

# DEPARTMENT OF MATHEMATICAL SCIENCES & COMPUTER APPLICATIONS

*Ordinances, Schemes of Examination*

**And**

*Course Curriculum*

**For**

## MASTER OF COMPUTER APPLICATIONS

### *Schedule of courses and Student Evaluation*

The MCA program is planned as a 6 semester's course out of which last semester is a project.

### *Scheme of Examination and Rules of Promotion*

1. The MCA, three-year full time degree course program shall be comprised of six semester, Viz. Semester I, II, III, IV, V & VI.
2. The candidates who have passed 10+2 examination with Science/Mathematics/B.Sc.(Math/Stats/ comp Science)/B.C.A. and graduate in any discipline with atleast 50 % marks or any other examination considered for equivalent at the entrance test for admission to the MCA Course, subject to the admission procedure to be laid down by the university from time to time.
3. The examination in all odd Semester papers shall be conducted at the end of odd Semester and an examination in all even Semester papers shall be conducted at the end of even semesters.
4. No supplementary examination for any of the semester shall be conducted.
5. English shall be the medium of instructions and examinations.
6. Each semester consist five-theory paper and one practical.
7. (a) Students are required to clear at least 5 Theory papers per year (2 semester) for promotion to the next year.  
The candidate shall have to clear the back paper in maximum two attempt of subsequent exam and then only they will be promoted to the next year.  
(b) To clear the backlog of III/IV/V semester, special examination may be arranged at the end of six semesters.
- 8.(a) The minimum pass marks for each individually in external and Internal exam, theory paper would be 40 %, while the aggregate of each semester shall be 50%.  
  
(b) The minimum pass marks in practical shall be 50% of marks. In case candidates are absent or failed in practical, shall get the opportunity only in the next subsequent exam of their semester.
9. The minimum attendance for each paper for appearing the semester examination shall be 75%. However the relaxation of 15% shall be given on the special ground by competent authority.

10. Successful candidate shall be classified on the basis of the combined result of semester I, II, III, IV, V, and VI, examinations as follows: Candidates securing in aggregate:
- |                      |                                 |
|----------------------|---------------------------------|
| 75% and above        | First Division with Distinction |
| 65% to less than 75% | First Division                  |
| 50% to less than 65% | Second Division                 |
- The minimum pass marks for the whole year would be 50%
11. Improvement shall be allowed only in theory papers but not in a paper pertaining to the six semesters after the final result is declared.
12. No revaluation shall be permitted.
13. *Evaluation*  
Each subject in the curriculum (theory practical/seminar/industrial lecture /project) is an independent entity and should be valued separately.  
The attendance and marks obtained in each entity should be above a minimum required level. They should not be aggregated
14. *Reregistering for a subject*  
For professional courses it is imperative that the course contents are modified at regular intervals. Allowing a candidate to appear for examination long after attending a subject cannot be justified academically. It is therefore necessary for a student at the earliest or some other relevant subject as per the requirements and then appears in the examination.
15. *Project, Seminar, Industrial Lectures*  
All candidates must take a project full time for approximately 5 months, preferably in industry / business culminating in a real application development. It is to be commended in the third year I semester. Further, all candidates must take the seminars in the 5th and 6th semester and Industrial lectures in 5th semester.
16. *Evaluation of Sessional Work*
- There shall be 3 Internal sessional examinations of 30 marks exam conducted during each semester.
  - Average of two better awards of sessional marks out of three shall be averaged.
  - The student is found absent in any of three sessional exam, he/she will be awarded 0 marks in that particular sessional exam.
  - Students failing in sessional examination even if he/she is passed in the respective theory paper will be declared failed in that course, he/she shall have to reappear in concerning exams including sessional exams.
17. The BOS/Departmental committee may recommend change in the syllabi etc of the course from time to time with the approval of appropriate body/Vice Chancellor.
18. *The course of studies and the scheme of examination shall be as follows:-*

**INFORMATION TECHNOLOGY**  
**MCA-I-SEM**  
**MC-11**

**UNIT -1**

Introduction: Basic concepts of information technology, concepts of data and information. Data processing history of computers, organization of computer, input output devices, Storage devices.

**UNIT -2**

Software concepts-System, software, application software. Utility packages, Compiler, Interpreters, operating system, elementary commands of DOS, windows and Unix, Operating System (file handling, directory management and general purpose user interfacing commands.)

**UNIT-3**

Computer Language M/C languages, assembly languages, higher languages, Fourth Generation language, general concept of OOPS (Object Oriented Programming) and SQL (Structured Query Language)

**UNIT-4**

Communications and Network Technology: Communication system elements, Communication modes [Analog and Digital, synchronous and asynchronous, simplex, half Duplex and full duplex, circuit switching, and packet switching), communication media;(Speed and capacity, twisted pair coaxial fiber optics, wireless), common network components.Host and server work station, network topologies and Network protocols (ISO/OSI Ref Model And TCP/IP).

**UNIT -5**

state of the art application on IT in business: industry, home education, and training, Entertainment, science, engineering, and medicine, multimedia data types (graphics, images, Audio, video), virtual reality application, Internet, World Wide Web (WWW). Domain names. E-Mail, teleconferencing, e-commerce, hypermedia, data warehousing.

