

INFORMATION TECHNOLOGY

5 th Semester				6 th Semester			
<i>Subject Code</i>	<i>Theory</i>	<i>Contact hrs. L-T-P</i>	<i>Credit C</i>	<i>Subject Code</i>	<i>Theory</i>	<i>Contact hrs. L-T-P</i>	<i>Credit C</i>
MA 301 CY 301	Optimization in Engg OR Bio-Environmental Engg	3-0-0	3	MA 301 CY 301	Optimization in Engg OR Bio-Environmental Engg	3-0-0	3
EC 443	Communication Engg	3-0-0	3	IT 310	Software Engg	3-0-0	3
EC 321	Digital Signal Processing	3-0-0	3	CS 314	Computer Graphics & Multimedia	3-1-0	4
CS 301	Operating Systems	3-0-0	3	CS 300	Data Communication & Computer Network	3-0-0	4
IT 311	Relational Database Management System	3-1-0	4	CS 304	Design & Analysis of Algorithms	3-0-0	3
MA 303	Discrete Mathematical Structures	3-0-0	3	EL-I	Elective-I	3-0-0	3
	Total	19	19		Total	19	20
<i>Subject Code</i>	<i>Practicals / Sessional</i>	<i>Contact. Hrs.</i>	<i>Credit</i>	<i>Subject Code</i>	<i>Practicals / Sessionals</i>	<i>Contact. Hrs.</i>	<i>Credit</i>
EC 371	DSP Lab	0-0-3	2	CS 380	Computer Network Lab.	0-0-3	2
IT 371	RDBMS Lab	0-0-3	2	CS 382	Algorithm Analysis & Design Lab.	0-0-3	2
CS 373	UNIX and Shell Programming Lab.	0-0-3	2	IT-380	Programming with JAVA Lab	0-0-3	2
	Total	9	6		Total	9	6
	Grand Total	28	25		Grand Total	28	26

MODULE-I (15 Hours)

Two variable LP model, Graphical sensitivity analysis, The Simplex method, Computational details, Simplex algorithm, Artificial Starting solution, Degeneracy, Alternative optima, unbounded solution. Duality and Sensitivity analysis, primal Dual relation, Transportation Model, Non-traditional transportation model, Assignment model, Hungarian method, Networks, Shortest route problem, Maximal flow method.

MODULE-II (13 Hours)

Integer linear programming, Illustration Branch & Bound Algorithm, Cutting-plane algorithm, Dynamics programming, Knapsack model, Decision analysis & Game Theory, Simulation modelling, Monte-Carlo simulation for discrete events.

MODULE-III (12 Hours)

Nonlinear programming, Unconstrained optimizations, unimodal function, Necessary & sufficient conditions, Newton Raphson method, constrained algorithm, Direct search method, gradient method.

TEXT BOOKS

1. H. A Taha, Operations Research: An Introduction, Pearson Education, (7th Edition); Ch-2[2.1,2.2 (2.2.1, 2.2.2), 2.3], Ch-3[3.1, 3.3, (3.3.1, 3.3.2) 3.4, 3.5], Ch-4[4.1, 4.2, 4.4 (4.4.1), 4.5 (4.5.1, 4.5.2)], Ch-5[5.1, 5.3(5.3.1, 5.3.2), 5.4(5.4.1)], Ch-6[6.1, 6.3 (6.3.1, 6.3.2), 6.4 (6.4.1, 6.4.2)], Ch-9 [9.1, 9.2(9.2.1, 9.2.3)], Ch-10 [10.3.1 Ch-14 :14.3, 14.4], Ch-18 [18.1, 18.4], Ch-20[20.1(20.1.1), 20.2 (20.2.1, 20.2.2)], Ch-21[21.1]

REFERENCE BOOKS

1. F.S Hiller, G. J. Libermen, An Introduction to Operations Research: Concepts & Cases, (8th Edition), TMH Publication.
2. Kalyanmayee Dev, Optimization for Engineering Design, PHI Publications

MODULE –I (22 hours)

Fundamentals of Ecology: Components and structures of Eco-system. Levels of organization in the biotic components of the Eco-system. Eco-system processes- Energy flow-primary and secondary production, tropic level, food chain & food web and Bio-magnification. Decomposition and Nutrient Cycling- Biogeochemical cycles of nature- Carbon cycle, Nitrogen cycle and Hydrological cycle.

Fundamentals of Chemistry and Microbiology

Water chemistry : Concentration expressions, mole concept and Stoichiometry. Physical & chemical properties of water. Organic chemical properties and their measurement, parameters like BOD, COD, and TOC & TOD Inorganic properties like pH, Alkalinity, Hardness, conductivity and Solubility.

Atmospheric chemistry – structure of atmosphere, chemistry of primary and secondary air pollutants.

Chemical Reaction- Chemical & Bio-chemical Reactions fundamentals of reaction kinetics, Reactor configurations and material balances.

Microbiology – Important microbes in Environmental Engineering, Microbial growth and decay rates, Aerobic & Anaerobic group of bacteria.

ENVIRONMENTAL POLLUTION

Water Pollution:- Water quality standard and parameter (Indian Standard Drinking Water Specifications, IS 10500, 1991), Physical, Chemical and Biological methods of assessment of water quality, Aquatic Pollution, Fresh Water Pollution:- Organic Pollution, Oxygen Sag Curve, Eutrophication and Acidification, Estuarine water quality, Marine Pollution and Ground water pollution. Parameters of organic content of water quality, DO and BOD in streams, Deaeration and Reaeration kinetics in streams (Streeter – Phelps oxygen sag formula)

Air Pollution:- Primary and Secondary pollutants, units of concentration, Global air pollution-Acid rain , Global warming and ozone layer depletion. Air pollution meteorology – Ambient and Adiabatic lapse rate, Atmospheric stability Lapse rates and Dispersion, Atmospheric Dispersion.

Noise Pollution: Sources of noise, Physical properties of sound, resultant and equivalent sound levels, Noise control measures and impact of noise on human health.

MODULE-II (14 Hours)

ENVIRONMENTAL POLLUTION CONTROL

Water Treatment:- Conventional water treatment comprising of Pre-treatment – Screenings, Aeration and Equalisation Primary Treatment – Sedimentation, Coagulation, Filtration Disinfection – Chlorination, Breakpoint chlorination Advanced water treatment – Fluoridation, Defluoridation, Ion-Exchange and Reverse Osmosis.

Wastewater Treatment (Domestic waste water) : Wastewater flow and characteristics Pretreatment- Screenings, Grit chamber, Equalisation and storage. Primary treatment – Sedimentation and coagulation Biological treatment (Aerobic) Activated Sludge Process (ASP) with complete mix reactor and design parameters. Biological treatment (Anaerobic)

Municipal Solid Waste (MSW) : Physical, Chemical and Energy properties of MSW, MSW Management – Composting, MSW Management – Landfill Operations

Hazardous Waste Management: Characterization, Hazardous Waste Treatment – Incineration

Industrial Air Emission Control : Gaseous Emission Control – Absorption, Adsorption and Condensation, Particulate Emission Control – Gravity Settling Chamber, Cyclone Separator, Bag Filter and Electrostatic Precipitator, Flue gas desulphurisation, NO_x Emission Control and Fugitive Emission

MODULE-III (6 Hours)

ENVIRONMENTAL MANAGEMENT

Evolution of environmental legislation in India, Environment, Development and Sustainable Development, ISO 14,000- Environmental Management Systems – Life Cycle Assessment

Elements of waste minimization- strategy-Reduction at source, Recycling/Reuse/ Recovery, Waste treatment and Disposal, Waste minimization program, Cost benefit analysis and advantage of clean technology, Environmental Impact Assessment

Stages of EIA procedure – Screening, Scoping, Environmental Impact Statement (EIS), Public Participation and Review, Generic Structure of EIA report:- Project Profile, Baseline Data Collection,

Impact Prediction and Assessment, Environmental Management Plan (EMP) and Post EMP Monitoring.

TEXT BOOKS

1. Gerard Kiely, Environmental Engineering, Tata McGraw Hill Publishing Company Limited
2. Peavy, Rowe and Tchobanoglous, Environmental Engineering, Tata McGraw Hill Company Ltd.1981,(International Edition).
3. C.S.Rao, Environmental Pollution Control Engg., Wiely Eastern Ltd, New Delhi,1999.

EC - 443

COMMUNICATION ENGINEERING

(3-0-0)

MODULE-I (14 Hours)

Elements of Communication System- Analogue System, Digital System, Distinguishing features. Electromagnetic Spectrum, Bandwidth.

Transformation of Base band signal from Time domain to Frequency domain and Vice-versa using Fourier Transform (FT) of few simple baseband signals.

Source of noise- External noise, Internal noise, white noise, Noise Calculation. Need for Modulation, Analogue Modulation Techniques: Amplitude Modulation (AM), Depth of Modulation, Modulated Waveform, Powers in Carrier, and Sidebands. Generation of DSBSC and SSB, Balanced Modulator, AM Demodulators. Frequency Modulation (FM)- Frequency Deviation, Frequency Modulated Waveform, Spectrum. Narrow Band FM and Wideband FM. Generation of FM; Narrow Band FM Modulator, Wideband FM Modulator, FM Discriminator. Frequency Division Multiplexing.

MODULE-II (14 Hours)

Converting an analogue signal to Digital Signal: Sampling, Nyquist Criteria. Quantization and Binary Coding of sampled values. Pulse Code Modulation. Quantization error. Companding. Line Coding: RZ, NRZ, Manchester Coding. Digital Baseband Signal Formats – T-I Carrier system. TDM. TDM of 8-bit PCM Signal. Digital Modulation Technique: Phase Shift Keying (PSK), Frequency Shift Keying (FSK) - their Basic principle, Waveform, Generation and Detection. Coding for error detection and correction. Sharon's Capacity theorem. Advantages of Digital Communication System.

