

DISCRETE MATHEMATICS – MCA-11

Theory - 100 Marks
Sessional - 50 Marks

Sets Theory, Functions & Relations: Basic properties & operations of Sets, Finite & infinite Sets Multi-Sets, Principles of mutual inductions and Mathematical induction, relations: Relations and relational Matrices, properties of relations, equivalence & partially ordered relation, chains & anti-chains & Lattices. Boolean Algebra. Job scheduling, Pigeon hole principle.

Propositional logic and propositional functions, Truth-values and Truth Table, the algebra of propositional functions - the algebra of truth values. Predicate Calculus.

Introduction of finite state machine as language recognizer. Equivalence of machines, Finite state language.

Trees & Graphs: Basic terminology of graphs, incidence and degree, planar graphs, multigraphs and weighted graphs, shortest path algorithms. Walks paths and circuits, Eulerian and Hamiltonian graphs.

Trees : Properties of trees, Minimum weight spanning trees and cut-trees, prefix codes.

Numeric Functions & Recurrence Relations:

Discrete Numeric Functions & generating functions and their manipulations.

Linear Recurrence Relation with constant coefficient, Homogeneous Solution, Particular & Total Solutions.

Groups: Group, subgroups, generator and evaluation of powers. Co-sets, isomorphism, homomorphism and automorphism Normal Subgroups.

Transmission errors, Single bit and multiple bit Error detection correction codes, Parity bit, VRC and CRC methods of error detection and correction.

References:

1. Discrete Mathematical Structures 5th ed by Kolman,
2. Discrete Mathematics by C.L. Liu
3. Discrete mathematics by Rosen. TMH
4. Discrete mathematics by G.P. Shrivastava and M. Kumar. Ravi Prasad & Sons.

Programming Fundamentals and C Programming- MCA-12

Theory - 100 Marks
Sessional - 50 Marks

An overview: Problem identification, analysis, design, coding, testing & debugging, implementation, modification & maintenance; algorithms & flowcharts; Characteristics of a good program - accuracy, simplicity, robustness, portability, minimum resource & time requirement, modularization; Rules/conventions of coding, documentation, naming variables; Top down design; Bottom-up design.

Fundamentals of C Programming: History of C; Structure of a C Program; Data types; Constant & Variable; Operators & expressions; Control Constructs – if-else, for, while, do-while; Case statement; Arrays; Formatted & unformatted I/O; Type modifiers & storage classes; Ternary operator; Type conversion & type casting; Priority & associativity of operators.

Modular Programming: Functions; Arguments; Return value; Parameter passing – call by value, call by reference; Return statement; Scope, visibility and life-time rules for various types of variable, static variable; Calling a function; Recursion – basics, comparison with iteration, tail recursion, when to avoid recursion, examples.

Advanced Programming Techniques: Special constructs – Break, continue, exit(), goto & labels; Pointers - & and * operators, pointer expression, pointer arithmetic, dynamic memory management functions like malloc(), calloc(), free(); String; Pointer v/s array; Pointer to pointer; Array of pointer & its limitation; Function returning pointers; Pointer to function, Function as parameter; Structure – basic, declaration, membership operator, pointer to structure, referential operator, self referential structures, structure within structure, array in structure, array of structures; Union – basic, declaration; Enumerated data type; Typedef; command line arguments.

Miscellaneous Features: File handling and related functions; printf & scanf family; C preprocessor – basics, #Include, #define, #undef, conditional compilation directive like #if, #else, #elif, #endif, #ifndef and #ifdef; Variable argument list functions.

References:

1. Kerninghan & Ritchie: The C programming language, PHI
2. Cooper Mullish: The Spirit of C, Jaico Publishing House, Delhi
3. Kanetkar Y.: Let us C
4. Kanetkar Y.: Pointers in C

DATA STRUCTURE USING C - MCA-13

Theory - 100 Marks

Sessional - 50 Marks

Prerequisite: Array; Structure; Pointers; Pointer to structure; Functions; Parameter Passing; Recursion.**Stack & Queue:** Contiguous implementation of stack; various operations on stack; Various Polish Notations – Prefix, postfix, infix; Conversion from one to another – using stack; Evaluation of post & prefix Expressions. Contiguous implementation of Queue; Linear queue, its drawback; Circular queue; Various operations on queue; Linked implementation of Stack & Queue – operations.

General List: List and its contiguous implementation, its drawback; Singly linked list – operations on it; Doubly linked list – operations on it; Circular linked lists; Linked list using arrays.

Trees: Definitions – height, depth, order, degree, parent & children relationship etc; Binary Tree – various theorems, complete binary tree, almost complete binary tree; Tree Traversals – preorder, in order & post order traversals, their recursive and non recursive implementations; Expression tree – evaluation; Linked representations of binary tree – operations. Threaded binary trees; Forest, Conversion of forest into tree. Heap– Definition.

Searching, Hashing & Sorting: Requirements of a search algorithm; sequential search, binary search, indexed sequential search, interpolation search; Hashing – basics, methods, collision, resolution of collision, chaining; Internal Sorting – bubble sort, selection sort, insertion sort, quick sort, merge sort on linked and contiguous lists, shell sort, heap sort , tree sort.

Graphs: Related definitions; Graph representations – adjacency matrix, adjacency list, adjacency multilist; Traversal schemes – depth first search, breadth first search; Minimum spanning tree; Shortest path algorithm; Kruskal & Dijkstra algorithms.

Miscellaneous features: Basic idea of AVL Tree – definition, insertion & deletion operation; Basic idea of B-tree – definition, order, degree, insertion & deletion operations; B+-tree – definition, comparison with B-tree; Basic idea of string processing.

References:

1. Kruse R.L.: Data Structures and Program Design in C; PHI
2. Tennenbaum A.M. & others : Data Structures using C & C++; PHI
3. Horowitz & Sahney: Fundamentals of Data Structures, Galgotia Publishers

COMPUTER ARCHITECTURE -MCA -14

Theory - 100 Marks
Sessional - 50 Marks

Representation of Information: Number systems, integer and floating-point representation, character codes (ASCII, EBCDIC), Error detection and correction codes. **Basic Building Blocks:** Boolean Algebra, combinational blocks: gates, multiplexers, decoders etc, Sequential building blocks: flip-flops, registers, counters, ALU, Random access memory etc.

Register Transfer Language and Micro-operations: concept of bus, data movement among registers, a language to represent conditional data transfer, data movement from/to memory, arithmetic and logical operations Along with register transfer, timing in register transfer.

Architecture of a simple processor: A simple computer organization and instruction set, instruction formats, addressing modes, instruction execution in terms of microinstructions, concepts of interrupt and simple I/O organization, implementation of processor using the building blocks.

Memory organization: basic cell of static and dynamic RAM, Building large memories using chips, Associative memory, cache memory organization, virtual memory organization.

References:

1. M. Morris Mano, "Computer System Architecture", PHI, 3rd edition
2. Bartee, "Digital Computer Fundamentals".
3. Malvino, "Digital Computer Electronics".