**REFERENCES**

- Rajaraman V," Fundamental of Computers" (2<sup>nd</sup> edition),Prentice Hall of India ,New Delhi 1996.Sanders . D. H " computers Today " Mc Graw Hill 1988.
- Nagpal, D.P.,"Computes Fundamentals"
- SJaiswal" Information technology Today:" galgotia pub. New Deldi. 1999

**COMPUTER ORGANIZATION**  
**MCA-I-SEM**  
**MC-12**

**Unit-I**

(Representation of Information and Basic Building Blocks) Introduction to Computer, Computer hardware generation, Number System: Binary, Octal, Hexadecimal, Character Codes (BCD, ASCII, EBCDIC), Logic gates, Boolean Algebra, K-map simplification, Half Adder, Full Adder, Subtractor, Decoder, Encoders, Multiplexer, Demultiplexer, Carry lookahead adder,

(2) Combinational logic Design, Flip-Flops, Registers, Counters (synchronous & asynchronous), ALU, Micro-Operation. ALU- chip, Faster Algorithm and Implementation (multiplication & Division)

**Unit-II (Basic Organization)**

Von Neumann Machine (IAS Computer), Operational flow chart (Fetch, Execute), Instruction Cycle, Organization of Central Processing Unit, Hardwired & micro programmed control unit, Single Organization, General Register Organization, Stack Organization, Addressing modes, Instruction formats, data transfer & Manipulation, I/O Organization, Bus Architecture, Programming Registers

**Unit-III (Memory Organization)**

Memory Hierarchy, Main memory (RAM/ROM chips), Auxiliary memory, Associative memory, Cache memory, Virtual Memory, Memory Management Hardware, hit/miss ratio, magnetic disk and its performance, magnetic Tape etc.

**Unit-IV (I/O Organization)**

Peripheral devices, I/O interface, Modes of Transfer, Priority Interrupt, Direct Memory Access, Input-Output Processor, and Serial Communication. I/O Controllers, Asynchronous data transfer, Strobe Control, Handshaking.

**Unit-V (Process Organization)**

Basic Concept of 8-bit micro Processor (8085) and 16-bit Micro Processor (8086), Assembly Instruction Set, Assembly language program of (8085): Addition of two numbers, Subtraction, Block Transfer, find greatest number, Table search, Numeric Manipulation, Introductory Concept of pipeline, Flynn's and Feng's Classification, Parallel Architectural classification.

**References:**

1. William Stalling, "Computer Organization & Architecture", Pearson education Asia
2. Mano Morris, "Computer System Architecture", PHI
3. Zaky & Hamacher, "Computer Organization", McGraw Hill
4. B. Ram, "Computer Fundamental Architecture & Organization", New Age
5. Tannenbaum, " Structured Computer Organization", PHI.

**PROGRAMMING IN C**  
**MCA-I-SEM**  
**MC-13**

**UNIT 1:**

Standard I/O in “C”, **Fundamental Data Types and Storage Classes:** Character types, Integer, short, long, unsigned, single and double-precision floating point, storage classes, automatic, register, static and external, **Operators and Expressions:** Using numeric and relational operators, mixed operands and type conversion, Logical operators, Bit operations, Operator precedence and associativity,

**UNIT 2:**

**Conditional Program Execution:** Applying if and switch statements, nesting if and else, restrictions on switch values, use of break and default with switch, **Program Loops and Iteration:** Uses of while, do and for loops, multiple loop variables, assignment operators, using break and continue, **Modular Programming:** Passing arguments by value, scope rules and global variables, separate compilation, and linkage, building your own modules.

**UNIT 3:**

**Arrays:** Array notation and representation, manipulating array elements, using multidimensional arrays, arrays of unknown or varying size, **Structures:** Purpose and usage of structures, declaring structures, assigning of structures, **Pointers to Objects:** Pointer and address arithmetic, pointer operations and declarations, using pointers as function arguments, Dynamic memory allocation, defining and using stacks and linked lists.

**UNIT 4:**

Sequential search, Sorting arrays, Strings, Text files, **The Standard C Preprocessor:** Defining and calling macros, utilizing conditional compilation, passing values to the compiler,

**UNIT 5:**

**The Standard C Library:** Input/Output : fopen, fread, etc, string handling functions, Math functions : log, sin, alike Other Standard C functions.

**Text Books :**

1. Problem Solving and Program Design in C, by Jeri R. Hanly, Elliot B. Koffman, Pearson Addison-Wesley, 2006.
2. Computer Science- A Structured Programming Approach Using C, by Behrouz A. Forouzan, Richard F. Gilberg, Thomson, Third Edition [India Edition], 2007.

**ACCOUNTING AND FINANCIAL MANAGEMENT**  
**MCA-I-SEM**  
**MC - 14**

**Unit I**

Overview: Accounting concepts, conventions and principles; Accounting Equation, International Accounting principles and standards; Matching of Indian Accounting Standards with International Accounting Standards.

**Unit II**

Mechanics of Accounting: Double entry system of accounting, journalizing of transactions; preparation of final accounts, Profit & Loss Account, Profit & Loss Appropriation account and Balance Sheet, Policies related with depreciation, inventory and intangible assets like copyright, trademark, patents and goodwill.