MODULE-III (08 Hours)Optical Communication System: Brief description of fiber optic communication System: Block Diagram, Range of operating wavelength, Optical Fiber, Optical Sources- LED and LASER, Optical detectors. Advantages of fiber optic system.

Brief description of Satellite Communication System: Block diagram. Frequency bands of operation, uplink and downlink frequencies, Transponder, earth stations, Types of Antenna mounted on satellites. Services available through satellite.

TEXT BOOKS

1. H. Taub and D.L. Shilling. Principle of Communication System, TMH
2. Leon W. Couch, II, Digital and Analogue Communication Systems – 6th Edition, Pearson Publication.

REFERENCE BOOKS

1. Louis E. Frenzel, Communication Electronics – Principles and Applications, 3rd Edition

MODULE-I (12 Hours)

Introduction to Discrete Time Signals & Systems: Discrete time signals, Elementary examples , Classification, Discrete Time Systems, Block diagram representation , Classification, **Analysis of discrete time LTI System:** Response of LTI systems to arbitrary inputs (convolution sum), properties of convolution and the interconnection of LTI systems, causal LTI systems, stability of LTI systems, systems with finite- duration and infinite-duration Impulse response, Recursive and non-recursive discrete time systems, LTI systems characterized by constant coefficient Difference Equations, Solution of linear constant coefficient Difference equations, **Implementation of Discrete time systems:** Structures for the realization of LTI systems (Form I, Form II, Cascade, Parallel, Lattice), Recursive and Non-recursive realizations for FIR systems. **Correlation of Discrete time signals:** Cross correlation and auto correlation sequence, Properties of the autocorrelation and cross correlation sequence. **Z transform:** The Z-transform and one sided Z-transform properties of Z transform, Inversion of the Z-transform, solution of difference equations, causality and stability of LTI systems in the Z-domain.

MODULE-II (12 Hours)

Frequency analysis of Discrete time Signals: Energy density spectrum of aperiodic signals, Relationship of the Fourier Transform to the Z-transform, The spectrum, Fourier Transform of Signals with poles on the unit circle.

LTI Systems as Frequency-selective filters:- Lowpass, highpass, bandpass filters, Digital resonators, Notch filters, Comb filters, Allpass filters

Inverse systems and Deconvolution: Minimum phase, maximum phase and mixed phase systems, system identification and deconvolution, Homomorphic deconvolution.

The Discrete Fourier Transform: DFT and IDFT, DFT as a linear transformation, relationship of DFT with Z-transform, properties of the DFT, Circular convolution, circular correlation, filtering of long data sequences: overlap-add and overlap-save method.

MODULE-II (12 Hours)

Fast Fourier Transform: Direct computation of DFT, Radix-2 FFT algorithm, DIT and DIF FFT, Applications of FFT: efficient computation of DFT of two real sequences, efficient computation of DFT of a $2N$ point real sequence.

Power Spectrum Estimation: computation of the Energy Density Spectrum, the Periodogram, DFT in power spectrum estimation, Bartlett method, Welch Method, Blackmann & Tookey method

Digital Filter: Causality and its implications, characteristics of practical frequency selective filter, FIR filter design using different windows (Rectangular, Hann, Hamming, Bartlet, Kaiser), FIR filter design using frequency sampling method, Design of IIR filters: Impulse invariant method, Bilinear transformation method.

TEXT BOOKS

1. J.G. Proakis & D.G. Manolakis, Digital Signal Processing- Principles, Algorithms and Applications, Pearson Education
2. Schilling & Harris, Fundamentals of Digital Signal Processing, Thomson Learning

REFERENCE BOOKS

1. J.R. Johnson, Introduction to Digital Signal Processing, PHI
2. Sanjit K. Mitra, Digital Signal Processing : A Computer Based Approach, Tata McGraw Hill

MODULE-I (15 Hours)

Introduction: What is an Operating System, Evolution of operating system, Simple Batch Systems, Multiprogramming and Time Sharing systems. Personal Computer Systems, Parallel Systems, Distributed Systems and Real time Systems. **Operating system structures:** O.S. Services, system calls, operating system structure. **Process Management:** Process concept, Process Scheduling, Operation on Processes, Cooperating Processes. Inter-process communication. Threads: User and Kernel level threads. **CPU Scheduling:** Basic concepts, scheduling criteria, scheduling algorithms. **Process synchronization:** Background , Critical section problem, Hardware Primitives Semaphore, Overview of classical synchronization problems, Monitors

MODULE-II (15 Hours)

Deadlocks: System model, Deadlock Characterization Methods for Handling Deadlocks, Deadlock Prevention, Deadlock avoidance, Deadlock Detection, Recovery from Deadlock. **Memory management:** Background, address Binding, Logical versus Physical Address space, Overlays, contiguous Allocation. Paging, Segmentation. Segmentation with paging. **Virtual Memory:** Background, Demand paging, performance of Demand paging, Page Replacement Algorithms. Allocation of frames, Thrashing,

MODULE – III (10 Hours)

File-system: File concept, Access Methods, Directory structure & implementation, Allocation Method, Free space management. **I/O systems:** Overview, I/O Hardware, Application of I/O interface, Kernel I/O - subsystem Transforming I/O requests to Hardware Operations. Secondary storage Structure: Disk Structure, Disk Scheduling, Disk Management, Swap space Management, Disk Reliability. UNIX Operating System calls and interprocess communication, Case study.

TEXT BOOK

1. Abraham Silberschatz and Peter Bear Galvin, Operating System Concepts, Addison Wesley.

REFERENCE BOOKS

1. H.M Deitel, Operating System, Eddison Wesley
2. Milenkovic, M , Operating Systems – concepts and Design, McGraw Hill International.
3. Andrew, S Tannenbaum, Operating System, PHI

IT-311 RELATIONAL DATABASE MANAGEMENT SYSTEM (3-1-0)**MODULE-I (15 Hours)**

Introduction to Database: Characteristics of the Database approach, Advantages & Disadvantages of using DBMS approach. Database System Architecture: Data abstraction, Schema, Instances, Three Schema Architecture and data Independence, Types of Database users , DBA. Data base languages, Data Models: DML, DDL, DCL, Entity Relationship(ER), Relational mapping ER model to Relational Model, Object oriented data model , Object relational data model. Relational Query Language: Relational algebra, Tuple and Domain Relational Calculus and SQL.

MODULE-II (15 Hours)

Relational Database Design: Informal Design Guidelines for Relational schema. Relational database

design: 1NF, concept of functional dependency, Relation keys, canonical cover, Decomposition of relational schemas, 2NF, 3NF, BCNF, Multivalued dependency. 4 NF, Query Processing and Optimization : Evaluation of Relational algebra Expression, Query Equivalence, Join Strategy, Query optimization algorithms.

MODULE-III (10 Hours)

Introduction to Transaction Processing: Transaction, Properties of Transaction, Serializability, Recoverability. Concurrency Control Techniques: Locking, Timestamp ordering, Multi version scheme , Storage Strategies: Indices, B Trees, Hashing, Database Recovery: Failure classification, Recovery and Atomicity, Log-based recovery and Check pointing, Introduction to advanced querying : Data mining and Data warehousing,

TEXT BOOKS

1. Ramez Elmasri and Shamkant Navathe: Fundamental of Database Systems. 4th Edition, Pearson Education.
2. Seilberschatz, H. Korth, S Sudharsan: Database System Concepts, MGH

REFERENCE BOOKS

1. C.J. Date, An Introduction to Database Systems, Pearson Education.
2. Bipin C. Desai, An Introduction to Database System, Galgotia publication

MA-303 DISCRETE MATHEMATICAL STRUCTURE (3-1-0)

MODULE – I (12 Hours)

Logic , Propositional Equivaleries , Predicates & Quantifiers, Nested Quantifiers, Methods of proof, Induction, Recursion, Counting, Permutation & Combination, Pigeonhole, Principle , Advanced counting techniques, Principles of inclusion-Exclusion, Recurrence relation, Generating function. Relation, Equivalence Relation, Partial order relation.

MODULE – II (12 Hours)

Graphs, kind of Graph, Adjacency matrix, Isomorphism, Euler & Hamiltonians path, Planar graph, Graph Coloring, Trees, Spanning, trees, minimum spanning trees. Boolean Algebra, Two element Boolean algebra, Disjunctive & conjunctive normal forms, Minimal sum product, Karnaugh Maps.

MODULE -III (16 Hours)

Algebraic structure, Monoid , Semi group, properties , Isomorphism , Cyclic group, Coding theory , Rings, Fields, Integral Domain, Finite fields, Polynomial rings.

TEXT BOOKS

1. K. H. Rosen : Discrete Mathematics & its Application (5th Edition), (TMH Publishers)
2. Thomas Koshy : Discrete Mathematics with Applications, Academic press (an imprint of Elsevier),2004
3. C. . Liu : Elements of Discrete Mathematics (2nd Edition) (McGraw Hill publications)
4. R. P. Grimaldi , B. V. Ramana : Discrete & combinatorial Mathematics (5th Edn) (Pearson)
5. D. S. Malik & M. K. Sen : Discrete Mathematical Structures (Theory & Application) (Thomson)

MODULE-I (15 Hours)

Introduction to Information System Development: Overview of System Analysis and Design, Categories of Information Systems, System development Strategies, Implementation and Evaluation, Tools for System development, **Introduction to software Engineering:** Basic concepts about software and program and Evolution of Software Engineering, Basic concepts on process and life cycle models. **Models:** Waterfall, Prototype, Evolutionary, Incremental, spiral, V, RADM etc. Requirement Analysis: Introduction to software specification, its needs and importance, formal specification methods. SRS: Attributes of good SRS and organization of SRS document.