COMMUNICATION SKILLS – MCA-15

Theory - 100 Marks
Sessional - 50 Marks

Meaning and process of communication, importance of effective communication, communication situation and communication skills, barriers to communication. Objectives of communication, types of communication, principles of communication, essentials of effective communication.

Media of communication: written, oral, face-to-face, visual, audio-visual, merits and demerits of written and oral communication, preparing for oral presentation, conducting presentations.

Developing communication skills, interview- how to face and how to conduct. Preparing of biodata, seminar, paper, bibliography, group discussion, official correspondence.

Mechanics of writing, paragraphing, precise, report writing, technical reports, length of written reports, organizing reports, writing technical reports.

References:

1. Essentials of Business Communication by Rajendra Pal nad J.S. Korlahalli, Sultan Chand & Sons Publishers, New Delhi.
2. Business Communications by U.S. Rai & S.M. Rai, Himalaya Publishing House.
3. Writing a Technical Paper by Menzal nad D.H. Jones, McGraw Hill, 1961.
4. Business Communication: Strategy and Skill, Prentice Hall New Jersey, 1987.

OPERATING SYSTEM – MCA-21

Theory - 100 Marks
Sessional - 50 Marks

Introduction: Evolution of operating systems, Types of operating systems, different views of the operating system, operating system concepts and structure.

Processes: The Process concept, systems programmer's view of processes, operating system services for process management, scheduling algorithms, Performance evaluation.

Memory Management: Memory management without swapping or paging, swapping, virtual memory, page replacement algorithms, modeling paging algorithms, design issues for paging system, segmentation.

Inter-process Communication and Synchronization: The need for inter-process synchronization, mutual exclusion, semaphores, hardware support for mutual exclusion, queuing implementation of semaphores, classical problems in concurrent programming, critical region and conditional critical region, monitors, messages.

Deadlocks: deadlock prevention, deadlock avoidance.

File System: File systems, directories, file system implementation, security protection mechanisms.

Input/output: Principles of I/O Hardware: I/O devices, device controllers, direct memory access. Principles of I/O software, User space I/O Software.

Disks: Disk hardware, scheduling algorithms, Error handling, track-at-a-time caching, RAM Disks.

Distributed System: Distributed System structure, Remote services and design issues. Distributed File System: Design, Implementation and trends. Distributed Coordination.

Protection: Goals of protection, Domains of protection, Capability based system, Language based Protection, Access Matrix.

Security: Security Problems, Authentication, One time passwords, Program Threats, System Threats, Threats monitoring, Encryption.

References:

1. Deitel, H.M. "An Introduction to Operating Systems". Addison Wesley Publishing Company 1984.
2. Milenkovic, M., "Operating Systems - concepts and Design" McGraw Hill International Edition-Computer Science series 1992.
3. Paeterson, J.L. Abraham Silberschatz. "Operating System Concepts". Addison Wesley Publishing Company, 1989.
4. Taanenbaum, A.S. "Modern Operating System", Prentice Hall of India Pvt. Ltd. 1995.

DATA BASE MANAGEMENT SYSTEM - MCA-22

Theory - 100 Marks
Sessional - 50 Marks

Introduction: Advantages of DBMS approach, Various views of data, data independence, schema & sub- schema, Primary concept of data models, Database languages, Transaction management, Database administrator & user, Data dictionary, Overall system architecture.

ER Model: Basic concept, Design issues, Mapping constraints, Keys, ER diagram, Weak & strong entity- sets, Specialization & generalization, aggregation, inheritance, Design of ER schema, Reduction of ER schema to tables.

Domains, Relations & Keys: Domains, Relations, Kinds of relations, Relational databases, Various types of keys: candidate, primary, alternate & foreign keys.

Relation Algebra & SQL: The structure, Relational algebra with extended operations, Modification of database, Idea of relational calculus, Basic structure of SQL, Set operations, Aggregate functions, Null values, Nested subqueries, Derived relations, Views, Modification of database, Join relations, DDL in SQL.

Functional Dependencies & Normalization: Basic definitions, Trivial & nontrivial dependencies, Closure set of dependencies & attributes, Irreducible set of dependencies, Introductions to normalization, decomposition, FD diagram, First, second and third normal forms, Dependency preservation, BCNF, Multivalued dependencies and fourth normal form, Join dependencies and fifth normal form.

Database Integrity: General idea, Integrity rules, Domain rules, Attribute rules, Relation rules, Database rules, assertions & triggers.

Transactions, Concurrency & Recovery: Basic concept, ACID properties, Transaction state, Implementation of atomicity & durability, Concurrent executions, Basic idea of serializability, Basic idea of concurrency control, Basic idea of deadlock, Failure classification, Storage structure- types, stable storage implementation, data access, Recovery & Atomicity - log based recovery, deferred database modification, immediate database modification, checkpoints.

Distributed Databases: Basic idea, distributed data storage, Data replication, and Data fragmentation - horizontal, vertical & mixed fragmentation.

Storage Structure & File Organization: Basic idea of RAID, Basic concepts of indexing, Ordered indices, Basic idea of B-tree & B⁺-tree ,file organization

Network & Hierarchical Models: Basic idea, Data structure diagram, DBTG model, implementation, Tree structure diagram, Implementation techniques, Comparison of the three

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models.

References:

- 1.Database System Concepts : A.Silberschatz, H.F.Korth, S.Sudarshan (3rd Ed)(Mc Graw Hill Publication)
- 2.An Introduction to Database Systems: C.J.Date (6th Ed) (Addison Wesley)
- 3.Fundamentals of Database Systems: Elmasri & Navathe (3rd Ed) (A/W)
- 4.An Introduction to Database Systems: B.C.Desai (Galgotia Publishers)

Object Oriented Analysis, Design and C++ - MCA-23

Theory - 100 Marks

Sessional - 50 Marks

OOA and OOD Three Models-Object, Dynamic and Functional
Object Modelling-Object and Classes, Links, Association, Generalization and
Inheritance, Grouping concepts, aggregation, abstract Classes, Multiple
Inheritance, Metadata, Candidate keys, UML, UML Implementation By Rational Rose

C++ basics, loops and decisions, structures and functions, object and classes, object arrays, constructor destructor functions, operator and function overloading, pointers, inheritance, multiple inheritance, virtual base classes, pointers to base and derived classes, virtual functions, friend function, early and late binding.

C++ I/O system, formatted I/O, creating insertors and extractors, file I/O basis, creating disk files and file manipulations using seekg(), seekp(), tellg() and tellp() functions, exception handling.

Books:

1. M.Kumar: C++ Programming made simple, (Cinpress), TMh.
2. Lafore R.: Object Oriented Programming in C++, Galotia Pub.
3. Balagurusamy: Object Oriented Programming with C++.
4. J. Rambaugh, M. Blaha Et .ai Object oriented Modelling and Design-PHI
5. B.G., Boach: Object Oriented Analysis & Design with Applications, Addison Wesley.

