

MCA - 501 MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

MCA Syllabus : www.manit.ac.in Maulana Azad National Institute of Technology

UNIT - I

Propositional and predicate calculus: Logic Propositions and logical operations truth tables and proposition generated by a set equivalence and implication. The laws of first order predicate logic, mathematical systems. Fuzzy sets, operations on fuzzy sets, Fuzzy Relations, properties and operations on fuzzy relations.

UNIT - II

Relations : Definitions, graphs of relations, properties of relations, matrices of relations, equivalence relations, Posets, Lattices , Complemented Lattices, Sub lattices. Distributive and Modular lattices. Boolean Algebra.

UNIT - III

Graph Theory: Notions & terminology, directed and undirected graphs, incidence and degrees, Sub-graphs, Walks paths, cycles, circuits, components, connectedness algorithms, shorter path algorithm. Euclidian and Hamiltonian graphs, The traveling Salesman Problem, Trees: Spanning trees, rooted trees and binary trees.

UNIT - IV

Discrete numeric functions, Generating functions, Recursion and recurrence relation, many faces of recursion, sequences solving a recurrence relation including non-homogeneous finite order linear relations.

UNIT - V

Coding Theory, Binary symmetric channel, Coding Process, decoding, error detection and correction codes. Vector Spaces : Linear Independence, bases, Subspaces, dimensionality, Linear mapping, linear in-equality, inner products, norms.

TEXT BOOK

Applied Discrete Structures for Computer Science by A Doerr and K Levasser.

Text & Reference Books

- 1) Discrete Mathematical Structures for Computer Science by B Kolman & R.C. Busby.
- 2) Discrete Mathematical Structures with Application to Computer Science by J.P. Trembley & R.P.Manohar.
- 3) Graph Theory by F.Harary.
- 4) Elements of Discrete Mathematics by C.Liu.
- 5) Graph Theory with Application to Computer Science by N.Deo.

MCA - 502 COMPUTER ORGANISATION & ARCHITECTURE

UNIT - I

Digital computers, Logic gates, Boolean Algebra, Map simplification, Combination circuits, Gates flip-flops, Sequential circuits, Integrated circuits, Decoders, Multiplexes, Registers, Shift registers, Binary circuits, Memory.

UNIT - II

Timing and Control unit, Arithmetic's Micro-operation, Introduction to cycle, Introduction to Central Processing unit, General Register Organization, Stack Organization, Instruction Formats, Addressing Models, Data Transfer and Manipulation, Program control, Reduced Instruction set computer.

UNIT - III

Input-output Organization: Peripheral Devices, Input-output Interface, Asynchronous Data Transfer, Mode of Transfer, Priority Interrupt, Direct Memory Access, Input-output Processor, Serial Communication, Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware.

UNIT - IV

Theory of Parallelism : Evolution of Computer architecture, multiprocessor and multicomputers, multi vector and SIMD Comp, PRAM models, conditions of parallelism, Program partitioning and scheduling.

UNIT - V

Program Flow mechanism, System interconnect architecture, performance metrics and measures (efficiency, utilization and quality), standard performance measures, basics of linear pipeline processor, nonlinear pipe line processor, instruction pipeline design.

Text & Reference Books

- 1) Computer System Architecture by M.Mano
- 2) Advanced Computer Architecture by Kai Hwang, McGraw Hill International

MCA - 503 DATA STRUCTURE

UNIT - I

Introduction to data structure, Primitive data structure, Static and Dynamic storage, Sub-algorithm function, procedure, parameters, parameter passing call by value, call by ref. Introduction to Algorithm analysis for time and space requirement, Rate of growth and Order of notation Basic time and space analysis of an algorithm, String Manipulation and Pattern matching Markov Algorithm Primitive and composite function, string manipulation Application - Text handling only, Abstract Data Types.

UNIT - II

Non-linear data structures - Concept and Technology of Storage structure of arrays row major column major Stacks Definition, concepts, operation and application of Stacks, Recursion and Polish notations. Queue, Priority Queue definition concepts operation and application of Queue, Dqueue.

UNIT - III

Linear data structures - Pointers and linked allocation concepts and operations on singly linked list, circular linked list, doubly linked lists Associative list Application of linked linear list, Polynomial Manipulation, Multiple precision arithmetic.

UNIT - IV

Trees - Definition and concepts storage representation and Manipulation of Binary tree conversion of general tree to Binary trees, Threaded Binary tree, Multi-linked structure, sparse matrices, Height balance tree, Multi weight tree, B-tree, B+ tree, graph and their representation Matrix representation of graph Breadth first and depth first search, shortest path algorithm.

UNIT - V

Internal Sorting External sorting - Selection sort, Bubble sort Merge sort quick sort, radix sort, Tape sorting; Shell sort, Poly phase and Oscillating sorting, (taking best case/worst case examples) sorting on Disk, Searching-Sequential search, Binary search, Search trees, Hash table methods.

Text & Reference Books

- 1) Data Structure - Tremble & Sorenson
- 2) Data Structure in 'C' Language : by Tanenbaum
- 3) Data Structure by Bhagat Singh
- 4) Data Structure by Horowitz & Sohani

HUM - 504 Businesses Organization & Financial Management

UNIT-I

Management-evolution, development and modern philosophy, management in India, Scientific Management, Rationalization, Quality Circle Movement, Principles of Management, Nature and Function of Management, Management by Objectives (MBO) and Management by Exception (MBE)-importance, characteristics, applications.

UNIT-II

Organization of industries, nature scope and formation of business organization, various legal forms of Business, Sole Proprietorship, Partnership, Joint Stock Companies, Co-operatives, Labor Co- partnership and Profit sharing, Govt. Ownership, The Joint stock companies, Private Limited, Public Limited, etc..., there characteristics, merits and demerits.

UNIT-III

Objectives and methods of Financial Management, Functions of Financial Management, Source of Finance, Permanent, Long Term, Medium Term, Short Term Sources, The Interest Rates, Simple Interest, Compound Interest, The Cost of Capital, Equity Capital, The Cost of Equity Capital, Retained Earnings, Debt Capital, Gearing, Capital Gearing, Capital Structure Decisions, Tax Planning, Limits of Borrowings, Zero Debt Companies.

UNIT-IV

Financial Statements, Types of Statements, Uses of Financial Statement, Analysis of Financial Statement, Window Dressing, Ratios, Financial Ratios Analysis, Analysis of Balance Sheet, Profit & Loss Account, Fund Flow Analysis, Cash Flow Analysis, Financial Planning.

UNIT-V

Capital Budgeting, Significance, Policies, Capital Investment Appraisal, Risk Evaluation and Sensitivity Analysis, Capital Rationing, Project Finance, Structuring, Risk and Reward, Infrastructure Mechanism, Mega Projects, BOLT, BOT, BOOT, BOO, Revival, Restructuring, Diversifications and Expansion, Sick Industries, SWOT Analysis of a company, Acquisition, Take-Over and Merger, Finance for Take-over, Merger, Valuation.

Text & Reference Books

- 1) Modern Business M. C. Shukla.
- 2) Elements of Management H. Koontz
- 3) Fundamentals of Financial Management James c. Van Horne et al
- 4) Financial Management S. K. Banerjee

MCA - 505 PROGRAMMING FUNDAMENTALS & 'C'

UNIT - I

Programming concepts, C structure, constants, variables and data types different types of operators/expressions. Managing input and output, formatted input and output. Decision making in C, branching looping, if structures, switch, do-while, for and ? : operator, Arrays: one, two and multidimensional arrays.

UNIT - II

Character strings, arithmetic operations on characters, compression of strings, string functions, User defined functions in C, Calling of a function, nesting, and function with arrays, argument passing,, array passing, recursion. Structures, arrays of structures, arrays within structures, structure with in structures. Real life application problem.

UNIT - III

Unions, pointers - definition, initialising pointers, pointer expression, pointers as arrays, pointers and character string, pointers and functions, structures, pointers and Data structure. Dynamic memory allocations and linked list, types of linked lists and applications,

UNIT - IV

Files in C, types of files opening and closing of files, I/O operations, random access to files, macros substitutions, Using and constructing header file, calling functions written in other languages, mathematical functions, functions for date, time. File processes- searching, updating etc.

UNIT - V

Graphics Programming: pixel, identifying pixel position, resolution, video memory, manipulating colors, plotting a graph, cursor, cursor controlling, controlling the screen, mouse programming. Interrupt programming: Accessing ports using DOS, BIOS interrupts, TSR and device drivers, Communication across process: signals, pipes, message queues, semaphores, shared memories.

Text & Reference Books

- 1) Programming in ANSI C by E Balaguru Swamy (TMM)
- 2) The spirit of C by M. Cooper
- 3) Programming in C by Kelly and I.Pohl (Add.Wesley)
- 4) Programming with C by B.S. Gottfried (McGraw Hill)

MCA 541 COMPUTER ORGANIZATION AND ARCHITECTURE

Viva-Voce shall be conducted on Computer Organization and Architecture.