MODULE-II (15 Hours)

Software design: Methods and strategies, desirable design attributes, Concept of good design, Cohesion and coupling. Function-Oriented Software Design: structured system analysis and structured design, formal approach design, data flow oriented design. Software coding and testing: coding standard and guidelines, code review, software inspection, **Testing:** Unit, Integration, System testing, black box and white box testing Incremental testing, formal proof of correctness, software matrix. Introduction to software verifications.

MODULE-III (10 Hours)

Software Reliability and Quality Management: S/W and H/W reliability, Reliability Matrices, S/W quality, ISO 9000 , Software engineering management: introduction to capability maturity model, quality assurance and software cost estimation (Delphi, COCOMO). Introduction to Computer-aided Software Engineering, Software reuse and maintenance.

TEXT BOOKS

1. Rajib Mall , Fundamentals of Software Engineering , PHI.
2. R.S. Pressman: Software Engineering, A practitioner's approach, McGraw Hill.

REFERENCE BOOKS

1. P. Jalote, An integrated approach to software engineering. Narosa, New Delhi.
2. G. Booch , Object-Oriented analysis and design, Benjamin / Cumming Publishing Co. New York.
3. James A. Senn, Analysis and Design of Information Systems, McGraw Hill
4. Hong Zhu , Software Design Methodology, Elsevier

MODULE –I (12 Hours)

A survey of Computer Graphics: Overview of graphics System: Video Display Devices, Raster-Scan and Random scan systems, Input Devices, Hard Copy Devices.

Graphical User Interface and Interactive Input methods: The User Dialogue, Input of Graphical data, Input Function, Initial Values for input Device parameters, Interactive Picture construction.

Output primitives: points and lines, Bresenham's Line Algorithm, Mid-Point Circle Drawing Algorithm, Filled Area Primitives.

Two Dimensional Geometric Transformation: Basic transformation (Translation, rotation, Scaling) Matrix Representation and Homogeneous coordination, Composite Transformations, Reflection, shears, Transformation between coordinate system.

MODULE –II (16 Hours)

Two Dimensional viewing: the viewing Pipeline, Viewing coordinate reference frame, window-to-view port coordinate Transformation.

Line Clipping (Cohen-Sutherland Algorithm) and polygon clipping (Sutherland-Hodgeman Algorithm)

Three Dimensional Object Representations: Polygon Surface, quadratic surface, spline representative, Bezier Curves and surfaces. B-spline Curve

Three Dimensional Geometric and Modeling Transformations: Translation Rotation, Scaling, Reflections, shear, Composite, Transformation, Modelling and Coordinate Transformation.

Three Dimensional viewing: Viewing Pipeline, Viewing Coordinates, Projections (Parallel and Prospective)

Visible surface detection method: Back Face detection, depth buffer, scan line, depth sorting, Area subdivision.

Illumination Models: Basic Models, Displaying Light Intensities, Halftone Pattern and dithering Techniques.

Surface Rendering Methods: Polygon Rendering Methods, Gouraud and Phong shading.

MODULE – III (12 Hours)

Multimedia system : Organization & Architecture, QoS Architecture, Digital Representation of sound, Elements of Audio system, synthesizer, MIDI. Transmission of video signals, television broadcasting standards.

Data Compression: Introduction, types of compression, JPEG Image compression techniques, MPEG standards overview, MPEG compression techniques, DVI technology.

Animation: Introduction, uses of Animation, Keyframes and tweening, types of animation, principle of animation.

Multimedia Information System: Operating system support, User interfaces, Multimedia. Database system, Application of Multimedia system.

TEXT BOOKS

1. D.Hearn & M. Baker, Computer Graphics, Pearson Education.
2. P. K. Bufford, Multimedia System, AWL

REFERENCE BOOKS

1. Z.Xiang and R.Pladdock, Computer Graphics, MGH
2. M.Hanmandlu, Computer Graphics, BPB Publication.
3. R. Parekh, Principle of Multimedia, TMH

CS-300 DATACOMMUNICATION & COMPUTER NETWORKS (3-0-0)

MODULE – I (12 Hours)

Overview of Data Communications and Networking, Physical Layer: Analog and digital, Analog Signals, Digital Signals, Analog versus Digital, Data Rate Limits, Transmission Impairments, Digital Transmissions: Line Coding Block coding, sampling, Transmission Mode. Analog Transmission: Modulation of Digital Data; Telephone modems, modulation of Analog signals. Multiplexing: FDM, WDM, TDM. Transmission Media: Guided Media, Unguided Media (Wireless) Circuit Switching and Telephone Network: Circuit Switching, Telephone Network.

MODULE – II (12 Hours)

Data Link Layer: Error Detection and Correction: Type of Errors, Detection, Error Correction. Data Link Control and Protocols: Flow and error Controls, stop-and-wait ARQ. Go-Back. N ARQ, selective Repeat ARQ, HDLC. Point-to-point Access: PPP, Point-to-point Protocol, PPP Stack, Multiple Access: Random Access, controlled Access, Channelization. Local Area Network: Ethernet, Traditional Ethernet, Fast Ethernet, Gigabit Ethernet, Wireless LANs: IEEE 802.11, Bluetooth virtual circuit : Frame Relay and ATM

MODULE – III (16 Hours)

Network Layer: Host to Host Delivery: Internetworking, addressing and routing Network Layer Protocols: ARP, RARP, ICMP, IPV6 and ICMPV6, Transport Layer: Process to process Delivery: UDP:TCP congestion control and quality of service. Application Layer :Client Server Model, Socket Interface Domain Name System(DNS): Electronic Mail(SMTP) and file transfer(FTP)HTTP and WWW.

TEXT BOOK

1. Behrouz A Forouzan , Data Communication and Networking , Third Edition, Tata McGraw - Hill Publishing Company Limited

REFERENCE BOOKS

1. Larry L. Peterson and Bruce S. Davie , Computer Networks: Third Edition, A system Approach, ELSEVIER
2. A.S. Tannenbaum, Computers Networks, PHI
3. William Stallings, Data and Computer Communication , PHI .
4. Peterson & Davice, Computer Networks, Elsevier

CS-304 DESIGN & ANALYSIS OF ALGORITHMS (3-0-0)

MODULE-I (14 Hours)

Introduction to design and analysis of algorithms: Introduction to Complexity, Growth of functions, asymptotic notations, Different algorithm design techniques, **Recurrences:** Solutions of Recurrences by Substitution, Recursion Tree method and Master methods. **Design and Analysis of Divide and Conquer Algorithms** (Binary Search, Merge sort and Quick sort), **Heap sort:** Heaps, Building Heaps, Heap sort Algorithm and Priority Queue.

MODULE-II (16 Hours)

Dynamic Programming Algorithms: Matrix Chain Multiplication, Elements of Dynamic

Programming vs Greedy Programming, Longest Common Subsequence. **Greedy Algorithms:** Activity Selection Problems, Elements of Greedy Strategy, Fractional Knapsack Problem, Huffman Codes. **Graph Algorithms:** Representation of Graphs, Breadth-first Search, Depth-first Search, Minimum Spanning Trees, Prim's algorithm and Kruskal's Algorithm, Single –Source Shortest Paths (Bellman-Ford and Dijkstra's Algorithms). All-Pairs Shortest Paths (Floyd-Warshall Algorithm).

MODULE-III (10 Hours)

String Matching: Robin-Karp, String Matching algorithm, NP-Completeness: Polynomial time, Polynomial-time verification, NP-Completeness and Reducibility, NP-Complete Problems (without proof). **Approximation Algorithm** (Traveling Sales man problem).

TEXT BOOK

1. T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C. Stein, Introduction to Algorithms. 2nd edition, McGraw-Hill, PHI(2nd Edition)

REFERENCE BOOKS

1. Horowitz E. & Sahni S.: Fundamentals of Computer Algorithms, Galgotia A. V. Aho, J. E. Hopcroft, and J. D. Ullman : The Design and Analysis of. Computer Algorithms, Addison Wesley.
2. Michael T. Goodrich, Roberto Tamassia: Algorithm Design: Foundations, Analysis, and Internet Examples., John Wiley & Sons, Inc.
3. S. Dasgupta, C.H. Papadimitriou, and U.V. Vazirani : Algorithms, McGraw-Hill 2006

ELECTIVE – I

IT-314	PROGRAMMING WITH JAVA
EC-333	MICRO PROCESSORS & MICRO CONTROLLERS
EC-452	SOFT COMPUTING
CY-201	ENGINEERING MATERIALS

MODULE –I (12 Hours)

Introduction to Java and Java programming Environment: History and Features of Java, Java Development Kit, JRE.

Fundamental programming structures in Java: Data Types, Variables, Assignments and initializations, Type Conversion and Casting, Arrays, Operators and their precedence, Control Flow, Strings, Comments.

Concepts of Objects and Classes: Introduction to Object oriented programming, Using Existing classes, Building your own classes, constructor overloading, Garbage Collection, Overloading Method, static Fields and Method, Understanding final and this keyword.

Inheritance Basics: Extending Classes, Using super to call super class Constructors, Method Overriding, Dynamic Method Dispatch, Using Abstract Classes, using final with Inheritance, Final Class and Method, Inner classes, The Object Class, The Class Class, Reflection.

Packages and Interfaces: Packages, Access Protection, importing packages, Interfaces, variables in interfaces, Interfaces can be extended, Interfaces vs. Abstract Class.

Exception Handling: Fundamentals, Dealing with Errors, Exception Types, Using try & catch, Multiple catch, throw, throws, finally, Java's Built-in exceptions, user defined exceptions, Assertions, Debugging Techniques.

MODULE –II (18 Hours)

Multi-Threading: Java Thread Model, Creating a thread, Creating multiple threads, Thread priorities, Thread Synchronization, Using isAlive() and join(), using wait() and notify().