COMPUTER ORIENTED NUMERICAL ANALYSIS - MCA-24

Theory - 100 Marks
Sessional - 50 Marks

Numerical approximation, Representation of integers and real numbers in computers, fixed and floating point arithmetic, normalized floating point numbers, errors due to storage limitations and safe guards, Round off and truncation errors, relative and absolute errors.

Iterative methods: Zeros of single transcendental equations and zeros of polynomials using bisection method, false position, Altken's Δ^2 method. Newton Raphson method, Secant Method, convergence of solutions.

Simultaneous linear equations: Solutions of simultaneous linear equations - Gauss elimination method and pivoting, ill conditioned equations and refinement of solutions, Gauss-siedal iterative methods.

Interpolation for equal and unequal intervals & inverse interpolation, Numerical differentiation of method based on finite differences, Numerical Integration, Simpson's rule, Gauss legendre integration method, solution of differential equation, Runge-Kutta methods, Automatic error monitoring, stability of solutions.

Note: Algorithmic approach can be adopted wherever necessary.

References:

1. Numerical Methodos by BS Grewal- Khanna Pub
2. Computer Oriented Numerical Methods by V. Rajaraman
3. Numerical Methods for scientific and engineering computation by Iyenoyr M.K. ain & r.K. Jain, Wiley Eastern (New Age), 1995
4. Computer Based Numerical Algorithms by E.V. Krishnamurthy & S.K. Sen

Essentials of Management 25-MCA

Theory - 100 Marks
Sessional - 50 Marks

Principles of Management

Philosophy of Management, Nature & Role of Management, Management Process, Evolution of Management, Briefing of Managerial Process, Planning Organizing, Directing, Staffing, Coordination, Objectives of Business.

Organizational Structure & HRM

Definition, Types or Forms of Organization, Principles of Organization Structures, Centralization & Decentralization, Delegation, Authority, Responsibility, Communication Scopes & Types in Management, Motivation Theory, Meaning of Motivation, Kinds of Motivation, Hawthorne Exp. Theory, Motivation Techniques, Concept of Leadership in Management, Leadership Styles, Type of Leaders, Function & Qualities of Leaders.

Accounting Management

Meaning and Objects of Accounting, Accounting Concepts & Conventions, Accounting Rules, Accounting Equations, Rules of Journalizing, Cashbook, Ledger Posting, Trial Balance, Balance Sheet with adjustments.

Financial Management

Meaning & Importance of Financial Planning, Capitalization, Comparative Merits & De-merits of different securities, Types of Budgeting, Introduction to Fixed & Working Capital. Break Even Analysis, Depreciation interpretation of Financial Statement & Ratios.

Marketing & Sales Management

Introduction to Marketing Management, Scope of Marketing, Marketing Environment, Elements of Marketing Mix: 4 P's, Product Positioning, Product Life Cycle, New Product Development, Marketing Logistics, Identification of market Segment & Selecting target market.

Suggested Readings :

- 6.Introduction to Management by Koontz
- 7.Marketing Management by P. Kotler
- 8.Organizational Behaviour by Fred Luthans
- 9.Financial Management by V.K.Bhala
- 10.Financial Management by Khan & Jain
- 11.Business Administration & Management by S.C.Saxena

COMPUTER ORIENTED OPTIMIZATION TECHNIQUES –MCA-31

Theory - 100 Marks
Sessional - 50 Marks

Introduction: Historical Development, models and modeling, classification, general methods for solving OR models, Basic O.R. models and their computer softwares.

Linear Programming LP Formulations, Graphical method for solving LP's with 2 variables, Simplex method, Duality theory in linear programming and applications, Transportation problem, Assignment problem.

Project Management : PERT and CPM Project management origin and use of PERT, origin and use of CPM, Applications of PERT and CPM, Project Network, Diagram representation, Critical path calculation by network analysis and critical path method (CPM), Determination of floats, crashing in project management, Project Evaluation and review Technique (PERT).

Dynamic Programming Basic Concepts, Bellman's optimality principles, Dynamics programming approach in decision making problems, optimal subdivision problem.

Queuing Models Essential features of queuing systems, operating characteristics of queuing system, probability distribution in queuing systems, classification of queuing models, solution of queuing M/M/1 : ∞ /FCPS, M/M/1 : N/FCPS, M/M/S : ∞ /FCPS, M/M/S :/FCPS, M/E/1: ∞ /FCPS

Sequencing Models Sequencing problem, Johnson's Algorithm for processing n jobs through 2 machines, Algorithm for processing n jobs through 3 or more machines, Processing 2 jobs through n machines.

Inventory Models Introduction to the inventory problem, Deterministic Models, The classical EOQ (Economic Order Quantity) model, Inventory models with deterministe demands (no shortage & shortage allowed), Inventory models with probabilistic demand, multiitem determinise models.

References:

1. Gillet B.E. : Introduction to Operation Research, Computer Oriented Algorithmic approach - Tata McGraw Hill Publising Co. Ltd. New Delhi.
2. J.K. Sharma "Operations Research", Theory and Applications", Mac Millan.
3. P.K. Gupta & D.S. Hira, "Operations Research", S.Chand & Co.
4. S.D. Sharma, Operations Research, Kedar Nath Ram Nath, Meent.
5. Kanti Swaroop "Operations Research", S.Chand & Sons.
6. Tata Hamdy, A : Operations Research - An Introduction, Fifth Edition, Prentice Hall of India Pvt. Ltd., New Delhi.

Microprocessors & Interfaces and Assembly Language Programming-MCA-32

Theory - 100 Marks

Sessional - 50 Marks

Intel 8086 microprocessor:

Review of 8086 architecture, addressing & instruction set, pins & signals, bus transfer techniques with read/write cycle. Interfacing of 8086 microprocessor with memories, A/D and D/A converter. Interfacing of 8086 microprocessor with, PPI(8255), programmable interval timer (8254) and programmable interrupt controller (8259).

Assembly Language programming: detailed study of 8086/8088 assembly language instruction set, loops and Comparisons, conditions and procedures, arithmetic operations in assembly language, illustrations using typical programs like: table search, subroutines, symbolic and numerical manipulations and I/O.

Interfacing of 8086 microprocessor with DMA controller (8257) & USART (8251).

Introduction to diskette controller (8272), CRT controller (8275), keyboard & display controller (8279) chips (interfacing with 8086 is not required for these three chips).

Introduction to Intel 80286/80386 & microcontrollers

Introduction to 80286/80386 architecture & comparison with 8086 model, microprocessors Vs microcontroller, role of microcontrollers in embedded system.

References:

1. Hall D.V. Microprocessors & Interfacing, Programming & Hardware, McGrawHills.
2. Hall D.V. Microprocessor & Interface programming.
3. Liu Y.C., Micro Computer Systems, the 8086/8088 family, PHI.
4. Rafiqzaman M Microprocessors and Microprocessor based design, Universal Book stall.
5. Brey: Programming 80286, 80386, 80486 and pentium based personal computer, PHI.
6. Liu and Gibson, "8086/8088 Micro processor Assembly Language.