MCA 542 DATA STRUCTURE

Viva-Voce shall be conducted on Data Structure. Assignment shall contain implementation of different types of Data Structures in C such as Stack, queue, link list, Tree and different sorting techniques.

MCA 543 PROGRAMMING LAB IN C

Assignment on C on Arrays, Functions, Structures, Pointers, Files and Graphics shall be covered.

Some sample programs

- 1) Using pointers write a function that receives a character string and a character as argument and delete all occurrences of this character in the string. The function should return the corrected string with no holes.
- 2) Given are 2-D arrays A and B which are sorted in ascending order. Write a program to merge them into a single sorted array C that contains every item from arrays A and B, in ascending order.
- 3) Write a program that dynamically allocates an array large enough to hold any number of test scores the user wishes to enter. Once all the scores are entered, the array should be passed to a function that sorts them in ascending order. Another function should then be called that calculates the average score. The program should display the sorted list of scores and average with appropriate headings. Drop the lowest score, the score should not be included in the calculation of the average.
- 3) Write a program to create circular link list so that the input order of data item is maintained. Add function to carry out the following operations on circular linked list.
Count the number of nodes
Write out contents
Locate and write the content of a given node
- 4) Write a program to draw a rectangle and two circles where one circle is inside the rectangle and other is cutting its edges from two opposite sides.
- 5) Write a program to generate following pyramid of numbers.

```
      0
    1 0 1
  2 1 0 1 2
3 2 1 0 1 2 3
4 3 2 1 0 1 2 3 4
5 4 3 2 1 0 1 2 3 4 5
6 5 4 3 2 1 0 1 2 3 4 5 6
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MCA - 551 SOFTWARE ENGINEERING - I

UNIT - I

Software characteristics, components, software myths, Layered Technology – Process, Methods, Tools, S/W process models, prototyping, RAD, evolutionary models, formal methods models, management spectrum. Software Process and Project metrics – metrics and indicators, software management, metric for quality.

UNIT - II

Software Project Planning – objectives, scope, resources, project estimation, decomposition techniques, empirical estimation models, make buy decision. Risk Management – S/W risks, risk identification, risk projection, monitoring and management.

UNIT – III

Project Scheduling and Tracking – Basic concepts, task set for s/w project, selecting tasks, refinement, scheduling, project plan. Quality assurance – meaning, movement, reviews, measures of reliability, SQA plan.

UNIT – IV

System engineering: Hierarchy, strategy planning, area analysis, product engineering, three feasibilities. Analysis Concepts – requirement analysis, principles, prototyping, specification, review.

UNIT – V

Analysis Modeling – elements of analysis model, data modeling, functional modeling, behavioral modeling, data dictionary.

Text & Reference Books

- 1) Software Engineering by Pressman – TMH
- 2) Software Engineering by
- 3) System Analysis & design Methods by Whiten and Barlow.
- 4) Analysis and design methods by J. Senn

MCA - 552 OPERATING SYSTEM

UNIT – I

Overview of the Operating Systems: Services of O/s, Classification, File management: File concepts, file types, tape based system, disk based system, blocking, file operations: creating, writing, reading, deleting, file access methods, file allocation methods: contiguous, Dynamic, linked and indexed allocation, performance of allocation methods under various size of files, Directory systems: Single level, two level tree structured, A cyclic graph, general graph, file protection mechanism layered file system, Processor Management: Process view, structure, process state, process control block, multiprogramming, levels of schedulers and scheduling algorithms, evaluation of various scheduling algorithm, multiple processor scheduling, process synchronization, synchronization mechanism, virtual processors, interrupt mechanism, future trends in processor trends in processor management.

UNIT – II

Memory Management: Memory management schemes; single contiguous, partitioned, relocation, partitioned, paged, segmented. Paged segmentation and segmented paging. Virtual memory: concepts, demand paging, performance, page fault page replacement algorithms, thrashing. Future trends in memory management: Large main memories, storage hierarchies, Hardware support of memory management, Deadlocks:- Definition, characterization, necessary condition, resource allocation graph, methods for handling deadlocks: deadlock prevention, deadlock avoidance; deadlock detection and recovery.

UNIT – III

Concurrent Processor and Programming: Precedence graphs, concurrency to the fork and join constructs, the concurrent statement, critical section and mutual exclusion problems; Two pass and N-pass software solutions, h/w solutions, semaphore solution, classical process co-ordination problems, interprocess communication. Modularization: Processes, Procedures, abstract data types, synchronization: Critical regions, conditional critical regions, monitors, concurrent languages.

UNIT – IV

Distributed Systems: Topologies, types, Design strategies, NOS, DOS, remote services Design issues. Distributed File Systems: Naming & Transparency, Remote file Access, Stateful & Stateless service, file replication. Distributed Coordination: Event ordering, Mutual exclusion, concurrency control, Deadlock Handling, Election procedure, Reaching Agreement.

UNIT – V

Protection & Security: Domain of protection, Access Matrix, Revocation of access rights, capability based systems, Language based protection; Security: Authentication, One Time passwords, program threats, Threat monitoring, Encryption, Computer security classifications, Case Studies; Unix, Linux, Windows NT

Text Book

Operating System concepts by James L. Patterson

Reference Books:

- 1) Internal structure of window 95 - By N.Zipps. PHI.
- 2) Novel Netware - David James Clarke, Comdex publication.
- 3) Operating System - By James L. Patterson.
- 4) An introduction to operating system - H.M.Deital.
- 5) Operating System Principles & design - By Tanenbaum A.S.

MCA - 553 COMPUTER BASED NUMERICAL METHODS

UNIT - I

Newton forward and backward formulae, Everett and Bessel Interpolation formulae, Lagrange's, Hermite and spline interpolation. Implementation of these method in C.

UNIT - II

Integration: Weddle, Gauss-Legendre, Monte Carlo methods of integration, Differential Equations: Modified Euler, Runge-Kutta methods, Predictor-Corrector methods- Milne Adams-Bashforth methods, Accuracy of Runge-Kutta and Milen's methods. Solution of second order differential equations. Solution of simultaneous differential equations.

UNIT - III

Solution of algebraic and transcendental equation: Newton-Raphsan method, Newton's method for multiple roots, Lin-Barstow's and Graffe's method for complex roots, Solution of Non-linear equations.

UNIT - IV

Simultaneous Equations : Gauss elimination and Pivotif, Gauss-Siedel and Gauss-Jacobi iteration techniques. Inversion of Matrix by Cholesky's method. Non-linear Equations: Solving simple non-linear equations. Programs of simultaneous and non-linear equations.

UNIT - V

System Models : Concept, environment, continuous and discrete simulation, Model Type- static, dynamic and probabilistic models. Growth and Decay model examples. Principles of Mathematical modeling.

* Mathematical Methods are to be implemented in C.

Text & Reference Books

1. B.S. Grewal : Numerical Algorithms, Khanna Publications.
2. Krishnamutthy & Sen : Numerical Algorithms EWP.
3. M.K. Jain & Iyengar: Numerical Methods for Scientists & Engineers
4. Gordan – Simulation and Modeling PHI.

MCA – 554 OBJECT ORIENTED METHODOLOGY AND C++

UNIT – I

What are OOA and OOD ? Three models – Object, Dynamic and Functional. Object modeling – objects and classes, links, associations, generalization and inheritance, grouping concepts, aggregation, abstract classes, multiple inheritance, metadata, candidate keys.

UNIT – II

Dynamic modeling – Events and states, operations, nested state diagrams, concurrency. Functional modeling – functional models, example of functional model, relation of functional to object and dynamic models, OMT methodology.

UNIT – III

Classes and objects, constructors and destructors, passing objects as function arguments, returning objects, array of objects, object pointer, new and delete operators, inline function, implementation of data structures like stack, queue and linked – list.

UNIT – IV

Function overloading, copy constructor, default arguments, Operator overloading, friend function Inheritance, multiple inheritance, virtual base classes.

UNIT – V

Virtual functions, pure virtual functions, polymorphism, Formatted I/O with manipulators, formatting with ios class, streams and files, writing and reading objects on a file, random access of files, updating file, introduction to templates, function and class templates.

Text & Reference Books

1. J.Rumbaugh, M.Blaha et.al - Object - Oriented modeling and design - PHI.
2. G.Booch - Oware - Object – Oriented design – Benjamin/Cummings.