**Unit III**

Analysis of financial statement: Ratio Analysis- solvency ratios, profitability ratios, activity ratios, liquidity ratios, market capitalization ratios ; Common Size Statement ; Comparative Balance Sheet and Trend Analysis of manufacturing, service & banking organizations.

**Unit IV**

Funds Flow Statement: Meaning, Concept of Gross and Net Working Capital, Preparation of Schedule of Changes in Working Capital, Preparation of Funds Flow Statement and its analysis ; Cash Flow Statement: Various cash and non-cash transactions, flow of cash, preparation of Cash Flow Statement and its analysis.

**SUGGESTED READINGS**

- 1) Narayanswami - Financial Accounting: A Managerial Perspective (PHI, 2nd Edition).
- 2) Mukherjee - Financial Accounting for Management (TMH, 1st Edition).
- 3) Ramchandran & Kakani - Financial Accounting for Management (TMH, 2nd Edition).
- 4) Ghosh T P - Accounting and Finance for Managers (Taxman, 1st Edition).

- 5) Maheshwari S.N & Maheshwari S K – An Introduction to Accountancy (Vikas, 9th Edition)
- 6) Ashish K. Bhattacharya- Essentials of Financial Accounting (PHI, New Delhi)
- 7) Ghosh T.P- Financial Accounting for Managers (Taxman, 3rd Edition)
- 8) Maheshwari S.N & Maheshwari S K – A text book of Accounting for Management (Vikas, 1st Edition)
- 9) Gupta Ambrish - Financial Accounting for Management (Pearson Education, 2nd Edition)
- 10) Chowdhary Anil - Fundamentals of Accounting and Financial Analysis (Pearson Education, 1st Edition).

**DISCRETE MATHEMATICS**  
**MCA-I-SEM**  
**MC – 15**

**Unit-I:**

Set Theory: Definition of sets, countable and uncountable sets, Venn Diagrams, proofs of some general identities on sets Relation: Definition, types of relation, composition of relations, Pictorial representation of relation, equivalence relation, partial ordering relation. Function: Definition, type of functions, one to one, into and onto function, inverse function, composition of functions, recursively defined functions. Notion of Proof: Proof by counter-example, the contra-positive, proof by contradiction, inductive proofs.

**Unit-II:**

Algebraic Structures: Definition, Properties, types: Semi Groups, Monoid, Groups, Abelian group, properties of groups, Subgroup, cyclic groups, Cosets, factor group, Permutation groups, Normal subgroup, Homomorphism and isomorphism of Groups, example and standard results, Rings and Fields: definition and standard results.

**Unit-III:**

Posets, Hasse Diagram and Lattices: Introduction, ordered set, Hasse diagram of partially, ordered set, isomorphic ordered set, well ordered set, properties of Lattices, and complemented lattices. Boolean Algebra: Basic definitions, Sum of Products and Product of Sums, Form in Boolean Algebra, Logic gates and Karnaugh maps. Graphs: Simple graph, multi graph, graph terminology, representation of graphs, Bipartite, Regular, Planar and connected graphs, connected components in a graph, Euler graphs, Hamiltonian path and circuits, Graph coloring, chromatic number, isomorphism and Homomorphism of graphs.

Tree: Definition, Rooted tree, properties of trees, binary search tree, tree traversal.

**Unit-IV:**

Propositional Logic: Proposition, First order logic, Basic logical operation, truth tables, tautologies, Contradictions, Algebra of Proposition, logical implications, logical equivalence, predicates, Universal and existential quantifiers.

**Unit-V:**

Combinatorics: Basic Counting Technique, Pigeon-hole Principle, Recurrence Relation, Generating function, Polya's Counting Theorem



Text books and Supplementary reading:

1. Discrete Mathematics and Its Applications, By Kenneth H Rosen, McGraw Hill, Sept.2002.
2. Discrete Mathematical Structures with Applications to Computer Science, By J. P. Tremblay, R. Manohar, McGraw Hill Pub, 1975.
3. Graph Theory With Applications to Engineering and Computer Science, By Prentice Hall, Englewood Cliffs, N. J, 1974
4. Combinatorics: Theory and Applications, By V. Krishnamurthy, East-West Press Pvt. Ltd., New Delhi, 1986.

## DATA STRUCTURES 'C'

### MCA II-SEM

#### MCA-- 21

#### Unit -I

Introduction: Basic Terminology, Elementary Data Organization, Data Structure operations, Algorithm Complexity and Time-Space trade-off Arrays: Array Definition, Representation and Analysis, Single and Multidimensional Arrays, address calculation, application of arrays, Character String in C, Character string operation, Array as Parameters, Ordered List, Sparse Matrices, and Vectors. Stacks: Array Representation and Implementation of stack, Operations on Stacks: Push & Pop, Array Representation of Stack, Linked Representation of Stack, Operations Associated with Stacks, Application of stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack. Recursion: Recursive definition and processes, recursion in C, example of recursion, Tower of Hanoi Problem, simulating recursion. Backtracking, recursive algorithms, principles of recursion, tail recursion, removal of recursion.

#### Unit - II

Queues: Array and linked representation and implementation of queues, Operations on Queue: Create, Add, Delete, Full and Empty. Circular queue, Deque, and Priority Queue. Linked list: Representation and Implementation of Singly Linked Lists, Two-way Header List, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion to/from Linked Lists, Insertion and deletion Algorithms, Doubly linked list, Linked List in Array, Polynomial representation and addition, Generalized linked list, Garbage Collection and Compaction.