ANALYSIS & DESIGN OF ALGORITHM- MCA-33

Theory - 100 Marks

Sessional - 50 Marks

Review of basic data structures such as stacks, queues, linked lists, trees and graphs.

Concept of algorithm analysis classifying functions by their growth rates, searching an ordered list: sequential and binary search. Domain independent algorithms design techniques such as divide and conquer, greedy method, branch and bound techniques

Example algorithms for sorting techniques: Insertion sort, Quick sort, merge sort, Heap sort. Selection sort finding max and min, finding next Largest key. Graphs , Minimum spanning Tree algorithm. A shortest-Path algorithm, Traversing Graphs and Digraphs, string matching, Boyer-moore Algorithm Polynomials, Horner's method and matrices , Evaluating Polynomial functions, Matrix multiplication, strassen's method.

Parallelism, models of parallel computers. Some algorithms for PRAM, Binary Fan-in Technique, Parallel merging and sorting.

References:

1. SARA BAASE: Computer Algorithms Introduction to design and analysis, Addison-Wesley Pub. Co. 1988
2. AHO, ULLMAN, Hopcroft : The design and analysis of computer algorithms, Addison - Wesley Co. 1974
3. HORWITZ and SAHNI: Fundamentals of Computer algorithms, Golgotia Publ. 1984.
4. KNUTH, D.E: Fundamental of algorithms: The art of computer programming Vol I, Narosa Publ 1985
5. KNUTH, D.E.: Sorting and searching. The art of Computer programming vol III, Addison wesley to 1973
6. QUINN M.J: Designing efficient algorithms for parallel computers, McGraw Hill 1987.

THEORY OF COMPUTATION – MCA-34

Theory - 100 Marks
Sessional - 50 Marks

Review of Mathematical Preliminaries, Relations, functions, set theory, predicate & propositional calculus, principle of mathematical induction/strong mathematical induction.

Formal Languages, Parse structured grammar & their classification, Chomsky hierarchy, closure properties of families of languages, regular grammar, regular expression properties of regular sets, finite automata, DFA & 2DFA, FSM with output, Determinism & Non determinism, FA minimization & related theorems.

Context free grammar & its properties, derivation tree simplifying CFG, unambiguifying CFG, CNF & GNF of CFG, push down automata, 2 way PDA, relation of PDA with CFG, Determinism & Non determinism in PDA & related theorems.

Concept of Linear Bounded Automata, context sensitive grammars & their equivalence.

Unrestricted grammars & their equivalence with TM, determinism & non determinism in TM, TM as acceptor/generator/algorithms & related theorems, Multi tape, multi head, multi track TM, automata with two push down store & related theorems. Introduction to Complexity theory. Recursively enumerable sets, recursive set, partial recursive sets, Russells paradox, undecidability & some non computable problems.

References:

1. Hopcroft & Ullman: Introduction to Automata theory, languages & Computation, Narosha Publishing house.
2. James Peterson: Petrinet theory & modelling of system, prentice Hall Inc, N.J
3. Lewish Papadimutrau: Theory of Computation, Prentice Hall of India.
4. Liu C.L.: Elements of Discrete Mathematics, Mc Graw Hill.
5. Mishra & Chandrashekharam: Theory of Computer Science, Anlomata, languages & corn putation, 2nd Ed PHI, New Delhi.

INFORMATION SYSTEM & DESIGN – MCA-35

Theory - 100 Marks
Sessional - 50 Marks

System concepts, classification of the system, information concepts, and their implications, systems, system control, types of information, role of system analyst.

System development life cycle (SDLC), information system planning and initial investigation various information gathering tools, feasibility study, conventional & structured tools of system analysis, various methods of process design, form design methodologies, introduction to information system testing, quality assurance security and disaster management.

Introduction to MIS, long range planning, development & implementation of an MIS, Quality control in MIS, factors of success and failure, applications of MIS in manufacturing sector and in service sector.

Decision support system (DSS) concepts, types of DSS, knowledge based expert system (KBES), overview of enterprises resource planning (ERP) system, basic features, benefits and implementation issues of ERP.

References:

1. W.S. Jawadekar : Management Information System, THM
2. Awad E.M: System Analysis & Design, Galotis Publications.
3. Murdric R.G., Munson: MIS concepts & Design, Prentice Hall.
4. O Brien James: Management Information System, Galotia 1998.

SOFTWARE ENGINEERING –MCA-41

Theory - 100 Marks
Sessional - 50 Marks

Introduction: The software problem, software engineering problem, the software engineering approach, definitions of S.E. Goals of S.E.

Software Processes: Processes, projects and products, component software processes, characteristics of a software process, software Development Process, project management process, software configuration management process, process management process.

Planning a software project: Cost estimation, uncertainties in cost estimation, building cost estimation models, on size estimation, COCOMO model, project scheduling, average duration estimation, project scheduling and milestones

Function Oriented Design: Design principles, coupling, cohesion, design notation and specification, structured design methodology, verification

Software Testing Methods: Software testing fundamentals, test case design, white box testing, control structure testing, black-box testing, testing for specialized environments.

Software Testing Strategies: A Strategic Approach to software testing, strategic issues, unit testing, integration testing, validation testing, system testing, the art of debugging, software Quality Macall's & Boehm Graest factor

Re-Engineering: Software reengineering, software maintenance, software reengineering process model, reverse engineering, reverse engineering user interfaces, restructuring, code restructuring, data restructuring, forward engineering, economics of reengineering.

Computer-Aided software Engineering: What is CASE, building blocks for CASE, taxonomy of CASE tools, interested CASE environments, and the integration architecture, the CASE repository.

References:

1. Jalote Pankaj. An Integrated Approach to software Engineering Narosa
2. Pressman Roger, Software Engineering: A Practitioner's Approach VI ed TMH
3. Soumerville, Software Engineering ,Pearson Education
4. Poyce, Software Project Management, Addison Wesley.
5. Javadekar, Software Engineering ,TMH

ARTIFICIAL INTELLIGENCE & APPLICATIONS – MCA-42

Theory - 100 Marks

Sessional - 50 Marks

General Issues and Overview of AI: The AI problems, What is an AI technique, Characteristics of AI applications.

Problem Solving, Search and Control Strategies: General problem solving, production systems, control strategies forward and backward chaining, exhaustive searches depth first breadth first search.

Heuristic Search Techniques: Hill climbing, branch and bound technique, best first search & A* algorithm, AND / OR graphs, problem reduction & AO* algorithm, constraint satisfaction problems.

Game playing: Minimax search procedure, alpha-beta cutoffs, additional requirements.

Knowledge Representations: First order predicate calculus, skolemization, resolution principle & unification, interface mechanisms, horn's clauses, semantic networks, frame systems and value inheritance, scripts, conceptual dependency.

