INTROCUUCTION:** 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 kernel; Scheduler activation. Inter Process Communication – Race conditions, Critical regions, Mutual exclusion with busy waiting, Sleep and wakeup, Classical IPC problems – Dining Philosophers problem, Readers and writers' problem and sleeping barber problem. Scheduling in Batch, Interactive and Real-Time Systems.
3. **DEADLOCKS RESOURCES:** Preemptable and Non- Preemptable resource, acquisition. Deadlock conditions and its modeling. Ostrich algorithm. Deadlock avoidance and Banker's algorithms. Deadlock prevention by attacking its conditions.
4. **MEMORY MANAGEMENT:** Concept of multiprogramming. Memory Management with bit maps and linked list. Virtual memory – page tables, TLBs and inverted page tables. Page Replacement Algorithms – Optimal LRU and working set page replacement algorithm, Belody's anomaly.
5. **INPUT OUTPUT MANAGEMENT:** I/O devices and device controllers; Interrupt handlers and device drivers, Disk hardware and disk arm scheduling algorithm.
6. **FILE SYSTEMS:** File naming, structure, types, access, attributes and operations. Directory systems. Implementation of files and directories and disk space management.

Recommended Books:

1. A.S. tanenbaum – Modern Operating Systems, Pearson Education Asia.
2. D.M. Dhamdhere – Operating Systmes – A Concept based approach, Tata Mc-Graw Hills.
3. Achyut Godble – Operating Systems, Tata Mc-Graw Hills.
4. Stallings – Operating System, 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, H261, DVI, CD-ROM Technology, Compact disk digital audio.
4. **MULTIMEDIA OPERATING SYSTEMS:** Real time, Process management, Rate monotonic algorithm, Earliest deadline first algorithm and Multimedia file systems.
5. **DOCUMENTS:** Hypertext, Hypermedia, MHEG.
6. **SYNCHRONIZATION:** Intra and Inter object synchronization, Live and Synthetic Synchronization, Lip synchronization requirements, pointer synchronization requirements, Elementary media synchronization.

Recommended Books:

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

7IT05 NETWORK PROGRAMMING

1. **COMPUTER NETWORKS AND THE INTERNET:** What is Internet? Network Protocols, Network Edge, Access Networks and Physical Media. Protocol Layers and their service models, Internet Backbones, NAPs and ISPs.
2. **APPLICATION LAYER:** Protocols and Services provided by Application Layer, Transport protocols, The word wide web – HTTP, Message formats, User Server Interaction, and Web caches, FTP commands and replies. Electronic Mail SMTP, Mail Message Formats and MIME and Mail Access Protocols. DNS – The Internet’s Directory Service, DNS records and Messages.
3. **TRANSPORT LAYER:** Transport-Layer services and Principles, Multiplexing and Demultiplexing applications, connectionless Transport – UDP Segment Structure and UDP Checksum. Principles of Reliable Data Transfer – Go back 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 Port, Switching fabric and Output Port. IPV6 packet Format.
5. **POINT-TO-POINT PROTOCOL (ppp):** Transition States, PPP Layers – Physical Layer and Data Link Layer, Link Control Protocols – LCP packets and options. Authentication PAP and CHAP, Network Control Protocol (NCP).
6. **SONET/SDH:** Synchronous Transport Signals, Physical Configurations-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 Tributaries and Types of VTs.

Recommended Books:

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

7IT06 (A) 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 – AAL5 layers.
3. **TRAFFIC MANAGEMENT:** Concept of Traffic and service. Traffic and service characteristics of voice and video data. ATM Traffic descriptors and QOS parameters. Factors affecting QOS parameters and service categories. QOS classes. Elements of ATM Traffic management – Traffic contracting, policing and shaping.
4. **SWITCHING IN ATM:** Performance measures and Architectural issues in switch design. ATM switching Architecture.

Recommended Books:

1. Sunil Kasera – ATM Networks Concepts and Protocols, TMH.
2. Rainer Handel – ATM Networks 2nd Edition, Pearson Education Asia.

7IT(B) DIGITAL SPEECH AND LANGUAGE PROCESSING

1. **INTRODUCTION:** Knowledge in speech and language processing, Ambiguity, Models and Algorithms, Language, Thought 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, Morphological parsing with Finite-State Transducers, Orthographic Rules and Finite-State Transducers. Combining FST Lexicons and rules. Lexicon-free FSTs and Human Morphological processing.
4. **COMPUTATIONAL PHONOLOGY AND TEXT-TO-SPEECH:** Speech Sound and phonetic Transcription – Consonants; Place and Manner of articulation and vowels. Phoneme, Phonological Rules and Transducers. Advanced Issues in computational phonology – Harmony, Templatic Morphology and Optimality theory. Machine Learning of Phonological Rules, Mapping Text to Phones for TTS, Prosody in TTS and Human, Processing of Phonology and Morphology.
5. **HMMs AND SPEECH RECOGNITION:** Speech Recognition Architecture, Hidden Markov models, 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.