#### Unit - III

Trees: Basic terminology, Binary Trees, Binary tree representation, algebraic Expressions, Complete Binary Tree. Extended Binary Trees, Array and Linked Representation of Binary trees, Traversing Binary trees, Threaded Binary trees. Traversing Threaded Binary trees, Huffman algorithm.

Searching and Hashing: Sequential search, binary search, comparison and analysis, Hash Table, Hash Functions, Collision Resolution Strategies, Hash Table Implementation.

#### Unit - IV

*Sorting: Insertion Sort, Bubble Sorting, Quick Sort, Two Way Merge Sort, Heap Sort, Sorting on Different Keys, Practical consideration for Internal Sorting.*

Binary Search Trees: Binary Search Tree (BST), Insertion and Deletion in BST, Complexity of Search Algorithm, Path Length, AVL Trees, B-trees.

## **Unit - V**

Graphs: Terminology & Representations, Graphs & Multi-graphs, Directed Graphs, Sequential Representations of Graphs, Adjacency Matrices, Traversal, Connected Component and Spanning Trees, Minimum Cost Spanning Trees.

File Structures: Physical Storage Media File Organization, Organization of records into Blocks, Sequential Files, Indexing and Hashing, Primary indices, Secondary indices, B+ Tree index Files, B Tree index Files, Indexing and Hashing Comparisons.

References

Text Books

1. Y. Langsam, M. Augenstein and A. Tannenbaum, Data Structures using C and C++, Pearson Education Asia, 2nd Edition, 2002.
2. Ellis Horowitz, S. Sahni, D. Mehta Fundamentals of Data Structures in C++, Galgotia Book Source, New Delhi.

Reference Books

1. S. Lipschutz, Data Structures Mc-Graw Hill International Editions, 1986.
2. Jean-Paul Tremblay, Paul. G. Soresan, An introduction to data structures with Applications, Tata Mc-Graw Hill International Editions, 2nd edition 1984.
3. A. Michael Berman, Data structures via C++, Oxford University Press, 2002.
4. M. Weiss, Data Structures and Algorithm Analysis in C++, Pearson Education, 2002, 2nd edition

**OPERATING SYSTEMS**  
**MCA-II-SEM**  
**MC 22**

**Unit-I**

Introduction: Definition and types of operating systems, Batch Systems, multi programming, time-sharing parallel, distributed and real-time systems, Operating system structure, Operating system components and services, System calls, system programs, Virtual machines.

**Unit-II**

Process Management: Process concept, Process scheduling, Cooperating processes, Threads, Interprocess communication, CPU scheduling criteria, Scheduling algorithms, Multiple-processor scheduling, Real-time scheduling and Algorithm evaluation.

**Unit-III**

Process Synchronization and Deadlocks: The Critical-Section problem, synchronization hardware, Semaphores, Classical problems of synchronization, Critical regions, Monitors, Deadlocks-System model, Characterization, Deadlock prevention, Avoidance and Detection, Recovery from deadlock, Combined approach to deadlock handling.

**Unit-IV**

Storage management: Memory Management-Logical and Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation with paging in MULTICS and Intel 386, Virtual Memory, Demand paging and its performance, Page replacement algorithms, Allocation of frames, Thrashing, Page Size and other considerations, Demand segmentation, File systems, secondary Storage Structure, File concept, access methods, directory implementation, Efficiency and performance, recovery, Disk structure, Disk scheduling methods, Disk management, Recovery, Disk structure, disk scheduling methods, Disk management, Swap-Space management, Disk reliability.

**Unit-V**

Security & Case Study: Protection and Security-Goals of protection, Domain of protection, Access matrix, Implementation of access Matrix, Revocation of Access Rights, language based protection, The Security problem, Authentication, One Time passwords, Program threats, System threats, Threat Monitoring, Encryption.

Windows NT-Design principles, System components, Environmental subsystems, File system, Networking and program interface, Linux system-design principles, Kernel Modules, Process Management, Scheduling, Memory management, File Systems, Input and Output, Interprocess communication, Network structure, security

*References*

1. Abraham Siberschatz and Peter Baer Galvin, "Operating System Concepts", Fifth Edition, Addison-Wesley
2. Milan Milankovic, "Operating Systems, Concepts and Design", McGraw-Hill.
3. Harvey M Deital, "Operating Systems", Addison Wesley
4. Richard Peterson, "Linux: The Complete Reference", Osborne McGraw-Hill.

**PRINCIPLES OF MANAGEMENT**  
**MCA-II-SEM**  
**MC - 23**

**UNIT I**

Management: Concept, Nature, Importance; Management : Art and Science, Management As a Profession, Management Vs. Administration, Management Skills, Levels of Management, Characteristics of Quality Managers. Evolution of Management: Early contributions, Taylor and Scientific Management, Fayol's Administrative Management, Bureaucracy, Hawthorne Experiments and Human Relations, Social System Approach, Decision Theory Approach. Business Ethics and Social Responsibility: Concept, Shift to Ethics, Tools of Ethics.