Natural Language processing: Parsing techniques, context free grammar, recursive transition nets (RTN), Augmented transition nets (ATN), case and logic granules, semantic analysis.

Planning: Overview an example domain the block world, component of planning systems, goal stack planning, non linear planning.

Probabilistic Reasoning and Uncertainty: Probability theory, Bayes theorem and Bayesian networks, certainty factor.

Expert Systems: Introduction to expert system and application of expert systems, various expert system shells, vidwan frame work, knowledge acquisition, case studies, MYCIN.

Learning: Rote learning, learning by induction, explanation based learning.

References:

1. Elaine Rich and Kevin Knight: Artificial Intelligence - Tata McGraw Hill.
2. Dan W. Patterson: Introduction to Artificial Intelligence and Expert Systems-Prentice
3. Nils J. Nilson : Principles of Artificial Intelligence - Narosa Publishing House.
4. Clocksin & C.S.Melish: Programming in PROLOG-Narosa Publishing House.
M.Sasikumar,S.Ramani etc. Rule based Expert System Narosa Publishing House.

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COMPUTER GRAPHICS - MCA-43

Theory - 100 Marks
Sessional - 25 Marks
Practical- 25 Marks

Introduction Computer graphics, definition, classification & applications, development of hardware & software for computer graphics.

Graphics System : Refresh Cathode ray tubes, Random and raster scan devices, DVST, plasma panel displays, LED and LCD monitors, laser devices, printers, plotters, display processors, raster and random scan system.

Interactive input Device: Logical classification, Keyboards, touch panels, light pens, joysticks, mouse, trackball digitizers, tablets.

Output primitives DDA along with, Bresenhan's line drawing algorithm, antialiasing, circle generation: Midpoint algorithms, ellipse, other curves, character generation, area filling scan line algorithm, boundary fill ,flood fill algorithm, attributes of output primitives line attributes, area fill attributes, character attributes.

Two-dimensional Transformations Translation, scaling rotation reflection sheer, matrix representation and homogeneous coordinates, composite transformations, transformation commands.

Windowing and Clipping: Viewing coordinates window, view port, clipping, window to view transformation line clipping Cohen sutherland algorithm polygon clipping ,Sutherland-hodgeman algorithm.

Three-dimensional concepts Three dimensional viewing, three dimensional object representation: polygons, curved line & surfaces quadrate (sphere, ellipsoid), surfaces, design of curves & surfaces, Bezier's methods, Bspline methods, three dimensional transformations, translating , scaling composite transformation, rotation about arbitrary axis, projection : parallel, perspective.

References:

- 1.D.Heam and M.P. Baker Computer Graphics (2nd ed), PHI.
- 2.S. Harrington - Computer Graphics - a Programming approach
- 3.New Mann & Sprout- Principles of interactive computer graphics (2nd ed) McGrawhill.
- 4.Roger S. David Procedural Elements for Computer Graphics, McGraw Hill.
- 5.Roger S David Mathematical Elements for Computer Graphics, McGraw Hill.
- 6.Foley & Vandan : computer Graphics: Principles & Practice in "C" Addison Wesley.
7. Prabhat k Andleigh, Kiran Thakral “Multimedia System Design”, PHI

JAVA & INTERNET APPLICATIONS - MCA-44

Theory - 100 Marks

Sessional – 25 Marks

Practical- 25 Marks

Java Programming : Evolution of Java , Tokens , Control structures , Programming structures , Packages , Setting class path , Starting java program , System , String , Math , Wrapper classes.

OOPs Programming : Objects and classes , Constructors , creating methods , access modifiers , garbage collector , Inheritance , Interfaces , Packages , **File Transfer protocol**: Introduction to FTP, public domain software, types of FTP servers (including anonymous), FTP, clients, common commands.

Telnet: Telnet protocol, server domain, telnet client, terminal emulation. Usenet and internet relay chat.

Web Publishing: Technology overview, website planning, analysis and design of websites, where to host your website, multiple sites on one server, maintaining a web site, publishing tools

HTML Document overview, header elements, section headings, block headings, lists, inline elements, visual markup, hypertext links, uniform resource locators, images, forms, tables, special characters, DHTML & Tools for Website Development

Overview of Interactivity tools: ASP, Java script , VB script, ActiveX, VRML

Internet Security: Internet security threats, firewalls, introduction to AAA.

Method overloading and overriding , Abstract methods , Exception handling , Inner class , Multithreading.

GUI framework : Applets , AWT , Introduction to Swing, Event handling model .

JFC: JDBC connectivity, Java.io, Java.net, Java.util, Introduction to RMI

References:

1. Alexis Leon and Mathews Leon - Internet for everyone, Tech World.
2. Douglas Corner - The Internet Book - Prentice Hall.
3. Programming for Java 2 Platform, Khalid & Mughal, Pearson Education.
4. E. Stephen Mack & Janan Platt, HTML 4.0, BPB Pub.
5. Principles of Web Design by Joe Sklar, vikas Pub. House
6. The Complete reference HTML (2nd ed) Thounas A.Powell, Tata McGraw Hill.

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7. Software Engineering 6th ed Pressman TMH.
8. Thinking in Java, Bruce Eckil, Pearson Education.

COMPUTER NETWORK AND COMMUNICATION – MCA-45

Theory - 100 Marks

Sessional - 50 Marks

Introduction: Layered Network Architecture, Review of ISO-OSI Model, Data communication techniques. Pulse code modulation (PCM) Differential Pulse Code Modulation (DPCM), Delta Modulation (DM), Data Modems, multiplexing techniques, Frequency division, time division, statistical time division multiplexing, multiplexing hierarchies, transmission media - wires cables, radio links, satellite links, fibre-optic links, error detection, parity check codes, cyclic, redundancy codes & Hemming Code.

Data Link Protocols: Stop and wait protocols: Noise free and noisy channels, performance and Efficiency, sliding Window protocols: Go back and selective repeat ARQS, performance and Efficiency, verification of protocols using finite state machine, HDLC data link protocol, Integrated services Digital network: Interfaces, Devices, Channel structure, Asynchronous transfer mode (ATM): ATM cells, header and cell formats, Layers in ATM, class 1,2,3,4 traffic.

Random Access Data Networks: Concept of random access, pure ALOHA: Throughput characteristics, slotted ALOHA. Throughputs for finite and infinite populations S-ALOHA, Markov chain model for S-ALOHA and delay in S-ALOHA stability in ALOHA.

Local Area Networks (LANs) IEEE 802.3, 802.4 and 802.5 protocols, performance of Ethernet and token Ring protocols, FDDI protocol, Distributed Queue Dual Bus (DQDB) protocol.

Network Layer Protocols Design Issues: Virtual Circuits and Datagrams, Routing algorithms: Optimality principle, shortest path routing - Dijkstra, bellman-ford and floyd warshall algorithms, flooding and broadcasting, distance vector routing, link state routing, flow based routing, multicasting, routing.