String Handling: String constructors, String length; Character Extraction, String Comparison, Modifying a String.

Exploring java.Lang: Simple type wrappers, Runtime memory management, Object Cloning.

Java.util: The Collection interface, Collection classes, Use of Iterator, The Collection Algorithm, The legacy Classes and interface, String Tokenizer, Random

Java.io: The java I/O Classes and Interfaces, Stream classes Byte Stream, Character Stream, serialization, File Management in Java.

Applet: Basics, Architecture, Skeleton, The HTML Applet tag, Passing parameter to Applets, AppletContext and showDocument().

AWT: AWT Classes, Window fundamentals, Components, Container, Panel, Window, Frame, Canvas, Creating a Frame window in an Applet, Working with Graphics, AWT

Control Fundamentals, Layout management, Dialog Boxes.

MODULE –III (10 Hours)

Event Handling: Basics of Event Handling, Delegation Event model, Event Class, Event Listener interfaces, Adapter Classes, Handling Events by extending AWT components.

Swing: An Introduction, Features, JApplet, Icons and Labels, Text Fields, Buttons, Combo Boxes, Tabbed Panes, Scroll Panes, Trees, Tables.

JDBC: Fundamentals, Type-I, Type-II, Type-III, Type-IV Drivers, Database connectivity programs.

Networking: Basics, Socket overview, Networking classes and interfaces, TCP/IP client sockets, URL connection, TCP/IP Server Sockets.

TEXT BOOKS

1. Herbert Schildt, "The Complete Reference Java 2, TMH
2. Balguruswamy, "Programming with Java", TMH.

REFERENCE BOOKS

1. Shirish Chavan, Java for Biginners, SPD.
2. Kathy Sierra and Bert Bates, Head First Java, O' Reilly, SPD.
3. Cay S. Horstmann & Gary Cornell, Core Java Vol-I & Vol-II, Sun MicroSystem Press.
4. SL-275-SE6 Java Programming Language, Sun Solaris.

EC-333 MICROPROCESSORS & MICROCONTROLLERS (3-1-0)

MODULE-I (12 Hours)

Microprocessor Architecture:- Introduction to Microprocessor and Microcomputer Architecture, Pins & Signals, Register Organization, Timing & Control MODULE, 8085 Instruction Timing & Execution. Instruction Set and Assembly Language Programming of 8085:- Instruction set of 8085, Memory & I/O Addressing, Assembly language programming using 8085 Instruction Set, use of Stack & Subroutines. Memory Interfacing:- Interfacing EPROM & RAM Memories Interrupts:-8085 Interrupts

MODULE-II (12 Hours)

Microprocessor Based System Development Aids:- Programmable Peripheral Interface: 8255, Programmable DMA Controller: 8257, Programmable Interrupt Controller: 8259, Microcontroller (Architecture and Programming):- Introduction to 8051 Microcontrollers (Architecture, Pin description), 8051 Assembly Language Programming (JUMP, LOOP, CALL Instructions), I/O Port Programming, 8051 Addressing Modes, Arithmetic & Logic Instructions, Microcontroller Interrupts and Interfacing to 8255:- 8051 Interrupts, Interfacing to 8255

MODULE-III (12 Hours)

Intel 8086 (16 bit processors):-8086 Architecture, Addressing Modes, Instruction Format, Pins & Signals, 8086 Basic System Concept, Interfacing with Memories, 8086 Interrupts.

Intel 80386 :- Introduction to 80386 Microprocessor, Architecture, Pins & Signals, Memory System, Registers, 80386 Memory Management, Paging Technique, Protected Mode Operation, brief introduction to 80387 Math Coprocessor. Pentium Processors (Only features):- Introduction to Pentium Processors, Memory System, Input/Output System, Branch Prediction Logic, Floating Point MODULE, Cache Structure, Superscalar Architecture. (only the features of Pentium Processor mentioned above are to be discussed)

TEXT BOOKS

1. Ghosh & Sridhar, 0000 to 8085 -Introduction to Microprocessor for Scientists & Engineers, PHI publication
2. A.K. Roy & K.M. Bhurchandi, Advanced Microprocessor and Peripherals (Architecture, Programming & Interfacing), TMH Publication
3. Mazidi & Mazidi, The 8051 Microcontroller & Embedded Systems, Pearson / PHI publications

EC- 452

SOFT COMPUTING

(3-0-0)

MODULE-I

Neural networks, Introduction, Neuron Models, Supervised and Unsupervised Learning Methods, Single Neuron/ Perceptron Networks, Training Methods, Applications to Linearly separable problems, Multi layered perceptrons, Back-propagation algorithm, Introduction to Fuzzy systems, Membership function, Fuzzy relational operation, fuzzy IF THEN rules, Defuzzification – Sugeno and Mamdani type systems, Adaptive Neuro-Fuzzy Systems, Training Methods.

MODULE-II

Genetic Algorithm: Basic Concepts, Search Space, Working Principle. Encoding: Binary, Octal, Hexadecimal, Permutation, Value and Tree. Decoding, Fitness Function, Selection: Roulette-wheel, Tournament, Rank and Steady-state. Elitism, Crossover: Single-Point, Two-Point, Multi-Point, Uniform, Matrix And Cross Over Rate, Mutation: Mutation, Mutation Rate.

Ant Colony Optimization: Ant Foraging Behavior, Combinatorial Optimization, Routing In Communication Network,

MODULE-III

Application: Control; Communication Engineering; System Identification And Pattern Classification, Function Optimization, Adaptive System Identification, Channel Equalization.

TEXT BOOKS

1. S. Haykin, Neural Networks, A Comprehensive Foundation, Pearson Education, India
2. Martin T. Hagan, Howard B. Demuth, Mark H. Beale; Neural Network Design; Thomson 2002
3. Jang, Sun and Mizutani; Neuro-Fuzzy and Soft-Computing – A computational approach to learning and machine intelligence, Prentice Hall of India David E. Goldberg, Genetic Algorithms in search, Optimization and machine learning, 1989.

REFERENCE BOOKS

1. Satish Kumar, A Classroom approach, Neural Networks: Tata McGraw Hill, 2004,

MODULE – I (16Hours)**Fuel and combustion:**

Classification, calorific value, Solid fuels (Analysis of coal, manufacture of metallurgical coke), Liquid fuels (Refining of crude oil: fractional distillation, cracking, reforming, knocking, octane number and cetane number), Gaseous fuel (Producer gas, water gas, Biogas, LPG), Combustion calculations.

Water treatment :

Hardness of water & its determination (EDTA method), Types of hardness, Disadvantages of hard water in boiler, Softening techniques (Soda lime, Zeolite and ion-exchange processes), Purification of Drinking water.

MODULE –II (12Hours)**Inorganic Engineering Materials:**

1. Glass: Manufacture of glass, Types.
2. Ceramics: White wares, glazing, optical fibres.
3. Refractories: Classification, manufacture of silica, fire clay and carborundum bricks.
4. Abrasives: Natural and artificial (carborundum, Alundum, Norbide).

Bio & Conducting polymers: Bio-polymers (Starch, Cellulose), Conducting polymers (Polyacetylene, Polyaniline) Properties and application.

MODULE – III (14Hours)**Composites :**

Constituents of Composites, Types of composites fibre - Reinforced composites, (Fiberglass, Advanced composites, wood) , Aggregate composites , mechanical properties of composites. Processing of composites.

Chromatography :

Thin layer chromatography, Gas-liquid chromatography, Column chromatography, High Performance Liquid Chromatography (HPLC).

TEXT BOOKS

1. Jain & Jain, Engineering chemistry , 15th Edition, Dhanpat Rai Publishing Co., 2007.
2. Shackelford & Muralidhara:, Introduction to Materials Science for Engineers , Sixth Edition 2007, Pearson Education.

REFERENCE BOOKS

1. W.D Callister , Materials Science and Engineering ,Wiley sons Inc.
2. W.F Smith, Principles of Materials Science and Engineering, Mc Graw Hill International edition
3. J.C.Kuriacose and R.Rajaram , Chemistry in Engineering and Technology, Tata Mc Graw Hill Publication.

5th & 6th Sessionals

EC-371

DIGITAL SIGNAL PROCESSING LAB

(0-0-3)

(Any 8 experiments should be completed)

1. Different types of Signal generation using MATLAB. (both continuous and discrete.)
2. Linear Convolution of sequences. (Without using the inbuilt function conv() available in MATLAB.)
3. Circular Convolution of two Sequences
 - i) Computation of circular convolution
 - ii) Computation of linear convolution using circular convolution & comparison of result with the result obtained from linear convolution.
4. Correlation between sequences
 - i) Finding auto correlation of a sequence
 - ii) Finding cross correlation of 2 sequences.
 - iii) Finding power spectral density of a sequence.
 - iv) Finding correlation using convolution
 - v) Finding circular correlation between sequences
5. Finding the convolution (linear and circular) and correlation (linear & circular) of periodic sequences using DFT and IDFT.
6. Implementation of DFT (Fast Fourier Transform) and IFFT algorithms using
 - i) Decimation in Time (DIT)
 - ii) Decimation in Frequency (DIF)
7. Design of FIR filters (lowpass, highpass, bandpass) Using windowing technique (hamming window, hanning, window rectangular window, Kaiser window) and comparison of their frequency responses.
8. Design of IIR filter.
 - i) Design of Butterworth Filter
 - ii) Design of Chebyshev filter
9. Convolution of long duration sequences using overlap add & overlap save methods using DFT and IDFT
10. Working with a DSP processor. (fixed point -TMS320C-5X / Floating point) series.
 - i) Implement convolution (Linear & circular convolution)
 - ii) FIR & IIR filtering implementation.