3. M.Kumar – Programming with C++ made simple - TMH.
4. H.Schildt – Teach yourself C++ - TMH

MCA-555 THEORY OF COMPUTATION

UNIT – I

Strings Alphabets and language, Finite state systems, Deterministic finite automata with ϵ moves, Two way finite automata, finite automata with output, Mealy & Moore machines

UNIT – II

Conversion of NFA to DFA. Removal of ϵ transition from ϵ – NFA. Pumping lemma for regular set, Closure properties of regular set, Decision algorithm for Regular set, Myhill Ners de theorem and initialization of finite automata Regular Expression and Language.

UNIT – III

Properties of Regular languages, Context free grammar, Chomsky Normal form, Greibach Normal form, Pumping lemma for CFL, Application for CFL of Pumping lemma. Closure properties of CFL, CYK algorithm, YACC, Introduction to LR grammar.

UNIT – IV

Pushdown automata: Informal description Definition Equivalence of PDA's and CFL's Prop Turning machine construction. Modification of turning machine.

UNIT – V

Undecidability Universal turning machine and an undecidable problem Rice theorem Greibach theorem. Recursion finite theory. Chomsky hierarchy, Unrestricted Grammar. Context sensitive Language Computational Complexity theory, Intractable problem.

Text & Reference Books

1. Introduction to Automata Theory Language and Computation, By John E. Hopcraft & Jeffary D. Ullman
2. Introduction to Automata Theory Language and Computation, By John E. Hopcraft Jeffary D. Ullman & Rajeev Motwani.
3. Theory of Computer Science K.L.P. Mishra, N. ChandraShekaran

HUM - 556 ORAL AND WRITTEN COMMUNICATIONS

UNIT - I

Communication - A Vital necessity for good management, Communication Process, Barriers to Communication Viz. organizational, individual and interpersonal, dealing with these barriers, effective communication & Modern Techniques of spoken and written communication .

UNIT - II

Oral Communication Skills - Verbal and non verbal communication, executive speaking and listening skills, presentation skills, Body language, Voice modulation, Negotiating skills, Development of positive personal attitudes, personal SWOT analysis and development of career plan. Identifying the job, selection process, written test-structural, situational and psychological analysis, principles of interviewing-reducing stress, retaining control, setting objectives for the Interview, planning and preparation - the challenge of face to face skills.

UNIT - III

Written communication skills - Writing Techniques and guidelines - letter writing - basic principle purpose, Types of Business correspondence.

UNIT - IV

Report Writing : Types of Reports - Structure of Reports - Drafting Reports - Preparation, analysis and interpretation of Reports.

UNIT - V

Developing other skill : Inter personal and human skills, Meeting skills, Reading skills, Time management skills - avoiding time wasters and identification of prime time, choosing an appropriate leadership style, development of an ideal mix of skills.

Text & Reference Books

- 1) Effective Business Communication - Murphy, Allied Publishers.
- 2) The essence of effective communication - Ron Ludlow and fergus Pantan, PHI.
- 3) Business correspondence & Report Writing - R.C.Sharma & Krishna Mohan-Tata McGraw Hill.

MCA 591 OPERATING SYSTEM

Viva-Voce shall be conducted on Operating System. Assignment related to Operating System shall be given. Case Study of different Operating Systems shall be studied.

MCA 592 PROGRAMMING LAB IN C++

Assignment on C++ based on Class, Objects, Operator Overloading, Polymorphism, Function Overloading, Pointers, Files shall be covered.

Some sample programs

- 1) Create class Distance having private data feet(type integer), inches(type float) and function getdist() and showdist() . Overload + operator to add two distance values and > operator to compare them.
- 2) Create a class called employee containing protected data name(20 characters), employee number(long integer).Also write its constructor and destructor functions. Create two derived classes called hourly _employee containing private data rate and hours and salary_ employee containing basic salary and allowances as data members. The class employee is inherited as public by these derived classes. Write appropriate functions in each classes to calculate total salary of each employee and to display name, number and total salary.
- 3) Create a class dimension containing three float type data and a constructor to accept values, also declare a pure virtual function area() in it. Now create three derived classes rectangle, square and triangle, each inheriting dimension as public. Define corresponding constructors and redefine virtual function area() in each to give area of respective figure. A main() program should create suitable objects to implement this inheritance.
- 4) Write a program using class pointer to read 20 strings each containing maximum 15 characters. Write a member function that arranges these in alphabetical order and print the alphabetical arranged list.
- 5) Write a program to demonstrate working of a stack using constructor and destructor function.

MCA – 601 ALGORITHM ANALYSES AND DESIGN

UNIT – I

Introduction: Analyzing algorithm, growth of functions, asymptotic notation, standard notation and common functions. Divide and Conquer approach: Performance analysis of binary search, quick sort, merge sort, heap sort.

UNIT – II

Recurrences: Substitution method, iteration method, master method, proof of master theorem. Red-Black Trees: Properties of red-black trees, Rotations, insertion, deletion. Augmenting Data Structures: Dynamic order statistics, How to augment a data structure.

UNIT – III

Dynamic Programming: Elements of Dynamic Programming, Matrix –chain multiplication, optimal binary search tree. Greedy Algorithm: Elements of the greedy strategy, Huffman codes, A task scheduling problem Amortized Analysis: Aggregate method, accounting method, potential method.

UNIT – IV

Introduction: Graph and Minimum Spanning Trees, Kruskal's and prim's algorithm. Single-Source Shortest Paths: The Bellman-Ford algorithm, Single-Source Shortest Paths in directed acyclic graphs, Dijkstra's algorithm. All-Pairs Shortest Paths: Shortest paths and matrix representation, The Floyd-Warshall algorithm. Maximum Flow : Flow networks, The Ford-Fulkerson method, Max-flow- min-cut theorem. Push –relabel algorithm.

UNIT – V

Sorting Networks: A bitonic sorting network, merging network, sorting network. Matrix Operations: Properties of matrices, Strassen's algorithm for matrix multiplication. Linear Programming: Standard and slack forms, Formulating problems as linear programs, The Simplex algorithm. Introduction to NP-Completeness. Number-Theoretic algorithms: The Chinese remainder theorem, The RSA public-key cryptosystem.

Text & Reference Books

- 1) Fundamentals of Computer Algorithms Ellis Horowitz, Sartaj sehani galgotia publications.
- 2) Introduction to Algorithms Cormen, Leiserson, Rivets, PHI.

EEG - 602 MICROPROCESSOR & ASSEMBLY LANGUAGE

UNIT I

MICROPROCESSOR ARCHITECTURE

Evolution and overview of Microprocessor, micro computer organization, Microprocessor architecture - introduction to 8085 and pin diagram of 8085, ALU timing and control unit, registers, data and address bus, timing and control signals, fetch and execute operations, instruction and data flow, system timing diagram, minimum system configuration for 8085.

UNIT II

ASSEMBLY LANGUAGE PROGRAMMING

Instruction type classification of instructions addressing modes, instruction format, assembler directives, over view of instruction set, writing assembly language programs with and without subroutines, concepts of stack, interrupts, interrupt service subroutine.

UNIT III

MEMORIES AND PERIPHERALS

Memory types, memory organization, static RAM interfacing memory, use of RAMs and EPROMs, RAM-6116, 6164, EPROM-2716, 2732, 2764, programmable peripherals interface (8255). Programmable interval timer 8253. Basic concepts in serial I/o and data transfer schemes and their classification.

UNIT IV

INTERFACING

Types of A/D & D/A converters, Interfacing & programming of ADC-0808/0809 and DAC-0800. Multiplexers and demultiplexer, 8085 based data acquisition system, stepper motor control, DC motor control, temperature control, traffic control.

UNIT V

ADVANCE MICROPROCESSORS

Advanced processor 8086 microprocessor family, 8086 internal architecture, instruction set. Introduction to programming of 8086, 8086 interrupts, multiuser, multitasking, Introduction to 80286, 80386, 80486, microprocessor family. Comparison of microprocessors

Text & Reference Books

- 1) Fundamentals of Microprocessors and Microcomputers by B.Ram
- 2) Microprocessors and programmed logic by Kenneth B.Short
- 3) Introduction to Microcomputer by Albert Paul Malvino
- 4) Microprocessors Architecture Programming and Applications- Ramesh S.Gaonkar.
- 5) Assembly language programming by Lance P. Levanthal
- 6) Microprocessors and Interfacing Programming and Hardware - Douglas V.Hall

UNIT - I

Use of computer networks; Type of networks; Network software: protocol hierarchies. Design; issues for the layers, interface and services, types of services, services primitives; Reference models: The OSI reference model, TCP/IP reference model, Example networks: The Internet, Novel Netware, Window NT.