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Flow and Congestion Control General principles, window flow control, packet discarding, Isarithmic control, traffic shaping, choke packets, PSVP, dead locks and their avoidance, network layer in ATM, internetworking : Bridges, routers and gateways, internet architecture and addressing.

Transport Layer Protocols Design Issues: Quality of services, primitives, Connection Management: Addressing, connection establishment of releases, use of timers, flow control and buffering, multiplexing, crash recovery, elements of TCP/IP protocol : user datagram protocol (UDP/TCP) layering, segment format, check sum, timeout, connection management, finite state machine.

Presentation and Application layer protocols Presentation concepts, SNMP Abstract Syntax notation. 1 (ASN.1), structure of management, management information base, Cryptography : Substitution and transposition, ciphers, data encryption standard (DES), DES chaining, breaking DAS, public key cryptography, authentication protocols, Electronic mail, word wide web.

References:

1. A.S. Tanenbaum, " Computer Networks", Second Ed., Prentice Hall, India(tan.).
2. J.F.Hayes, "Modeling and Analysis of Computer Communication Networks", plenum press.
3. D.Bertsekas and R. Gallager, "Data Networks", second Ed. prentice Hall, India.
4. D.E.Comer, "Intemetworking with TCP/IP", vol 1, prentice Hall India.
5. G.E.Keiser, "Local Area Networks", McGraw Hill, International Ed.
6. W.Stalling, "Data & Computer Communications", Maxwell macmillan International Ed.

UNIX & SHELL PROGRAMMING- 51-MCA

Theory - 100 Marks

Sessional - 25 Marks

Practical-25 Marks

General Overview of the System: System structure, user perspective, O/S services, assumption about Hardware. The Kernel and buffer cache architecture of Unix O/S, System concepts, Kernel data structure, System administration, Buffer headers, Structure of the buffer pool, Scenarios for retrieval of the buffer, Reading and writing disk block, Advantage and disadvantage of buffer cache.

Internal Representation of Files: INODES, Structure of regular directories conversions of a path name to an inode, Super block, Inode assignment to a new file, Allocation of disk blocks.

System Calls for the System: Open read write file and record close, File creation, Operation of special files change directory and change root, change owner and change mode, STAT and FSTAT, PIPES Mounting and unmounting files system, Link Unlink.

Structures of Processes and process control: Process states and transitions layout of system memory, the context of a process, manipulation of process address space, Sleep process creation/termination. The user Id of a process, changing the size of a process. The SHELL

Interprocess Communication and multiprocessor system: Process tracing system VIPO network communication sockets problem of multiprocessors systems, solution with master and slave process, solution with semaphores.

Introduction to shell scripts: Bourne shell, C shell, shell variables, scripts, metacharacters and environment, if and case statements, for while and until loops.

Awk Programming: Awk pattern scanning and processing language, BEGIN and END patterns, Awk arithmetic and variables, Awk built in variable names and operators, arrays, strings.

Linux: History & Features of Linux, Linux structure, various flavours of linux.

References:

1. Design of UNIX O.S. by M.J. Bach, Prentice Hall of India.
2. B.W. Kernighan & R. Pike, The UNIX Programming Environment, PHI, 1995.
3. S. Prata Advanced LINUX A Programming's Guide, BPB Publications.
4. Guide to UNIX using LINUX by Jack Dent Tony Gaddis, Vikas Pub.House.
5. Linux complete by BPB Publications
6. Linux Kernel by Beck Pearson Education, Asia.

DATA WAREHOUSING & DATA MINING 52-MCA

Theory - 100 Marks

Sessional - 50 Marks

Introduction to data warehouse :-kinds of data, relational databases, traditional databases, advanced database systems, data mining functionalities & patterns generated. data warehouse & operational databases, multidimensional data model. data warehouse architecture:process flow, extract & load process. Clean & transform data. backup & archive process load & warehouse manager

Data warehouse design:-identifying facts & dimensions. Designing, fact tables, dimension tables. star flake schema query redirection. Multidimensional schemes, partitioning strategy, aggregation, data marting, metadata. Capacity planning, tuning the data warehouse. testing the data warehouse, developing test plan. testing operational environment, database, application.

Data preprocessing, data cleaning, data integration & transformation, data reduction. data mining primitives, language & system, architecture of data mining system.

Concept description:- characterization & comparison. mining & association rules in large databases. Mining single dimension & multilevel association rules for transactional databases relational databases & data warehouses.

Issues regarding classification & prediction. methods of classification & prediction. cluster analysis, type of data in cluster analysis clustering methods. multidimensional databases. text databases & world wide web.

References:-

1. Kimball R, Reeves L, Ross M etc - Data Warehouse life cycle tool kit, John Wiley.
2. Anahory: Data Warehousing in Real World, Addison Wesley.
3. Adriaans: Data Mining, Addison Wesley.
4. Jayce Bischaff & Ted Alexander : Data WareHouse : Practical advice from the Expert, Prentice Hall, New Jersey.
5. Data Mining by Arun Pujari.

COMPILER DESIGN - 53 - MCA

Theory - 100 Marks
Sessional - 25 Marks
Practical- 25 Marks

Introduction to Compiling and one pass compiler: Compilers and translators, phases of compilers, compiler writing tools, bootstrapping, and overview of one pass compiler.

Finite Automata & Lexical Analysis: Role of lexical analyzer, specification of tokens, recognition of tokens, regular expression, finite automata, from regular expression to finite automata, DFA and NFA, implementation of lexical analyser, tools for lexical analyser LEX.

Syntax Analysis & Parsing Techniques: Context free grammars, bottom up parsing and top down parsing, shift reduce parsing, operator precedence parsing, top down parsing, elimination of left recursion, recursive descent parsing, predictive parser construction. LR parsers, constructing SLR and canonical LR parsing tables, using ambiguous grammar, Introduction to YACC, LR(1) & LALR Parsers.

Syntax Directed Translation: Syntax directed translation scheme, construction of syntax trees, SDT with inherited and synthesized attributes.

Run time Environment: Source language issues, storage organization and allocation strategies, parameter passing, implementation of block structured languages.

Intermediate code generation: Intermediate languages, prefix notation, three address code, quadruples and triples, translation of assignment statements, Boolean expression, procedural calls and iterative statements.

Error Detection and Recovery: Lexical & syntactic phase error, semantic errors.

Code Optimization: Optimization of basic blocks, loop optimization, global data flow analysis, loop invariant computations and other related optimization techniques.

Code Generation: Issues in design of code generator, design a simple code generator.

References:

1. Alfred V Aho, Ravi Sethi and J.D. Ullman : Compilers- Principles, Techniques and tools- Addison Wesley.
2. Alfred VAho and J.D. Ullman : Principles of Compiler Design-Narosa Publishing
3. Tremblay, Theory and Practice of compiler writing, Mc Graw Hill.
4. Holuv, Compiler Design in C, PHI.