IT-371**RDBMS LAB****(0-0-3)**

1. Use of SQL syntax: insertion, deletion, updating using SQL.
2. Program segments in embedded SQL using C as host language to find average grade point of a student, etc.
3. SQL querying using Oracle functions
4. Table creation using constraints and referential integrity.
5. Sub queries and Join
6. Exploring Oracle objects like view, index sequence etc.
7. Introduction to PL SQL.
8. Introduction to Procedure and Function and Programming procedure and functions.
9. Use of Cursor for the programming approach.
10. Introduction to Trigger and Packages for programming approaches.
11. Use of package (ORACLE) for programming approaches.
12. Use of package (DB2) for programming approaches.
13. Programs on JDBC/ODBC to print employ's / student's/ information of a particular department.

CS-373**UNIX & SHELL PROGRAMMING LAB****(0-0-3)****Experiment-1**

Unix Command

Experiment-2

vi Editor Command

Experiment-3

Find multiplication table of a given number.

Write a script language to view no. of arguments given with command and print the arguments.

Experiment-4

Write a script language find greatest of three numbers using if then else stmt.

Write a script language to generate 1 to n using do while statement.

Experiment-5

Write script language to calculate given salary of person given basic salary, DA 40%, HRA is 40% of basic pay as input.

Write script language to find sum of digits of a input number.

Experiment-6

Write script language to find out max min element in an array.

Write script language to merge the content of two array.

Experiment-7

Write script language to combine contents of one file to another.

Experiment-8

Implement FCFS scheduling algorithm using shell script.

Implement SJF scheduling algorithm using shell script.

CS-380

COMPUTER NETWORK LAB

(0-0-3)

1. Acquaintance of Comp. Network, Network Specification and study of different Network components such as NIC, HUB, SWITCH etc.
2. Adapter Configuration, Services, Clients and Protocols.
3. IP classification and Configuration, Sub netting and Subnet Masking.
4. Peer- to Peer Configuration – I
5. Peer- to Peer Configuration, sharing of resources, user creation and sharing protections.
6. Client-Server Networking with 2000/2003
 - a. Server Installation
 - b. User & Group Management
 - c. Active directory Services
 - d. DHCP Services
 - e. Print services
 - f. IIS configuration, Telnet Services, Remote Access Services etc.
7. Socket Programming in Java
8. W.A.P in java creating client and server sockets and implement day time server . Server time should be calculated in client side ?
9. WAP in java for the above client server program to implement in echo server so that paragraph may be sent back ?
10. WAP to implement a simple calculator may be implemented in server mode ?
11. WAP to implement a chat server .Also include swing to make the program user friendly?
12. General Troubleshooting.

CS-382 ALGORITHM ANALYSIS & DESIGN LAB (0-0-3)

(All the problems have to be implemented either in C programs or C++ programs)

Elementary Problems : (8 is compulsory and any four among the rest)

1. Using a stack of characters, convert an infix string to a postfix string.
2. Implement polynomial addition using a single linked list
3. Implement insertion, deletion, searching of a BST, Also write a routine to draw the BST horizontally.
4. Implement insertion routine in an AVL tree using rotation.
5. Implement binary search and linear search in a program
6. Implement heap sort using a max heap.
7. Implement DFS/ BFS routine in a connected graph
8. Implement Dijkstra's shortest path algorithm using BFS

Greedy Algorithm (Any Two)

1. Given a set of weights, form a Huffman tree from the weight and also find out the code corresponding to each weight.
2. Take a weighted graph as an input, find out one MST using Kruskal / Prim's algorithm
3. Given a set of weight and an upper bound M – Find out a solution to the Knapsack problem.

Divide and Conquer Algorithm (any Two)

1. Write a quick sort routine, run it for a different input sizes and calculate the time of running. Plot in graph paper input size verses time.

Dynamic programming (Any one)

1. Find out a solution for 0/1 knapsack problem
2. Given two sequences of character, find out their longest common subsequence using dynamic programming

NP Complete and NP Hard problems

1. Find out a solution to Traveling Sales Man problem of an input graph

1. Basic java programming (Application and Applet)
2. Usage of various data types
3. Usage of constructors
4. Usage of method overriding
5. Usage of method overloading
6. Incorporating the concept of inheritance
7. Usage of string related operation
8. Usage of exception handling
9. Multi threaded programming
10. Programs involving various methods of creating multithreaded program
11. Thread communications and signals
12. Programs involving event handling in AWT.
13. Use of various layout managers
14. Programming to carry out different types of input output
15. Graphics programming in AWT / Swing
16. Database programming in Java using JDBC
17. Network Programming in Java

INFORMATION TECHNOLOGY

7 th Semester				8 th Semester			
<i>Subject Code</i>	<i>Theory</i>	<i>Contact Hrs. L-T-P</i>	<i>Credit C</i>	<i>Subject Code</i>	<i>Theory</i>	<i>Contact Hrs. L-T-P</i>	<i>Credit C</i>
IT 411	Internet & Web Technology	3-1-0	4	HS 402	Principles of Management	3-0-0	3
IT 413	Cryptography & Security	3-0-0	3	IT 410	Object Oriented Analysis & Design with UML	3-1-0	4
EL-II	Elective- II	3-0-0	3	EL-IV	Elective – IV	3-0-0	3
EL-III	Elective – III	3-0-0	3	EL-V	Elective – V	3-0-0	3
	Total	13	13		Total	13	13
<i>Subject Code</i>	<i>Practicals / Sessional</i>	<i>Contact Hrs.</i>	<i>Credit</i>	<i>Subject Code</i>	<i>Practicals / Sessionals</i>	<i>Contact Hrs</i>	<i>Credit</i>
IT 471	Computer Graphics & Multimedia Lab.	0-0-3	2	IT 492	Seminar	0-0-3	1
IT 473	Internet & Web Technology Lab	0-0-3	2	IT 494	Major Project	0-0-10	7
IT 491	Seminar	0-0-2	1	IT 496	Comprehensive Viva Voice		2
IT 493	Minor Project	0-0-6	3				
IT495	Summer training	0-0-2	10				
	Grand Total	27	21		Grand Total	26	23

MODULE-I (17 Hours)

Internet Basics: Basic Concepts, Communication on the Internet, Internet Domains, TCP/IP and Internet, Application Protocols, Idea of Web Server, Web Browser. **Web Design:** HTML Tags, Color and Background, text formatting tags, creating hyperlinks and anchors, Image, Image map, table, frame, Designing Forms and controls, Multimedia in Web DHTML, Style sheet. **Client Side Scripting:** Introduction to Client side Scripting, Programming Fundamentals, Java Script Document Object Model, built in object, form object and element, working with data, flow control structures, operator, custom function and object, data entry and validation using tables and forms using JavaScript, VBScript functionalities, VBScript controls. **Server Side Scripting:** Introduction to Server side Scripting, ASP Objects and Components, Working of .asp files, CGI Basics, Why CGI is used? How it Works? Get and Post methods.

MODULE-II (15 Hours)

Introduction to Java Enterprise Edition 5: Programming for the Enterprise, Enterprise Architecture (Single tier, two tier, three tier, N tier, Enterprise) and Technologies, Introduction to Web Application. **Java Servlets:** Introduction to Web Containers, Servlet Programming, Servlet vs. Applet, Servlet API, GenericServlet Class, HttpServlet Class, Servlet Architecture, Servlet life Cycle, Working with Servlet, Working with Databases, Servlet Sessions, Cookies, Context and Collaboration. **Java Server Pages:** Basics and Architecture, Life Cycle of JSP Page, JSP Directives, Scripting Elements, Standard Action Elements of JSP, Implicit Objects and scope, Writing JSP application with standard Tag Libraries, Connecting to Databases. **XML:** Introduction, XML Document Syntax, Document Type Definition, Parsing valid XML, SAX, DOM.

MODULE-III (8 Hours)

Distributed Computing Using RMI: Basics, RMI Architecture, Locating Remote Objects, RMI Exceptions, and Developing Applications with RMI, Understanding Directory Services and JNDI. **Enterprise Java Beans:** Introduction, EJB vs. Java Beans, EJB Architecture, Features/ Benefits of EJB, Types of EJB, Working with Session Beans, Entity Beans.

TEXT BOOKS

1. Ivan Bayross, Web Technologies, Vol-I and Vol-II , BPB Publications.
2. Subrajmanyam Allamaraju and others, Professional Java Server Programming J2EE 1.3 Edn., Apress, SPD.

REFERENCE BOOKS

1. Ivan Bayross and Others, Java Server Programming for Professional covers JAVA EE 5, SPD.
2. Danny Ayers and others, Professional Java Server Programming, Wrox Press Ltd, SPD.
3. Dream Tech Press , Java Server Programming (J2EE 1.4) Black Book” Bruce W. Perry, “Java Servlet & JSP”, Cookbook SPD-O’Reilly
4. SL-134 Web Component with Servlets & JSP Technologies, Sun Solaris.
5. FJ-310-EE5 Developing Applications for the Java EE Platform, Sun Solaris.
6. SL-285-SE6 Developing Applications with the Java SE Platform, Sun Solaris.

MODULE-I (14 Hours)

Introduction: Service, Mechanisms and attacks, Symmetric key encipherment , Mathematics of Cryptography, Traditional Symmetric key ciphers, Modern Symmetric key ciphers.

MODULE-II (14 Hours)

DES, AES, Encipherment using Modern Symmetric key ciphers, asymmetric key Encipherment , Primes, Primality Testing, Factorization, Quadratic Congruence, RSA Cryptosystem.

MODULE-III (12 Hours)

Message Integrity and Message Authentication, Digital Signature, Key Management, Security at the Application layer.