UNIT – II

Physical layer: Transmission media: magnetic media, Twisted pair, Base band / broadband coaxial cable, fiber optics; Analog, digital, wireless transmission; Transmission and switching; ISDN system architecture, Satellite versus fiber; Terminal handling. The Data link layer Design issues: services provided, framing, Error control, flow control; Error detection and correction; Error correcting codes, Error detecting codes; Elementary data link protocols: Unrestricted simplex, simplex stop and wait, simplex protocol for noisy channels; sliding window protocols: one bit, go back n, selective repeat; DLL in the Internet.

UNIT – III

Medium access sub layer: Static/dynamic channel allocation in LANs and MANs; multiple access protocols: ALOHA, carrier sense, collision free, limited contention, wireless LAN; IEEE standard 802 for LANs and MANs: Ethernet; token bus, token ring, comparison of 802.3, 802.4, 802.5; Bridges: bridges from 802.x and 802.y, Transparent bridges, High speed LANs.

UNIT – IV

Network Layer: Design issues, Internet organization of network layer; Routing algorithms: optimality principle, shortest path, flooding, Flow - based, hierarchical, multicast, broadcast; congestion control algorithms: General principle, prevention, Traffic shaping, choke packets, load shading etc.; Internetworking: How network differ, connectionless internetworking, Tunneling, internetworking, fragmentation, firewalls; Network layer in the Internet: IP protocol, IP address, subnets, OSPF, BGP, FTP, telnet, email. etc.

UNIT – V

Network Programming: Basically Sockets : Overview, Unix Domain Protocols, Overview, Unix Domain Protocols, socket-address, socket-system calls, reserved ports, passing file descriptions, I/O asynchronous & multiplexing, socket implementations.

Text & Reference Books

- 1) Computer Networks by Leon & Garcia
- 2) Local Area Networks by Keiser Windows Network Programming by R. Davis, Add Wesley
- 3) Unix Network Programming by S. Davis, PHI
- 4) Computer Networks by A.S. Tanenbaum

MCA – 604 STATISTICAL COMPUTING

UNIT – I

Probability Theory- Sample spaces, events and probability, some rules of probability, conditional probability, independent events and baye's theorem. Non-linear regression, multiple correlation and regression.

UNIT – II

Random Numbers: Algorithms for generation of random numbers, discrete random variables, acceptance and rejection techniques. Random Variables and Distributions-Random variables, continuous random variables, probability density functions.

UNIT-III

The discrete uniform distributions, Binomial, Poisson, Hyper geometric distributions. Continuous probability distributions, uniform, exponential and Normal distributions.

UNIT-IV

Hypothesis Testing-Testing of statistical hypothesis, Null hypothesis, tests of hypothesis and significance, one failed proportions, Chi-square, t, z and F tests, Losses and risks.

UNIT-V

Analysis of Variance- One way and two-way analysis Programming - Students must be encouraged to develop programs in C for correlation and regression, standard deviation, testing of hypothesis etc. Using standard package like SPSS.

Text Book

Mathematical Statistics by J.E. Freund and R.E. Walpole

Reference Books:

- 1) Probability and Statistics with reliability queuing and Computer Science Applications by K.S. Trivedi.
- 2) Introduction to Mathematical Statistics by F. Kreyzic
- 3) Statistical Analysis: Computer Oriented Approach by A.A. Affi
- 4) Statistics- Schaum's Series - By M.R. Spiegel

MCA - 605 DATA BASE MANAGEMENT SYSTEM

UNIT-I

Introduction to database: Data Abstraction, Data Models, Basic concepts of database: Data Independence DML, DCL, DDL and structure of Data Base Management System. Entity relationship diagram : Basic and Advance concepts Application of ER diagram in designing database system. Relational Algebra, Tuple Relational Calculus

UNIT-II

SQL, QUEL, Domain relational calculus, Integrity, Referential, Domain constraints, functional dependency, Assertions, Triggers, Query processing and Query optimization and Embedded and Dynamic SQL

UNIT-III

Database design issues, Normalization 1NF, 2NF, 3NF, 4NF, BCNF and 5NF, live database design problem. Security and Integrity: Use of SQL for specifying Security and integrity. Authorization, view, Encryption. Storage structure indexing and hashing. Different type of file organization.

UNIT-IV

Transaction & concurrency control, Schedules, testing, serializability, Lock based Protocol, Time stamp protocol, validation technique, Multiple granularity, Multi-version scheme Insert and delete operation, Crash recovery, Log based recovery, buffer management checkpoints, shadow paging. Object oriented databases

UNIT-V

Distributed database structure, Design transparency and Autonomy, Distributed Query processing Recovery, commit protocol Deadlock handling, Multidatabase system, Parallel database concept and related issues, Web interface to database, Database System Architecture.

TEXT BOOK:

Database System Concept By Henry F. Korth Abraham Silber Schatz

REFERENCE BOOK:

- 1) Database System Concept By C.J. Date.
- 2) Database System By Aho. Ullman.
- 3) Database Systems By Rob, Coronel.

EEG 641 MICROPROCESSOR AND ASSEMBLY LANGUAGE

LIST OF EXPERIMENTS

- 1) STUDY & FAMILIARIZATION OF MICROPROCESSOR 8085 KIT (VMC-8503).
- 2) WRITE A PROGRAM FOR ADDITION AND SUBTRACTION OF TWO 8 BIT HEXADECIMAL NUMBERS.
- 3) WRITE A PROGRAM FOR ADDITION OF TWO 16 BIT HEXADECIMAL NUMBERS.
- 4) WRITE A PROGRAM FOR MULTIPLICATION OF TWO 16 BIT HEXADECIMAL NUMBERS USING REGISTER SHIFTING METHOD.
- 5) WRITE A PROGRAM FOR DIVISION OF TWO 16 BIT HEXADECIMAL NUMBERS USING REGISTER SHIFTING METHOD.
- 6) TO STUDY AND TO GENERATE SQUARE WAVE USING 8255 PPI PROGRAMMABLE PERIPHERAL INTERFACE.
- 7) TO STUDY AND TO GENERATE SQUARE WAVE USING 8253 PPI PROGRAMMABLE PERIPHERAL INTERFACE.
- 8) STUDY & FAMILIARIZATION OF MICROPROCESSOR 8086 INSTRUCTION SET.

BEGINNERS PRACTICE PROBLEMS

- 1) Write a program to add the contents of the registers c and d & save the result in register b.
- 2) Write a program to add the contents of 2040h memory location to the contents of register c & store the result in 2050h memory location.
- 3) Write a program to subtract 07h from 0dh & save the result in register c.
- 4) Write a program for adding the contents of specified memory location and subtracting the contents of another specified memory location from the sum; then save the result to a specified register and also display at a specified output port.
- 5) Write a program for loading two numbers 8c and 9a in register b and c respectively and add them if carry is generator display the carry at port 02 and if no carry display sum itself at port 02.

MCA 642 COMPUTER NETWORK & N/W PROGRAMMING

Viva-Voce shall be conducted on Computer Network & N/w programming. Assignment related to Computer Network shall be given. Case Study of different Operating Systems having Network Features shall be studied. Assignment shall include Network Programming

MCA 643 PROGRAMMING LAB IN RDBMS & FRONT END TOOLS

Student is required to develop a small real life database oriented project .

MCA - 651 COMPUTER ORIENTED OPTIMISATION MODELS

UNIT – I

Linear Programming, Mathematical Model, Assumptions of Linear Programming, simplex Method, Degeneracy, Applications, Duality, Dual Simplex Method, & Algorithm Assignment Problem. Hungarian Method & its Algorithm.

UNIT – II

Transportation Problem, Integer Programming :- Gomorra's method, Branch and Bound techniques. Integer Programming Algorithm.

Dynamic Programming:- Bellman's Principle of optimality, Dynamic Programming Approach, optimal subdivision problem, Decomposition, Applications in linear programming. DPP Algorithms.

UNIT – III

Queuing Theory : Queuing problem and system, Transient and steady state distributions in queuing system, Poisson process, Exponential process, classification of queuing models, Model I (M/M/1) : (∞ /FCFS), Model -II General Erlang Queuing model, Model - III (M/M/1) : (N/FCFS), Model - IV (M/M/S) : (∞ /FCFS). Algorithms.

UNIT – IV

Inventory Theory :- Basic concepts, classification of Inventory systems & models, Economic order quantity, Deterministic Inventory models :- EoQ Models without shortages, EoQ Models with shortages, Probabilistic Inventory Models with instantaneous demand, no set up cost model, Discrete and continuous cases.

UNIT – V

Games Theory : solution of games with saddle points, Minimax-Maxmin principle for Mixed strategy games, Dominance, to reduce size of game, Graphical method, solution of (mxn) game by simplex method & Algorithms.

Job sequencing : Processing n jobs through 2 machines, Processing n jobs through 3 machines & Algorithms.

PERT – CPM: introduction, applications, network diagram representation, Determination of the critical path, updating.

Computer Programming in Lab. :

Practical & Viva : To write computer programs of various optimization techniques in any programming language learnt in MCA course.

TEXT BOOKS :

- 1) S.D. Sharma Operations Research, Kedarnath Ramnath & Co. Meerut
- 2) P.K.Gupta & D.S.Hira Operations Research, S.Chand & Co.
- 3) Kantiswaroop Operations Research, S.Chand & Sons.
- 4) Gillet, B.E. Introduction to operations Research - A Computer Algorithm Approach, McGraw Hill.