**UNIT II**

Introduction to Functions of Management

Planning: Nature, Scope, Objectives and Significance of Planning, Types of Planning, Process of Planning, Barriers to Effective Planning, Planning Premises and Forecasting, Key to Planning, Decision Making. Organizing: Concept, Organisation Theories, Forms of Organisational Structure, Combining Jobs: Departmentation, Span of Control, Delegation of Authority, Authority & Responsibility, Organisational Design.

**UNIT III**

Staffing: Concept, System Approach, Manpower Planning, Job Design, Recruitment & Selection, Training & Development, Performance Appraisal Directing: Concept, Direction and Supervision Motivation: Concept, Motivation and Performance, Theories Of Motivation, Approaches for Improving Motivation, Pay and Job Performance, Quality of Work Life, Morale Building.

**UNIT IV**

Leadership: The Core of Leadership: Influence, Functions of Leaders, Leadership Style, Leadership Development. Communication: Communication Process, Importance of Communication, Communication Channels, Barriers to Communication. Controlling: Concept, Types of Control, Methods: Pre-control: Concurrent Control: Post-control, An Integrated Control System, The Quality Concept Factors affecting Quality, Developing a Quality Control System, Total Quality Control, Pre-control of Inputs, Concurrent Control of Operations. Post Control of Outputs. Change and Development: Model for Managing Change, Forces for Change, Need for Change, Alternative Change Techniques, New Trends in Organisational Change.

Suggested Reading:

1. Stoner, Freeman & Gilbert Jr - Management (Prentice Hall of India, 6th Edition)
2. Koontz - Principles of Management (Tata Mc Graw Hill, 1st Edition 2008)
3. Robbins & Coulter - Management (Prentice Hall of India, 8th Edition)
4. Robbins S.P. and Decenzo David A. - Fundamentals of Management: Essential Concepts and Applications (Pearson Education, 5th Edition)
5. Hillier Frederick S. and Hillier Mark S. - Introduction to Management Science: A Modeling and Case Studies Approach with Spreadsheets (Tata Mc Graw Hill, 2nd Edition 2008)
6. Wehrich Heinz and Koontz Harold - Management: A Global and Entrepreneurial Perspective (Mc Graw Hill, 12th Edition 2008)

**COMPUTER BASED NUMERICAL AND STATISTICAL TECHNIQUES**  
**MCA-II-SEM**  
**MC - 24**

**Unit-I**

Floating point Arithmetic: Representation of floating point numbers, Operations, Normalization, Pitfalls of floating point representation, Errors in numerical computation  
Iterative Methods: Zeros of a single transcendental equation and zeros of polynomial using Bisection Method, Iteration Method, Regula-Falsi method, Newton Raphson method, Secant method, Rate of convergence of iterative methods.

**Unit-II**

Simultaneous Linear Equations: Solutions of system of Linear equations, Gauss Elimination direct method and pivoting, Ill Conditioned system of equations, Refinement of solution. Gauss Seidal iterative method, Rate of Convergence  
Interpolation and approximation: Finite Differences, Difference tables  
Polynomial Interpolation: Newton's forward and backward formula  
Central Difference Formulae: Gauss forward and backward formula, Stirling's, Bessel's, Everett's formula. Interpolation with unequal intervals: Langrange's Interpolation, Newton Divided difference formula, Hermite's Interpolation  
Approximation of function by Taylor's series and Chebyshev polynomial

**Unit-III**

Numerical Differentiation and Integration: Introduction, Numerical Differentiation, Numerical Integration, Trapezoidal rule, Simpson's rules, Boole's Rule, Weddle's Rule  
Euler- Maclaurin Formula  
Solution of differential equations: Picard's Method, Euler's Method, Taylor's Method, Runge-Kutta methods, Predictor-corrector method, Automatic error monitoring, stability of solution.

**Unit-IV**

Curve fitting, Cubic Spline and Approximation: Method of least squares, fitting of straight lines, polynomials, exponential curves etc  
Frequency Chart: Different frequency chart like Histogram, Frequency curve, Pi-chart. Regression analysis: Linear and Non-linear regression, Multiple regression



## **Unit-V**

Time series and forecasting: Moving averages, smoothening of curves, forecasting models and methods. Statistical Quality Controls methods Testing of Hypothesis: Test of significance, Chi-square test, t-test, ANOVA, F-Test Application to medicine, agriculture etc.

### References:

1. Rajaraman V., "Computer Oriented Numerical Methods", PHI
2. Gerald & Wheatley, "Applied Numerical Analyses", AW
3. Jain, Iyengar and Jain, "Numerical Methods for Scientific and Engineering Computations", New Age Int.
4. Grewal B. S., "Numerical methods in Engineering and Science", Khanna Publishers, Delhi
5. T. Veerarajan, T Ramachandran, "Theory and Problems in Numerical Methods", TMH
6. Pradip Niyogi, "Numerical Analysis and Algorithms", TMH
7. Francis Scheld, "Numerical Analysis", TMH
8. Gupta S. P., "Statistical Methods", Sultan and Sons

**SYSTEM ANALYSIS AND DESIGN**  
**MCA-II-SEM-**  
**MCA 25**

**Unit-I**

Overview of System Analysis and design : System Development life Cycle . Concept and models : requirements determination , Logical design , physical Design , test , planning, implementation planning and performance evaluation , interviewing , presentation skills ; group – based approaches JAD.