TEXT BOOK

1. Behrouz A. Forouzan, “Cryptography And Network Security”, The McGraw-Hill Companies, Special Indian Edition.

REFERENCE BOOKS

1. William Stallings, Cryptography And Network Security – Principles and Practices, Prentice Hall of India, Third Edition, 2003.
2. D. Stinson, Cryptography, Theory and Practice 2nd Edition, 2004, Chapman & Hall/CRC.
3. Atul Kahate, Cryptography and Network Security, Tata McGraw-Hill, 2003.
4. Charles B. Pfleeger, Shari Lawrence Pfleeger, Security in Computing, Third Edition, Pearson, 2003.

ELECTIVE – II

CS-403 THEORY OF COMPUTATION

CS-308 SYSTEM PROGRAMMING

CS-425 ARTIFICIAL INTELLIGENCE

EI-425 EMBEDDED SYSTEM DESIGN

IT-415 E-COMMERCE & ERP

MODULE-I (16 Hours)

Introduction to Automata Theory, Finite Automata (DFA & NFA), Finite Automata with Epsilon-Transitions, Conversion of NFA to DFA, Regular Expressions and Languages, Finite Automata & Regular Expression, Properties of Regular Languages.

MODULE-II (12 Hours)

Grammar, Chomsky's hierarchy of grammars, Context-Free Grammars (CFG) and Languages: Context-Free Grammars, Parse Trees, Ambiguity in Grammars and Languages. Pushdown Automata, Languages of PDA, Equivalence of PDA's and CFG's, Properties of Context-Free Languages

MODULE-III (12 Hours)

Introduction to Turing Machine: Definition, Extension of Turing machine, Non-deterministic TM, Equivalence of various TM formalisms. **Undecidability:** Church Turing Thesis, Universal Turing Machine, Halting Problem, Other unsolvable problems. **Computational Complexity & NP-Completeness:** Class P, Class NP, Reductions, Class NP-Completeness, Dealing with NP-Completeness.

TEXT BOOK

1. J. E. Hopcroft, R. Motwani & J.D. Ullman, Introduction to Automata Theory, Languages and Computation, Pearson Education Asia-2002.

REFERENCE BOOKS

2. Peter Linz, Introduction to Formal Language and Automata, Narosa Publishing House (Third Edition)-2004.
3. Michael Sipser, Introduction to the theory of Computation, Thomson Books
4. John. C Martin, Introduction to Languages and the Theory of Computation. The McGraw-Hill Companies.
5. Eitan Gurari , An Introduction to the Theory of Computation, Computer Science Press.

MODULE- I (10 Hours)

Introduction: System Software, Application Software, Machine Structure, Evolution of components of a programming system (Assembler, Loader, Macros, Compiler, Formal Systems), Evolution of Operating Systems, Functions of Operating System. Machine Structure: General Machine Structure, Approach to a new machine, Memory Registers, Data, Instructions, special features. Machine Language: Long Way, No looping, Address Modification, Looping, Introduction to Assembly Language Program

MODULE- II (10 Hours)

Assemblers: Design Procedure, Design of Assembler, Table Processing. Macros Language and Macro Processor: Macro Instructions, Features of a Macro Facility, Implementation. Loaders: Loader Schemes, Design of an Absolute Loader, Direct Linking loader, Bootstrap Loader.

MODULE- III (12 Hours)

Programming Languages: Importance of High Level Languages, Features, Data Types and Data Structures, Storage Allocation and Scope Name, Accessing Flexibility, Functional Modularity, Asynchronous Operations, Extensibility and Compile time Macros. Formal Systems: Uses of Formal Systems, Formal Specification, Formal Grammars, Backus-Naur Form, Canonic Systems, Canonic Systems vs Formal Systems Compilers: Introduction to Compilers, Phases of a compiler(Lexical Phase, Syntax Phase, Interpretation Phase, Optimization, Code Generation, Assembly, passes of a compiler), Intermediate Form, Storage Allocation, Code Generation, Data Structure

TEXT BOOK

1. John J Donovan, Systems Programming , McGraw-Hill Education.

REFERENCE BOOKS

2. Leland Beck, System Software: An Introduction to systems programming, Pearson
3. Nityashri, System Software , McGraw-Hill Education.
4. Dhamdhare , Operating System and System Programming, McGraw-Hill Education
5. Hoover, System Programming with C and Unix, Pearson Education

CS-425

ARTIFICIAL INTELLIGENCE

(3-0-0)

MODULE-I (15 Hours)

Introduction to AI, The foundation of AI, The History of AI, The state of Art, Intelligent Agent, How agent should act, Structure of Intelligent Agent, Environments, Solving Problem by Searching, Formulating Problems, Searching for solutions, Search Strategies, Avoiding repeated search, Constraint Satisfaction Problem. Informed Search Methods: Best-First Search, Heuristic Functions, Memory Bounded Search, Iterative Improvement Algorithms, Knowledge & Reasoning : A Knowledge based Agent, The Wumpus world Environment, Representation Logic and Reasoning.

MODULE-II (15 Hours)

Propositional Logic, An Agent for the Wumpus world, First Order Logic: Syntax and Semantics, Extensions and Notational variations, Using first order logic, Logical Agent for Wumpus world. Inference in First-Order Logic, Inference Rules involving Quantifiers, Generalized Modus Ponens, Forward and Backwards Chaining, Clausal form, Semantic nets, Planning, A simple planning agent, From problem solving to planning, Planning in situation calculus, Basic representation for planning. Uncertainty: Acting under Uncertainty, Basic Probabilistic Notation, Axioms of Probability, Bayes' Rules and its use.

MODULE-III (10 Hours)

Learning in Neural and Belief Networks, How the brain works, Neural Network, Perceptrons, Multilayer Feed Forward Networks, Application of Neural Networks, Bayesian Methods for Learning Belief Networks. Practical Natural language Processing, Practical Application, Efficient Parsing, Scaling up Lexicon, scaling up the grammar, Ambiguity, Discourse Understanding. Derivative free optimization techniques: Genetic Algorithm, Simulated Annealing.

TEXT BOOK

1. S. Russell & P. Norvig, Artificial Intelligence A Modern Approach , Pearson Education

REFERENCE BOOKS

2. E. Rich and K. Knight, Artificial Intelligence ,Tata Mc Graw-Hill Edition.
3. Nils J. Nilsson Morgan, Artificial Intelligence : A New Synthesis, Kaufman Publishers
4. Daniel G. Bobrow, Artificial Intelligence in Perspective , MIT Press

EI-425

EMBEDDED SYSTEM DESIGN

(3-0-0)

MODULE-I (14 Hours)

Introduction: An Embedded System, Processor in the System, Other hardware units, Software embedded into a system, Exemplary Embedded System-on-Chip (SOC) and VLSI circuit.

Devices and Device Drivers:

I/O Devices, Timer and counting Devices, Serial communication using IC, CAN and advanced I/O buses between the networked multiple devices, Host system or computer parallel communication between networked I/O multiple devices using ISA,PCI, PCI-X and advanced buses, Device Drivers, Parallel Port Device Drivers in a System. Serial Port Device in a system, Interrupt servicing (Handling) mechanism.

MODULE-II (14 hours)

Software and Programming Concepts:

Processor selection for an embedded system, memory selection for an embedded system, Embedded programming in C++, Embedded Programming in JAVA, Unified modeling language (UML), Multiple Processes and Application, Problem of sharing data by multiple tasks and routines, Inter Process Communication.

Real Time Operating System:

Operating system services, I/O subsystem, Network Operating System, Real time and Embedded System, Need of well tested and debugged Real time Operating System (RTOS), Introduction to C/OS-II.

MODULE-III (12 hours)

Case Studies of Programming with RTOS: Automatic vending machine, Adaptive Cruise Control System for a Car, Smart Card.

Hardware and Software Co-design: Embedded system project management, embedded system design and co-design issues in system development process, Design cycle in development phase for an embedded system, Use of software tools for development of an embedded system, Issues in embedded system design.

TEXT BOOKS

1. Raj Kamal, Embedded systems-Architecture, Programming and Design. Tata McGraw Hill, ISBN: 0070494703
2. Stephen A. Edwards, Languages for Digital Embedded Systems. Kluwer, 2000, ISBN:

REFERENCE BOOKS

1. Embedded Microprocessor Systems: Real World Design.
By: Stuart R. Ball, Butterworth-Heinemann Publishers, 3rd edition, 2002,
ISBN: 0750675349
2. The Art of Programming Embedded systems.
By: Jack G. Ganssle, academic Press,1992, ISBN:0122748808.

IT-415

E-COMMERCE AND ERP

(3-0-0)

MODULE - I (15 Hours)

Electronic Commerce : Overview, Definitions, Advantages & Disadvantages of E-Commerce, Threats of E-Commerce, Managerial Prospective, Rules & Regulations for Controlling E-Commerce, Cyber Laws. **Technologies** : Relationship Between E-Commerce & Networking, Different Types of Networking for E-Commerce, internet, Intranet, EDI Systems **Wireless Application Protocol** : Definition, Hand Held Devices, Mobility & Commerce, Mobile Computing, Wireless Web, Web Security, Infrastructure Requirement for E-Commerce. **Business Models of E-commerce** ; Model Based on Transaction Type, Model Based on Transaction Party - B2B, B2C, C2B, C2C, E-Governance.

MODULE - II (15 Hours)

E-strategy : Overview, Strategic Methods for developing E-Commerce. **Four C's** (Convergence, Collaborative Computing, Content Management & Call Centre). **Convergence** : Technological Advances in Convergence - Types, Convergence and its implications, **Collaborative Computing** : Collaborative product development, **Content Management** : Definition of content, Authoring Tools and Content Management, **Traffic management** : Content Marketing. **Call Centre** : Definition, Need, Tasks Handled, Mode of Operation, Equipment, Strength & Weaknesses of Call Centre, Customer Premises Equipment (CPE). [6L] **Supply Chain Management** : E-logistics, Supply Chain Portal, Supply Chain planning Tools (SCP Tools), Supply Chain Execution (SCE), SCE - Framework, Internet's effect on Supply Chain Power + Customer Relationship Management.