ELECTIVE -1- 54 - MCA

(1) MULTIMEDIA & ANIMATION

Overview of Multimedia, Multimedia and Interactivity.

Multimedia technology **Multimedia components:** Multimedia Hardware, SCSI, IDE, MCI, Multimedia data and file formats, RTF, TIFF, MIDI, JPEG, DIB, MPEG, Multimedia Tools, Presentation tools, Authoring tools, presentation.

Sound and audio technology, image and graphics, animation and special effects, video technology, storage media and access speed, data compression, multimedia document and interchange formats, synchronization, multimedia & network.

Application Development

Product development overview, authoring tools and metaphors, production processes.

Animation

Design animation sequences, general computer animation functions, faster animations, computer animation languages, key frame systems morphing, tweening motion specification.

Books:

1. Multimedia Systems Design, P.K. Andleigh and K.Thakrar, Prentice Hall PTR, 1996.
2. Multimedia Computing, communications & applications, ralf steimnetz and kerla nashtedt, prentice Hall 1995.
3. Creating Multimedia Presentations, Douglas E. Wolfgram, Que, Corp,
4. Multimedia System, Edited by John F.K. Buford. Addison Wesley.
5. Vilkamil-Casanova: Multimedia Production, Planning & Delivery, PHI.
6. Vilkamil-Casanova : Multimedia An Introduction, PHI.

ELECTIVE -1- 54 - MCA
(2) NEURAL NETWORK & FUZZY LOGIC

Overview of Crisp sets and fuzzy sets

Basic concepts of crisp sets and fuzzy sets, basic types of sets, fuzzy sets versus crisp sets, representation and extension principle for fuzzy sets, operations on fuzzy sets.

Fuzzy relations and fuzzy logic

Crisp versus fuzzy relations, binary relations on sets, equivalence compatibility and ordering relations, morphisms and compositions of relations, fuzzy relations equations, fuzzy measures and possibility theory, classical logic and multivalued logics, fuzzy propositions and approximate reasoning.

Introduction to Neural Networks

Biological and artificial neurons, perceptrons classification and linear separability XOR problem, hopfield networks, overview of neural network architectures, multilayered feed forward and recurrent networks, learning supervised unsupervised and reinforcement, generalised delta rule.

Multilayered Networks

Backpropagation network, BP training algorithm and derivation for adaptation of weights, variations in backpropagation and alternative cost function, radial basic function network, applications of BP and RBF network.

Recurrent Network and Unsupervised learning, associative memories, fuzzy systems and neuro systems, applications of sets and neural networks in pattern recognition, image processing & Automation.

References:

1. G. Klir and B. Yuan "Fuzzy sets and Fuzzy Logic" Theory and Applications". Prentice Hall of India 1997.
2. B. Kosko "Neural Networks and Fuzzy Systems A Dynamical Systems Approach to Machine Intelligence" Prentice Hall of India 1997.

ELECTIVE -1- 54 - MCA
(3)DISTRIBUTED & PARALLEL COMPUTING

Introduction

Introduction to parallel processing/computing, parallel processing terminology, control parallel approach, data parallel approach, PRAM model of parallel computing, various fundamental PRAM algorithms, analysis of PRAM algorithms, introduction to processor arrays, multiprocessors and multicomputers, flynn's taxonomy, performance issues in parallel processing.

Elementary Parallel Algorithms

Mapping one processor array on to another, dynamic load balancing on multicomputers, static scheduling on UMA multiprocessors, deadlock, classification of MIMD and SIMD algorithms, parallel reduction/broadcast/prefix sum algorithm.

Matrix multiplication/Fast fourier transform

Matrix multiplication algorithms for various SIMD models/multiprocessors/multicomputers implementation of fast fourier transform/inverse fast fourier transform, algorithm on various SIMD models/multicomputers.

Solving linear system & graph algorithms

Parallel algorithms for implementation of various numerical methods of solving linear system, parallel algorithms for searching a graph, finding connected components, finding all pair shortest path, single source shortest path, minimum cost spanning tree.

Parallel searching & sorting

Complexity of parallel search, algorithm for searching on multiprocessors, enumeration sort, lower bounds on parallel sorting, odd even transposition sorting, bitonic merge/sort on various topologies.

References:

1. Michael J Quinn : Parallel computing: Theory and practice second edition Mc Grawhill June
2. Aki S.G: The Design & Analysis of Parallel Algorithms, Prentice Hall.
3. Hwang Kori : Advanced computer Architecture Parallelism, Scalability Programmability, McGraw Hill
4. Perrot R: Parallel Programming, Addison Wesley.
5. Crichlow J: An Introduction to distributed & Parallel Computing, Prentice Hall.
6. Lakshmi Vandan S. & Dhall S.K: Analysis Design of Parallel Algorithm, McGraw Hill.

ELECTIVE -1- 54 - MCA
(4) NETWORK SECURITY AND CRYPTOGRAPHY

Basic concepts: Information Systems reviewed, Batch Systems , On-line Systems ,Wide Area Networks(WAN), Metropolitan Area Networks(MAN),Local Area Networks (LANs: applications types)
Security defined , Roles.

Models: Characteristics of security models , Reference monitor concept, Formal Security Models - Harrison- Piazzo model, Ulman Model, Bell La-Fadila Model, Object-oriented Model, Clares Willson, Chines Wall Model,etc.

Information Flow , Role based access control. Covert channels, Security mechanisms in Operating Systems.

Policy Paradigm: Meta policies.

Implementing a security model , formal specifications and verification methodologies. Targets, Facility , Hardware , Software ,Applications, Data Communications, Procedures (Administrative), Personnel.

Threats to Security: Areas of vulnerability, Physical Security, Data Security, Systems Security, Computer System Security, Communication Security, Personnel Security Threat Perpetration: Sources. Manmade, accidental. Threat prevention measures. Identity verification , Cryptography. Disaster recovery and Contingency Plan , Security Management , The future of Computer Security.

References :

1. Security & Protection in Information Systems by Grissonnanche, North Holland
2. Cryptography and Data Security by Denning, Addison Wesley.
3. Computer Security Management by Frocht, Boyal & Frasev.
4. Security architecture for open Distributed systems by Muflic, JohnWiley.
5. Network Security by Kacifman & Perlman, PHI.
6. [Http//www.Theory.les.MIT.edu/Rivest](http://www.Theory.les.MIT.edu/Rivest)

ELECTIVE -II- 55 - MCA
(1)WEB DESIGN TECHNOLOGY

Theory – 100
Sessional – 50

Unit:- 1

Introduction to multimedia applications, people to people and people to system applications, audio and video interpersonal applications, shared applications tools, Audio- video conferencing, multimedia electronic mail and document transfer, server based application.

Unit:- 2

Networking requirements, network features and performance of audio and motion video, other requirements like multicasting, image transfer etc.

Unit:- 3

Networking solutions, for multimedia several network aspects, LAN, WAN, circuit WAN and ATM, WAN as multimedia carrier, frame relay and SMPS as multimedia carriers.