**Unit-II**

Information requirement Analysis ; process modeling with physical data flow diagrams, data modeling with logical entity relationship diagrams ; Developing a Proposal ; Feasibility study and cost estimation . System Design ; Design of input and control , design of output and control . File design / database design , process design , user interface design , prototyping , software construction ,documentation .

**Unit-III**

Application Development Methodologies and CASE tools , information engineering , structured system analysis and design object oriented methodologies for application development data modeling , process modeling , user interface design and prototyping , use of computer aided software engineering (CASE) tools in the analysis , design implementation of information systems.

**Unit-IV**

Design and Implementation of OO platform , Object Oriented Analysis and design through object modeling technique , object modeling , dynamic modeling and functional modeling , object oriented design and object oriented programming system for implementation , object oriented data bases.

**Unit -V**

System Implementation , Hardware Software selection , System testing , System Training , Software design , System maintenance.

**References**

- 1.Haryszkiewicz, I.T, “ Introduction of System Analysis and Design “ PHI 1989
- 2Raja Raman , V ,” Analysis and Design of Information System” PHI 1991

**DATABASE MANAGEMENT SYSTEMS**  
**MCA III SEM**  
**MC 31**

**Unit- I**

**Introduction:** An overview of database management system, Database System Vs File System, Database system concepts and architecture, data models schema and instances, data independence and data base language and interfaces, Data definitions language, DML, Overall Database Structure. **Data Modeling using the Entity Relationship Model:** ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables, extended ER model, relationships of higher degree

**Unit- II**

**Relational data Model and Language:** Relational data model concepts, integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra, relational calculus, tuple and domain calculus. **Introduction to SQL:** Characteristics of SQL, Advantages of SQL, SQL data types and literals, Types of SQL commands, SQL operators and their procedure, Tables, views and indexes, Queries and sub queries, Aggregate functions, Insert, update and delete operations, Joins, Unions, Intersection, Minus, Cursors in SQL. PL/SQL, Triggers and clusters.

**Unit- III**

**Data Base Design & Normalization:** Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependencies, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design.

**Unit- IV**

**Transaction Processing Concepts:** Transaction system, Testing of serializability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures, log based recovery, checkpoints, deadlock handling.

**Unit- V**

**Concurrency Control Techniques:** Concurrency control, locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation based protocol, multiple granularity, Multi-version schemes, Recovery with concurrent transaction. Transaction Processing in Distributed system, data fragmentation. Replication and allocation techniques for distributed system, overview of concurrency control and recovery in distrusted database.

**References**

- 1 Date C J, "An Introduction To Database System", Addison Wesley
- 2 Korth, Silbertz, Sudarshan, "Database Concepts", McGraw Hill
- 3 Elmasri, Navathe, "Fundamentals Of Database Systems", Addison Wesley
- 4 Paul Beynon Davies, "Database Systems", Palgrave Macmillan
- 5 Bipin C. Desai, "An introduction to Database Systems", Galgotia Publication
- 6 Majumdar & Bhattacharya, "Database Management System", TMH
- 7 Ramakrishnan, Gehrke, "Database Management System", McGraw Hill
- 8 Bharti P.K, "An introduction to Database Systems", JPNP

**COMPUTER COMMUNICATION NETWORKS**  
**MCA-III-SEM**  
**(MC-32)**

**UNIT-1**

**Introduction to computer network:**

Type of Network, Network topology, basic element in networking, data communication, form of data communication, data transmission techniques, data transmission media, methods of data transmission, transmission mode, line configuration: point-to-point and multipoint multiplexing and switching.

**UNIT-2**

**Layered Protocols and Reference model:**

Definition of Protocol and Standards, Interfaces and Services, Connection-Oriented and Connectionless Services, The OSI Reference model, The TCP/IP Reference model, A comparison of the OSI Reference model, and the TCP/IP Reference model, Introduction of X.25 and ATM, Framing, Error Detection and Correction, Elementary Data Link Protocols.

**UNIT-3**

**Local Area Network:** Primary attributes of a LAN, Broadband and baseboard LANs, IEEE Standard: -Ethernet (CSMA/CD), Token Bus, Token Ring, Comparison 802.3,802.4 and 802.5 Introduction of LLC and MAC protocol Introduction of FDDI and ISDN.

**UNIT-4**

**Routing Algorithm and IP Address:**

Shortest Path Routing, Distance Vector Routing, Link State Routing. Internetworking: Repeater, Bridge, Router, Hub, Gateway, and Fragmentation. The IP address structure, Major features of IP, IP Datagram, Major IP services, IP source routing. ICP, ICMP, ARP, RARP, UDP.

**UNIT-5**

**Network Security:**

Public key and Secret key, DNS, Resource Records, Name Service, E-mail-Architecture and services, TELNET, File Transfer Protocol (FTP), Simple Network Management Protocol (SNMP) Simple Mail Transfer Protocol (SMTP) Hyper Text Transfer Protocol (HTTP), World Wide Web (WWW).