E-Payment Mechanism ; Payment through card system, E-Cheque, E-Cash, E-Payment Threats & Protections. **E-Marketing** : Home - shopping, E-Marketing, Tele-marketing Electronic Data Interchange (EDI) : Meaning, Benefits, Concepts, Application, EDI Model, protocols (UN EDI FACT / GTDI, ANSIX - 12, Data Encryption (DES / RSA) **Risk of E-Commerce** : Overview, Security for

E-Commerce, Security Standards, Firewall, Cryptography, Key Management, Password Systems, Digital Certificates, Digital Signatures.

MODULE – III ERP (10 hrs.)

Basic ERP concept, Business process engineering, data warehousing, data mining, ERP implementation life cycle. Business Modules : (Finance, HR, production, material management, quality management, marketing & sales, distribution & service). ERP vendor (SAP, J D Edward, People Soft). ERP – Present & Future.

TEXT BOOKS

1. Bhaskar Bharat, Electronic Commerce - Technologies & Applications, TMH.
2. E-commerce : Strategy Technologies & Applications, Tata McGraw Hill.

REFERENCE BOOKS

1. MM Oka, E-commerce, EPH
2. Kalakotia, Whinston, Frontiers of Electronic Commerce, Pearson Education.
3. Loshin pete, Murphy P.A., Electronic Commerce, Jaico Publishing Housing
4. Murthy : E-Commerce, Himalaya publishing.
5. J. Christopher & T.H.K. Clerk, Global E-Commerce, University Press
6. Reynolds, Beginning E-Commerce,SPD
7. Krishnamurthy, E-Commerce Mgmt. Vikas.

ELECTIVE – III

(Open Elective)*

CS-423	DISTRIBUTED DATABASE SYSTEM
CS-419	DATA MINING
IT-417	MANAGEMENT INFORMATION SYSTEM

CS-423

DISTRIBUTED DATABASE SYSTEM

(3-0-0)

MODULE-I (14 Hours)

Introduction to Distributed Data Processing and Distributed Database system, Relational DBMS Concept-Normalization, Integrity Rules, Relational Data Languages, Functional Layers of Relational DBMS, Data Communication Concepts-Types of Computer Networks, Protocol Standards, Broadband Networks, Wireless Networks, Internet, DBMS Standardization, Distributed DBMS Architecture and Models.

MODULE-II (14 Hours)

Distributed Database Design Strategies and Issues, Fragmentation, Allocation, Semantic Data Control, View Management, Data Security, Complexity of Relational Algebra Operations, Objectives and Characterization Query Processing, Layers of Query Processing, Query Decomposition and Data Localization, Distributed Query Optimization Introduction to Transaction Management: Properties of Transaction, Types of Transaction, Distributed Concurrency Control, Serialization, Concurrency Control Mechanisms, Concurrency Control Algorithms, Deadlock Management, Relaxed Concurrency Control.

MODULE-III (12 Hours)

Reliability concepts and Measures: Failures and Fault Tolerance in Distributed Systems, Failures in Distributed DBMS, Local and Distributed Reliability Protocols, Network Partitioning, Fundamental Object Concepts and Models, Object Distribution Design, Client/Server Architecture, Object Management and Storage, Object Query Processing.

TEXT BOOKS

1. OZSU & Valduriez, Principles of Distributed Database System, Pearson Education.
2. C. J. Date, An Introduction to Database Systems, Pearson Education.

CS-419

DATA MINING

(3-0-0)

MODULE-I (15 Hours)

Introduction: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Major issues in Data Mining, OLAP Technology for Data Mining, Multidimensional Data Model. **Data Preprocessing:** Needs Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

MODULE-II (10 Hours)

Mining Association Rules in Large Databases: Association Rule Mining, Mining Single-Dimensional Boolean Association Rules from Transactional Databases, Mining Multilevel Association Rules from Transaction Databases, Mining Multidimensional Association Rules from Relational Databases and Data Warehouses, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

MODULE-III (15 Hours)

Classification and Prediction: Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Classification by Back propagation, Classification Based on Concepts from Association Rule Mining, Other Classification Methods, Prediction, Classifier Accuracy. **Cluster Analysis Introduction:** Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods.

TEXT BOOK

1. Jiawei Han & Micheline Kamber Harcourt India., Data Mining – Concepts and Techniques.

REFERENCE BOOK

2. Arun K. Pujari, Data Mining Techniques, University Press
3. David J. Hand, Heikki Mannila and Padhraic Smyth, Principles of Data Mining, MIT Press, Fall 2000.
4. Mehmed Kantardzic, Wiley, Data Mining: Concepts, Models, Methods, and Algorithm, IEEE Press, 2002.
5. Daniel T. Larose, John Wiley, Discovering Knowledge in Data : An Introduction to Data Mining, John Wiley & Sons, Hoboken, New Jersey, 2004.

IT-417 MANAGEMENT INFORMATION SYSTEM (3-0-0)

MODULE-I (12 Hours)

Fundamentals of Information Systems, Systems approach to problem solving, Developing information system solutions. Information system components, Information quality, Data resource management, Database, Data models, Information Systems in marketing, manufacturing, HRM, Accounting and Finance.

MODULE-II (12 Hours)

Information analysis and design tools : Decision tools, Decision Table, Structured Analysis, Dataflow Analysis, Tools for dataflow strategy, Developing dataflow diagrams, Leveling, Data dictionary, Structured flow chart, HIPO, Warnier/ORR diagram.

MODULE-III (12 Hours)

Planning & implementation of Information Systems, Transaction Processing Systems, Executive information Systems, Decision Support Systems, Expert Systems, Knowledge Management. Computer crime, Security (Goals, risks, controls, security & recovery measures of IS, economics of information security) & ethical challenges.

TEXT BOOKS

1. James A. O'Brien, George M. Marakas, Management Information Systems, Eighth Edition, 2008, McGraw-Hill Education (India), New Delhi.
2. Kenneth C. Laudon, Jane P. Laudon, Management Information Systems, Tenth Edition, Pearson Education Inc., New Delhi.

REFERENCE BOOKS

1. Kenneth E. Kendall, Julie E. Kendall , System Analysis and design, PHI Learning Pvt. Ltd., New Delhi.
2. James A. Senn ,Analysis & Design of Information Systems, McGraw-Hill Education, New Delhi
3. Effy Oz, Management Information Systems, Sixth Edition, 2009, CENGAGE Learning India Pvt. Ltd., New Delhi.
4. Robert G. Murdick, Joel E. Ross, James R. Claggett, Information Systems for Modern Management, Third Edition, PHI Learning Pvt. Ltd., New Delhi.
5. Stephen Haag, Maeve Cummings, Amy Philips, Management Information Systems, Sixth Edition, 2007, McGraw-Hill Education (India), New Delhi.
6. Gordon B. Davis, Margarethe H. Olson, Management Information Systems, Second Edition, 1985, McGraw-Hill Education (India), New Delhi.
7. Mahadeo Jaiswal, Monika Mital, Management Information Systems, First Edition, 2004, Oxford University Press, New Delhi.

HS-402 PRINCIPLES OF MANAGEMENT (3-0-0)

MODULE-I [12 hours]

Introduction to Management: Science, Theory and Practice; Importance and Scope of Management; Evolution of Management Thought; Management and Environment- Environmental Impact on the Management Process; Globalisation and Business Environment; Social Responsibilities and Obligations of Business Management.

Importance of Management in Engineering and Technology - Critical Factors in Managing Technology, Management of Technology and Global Competitiveness, Formulation of a Technology Strategy; Creating the Product-Technology-Business Connection, Technology Planning, Technology as an Instrument of Competition.

MODULE-II [12 hours]

The Process of Management; Planning – Essentials of Planning and Managing by Objectives, Strategies, Policies, Planning Perishes, and Decision Making; Organising – Principles of Organization, Organization Structure, Effective Organizing and Organization Culture; Directing – Crisis Management and Corporate Governance; Staffing – Selection, Training, Development, Appraisal, Knowledge Management; Controlling – The System and Process of Controlling, Control Techniques and Information Technology.

MODULE-III [12 hours]

Functions of Management – Marketing Function of Management, Modern Concept of Marketing, Functional Classification of Marketing, Marketing Mix, Fundamental Needs of Customers, Role of Distribution Channels and Advertising; Financial Functions of Management – Concept of Financial Management, Project Appraisal, Tools of Financial Decision Making, Introduction to Short-Term and Long-Term Sources of Financing.

TEXT BOOKS

1. Essentials of Management, Harold Koontz and Heinz Weihrich, Tata McGraw Hill, 8th Edition, 2010.
2. Business Organisation and Management, C. R. Basu, Tata McGraw Hill, 3rd Reprint, 2008.
3. Management of Technology, Tarek Khalil, Tata McGraw-Hill Edition, 2009.

REFERENCE BOOKS

1. Management – Theory and Practice, C. B. Gupta, 14th Edition, S. Chand & Sons, 2009.
2. Financial Management, I. M. Pandey, Vikas Publications, 9th Edition, 2009.

IT-410 OBJECT ORIENTED ANALYSIS AND DESIGN WITH UML (3-0-0)

MODULE –I (8 Hours)

Overview of Object Oriented Concepts: Basic mechanisms, Key concepts, related technical terms, Advantages of OOD. **Object-Oriented S/W design:** Object oriented vs. function-oriented design, The Importance of Modeling, Principles of Modeling, Object oriented modeling. **Introduction to UML:** Overview, conceptual model Architecture, software development life cycle, Rational Unified Process.