- 5) Introduction to operations Research, 7/e by Hillier. TMH.

MCA - 652 SOFTWARE ENGINEERING - II

UNIT- I

Design Concepts and Principles- Software design and engineering, design process, principles, concepts. Effective modular design.

Design Methods- Data design, architectural design & process, transform mapping. Design steps, transaction mapping, interface design and guide lines.

UNIT- II

Software Testing Methods- Fundamentals, Test case design, white box testing, basic path testing, control testing, black-box testing. Testing strategies-strategic approach, criteria for completion testing, unit testing, validation testing, system testing.

UNIT-III

Software quality- McCall's quality factor, FURPS, Framework for software matrices.

Object-Oriented software engineering- Management of Object-oriented software projects. Object-oriented analysis, domain analysis, object-oriented design- issues, landscape, system design process, task data and resource management.

UNIT-IV

Object-oriented testing- Testing OOA and OOD models, unit and integration testing. Software Reuse-management issues, reuse process, domain engineering building reusable components, economics of reuse.

UNIT-V

Business process reengineering, s/w reengineering, reverse engineering forward engineering.

Client/Server Software Engineering- Structure of Client/Server systems, s/w engineering for c/s systems, Analysis & design issues. Introduction to Case, building blocks and taxonomy.

Text & Reference Books

- 1) R. Pressman- Software Engineering- A Practitioner's Approach Mc GrawHill Intern.
- 2) Soumerville- Software Engineering, PHI
- 3) P. Jalote- Software Engineering, Narosa.
- 4) A Leon & M Leon- Fundamentals of s/w engineering, Vikas.

MCA - 653 COMPILER DESIGN

UNIT – I

Introduction to Compiling: Compiling & Translator analysis of source Program, Phases of Compiler, introduction to preprocessor, assembles, loader and linkers, book-keeping, error-handling, bootstrapping,

One Pass Compiler Syntax definition, Syntax-directed translation, parsing, translator for simple expressions, lexical analysis, incorporating a symbol, table, abstract stack machines, Putting the techniques together.

UNIT – II

Lexical analysis Role of the lexical analyzer, input buffering, specification of tokens, recognitions of tokens, language for specifying lexical analyzers, designing a lexical analyzer generator, Syntax Analysis Role of Parser, Context free grammar, writing a grammar, top-down and bottom up parsing, operator precedence parsing, LR-Parsers, parser generator.

UNIT – III

Syntax Directed Translation Syntax directed definition, construction of syntax tree bottom up and for down translations, recursive evaluator, type systems specification of simple type checker, Symbol table & Structure of Symbol tables.

UNIT – IV

Run Time Environments Source language issues, storage organization storage allocation strategies error detection & recovery, Intermediate Code Generation Intermediate languages, Declarations Assignment Statements.

UNIT – V

Code Generation Issues in design of code generator target machine run-time storage management, basic block and flow graphs, Code Optimization Introduction, Principal sources of code optimization optimization of basic blocks.

TEXT BOOKS

Aho & Ulman - COMPILER DESIGN

REFERENCE BOOKS:

- 1) Art of Compiler Design : The Theory & Practice by Tomas P: H men, Peter & Peters, Prentice Hall.
- 2) Compiler Design by Renhord Wilhelum Dieter Mauerl.
- 3) Compiler Design in Addison - Wesley Rib by Holub

UNIT – I

Introduction to Unix operating system, system structure and operating system services, Buffer cache: buffer headers, structure of the buffer port, scenarios for the retrieval of a buffer, reading and writing disk blocks. Advantage and disadvantage of the buffer cache. Internal representation of the files: I nodes, structure of a regular file, directories, conversion of a path name to an i-node, super block, i-node assignment to a new file, allocation of disk block.

UNIT - II

System calls for the file system: Open, read, write, file and record locking, l-seek, close, file creation, creation of special files, change directory and change root, change owner and change mode, STAT AND FSTA, pipes, dup, mounting and un mounting file systems link, unlink, file system abstractions, file system maintenance.

UNIT – III

Structure of processes: Process states and transitions, layout of system memory, the context of a process, saving the context of a process, manipulation of the process address space, sleep; Process control: process creation, process termination, signals shell system boot and init process.

UNIT – IV

Process scheduling and System call for Time, Memory management policies and I/O subsystem and I/O related concepts in UNIX

UNIT – V

Interposes communication available facilities in UNIX, Multiprocessor systems, (Semaphore, messages etc.) Introduction to distributed UNIX system.

TEXT BOOK

1. Design of UNIX Operating System By Maurice J. Back

REFERENCE BOOK

- 1) UNIX Utilities by Tare
- 2) UNIX Operating System by Subhajit Das

MCA - 655 WINDOWS PROGRAMING AND VISUAL C++

UNIT – I

Introduction to Windows Program. Message processing in Windows Programming. Message boxes, Menu and Accelerators. Dialog Box. Creating Icons, Cursor and Bitmaps.

UNIT – II

Introduction to Child Window Controls. Check boxes, Static control, Radio Buttons, Scroll bars, Advance Window Controls : Toolbars up down controls, Spin control, Progress bar, Tree view, Tab controls, Text and Font.

UNIT – III

Working with Graphics, Consoles, Multitasking Process and Threads. Clipboard Drag and Drops, Advance features of Windows Programming GDI Metafiles, Sound API, DLL.

UNIT – IV

Visual C++ Basic: Introduction, Building a Basic Application, SDI and MDI, View Document Architecture Using Microsoft Foundation Class (MFC) Library, Visual C++ resources: Application Wizard, Accelerators and Menus, Toolbars.

UNIT – V

Visual C++ And Database Management: MFC programming without View Document Architecture,. Data Access Objects (DAO) versus Open Database Connectivity (ODBC), Database Building Overview, Building a Database Application using ODBC, Building a Database Application Using

Text & Reference Books

- 1) Windows Programming , by Charles Petzold, Microsoft press.
- 2) Windows Programming, by Herbett Schildts .
- 3) VC++, by Murray, TMH.
- 4) Introduction to VC++, by Steve Holzner.

MCA-691 SOFTWARE ENGINEERING

Viva-Voce shall be conducted on Software Engineering. Assignment shall include small design problems.

MCA-692 COMPILER DESIGN

Viva-Voce shall be conducted on Compiler Design. Exposure to Lex and yacc tools shall be given.

MCA-693 PROGRAMMING LAB IN VC++

Students are required to do assignments on Windows programming and Visual C++ along with a small project.

MCA - 701 COMPUTER GRAPHICS

UNIT - I

Graphic Systems : Refresh CRT, raster-scan displays, DVST, plasma displays, LCD, Input devices : functions provided by input devices, basic working of these input devices, image scanners, touch panels, Input modes, request mode, event mode.

UNIT – II

Output Primitives : Points, lines, DDA, Bresenham line & circle drawing algorithm, ellipse generation. Filled area Primitives : scan line polygon fill algorithm, inside outside tests, boundary fill algorithm. Line width, color, color and gray levels, character attributes.

UNIT – III

Two-dimensional Geometric Transformation: Basic transformation, translation, rotation, scaling, fixed point scaling, general scaling direction. The viewing pipeline, window-viewpoint transformation. Line clipping algorithms.

UNIT – IV

Three Dimensional concepts : Polygon surfaces, plane equation, curved lines and surfaces, quadric surfaces, spline representation, spline specification. Bezier curves and surfaces, B-splines and surfaces, Displaying spline curves and surfaces, Horner's rule.

UNIT – V

Three Dimensional transformation and viewing methods : 3 D transformations, viewing co-ordinates, transformation from world to viewing co-ordinates, parallel and perspective projections, Back face detection, depth-buffer and A-buffer methods.

Text & Reference Books

- 1) Computer Graphics by D.Hearn and M.P. Baker
- 2) Computer Graphics - A programming approach by Harriyton.
- 3) Procedural Elements of Computer Graphics by Roger.
- 4) Three Dimensional Computer Graphics by Folley and Dam

MCA 702 AI & EXPERT SYSTEM

UNIT-I

Introduction to AI various types of production system. Analysis of problem for developing an AI system. Problem characteristics, Production system and its characteristics. BFS, DFS, and Different heuristic search techniques- Hill climbing, Ascent Hill climbing, Constraint satisfaction. A* algorithm AO* Algorithm.

UNIT-II

Knowledge Representation : Representation and mappings, Approaches to knowledge representation, Issue in knowledge representation, Knowledge representation using predicate logic resolution, and unification algorithm. Knowledge representation using rules procedural versus declarative knowledge logic programming, Forward and back ward reasoning .Symbolic reasoning under uncertainty monotonic and non monotonic reasoning. Semantic nets, Frames Conceptual dependency.

UNIT-III