**REFERENCES**

- Black ,U., "Computer Networks-Protocols Standards and Interface, "Prentice Hall of India, 1996
- Tannebaum ,A.S., | Computer Networks ",(4\* edition) .Prentice Hall of India, 1993

**OBJECT ORIENTED ANALYSIS AND PROGRAMMING C++**  
**MCA-III**  
**SEM- (MC-33)**

**UNIT-1**

Principles of object oriented programming: Procedure Vs object oriented methodology, Object oriented paradigm, Why object oriented Analysis & Design, Application of OOPS, Concepts and Terminology: Concepts and Philosophy, Data Abstraction, Class, Object-Attribute, Operation, Method, Message and Event; Construction and Destruction, Persistence, Data Encapsulation, Polymorphism, Inheritance: Super class, Subclass and Multiple Inheritance.

**UNIT-2**

Implementation of class, Memory allocation for objects, inline function, Static data members and functions, constructors and its types, Destructors and its implementation, Inheritance: Types of inheritance, implementation of inheritance using real world problems, Ambiguity in inheritance, Virtual Base Classes, Abstract Classes, Nesting of Classes.

**UNIT-3**

Polymorphism: Operator Overloading -Overloading Unary Operators, Overloading Binary Operators, rules for overloading operators, Pointer to derived classes, Pointers to Objects, This pointer, Virtual function, Pure Virtual function, Friend functions.

**UNIT-4**

Problem Domain Analysis: Definition of object oriented Analysis, Use Case, Why Employ a Use Case. Object Model: Key Abstractions, Object Diagrams, Class Diagrams, Identifying Classes, Candidate Classes, Eliminating Unfit Classes, Identifying Attributes, Different Types of Attributes, Operations, Events, Relationships b/w Objects, Different types of Links, Associations, Identifying Link Attributes.

**UNIT-5**

Aggregation, Generalization, Specialization, Discriminators, Abstract Classes, Dynamic Model: Introduction, The necessity of Dynamic Model, Tools used in Dynamic modeling, Advantages of Dynamic Model, Various Components of the Dynamic Model-Events, Internal Vs External events, Life Cycles of Objects.

**REFERENCES**

- Object Oriented Programming with C++ by E. Balaguruswamy.
- Object Oriented Analysis & Design by Greedy Booch.
- Object Oriented Analysis & Design by Raumbaugh [Eastern Economy Edition]
- Object Oriented Analysis & Design by David Parsons.
- Thinking in C++ by Bruce Ekel.

## COMPUTER GRAPHICS AND ANIMATION

### MCA-III

### MC 34

#### Unit I

**Graphics Primitives:** Display Devices: Refresh Cathode Ray Tube, Raster Scan Display, Plasma display, Liquid Crystal display, Plotters, Printers. **Input Devices:** Keyboard, Trackball, Joystick, Mouse, Light Pen, Tablet, and Digitizing Camera. **Input Techniques:** Positioning techniques, Positioning Constraints, Scales & Guidelines, Rubber-Band techniques, Dragging, Dimensioning techniques and Graphical Potentiometers, Pointing and Selection: the use of selection points, defining a boundary rectangle, multiple selections, Menu selection.

#### Unit II

**Mathematics for Computer Graphics:** Point representation, Vector representation, Matrices and operations related to matrices, Vector addition and vector multiplication, Scalar product of two vectors, Vector product of two vectors. **Line Drawing Algorithms:** DDA algorithms, Bresenham's Line algorithm. **Segment & Display files:** Segments, Functions for segmenting the display file, Posting and unposting a segment, segment naming schemes, Default error conditions, Appending to segments, Refresh concurrent with reconstruction, Free storage allocation, Display file Structure. **Graphics Operations:** Clipping: Point Clipping, Line Clipping. Polygon Clipping. **Filling:** Inside Tests, Flood fill algorithm, Boundary-Fill Algorithm and scan-line polygon fill algorithm.

#### Unit III

**Conics, Curves and Surfaces:** Quadric surfaces: Sphere, Ellipsoid, and Torus. Superquadrics: Superellipse, superellipsoid. Spline & Bezier Representations: Interpolation and approximation splines, parametric continuity conditions, Geometric Continuity Conditions, Spline specifications. Bezier curves and surfaces.

#### Unit IV

**Transformation:** 2D transformation, Basic Transformations, Composite transformations: Reflection, Shearing, Transformation between coordinate systems.

**3 D Graphics:** 3 D Display Methods, 3 D modeling, 3 D transformations, Parallel projection, Perspective projection, Visible lines and surfaces identification, Hidden surface removal

#### Unit V

**Animation :** Introduction to Animation, Principles of Animation, Types of Animation, Types of Animation Systems : Scripting, Procedural, Representational, Stochastic, etc.

**Animation Tools :** Hardware –SGI, PC's, Amiga etc.

**Software :** Adobe Photoshop, Animation studio, Wave front etc.

**Gif Animator :** Microsoft GIF Animation, GIF Construction, GIFmation etc.

**GKS:** GKS Standards, GKS Primitives – Polyline, Polymarker, and Fill area, Text, GKS Workstation and Metafiles.

#### References:

1. Donald Hearn and M. Pauline Baker, "Computer Graphics", PHI
2. Steven Harrington, "Computer Graphics: A Programming Approach", TMH
3. Prajapati A. K, "Computer Graphics", PPM Ed 2
4. Foley James D, "Computer Graphics", AW Ed 2