MODULE –II (15 Hours)

Basic structural Modeling: Classes, Relationships, Common mechanisms, Diagrams, class diagrams. **Advanced structural Modeling:** Advance classes and relationship, Interfaces, types and Roles Object diagrams, packages.

MODULE –III (17 Hours)

Basic behavioral Modeling: Use cases, use case diagrams, Interaction diagram, Activity diagrams, state chart diagrams, component diagrams, deployment diagrams, patterns and frame works.

A CASE STUDY:

(Ex: - ATM, Trading System, Banking System, Library Information System, Student Information System etc.)

TEXT BOOKS

1. Peerson Grady Booch, Rambaugh, Ivar Jacobson: Unified Modeling language, User Guide, Pearson Education
2. Rajib Mall Introduction to Software Engineering by, PHI.

REFERENCE BOOKS

1. Pankaj Jalote , An Integrated approach to SW Engineering .
2. H. Srimathi, H. Sriram, A. Krishnamurthy, Object Oriented Analysis & Design Using UML, Scitech
3. Craig Larman : Applying UML and Patterns.

ELECTIVE – IV

CS-406	MOBILE COMPUTING
CS-302	COMPUTER ARCHITECTURE
CS-416	BIOINFORMATICS
CS-421	REAL TIME SYSTEM

MODULE-I (10 Hours)

Introduction to Personal Communications Services (PCS): PCS Architecture, mobility management, Networks signaling, Global System for Mobile Communication (GSM) System overview : GSM Architecture, Mobility management, Network signaling. **General Packet Radio Services (GPRS):** GPRS Architecture, GPRS Network Nodes, Mobile Data Communication ; WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP.

MODULE-II (15 Hours)

Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless mark up Languages (WML), **Wireless Local Loop (WLL):** Introduction to WLL Architecture, wireless Local Loop Technologies. Third Generation (3G) **Mobile Services:** Introduction to International Mobile Telecommunications 2000 (IMT 2000) Vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G.

MODULE-III (15 Hours)

Global Mobile Satellite Systems; case studies of the IRIDIUM and GLOBALSTAR systems. **Wireless Enterprise Networks:** Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols. Server-side programming in Java, Pervasive web application architecture, Device independent example application.

TEXT BOOK

1. Burkhardt, Pervasive Computing, Pearson Education
2. J. Schiller, Mobile Communication, Pearson Education
3. Sandeep Singhal, The Wireless Application Protocol, Pearson Education

REFERENCE BOOKS

1. Mark Ciampa, Thomson learning, Guide to Designing and Implementing Wireless LANs, Vikas Publishing House, 2001.
2. Ray Rischpater, Wireless Web Development, Springer Publishing
3. Sandeep Singhal, The Wireless Application Protocol, Pearson Education

MODULE-I (08 Hours)

Input output organization: Accessing I/O devices programmed I/O, interrupt driven I/O, DMA, buses, Interface circuits, standard I/O interfaces (PCI, SCSI, and USB).

MODULE-II (17 Hours)

Architectural classification of parallel processing(Flynn's), **Pipelining:** Basic concepts, instruction and arithmetic pipelining, data hazards, instruction hazard ,influence on instruction sets, data path and control consideration, superscalar operation, performance consideration, pipeline reservation table,

pipeline memory organization, job sequencing and collision prevention, pipeline scheduling.

MODULE-III (15 Hours)

Array processor: SIMD array processor, SIMD interconnection network, **SIMD computers and performance enhancement:** the space of SIMD computers, the ILIAC-IV and BSP systems, the massively parallel processor, performance enhancement methods. **Multiprocessor:** functional structure, interconnection networks, parallel memory organizations, **some example of multiprocessor:** C.MMP, CRAY X-MP.

TEXT BOOKS

1. Kai Hwang, Faye A. Briggs, Computer Architecture and Parallel Processing. McGraw-Hill .
2. V.Carl Hamacher, Zvonko G. Vranesic, Sajwat G. Zaky, Computer Organization and Architecture & Computer Organisation, Mc. Graw Hill Publication.

REFERENCE BOOK

1. David A. Patterson, John L. Hennessy, Computer Organization and Design, Elsevier.

CS-416

BIOINFORMATICS

(3-0-0)

MODULE-I (12 Hours)

Basic Concepts of Molecular Biology: Cellular Architecture, Nucleic Acids (RNA & DNA) Transcription and Translations, Open reading frame, Genetic code, Protein structure and function, Molecular biology tools. Suffix Trees: Definition and examples Ukkonen's linear-time suffix tree algorithm, Applications longest common sub strings of two strings, Recognizing DNA contamination. Pair wise Sequence Alignment (Edit distance, Dynamic Programming Calculation of edit distance, string similarity, gaps).

MODULE-III (14 Hours)

Pair wise sequence alignment local, Multiple String Alignment, Need of MSA, Family & Super Family representation, multiple sequence comparison for structural inferences, Multiple alignments with sum-of- pairs, consensus objective functions. Database searching for similar sequence (FASTA, BLAST), PAM, BLOSUM SUBSTITUTION MATRICES.

MODULE-III (14 Hours)

Sequencing (DNA sequencing, shortest superstring problem, DNA Arrays, sequencing by Hybridization)

Phylogenetic analysis (Evolutionary Trees, Distance and character based true reconstruction, Reconstructing trees from additive matrices, Evolutionary trees and hierarchical clustering –VPGMA Neighbors Joining,) small and large parsivrony problem.

TEXT BOOKS

1. Dan Gusfield, Algorithm on strings, Trees and Sequences: Computer Science & Computational Biology, Cambridge University Press, 1997 (Chapters: 5, 6, 7, 10, 11, 14 & 15 relevant portions)
2. N. C. Jones and P. A PEVZNER- An Introduction to Bioinformatics Algorithms- MIT press, 2009 (chapters 3, 8 7 10 – relevant portions)

3. D. E. Krane & M. L. Raymer- Fundamental concepts of Bioinformatics – Pearson Education, 2003 (Chapter-1)

REFERENCE BOOK

1. D. Baxevanis, B. F. Francis one Ilitte Bioinformatics, Wiley- Interscience

CS-421

REAL TIME SYSTEM

(3-0-0)

MODULE-I (12 Hours)

Introduction: What is real time, Applications of Real-Time systems, A basic model of Real-time system, Characteristics of Real-time system, Safety and Reliability, Types of Real-time tasks, timing constraints, Modeling timing constraints , Real-Time Task Scheduling: Some important concepts, Types of Real-time tasks and their characteristics, Task scheduling, Clock-Driven scheduling, Hybrid schedulers, Event-Driven scheduling, Earliest Deadline First (EDF) scheduling, Rate monotonic algorithm (RMA). Some issues Associated with RMA. Issues in using RMA practical situations. Handling Resource Sharing and dependencies among Real-time Tasks: Resource sharing among real-time tasks.

MODULE-II (15 Hours)

Priority inversion. Priority Inheritance Protocol (PIP), Highest Locker Protocol (HLP). Priority Ceiling Protocol (PCP). Different types of priority inversions under PCP. Important features of PCP. Some issues in using a resource sharing protocol. Handling task dependencies. Scheduling Real-time tasks in multiprocessor and distributed systems: Multiprocessor task allocation, Dynamic allocation of tasks. Fault tolerant scheduling of tasks. Clock in distributed Real-time systems, Centralized clock synchronization, Commercial Real-time operating systems: Time services, Features of a Real-time operating system, Unix as a Real-time operating system, Unix-based Real-time operating systems, Windows as a Real-time operating system, POSIX, A survey of contemporary Real-time operating systems. Benchmarking real-time systems.

MODULE-III (13 Hours)

Real-time Databases: Example applications of Real-time databases. Review of basic database concepts, Real-time databases, Characteristics of temporal data. Concurrency control in real-time databases. Commercial real-time databases. Real-time Communication: Examples of applications requiring real-time communication, Basic concepts, Real-time communication in a LAN. Soft Real-time communication in a LAN. Hard real-time communication in a LAN. Bounded access protocols for LANs. Performance comparison, Real-time communication over packet switched networks. Qos framework, Routing, Resource reservation, Rate control, Qos models.

TEXT BOOK

1. Rajib Mall, Real-time Systems Theory and Practice, Pearson Publication.

7th Semester Sessionals

IT-471 COMPUTER GRAPHICS & MULTIMEDIA LAB (0-0-3)

1. Introduction to program writing in graphics with fundamentals.
2. Drawing of line, circle, and ellipses using graphics functions & filling with color.
3. Drawing of different logo of different organizations.
4. Implementation of line drawing Algorithms
 - Polynomial
 - DDA
 - Bresenham's
5. Implementation of circle drawing Algorithms
 - Polynomial
 - Trigonometric
 - Mid-point
5. Demonstration different 2-D geometric transformations
6. Implementation of Sutherland - Hodgeman polygon clipping Algorithms
7. Implementation of Cohen-Sutherland line clipping Algorithms
8. Drawing of different Splines – Hermites, Bezier, Spline.
9. Introduction to Multimedia software

IT-473 INTERNET & WEB TECHNOLOGY LAB (0-0-3)

1. Page formatting using HTML (Using simple text formatting tags)
2. Web page designing using HTML (Using tags, Table, Image, Clickable map)
3. Web page designing using DHTML and CSS.
4. Client side scripting through Java script (Simple script)
5. Java script object model
6. Java Script (Working with properties and methods)
7. Java Script (Event Handling)
8. Java Script (Form Validation)
9. VBScript (Objects and functions)
10. Server side Programming(Usage of Servlet)
11. Server side Programming (Usage of JSP)
12. Database Programming (Servlet-JDBC)
13. Database Programming(JSP-JDBC)
14. XML Programming
15. Distributed computing using RMI
16. Simple EJB Programs (Session Bean and Entity Bean)