Unit:- 4

Introduction to web technology, encoding, digitization, compression techniques for audio, image etc, Images - compression, formats; Audio - compression, formats; Content Delivery - protocols - HTTP and variants.

Unit:- 5

Content preparation - HTML, DHTML, VRML, SGML, XML and other markup schemes;, Internet servers, proxy servers; Search engines; Data on the web; Content Display - browsers, plugins, helper applications; Interactivity - Java, Active-X; Component technologies, Javabeans, CORBA; Security, Electronic payment systems, Firewalls, Encryption, Watermarks; Performance, Benchmarking the Web.

Books and References:

- S. Tannenbaum. Computer Networks , 2nd Edition, Prentice-Hall, 1988.
- D. E. Comer. Internetworking with TCP-IP: Principles, Protocols and Architecture , Vol I, 2nd Edition, Prentice Hall, 1991.
- D. E. Comer and D. L. Stevens. Internetworking with TCP-IP: Design, Implementation, and Internals , Vol II, Prentice Hall, 1990.
- D. Bertsekas and R. Gallagar. Data Networks , 2nd Edition, Prentice Hall, 1992.

ELECTIVE -II- 55 - MCA
(2) ENTERPRISE RESOURCE PLANNING

Overview of business functions

Business function in an organization, material management, scheduling, shop floor control, forecasting, accounting and finance, human resources, productivity management

Typical business processes

Core processes, product control, sales order processing, purchases, administrative process, human resource, finance, support processes, marketing, strategic planning, research and development.

Problems in traditional functional view

Need for integrated process view, information as a resource, motivation for ERP.

Evolutive of information systems

Electronic Data processing (EDP) systems, management information systems, executive information systems, information needs of organization, ERP as an integrator of information needs at various levels, Decision making involved at the above level.

ERP Models/Functionality

Sales order processing, MRP, scheduling, forecasting, maintenance, distribution, finance, features of each of the models, description of data flows across each module, overview of the supporting databases, technologies required for ERP.

Implementation Issues

Pre implementation issues, financial justification of ERP, evaluation of commercial software, during implementation issues, reengineering of various business processes, education and training, project management, post implementation issues, performance measurement.

Reference:

1. V.K. Garg and N.K. Venkitakrishanan, Enterprise Resource Planning : Concepts and Practices Prentice Hall(1) 1999 New Delhi.
2. J.Kanter, Managing with information, Prentice Hall(I) 1996, New Delhi.
3. S.Sadagopan, Management Information Systems, Prentice Hall(I) 1996 New Delhi.
4. V. Rajaraman, Analysis and Design of Information Systems, Prentice Hall(I) 1997, New Delhi.
5. K.M. Hussain and D. Hussain, Information Systems : Analysis Design and Implementation, Tata McGraw Hill 1995 New Delhi.
6. Concepts in ERP by Monk & Brady, Vikas Pub. (Thomson).

ELECTIVE -II- 55 - MCA
(3) DIGITAL IMAGE PROCESSING & COMPUTER VISION

Introduction, Image processing system, Image process, digitizer, display and recording devices.

Digital Image fundamentals: Image model, relationship between pixels imaging geometry. Manipulation of images, image transformation, introduction to fast fouries transformation, walsh transformation, hadmard transformation, hotelling transformation, hough transformation.

Image Enhancement : Special domain method, frequency domain method, histogram modification.

Image smoothing : Neighbourhood averaging, median filtering, lowpass filters average of multiple images. Image sharpening by differentiation technique high pass filtering.

Image restoration : Degradation model for continuous function, effect of diagnalization on degradation models, algebric approach to restoration, east mean square filter, interactive restoration, grey level interpolation.

Image Encoding & segmentation: Segmentation, detection of discontinuation by point detection, line detection edge detection. Edge linking & Boundary detection, Local analysis, global by hough transform & global by graph theoretic techniques.

Thresholding: Definition, global thresholding.

Filtering : Median, gradient. Simple methods of representation, Signatures, bounderesegment, skeleton of a region. Polynomial approximation.

References:

1. Schal Koff: Digital Image Processing & Computer Vision, Willy.
2. M. Sonka et.al: Image Processing and Machine Vision, Thomson Learning.
3. Ballard & Brown: Computer Vision, Prentice Hall.
4. Gontalix & Wintx: Digital Image Processing, Addision Wesley.
5. Jan A.K: Fundamentals of Digital Image Processing, PHI.

ELECTIVE -II- 55 - MCA
(4) SIMULATION & MODELING

System Models:

Concept of a system, system environment, stochastic activities, continuous and discrete system modeling, system modelling, type of models, static and dynamic systems, principles used in modeling, system studies.

System Simulation :

Techniques of simulation, monte carlo method, comparison of simulation and analytical methods, numerical computation techniques for continuous and discrete models, distributed leg models, cobweb models, simulation study.

Continuous system simulation :

Continuous system models, differential equation, analog computer analog methods, digital analog simulators, CSSLS, CSMPIII language.

System Dynamics :

Historical background, exponential, Growth and decay models, modified exponential growth models, logistic curves and generalization of growth models, system dynamics diagrams, dynamo language.

Probability concepts in simulation :

Stochastic variables, discrete and continuous probability function, continuous uniform distributed and computer generation of random numbers, uniform random number generator, non uniform continuously distributed random numbers, rejection method.

Discrete system simulation:

Discrete events, representation of time, generation of arrival patterns, simulation of telephone system, delayed calls, simulation programming tasks, gathering statistics, and discrete simulation languages.

Simulation languages:

Classification of simulation languages, Introduction to GPSS, general description, action times, choice of paths, simulation of a manufacturing shop, facilities and storage, program control statements, priorities and parameters, numerical attributes, functions, simulation of a supermarket transfer models, GPSS model applied to any application, simulation programming techniques like entry types.

References:

1. G.Gordan - System Simulation, PHI, 1995
2. T.A. Payer - Introduction to simulation
3. W.A. Spriet - Computer Oriented Modeling and Simulation.
4. B.Barnes - Modelling and Performance Measurement of Computer System.

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5. V. Rajaraman “Analog Simulation” PHI

**ELECTIVE -II- 55 - MCA
(5) BIOINFORMATICS**

Unit – I

Bio-informatics as multidisciplinary domain, Scope of Bio-informatics, Terminology & Technology of Bio-informatics. Future prospects of Bio-informatics

Unit – II

Evolutionary basis for sequence alignment. Distance & similarity, Optimal alignment method. Use of Matrices, Bayesian statistics in sequence alignment..

Unit – III

Evolutionary basis for sequence alignment . Database similarity searching. FASTA & BLAST

Unit – IV

Searching for trees, multiple alignment procedures phylogenetic trees building methods.

Unit – V

Evolution of trees & data phylogenetic software HTML, XML, BSML, CML & PERL.

Reference Book

1. Rehm and Reed (eds). Biotechnology- A multivolume Comprehensive Treatise. Volume 5b.