Natural language processing and study of its different phases, Game planning Minimax Search procedure, Adding Alpha Beta cut-offs, Iterative deepening Planning components of planning system Goal stack planning Nonlinear and Hierarchical planning.

UNIT-IV

Statistical reasoning Probability and Bayes Theorem Certainty factor and rule base system Bayesian Networks Dempster Shafer Theory Fuzzy Logic. Understanding Parallel and distributed AI Psychological Modeling, Parallelism in reasoning system.

UNIT-V

Introduction to learning, various learning techniques Introduction to Expert System . Connectionist Model Hopfield networks learning in Neural Networks Application Common Sense ontology's and Memory organizations

Text & Reference Books

- 1) AI by Rich & Knight.
- 2) AI by Norwing.

ELECTIVE – I

MCA - 711 DATA WARE HOUSING & DATA MINING

UNIT I

Need for data warehouse, definition, goals of data warehouse, Data Mart, Data warehouse architecture, extract and load process, clean and transform data, star, snowflake and galaxy schemas for multidimensional databases, fact and dimension data, Designing fact tables. partitioning, partitioning strategy – horizontal partitioning, vertical partitioning,

UNIT II

Data warehouse and OLAP technology, multidimensional data models and different OLAP operations, OLAP Server: ROLAP, MOLAP and HOLAP. Data warehouse implementation, efficient computation of data cubes, processing of OLAP queries, indexing OLAP data.

UNIT III

Data preprocessing, data integration and transformation, data reduction, Discretization and concept Hierarchy Generation, Data mining primitives, Types of Data Mining, Data Mining query language, Architectures of data mining. data generation & Summarization based characterization, Analytical characterization, Mining class comparisons, Mining descriptive statistical measures in large data bases.

UNIT IV

Mining Association Rules in large databases: Association rule mining, single dimensional Boolean association rules from Transactional DBS, Multi level association rules from transaction DBS, multidimensional association rules from relational DBS and DWS, Correlation analysis, Constraint based association mining.

UNIT V

Classification and Prediction : Classification by decision tree induction, Back propagation, Bayesian classification, classification based in association rules, Prediction, classifier accuracy, Cluster analysis, partitioning and hierarchical methods, Density based methods Grid based methods, web mining, Temporal and spatial data mining.

Text & Reference Books

- 1) Building Data Ware House by W.H.Inmon, John Wiley & Sons
- 2) Data warehousing by S . Anahory and D.Murray, Pearson Education, ASIA
- 3) Data Mining Concepts & Techniques by Jiawei Han & Micheline Kamber; Harcourt India PVT Ltd.
- 4) TMH Oracle 8i Building Data Ware Housing by Michall Corey, M.Abbey, I Azramson & Ben Taub.
- 5) Data Mining, Practical Machine Learning tools & techniques with Java by I.H. Witten (Morgan Kaufmann)
- 6) Data Ware Housing with oracle by Sima Yazdanri & Shirky S. Wong
- 7) Data Mining Techniques by A.K. Pujari , University Press.

ELECTIVE – II

MCA 704 NEURAL NETWORKS AND FUZZY LOGIC

UNIT-I

Introduction:- Models of Neuron, Neural Networks viewed as directed graph of Feedforward, network architectures, knowledge representation, applications of neural network. Learning Processes:- Error correction learning, memory based learning, Hebbian learning competitive learning, Boltzmann learning credit assignment problem, learning with teacher learning without a teacher, learning tasks.

UNIT-II

Memory Adaptation, Statistical nature of learning process, statistical learning theory probably approximately correct model of learning.

Single Layer Perceptrons:- Adaptive Filtering problem, unconstrained optimization techniques, linear least square filters, least-mean-square algorithm, learning curves, learning rate annealing techniques.

Perceptron, perceptron convergence theorem relation between the perceptron and bayes classifier for gaussian environment.

UNIT-III

Multi-layer Perceptrons:- Some preliminaries, back-propagation algorithm, summary of back propagation algorithm, XOR problem, Heuristic for making the back propagation algorithm perform better.

□ Output representation and decision rule, Computer experiment, Feature detection, back-propagation and differentiation, Hessian matrix, generalization, approximation of functions virtues and limitations of back-propagation learning, accelerated convergence of back-propagation learning, connection networks regularization theory.

UNIT-IV

Supervised learning on Posed Hyper-surface reconstruction problem Cover's theorem on separability of patterns interpolation problem regularization network, generalized radial basis function networks, XOR problem. How to build a support vector machine, for pattern recognition.

UNIT-V

Supervised learning on Posed. Hyper-surface reconstruction problem. Cover's theorem on separability of patterns interpolation problem regularization network, generalized radial basis function networks, XOR problem. How to build a support vector machine, for pattern reorganization.

Text & Reference Books

- 1) Neural Network, Simon Haykin, Pearson Education Association.

MCA-705 WEB BASED APPLICATIONS DEVELOPMENT

UNIT-I

Object Oriented Programming with JAVA: Overview construction, this, Super, final, static, abstract classes, interfaces, overloading, overriding, virtual methods, reference manipulation, Applets, parameter passing to applet, Graphics programming, string, string buffer.

UNIT-II

Packages: Java. AWT: table, buttons, list etc., Java.lang: Object class, Garbage collection, cloning, Reflection etc. Java.io: streams, File class, File I/O stream, Date I/O stream, Random & buffered access, java.net.

UNIT-III

Java Database Connectivity : Two tier & three tier models, Types of Drivers : communicating with database, creating JDBC statements, creating and using statement objects, Result set, Database Meta Data, Result set Meta Data; Servlets: Servlet Architecture, Servlet interface, Servlet Request/Response interface, Servlet designing, using cookies, session management, connection pooling, servlet & JDBC, JFC & Swing.

UNIT-IV

Remote Method Invocation RMI: RMI Architecture, Stub, skeleton, Remote Reference Layer, Transport Layer, Writing RMI client/ server, RMI Registry, Call back Mechanism; JAVA Security: Language level security, JVM Level security and security API, Applet security, security manager.

UNIT-V

Concepts of COM, DCOM, Active X, ORB, WAP, Bluetooth, Net technology.

Text & Reference Books

- 1) Complete Reference JAVA2 By H.Schildt. TMH
- 2) Java Servlets By Phil Hanna, TMH
- 3) Java Thread Programming By Paul Hyde, SAMS
- 4) Java Virtual Machine By Tim Lindholm & Frank Yellin, Addison Wesley
- 5) Java Swing By Loy & Wood, O' reilly
- 6) Java Beans BY Monson & Haefel, O' reilly
- 7) JDBC IDG Publications
- 8) Java servlets By Korl Moss, TMH

MCA-741 COMPUTER GRAPHICS

Viva-Voce shall be conducted on Computer Graphics. Assignment shall include Graphics programming which has to be implemented using C/C++.

MCA-742 ELECTIVE – I

Viva-Voce shall be conducted on Data ware Housing and Mining.

MCA-743 PROGRAMMING LAB IN JAVA

Students are required to do develop a small project using JAVA.

MCA - 711 DATA WARE HOUSING & DATA MINING

UNIT I

Need for data warehouse, definition, goals of data warehouse, Data Mart, Data warehouse architecture, extract and load process, clean and transform data, star, snowflake and galaxy schemas for multidimensional databases, fact and dimension data, Designing fact tables. partitioning, partitioning strategy – horizontal partitioning, vertical partitioning.

UNIT II

Data warehouse and OLAP technology, multidimensional data models and different OLAP operations, OLAP Server: ROLAP, MOLAP and HOLAP. Data warehouse implementation, efficient computation of data cubes, processing of OLAP queries, indexing OLAP data.

UNIT III

Data preprocessing, data integration and transformation, data reduction, Discretization and concept Hierarchy Generation, Data mining primitives, Types of Data Mining, Data Mining query language, Architectures of data mining. data generation & Summarization based characterization, Analytical characterization, Mining class comparisons, Mining descriptive statistical measures in large data bases.

UNIT IV

Mining Association Rules in large databases: Association rule mining, single dimensional Bookan association rules from Transactional DBS, Multi level association rules from transaction DBS, multidimensional association rules from relational DBS and DWS, Correlation analysis, Constraint based association mining.

UNIT V

Classification and Prediction : Classification by decision tree induction, Back propagation, Bayesian classification, classification based in association rules, Prediction, classifier accuracy, Cluster analysis, partitioning and hierarchical methods, Denrity based methods Grid based methods, web mining, Temporal and spatial data mining.

Text & Reference Books

- 1) Building Data Ware House by W.H.Inmon, John Wiley & Sons
- 2) Data warehousing by S . Anahory and D.Murray, Pearson Education, ASIA
- 3) Data Mining Concepts & Techniques by Jiawei Han & Micheline Kamber; Harcourt India PVT Ltd.
- 4) TMH Oracle 8i Building Data Ware Housing by Michall Corey, M.Abbey, I Azramson & Ben Taub.