7IT(C) 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 handlers. Co routines and scheduled subprograms. Task and concurrent exception.
5. Name and referencing environments. Static dynamic and block structure. Local data and local referencing environments.
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 storage 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 Languages 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 (D) NEURAL NETWORKS

1. **INTRODUCTION TO ARTIFICIAL NEURAL NETWORKS:** Elementary Neurophysiology, Neural circuits for computation and Hebbian learning, Artificial neurons as processing elements, perception. 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 error propagation.
3. **NEURAL NETWORK MEMORIES:** Introduction to Associative memory – Hamming distance, linear associator, Bi-directional Associative memory (BAM) Architecture, Processing, Mathematics and Energy Function. Hopfield Memory – Discrete Hopfield Memory. Continuous Hopfield Model Traveling-sales person problem. BAM Simulation-Bi-directional connections, data Structures, initialization algorithms and signal propagation.
4. **SIMULATED ANNEALING:** information theory and statistical mechanics concepts, Real and simulated Annealing. Boltzmann machine – Basic Architecture and processing, learning in Boltzmann machine and its practical consideration. Boltzmann simulator – Modified Boltzmann Networks its data structure and algorithm.
5. **COUNTER PROPAGATION NETWORK (CPN):** Counter propagation Network Building Blocks – Input Layer, Instar, Competitive Networks and outstar. 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, Pearson Education Asia.
2. Simson Haykin – Neural Networks 2/e, Pearson Education Asia
3. Yagya Naryan – Artificial Neural Networks, Prentice Hall India, 1999.

8IT01 DATA MINING & WAREHOUSING

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

Recommended Books:

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

8IT02 INFORMAITON SYSTEM SECURITIES

1. INTRODUCTION: Attacks, services and mechanisms, security attacks, security services, model for Inter network security.
2. CONVENTIONAL ENERCYPTION: Principles, algorithms, cipher block models of operation, location of encryption devices, key distribution.
3. PUBLIC KEY CRYPTOGRAPHY: Approaches to message authentication, secure Hash function & HMAC, public key cryptography principles, algorithms, digital signature, key management.
4. AUTHENTICATION APPLICATION: Kerberose, X.509 Directory authentication service.
5. IP SECURITY: Requirement, Secure Sockets Layer (SSL) & Transport Layer Security (TLS). Secure Electronic Transaction (SET).
6. WEB SECURITY: 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.

Recommended Books:

1. Stallings – Network Security Essentials, Pearson Education Asia, 2003
2. Nic Galbreath – Cryptography for database and Internet applicatons, Wiley-Dreamtech, 2002
3. Stallings – Cryptography & Network Security, Pearson Educaiton Asia. 2nd Ed.

7IT03 REAL –TIME SYSTEMS

1. **INTRODUCTION TO REAL-TIME APPLICATIONS:** Digital control-sampled data systems. Complex control-law computations, High-level – control hierarchy, guidance and control, real-time command and control. Signal processing - Processing Bandwidth demands, Radar system. Real-time data bases and Multimedia application.
2. **HARD VERSUS SOFT REAL-TIME SYSTEMS:** Jobs and processors. Release times, deadlines and timing constraints. Hard and soft timing constraints – Hard timing constraints and temporal Quality-of-Service guarantees. Hard real-time systems –reasons for timing guarantee requirement and examples of hard timing constraints. Soft real-time systems.
3. **A REFERENCE MODEL OF REAL-TIME SYSTEMS:** Processors and resources. Temporal parameters of real-time workload – fixed, jittered, sporadic release times and 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 criticality of jobs, optional execution, laxity type and laxity function. Resource parameters of jobs and parameters of resources – preemptivity of resources and resource graph. Scheduling hierarchy – Scheduler and schedules; Feasibility optimality and performance measures; Interaction among schedulers.
4. **COMMONLY USED APPROACHES TO REAL-TIME SCHEDULING:** Clock-driven approach; Weighted round-robin approach; priority driven approach. Dynamic versus static systems. Effective release times and deadlines. Optimality of EDF and LST algorithms. Non optimality of EDF and LST algorithms. Challenges in validating timing constraints and their performance. Off-line versus on-line scheduling.
5. **CLOCK-DRIVEN SCHEDULING:** Assumptions for scheduling Static and timer-driven scheduler. General structure of cyclic schedules – frame major cycles. Frame size constraints and job stices. Cyclic executives. Improving the average response time of aperiodic jobs slack stealing and average response time. Scheduling sporadic jobs – acceptance test, EDF scheduling of the accepted jobs, implementation of acceptance test and optimality of cyclic EDF algorithm.

Recommended Books:

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

8IT04 (A) SIMULATION AND MODELING

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

Recommended Books:

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

8IT04(b) DISTRIBUTED SYSTEMS

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

Recommended Books:

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

8IT04(c) ARTIFICIAL INTELLEGENGE

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

Recommended Books:

1. E. Rich, K Knight – Artificial Intelligence, 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 Coursey, The Essence of Artificial Intelligence, Pearson Education, Asia.

8IO4(d) 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 perception in eye, light and electromagnetic spectrum, Image sensing and acquisition using sensor array. Image sampling and quantization- Representing digital images, Spatial and gray-level resolution, Aliasing and Moiré patterns, Zooming and shrinking digital images. Relationship between pixels.
3. **IMAGE ENHANCEMENT IN SPATIAL DOMAIN:** gray-level transformation. –image negatives log transformations, power law transformations, histogram equalization and matching something spatial and sharpening filters.
4. **IMAGE RESTORATION:** Image restoration model, noise models, -spatial and frequency properties of noise ,noise probability density functions. Noise – only spatial filter –main 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 decoder and decoder , lossy compression and compression standards.

Recommended books:

1. Rafael C. Gonzalez –Digital image processing,pearsons education Asia
2. Kenneth R. Castleman – Digital image processing, Pearson education Asia
3. Nick Effard- Digital image processing, Pearson education iAsia
4. Jain- Digital image processing PHI