- 5) Data Mining, Practical Machine Cearing tools & techniques with Java by I.H. Whiffen (Morgan Kanffmen)
- 6) Data Ware Housing with oracle by Sima Yazdanri & Shirky S. Wong
- 7) Data Mining Techniques by A.K. Pujari , University Press.

MCA 712 Mobile Computing

UNIT I

Introduction: Current Wireless Systems; Overview of Paging Systems, Cordless Phones, Cellular Telephone Systems, Satellite Communication, Wireless LANs, Blue tooth.

Modern Wireless Communication Systems, Wireless Networks and Standards, Wireless in Local loop & LMDS Cellular Concepts Frequency spectrum, frequency reuse, channel assignment strategies, handoff strategies, interference and system capacity, fundamentals of antennas, Equivalent circuit for antenna, Antennas as cell site, Mobile antennas, Analog Vs Digital, Spectrum regulation, Licensing methods.

UNIT II

Cellular Networks: Mobile Radio Propagation, A basic cellular system, Performance criterion, Operations of Cellular Networks, Concept of frequency reuse Channels, Co channel Interference and it's reduction factor, types of non co channel Interference, Desired C/I from normal case on omni directional antenna systems, Digital Modulation

UNIT III

Multi Access Technique & Wireless Standards :TDD, FDD, Rake receiver, CDD, Spread spectrum, FDMA, TDMA, CDMA, Wireless Standards GSM, CDMA, DECT, UMTS & IMT-2000, **WAP** Model and architecture, Gateway, Protocol stack, Wireless Application environment

UNIT IV

Wireless LAN:IEEE 802.11 Concepts, MAC Layer, Spread Spectrum Wireless LAN, Infrared Wireless LANs, Other Physical Layer Protocol (IEEE 802.11b, IEEE 802.11a), Wireless PAN (Blue tooth), HIPERLAN, Mobile Network Layer (Mobile IP), Mobile Transport Layer (Mobile TCP), Mobile Data network (GPRS),

UNIT V

GSM Systems Overview: Architecture, Location tracking, and call setup. Security, Data Services N/W Signaling, GSM mobility management, Operations, Administration and maintenance. GSM bearer Services: SMS architecture-Protocol Hierarchy, DTE-DCE interface, Mobile prepaid phone services.

Text & Reference Books

- 1) Wireless communication, T. S. Rappaport, PHI
- 2) Wireless and Mobile Network Architecture : Yi-Bing Lin, Wiley.
- 3) Mobile Communications, J. Schiller, Pearson Education

MCA 713 ADVANCED RDBMS

UNIT I

The Extended Entity Relationship Model and Object Model: The ER model revisited, Motivation for complex data types, User defined abstract data types and structured types, Object-Oriented Databases: Overview of Object-Oriented concepts, Object identity, Object structure, and type constructors, Encapsulation of operations, Methods, and Persistence, Type hierarchies and Inheritance, Type extents and queries, Complex objects; Database schema design for OODBMS; OQL, Persistent programming languages; OODBMS architecture and storage issues; Transactions and Concurrency control, Example of ODBMS

UNIT II

Object Relational and Extended Relational Databases: Database design for an ORDBMS - Nested relations and collections; Storage and access methods, Query processing and Optimization; Advance Querying and Information Retrieval Decision Support Systems, Information Retrieval Systems Data Analysis and OLAP, Data Mining.

UNIT III

Parallel and Distributed Databases and Client-Server Architecture: Architectures for parallel databases, Parallel query evaluation; Parallelizing individual operations, Sorting, Joins; Distributed database concepts, Data fragmentation, Replication, and allocation techniques for distributed database design; Query processing in distributed databases; Concurrency control and Recovery in distributed databases

UNIT IV

Databases on the Web and Semi Structured Data: Web interfaces to the Web, Overview of XML; Structure of XML data, Document schema, Querying XML data; Storage of XML data, XML applications; The semi structured data model, Implementation issues, Indexes for text. Enhanced Data Models for Advanced Applications: Active database concepts. Temporal database concepts.; Spatial databases, Concepts and architecture; Deductive databases and Query processing; Mobile databases, Geographic information systems, MultiMedia databases.

UNIT V

Advance Transaction Processing Systems : Transaction Processing Monitor, Transaction Work flows , Main Memory Databases, Real Time Transaction Systems, Long Duration Transactions Transaction Management in Multi Databases Case Studies Oracle, Microsoft SQL Server

Text & Reference Books:

- 1) Elmasri and Navathe, Fundamentals of Database Systems, Pearson Education
- 2) Korth, Silberchatz, Sudarshan , Database System Concepts, McGraw-Hill.
- 3) C.J.Date, Longman, Introduction To Database Systems, Pearson Education.

MCA 714 DISTRIBUTED SYSTEMS

UNIT I

Introduction: Motivation, objectives, characterization & classification of distributed systems. Distributed system architecture. Hardware & software issues. Communication: Layered protocols, Client server protocols, RPC, group communication. Coordination, synchronization & consistency: Logical clocks, Physical clocks, mutual exclusion, election algorithms, atomic broadcast, sequential consistency transaction distributed consensus, Threads: Thread synchronization, implementation issues, threads vs. RPC.

UNIT II

Models of distributed computing: client server and RPC, RPC architecture, exceptions, underlying protocols, IDL, marshalling. Group models and peer to peer: Groups for service replication/reliability, groups for parallelism / performance, client/ server vs. peer-to-peer, multicast, atomic broadcast

UNIT III

Distributed file system: security, Naming/ location transparency, R/W semantics, cache coherence, replication. Distributed shared memory: DSM architecture, consistency models and relation to caching, release consistency, comparison with message passing and RPC.

UNIT IV

Fault tolerant distributed systems: Introduction, dependability, faults vs. errors vs. failure, space time and value redundancy, fault tolerant architecture, failure detection algorithms, partitioning, FT consensus. Distributed multimedia system: Introduction, characteristics, and resource management stream adaptation.

UNIT V

Security: introduction, security techniques, cryptographic algorithms, authentication and access control. Case study: CORBA, MACH

Text Books & References:

- 1) Distributed systems, concepts and design, 3rd Edition, Addison Wesley by George Colouris, Jean Dollimore and Tim Kinder berg.
- 2) Distributed system, 2nd Edition, Addison Wesley by Sape Mull ender.

MCA 715 NATURAL LANGUAGE PROCESSING

UNIT I

Introduction to Natural Language Processing: Linguistic Background, Words, Simple Noun Phrases, Verb and Adjective Phrases, Grammar and Parsing, Top-Down Parser, Bottom-Up Parser, Features and Augmented Grammars.

UNIT II

Grammars For Natural Language: Efficient Parsing, Shift-Reduce Parsing, Deterministic Parser, Partial Parsing, Ambiguity Resolution: Statistical Methods, Parts-Of-Speech Tagging ,Best-First Parsing.

UNIT III

Semantic and Logical Forms: Word Senses and Ambiguity, Linking Syntax and Semantics, Ambiguity Resolution.

UNIT IV

Semantic Interpretation: Scope and Interpretation of Noun Phrases, Knowledge Interpretation and Reasoning.

UNIT V

Local Discourse Context and Reference: Discourse Structure, Using World Knowledge, Matching Against Expectations, Reference and Matching Expectations Using Knowledge About Action and Causality.

Text Books & References:

- 1) Natural Language Understanding James Allen 2nd Edition Pearson Education

MCA 721 PATTERN RECOGNITION & COMPUTER VISION

UNIT I

Introduction to pattern recognition, types of images, regular pattern, irregular pattern, fuzzy methods. Statistical pattern recognition, feature selection, syntactic pattern recognition, clustering and non supervised learning methods.

UNIT II

Combined detection method, edge detection, edge linking, gradient. Laplacian, line detection, method based, point detection, snake methods. Boundary description detection, matching, merging segmentation, smoothing, splitting of boundaries syntactic, analysis of region boundaries, study of shape by region analysis.

UNIT III

Explanation of how fuzzy approach can be applied to pattern recognition, classificatory analysis preprocessing, feature detection and primitive extraction, adaptive classification of fuzzy grammar. Algorithms for pattern recognition, neural network fundamentals, approaches for pattern recognition.

UNIT IV

Introduction of Computer Vision ,Computer Imaging System, Image Formation and sensing CVIP tools Software , Image representation. Area Extraction: Concepts, Data-structures, Edge, Line-Linking, Hough transform, Line fitting, Curve fitting .

UNIT V

Region Analysis: Region properties, External points, Spatial moments, Mixed spatial gray-level moments, Boundary analysis: Signature properties, Shape numbers. General Frame Works For Matching: Distance relational approach, Ordered- structural matching, View class matching, Models database organization. Knowledge Based Vision: Knowledge representation, Control-strategies, Information integration.

Text Book & References:

- 1) Duda, Hart, and Stock, *Pattern Classification*, John Wiley and Sons.
- 2) Gose, Johnsonbaugh and Jost, *Pattern Recognition and Image analysis*, PHI
- 3) Milan Sonka, Vaclav Hlavac, Roger Boyle, *Image Processing, Analysis, and Machine Vision* Thomson Learning
- 4) Robert Haralick and Linda Shapiro, *Computer and Robot Vision*, Vol I, II, Addison-Wesley, 1993.

MCA 722 MULTIMEDIA COMPUTING

UNIT I

Introduction to multimedia, system architecture & technologies , Objects for multimedia systems , Multimedia interface standards , data and file format standards RTF, TIFF , RIFF , MIDI , JPEG , MPEG. MP3 Authoring Tools.

UNIT II

Need for data compression, lossy and lossless compression, Binary Image Compression techniques, Video Image compression , Full motion video compression , audio compression. Animation and its Basics, Software for Animation, Animation Techniques – Concept of Key Frame, Tracing and Path, 2D Tweaking, Morphing, Color Cycling, Walk Cycle Wrap, Rotation, 3D Animation Techniques : Lofting, Lighting Revolving Inverse Kinematics Morphing Key Framing

UNIT III

□ Multimedia input and output technologies, Pen input, video and image display systems, image scanners , Print output technologies. Digital voice and audio, Digital camera, hardware for video images and animation, Full motion video hardware. Storage and retrieval technologies. Digital Sound Capturing And Editing Tools

Sampling of Sound, Frequency, Sound Depth, Channels in Sound and Third Effects on Quality and Storage Size Estimation of Space of a Sound File, Sound Card Standard – Fm Synthesis Cards, Waves Table Cards

UNIT IV

Speech recognition and generation Telecommunications considerations for Multimedia, Specialized processors , Memory systems, LAN/WAN connectivity , Network performance parameters , Multimedia communication protocols (UDP , RTP , RTCP , XTP , TELNET , IP Multicast etc) .

UNIT V

Multimedia authoring systems and tools, Multimedia Applications and Design issues, VRML(Virtual reality modeling language), Streaming, Hypermedia application design considerations , User interface design , Hypermedia message , Integrated Multimedia message standards .

Text Books & References:

- 1) Multimedia system Design by Prabhat K Andleigh and Kiran Thakrar(PHI Publications).
- 2) Multimedia Communications by Fred Halsall(Pearson Publications).
- 3) Multimedia: Computing , communications and applications by Ralf Steinmetz and Kalra Nahrstedt (Pearson Publications).
- 4) Multimedia Making it work (4th Edition)-by Vaughan TataMcgraw Hill

MCA 723 PARALLEL COMPUTING

UNIT I

Introduction to parallel processing and pipelining, array computers, multiprocessor systems, dataflow diagrams and applications of parallel processors.

UNIT II

Various types of pipeline processors like arithmetic pipelines, instruction pipelines etc., reservation table, design of various types of pipelines, instruction pre-fetching and branch handling in pipelines, data buffering and busing structures in pipelines. Vector supercomputers.

UNIT III

Structures and Algorithms for Array Processors: Meaning of instruction streams and data streams, classification of computers based on these as SISD, SIMD, MISD and MIMD, SIMD computer organization, various types of SIMD interconnected networks like static and dynamic networks, mesh-connected, networks, cube connected networks etc., SIMD matrix multiplication and parallel sorting algorithms.

UNIT IV

Multiprocessors :Introduction, Architecture, Fault-tolerant computers. Various types of array and associative processors, loosely and tightly coupled microprocessors, various types of interconnection networks like time shared or common bus, crossbar switch, multi-port memories etc.

UNIT V

Control flow and data flow computers, data flow computers, data flow graphs and languages, static and dynamic data flow computers, systolic array architecture.

Text Book & References:

- 1) Kai Hwang: Computer Architecture and Parallel Processing: Tata McGraw Hill
- 2) John P. Hayes Computer Architecture and Organization: Tata McGraw Hill
- 3) Andrew S: Tanenbaum, Modern Operating Systems, 2nd Edition, Prentice Hall, 2001.

MCA 724 ADVANCED COMPUTER ARCHITECTURE

UNIT I

Overview of Modern Processor Architectures. Theory of Parallelism : Evolution of Computer Architectures, Multiprocessors and Multicomputers. Multivector and SIMD computers ,PRAM and VLSI models, Condition of Parallelism , program partitioning and scheduling.

UNIT II

Program flow mechanism, System interconnect architecture, Performance metrics and measures : Efficiency, utilization and quality. Standard Performance Measures. Parallel processing Applications, Speedup Performance laws.

Bus Architecture Implementations of shared memory, cache memory organization.

UNIT III

Replicated Architectures: SIMD/MIMD, Shared Memory and Distributed Memory RISC, CISC Scalar processors, super Scalar and VLIW Computers, Multi-vector Computers, Connectivity Interconnection networks: topology, routing, flow control, deadlock avoidance, static and dynamic interconnection networks.

UNIT IV

Vector Pipeline Architectures Pipelined CPU architecture. Instruction set design and pipeline structure, instruction Pipeline Design, Nonlinear Pipelining Processors, Arithmetic pipeline design, Super scalar and Super pipeline design.

UNIT V

Parallel and Scalable Architectures: Multiprocessors system Interconnects Cache Coherence and Synchronization Mechanism Scalable, Multi Threaded and Data Flow Architecture.

Text Book & References:

- 1) Kai Hwang: Advanced Computer Architecture: Tata McGraw Hill
- 2) Andrew S: Tanenbaum, Modern Operating Systems, 2nd Edition, Prentice Hall, 2001.
- 3) John Hennessy and David Patterson, Computer organization and Design: The hardware/Software interface, 2nd Edition, Morgan Kaufman Publishers.
- 4) John P. Hayes Computer Architecture & Organization: Tata McGraw Hill

MCA 725 IMAGE PROCESSING

UNIT I

Introduction to Image Processing Systems, Digital Image Fundamentals:- Image model, Relationship between Pixels, Imaging geometry, Camera model.

Manipulation on Images:- Images transformation : Introduction to FT, DFT and FFT. Walsh transformation, Hadamard transformation, Hostelling transformation, Histogram.

UNIT II

Image Smoothing: - Neighborhood Averaging, Median Filtering, Low Pass Filters, Average of Multiple Images, Image Sharpening by Differentiation Technique, High Pass filtering. Image

Restoration: - Degradation models for continuous function, effect of diagonalization, on-degradation, algebraic approach to restoration, interactive restoration, Gray level interpolation.

UNIT III

Image Encoding and Segmentation: - Encoding, Mapping, Quantizer and Coder.

Segmentation: - Detection of discontinuation by point detection, line detection, edge detection.

Edge linking and boundary detection:- Local analysis, global by graph, theoretic techniques.

Thresh-holding: - definition, global thresh-holding.

UNIT IV

Filtering:- median, gradient, simple method of representation signatures, boundary segments, skeleton of region.

UNIT V

Mathematical Preliminaries : Random signals, Discrete Random fields , Spectral density function , Review of Estimation theory ,Review of information theory , Image Representation by Stochastic models : One dimensional Causal models , Levinson Algorithm.

Text Book & References:

- 1) Digital Image Processing by Gonzalez & Wood , PHI.
- 2) Digital Image Processing by A.K.Jain.

MCA 726 NEURAL NETWORKS AND FUZZY LOGIC

UNIT I

Introduction:- Models of Neuron, Neural Networks viewed as directed graph of Feedback, network architectures, knowledge representation, applications of neural network. Learning Processes:- Error correction learning, memory based learning, Hebbian learning competitive learning, Boltzmann learning credit assignment problem , learning with teacher learning without a teacher, learning tasks.

UNIT II

Memory Adaptation, Stastical nature of learning process, stastical learning theory probably approximately correct model of learning. Single Layer Perceptron: Adaptive Filtering problem, unconstrained optimization techniques, linear least square fillers, least-mean-square algorithm, learning curves, learning rate an healing techniques. Perceptron, perceptron convergence theorem relation between the perceptron and bayes classifier for gaussian environment.

UNIT III

Multi-layer Perceptrons Some preliminaries, back-propagation algorithm, summary of back propagation algorithm, XOR problem, Heuristic for making the back propagation algorithm perform better. Output representation and decision rule, Computer experiment, Geature detection, back-propagation and differentiation, Hessian matrix, generalization, approximation of functions virtues and limitations of back-propagation learning, accelerated convergence of back-propagation learning, converction networks regularization theory.

UNIT IV

Supervised learning on Ill Posed Hypersurface reconstruction problem Cover's theorem on separability of patterns interpolation problem regularization network, generalized radial basis function networks, XOR problem. How to build a support vector machine, for pattern recognition.

UNIT V

Supervised learning on Posed. Hyper-surface reconstruction problem. Cover's theorem on separability of patterns interpolation problem regularization network, generalized radial basis function networks, XOR problem. How to build a support vector machine, for pattern reorganization.

Text Book & References:

- 1) Neural Network, Simon Haykin, Pearson Education Association.