**DESIGN ANALYSIS AND ALGORITHM**  
**MCA-III-SEM**  
**MCA 35**

**Unit-I**

**Introduction:**

Algorithms, Analysis of Algorithms, Design of Algorithms, and Complexity of Algorithms, Asymptotic Notations, Growth of function, Recurrences Sorting in polynomial Time: Insertion sort, Merge sort, Heap sort, and Quick sort Sorting in Linear Time: Counting sort, Radix Sort, Bucket Sort Medians and order statistics

**Unit-II**

**Elementary Data Structure:** Stacks, Queues, Linked list, Binary Search Tree, Hash Table **Advanced Data Structure:** Red Black Trees, Splay Trees, Augmenting Data Structure Binomial Heap, BTree, Fibonacci Heap, and Data Structure for Disjoint Sets Union-find Algorithm, Dictionaries and priority Queues, mergeable heaps, concatenable queues

**Unit-III**

**Advanced Design and Analysis Techniques:** Dynamic programming, Greedy Algorithm, Backtracking, Branch-and-Bound, Amortized Analysis

**Unit-IV**

**Graph Algorithms:** Elementary Graph Algorithms, Breadth First Search, Depth First Search, Minimum Spanning Tree, Kruskal's Algorithms, Prim's Algorithms, Single Source Shortest Path, All pair Shortest Path, Maximum flow and Traveling Salesman Problem

**Unit -V**

Randomized Algorithms, String Matching, NP-Hard and NP-Completeness Approximation Algorithms, Sorting Network, Matrix Operations, Polynomials & the FFT, Number Theoretic Algorithms, Computational Geometry

**References**

1. Horowitz Sahani, "Fundamentals of Computer Algorithms", Goltotia
2. Coremen Leiserson etal, "Introduction to Algorithms", PHI
3. Brassard Bratley, "Fundamental of Algorithms", PHI
4. M T Goodrich etal, "Algorithms Design", John Wiley
5. A V Aho etal, "The Design and analysis of Algorithms", Pearson Education

**CLIENT SERVER COMPUTING**  
**MCA IV SEM**  
**MC 41**

**Unit I**

**Client/Server Computing:** DBMS concept and architecture, Single system image, Client Server architecture, mainframe-centric client server computing, downsizing and client server computing, preserving mainframe applications investment through porting, client server development tools, advantages of client server computing.

**Unit II**

**Components of Client/Server application:** The client: services, request for services, RPC, windows services, fax, print services, remote boot services, other remote services, Utility Services & Other Services, Dynamic Data Exchange (DDE), Object Linking and Embedding (OLE), Common Object Request Broker Architecture (CORBA).

The server: Detailed server functionality, the network operating system, available platforms, the network operating system, available platform, the server operating system.

**Unit III**

**Client/Server Network:** connectivity, communication interface technology, Interposes communication, wide area network technologies, network topologies (Token Ring, Ethernet, FDDI, CDDI) network management, Client-server system development: Software, Client–Server System Hardware: Network Acquisition, PC-level processing unit, Macintosh, notebooks, pen, UNIX workstation, x-terminals, server hardware.

**Unit IV**

**Data Storage:** magnetic disk, magnetic tape, CD-ROM, WORM, Optical disk, mirrored disk, fault tolerance, RAID, RAID-Disk network interface cards.

Network protection devices, Power Protection Devices, UPS, Surge protectors.

**Client Server Systems Development:** Services and Support, system administration, Availability, Reliability, Serviceability, Software Distribution, Performance, Network management, Help Desk, Remote Systems Management Security, LAN and Network Management issues.

**Unit V**

**Client/Server System Development:** Training, Training advantages of GUI Application, System Administrator training, Database Administrator training, End-user training.

The future of client server Computing Enabling Technologies, The transformational system.

**References:**

1. Patrick Smith & Steave Guengerich, “Client / Server Computing”, PHI
2. Dawna Travis Dewire, “Client/Server Computing”, TMH
3. Majumdar & Bhattacharya, “Database management System”, TMH
4. Korth, Silberchatz, Sudarshan, “Database Concepts”, McGraw Hill
5. Elmasri, Navathe, S.B, “Fundamentals of Data Base System”, Addison Wesley



**SOFTWARE ENGINEERING**  
**MCA-IV-SEM**  
**(MC-42)**

**UNIT1**

Software & Software Engineering

The Evolving Role of Software, Software Characteristic, Software Component, Software Application, software Engineering: - A Definition, the Classical Life Cycle, Prototype, the spiral Model, fourth Generation Technique.

**UNIT 2** Software Matrices Project Management Process, Size oriented Metrics, Function Oriented Metrics, Measuring Quality, Project Planning, Objectives, Software Scope, Computer System Engineering.

**UNIT 3**

Software Design Fundamental

The evaluation of Software Design, Effective Modular Design, Procedure Design, Structural Programming Design Documentation, Design Process Consideration.

**UNIT 4**

Software Quality Assurance

Software Quality Factor, Software Quality Assurance, SQA Activities, S/W Reliability Software testing Fundamentals, White box Testing, Black box testing.

**UNIT 5**

Software Maintenance

Maintenance Characteristic, Maintainability, Maintenance Side effects, S/W configuration Management, The SCM Process, Identification of Object in the S/W Configuration, Version Control, Configuration Audit, Status Reports,

**REFERENCE**

1. A Practitioner Approach to Software Engineering :Pressman
2. Introduction to Software Engineering - Pankaj Jalote

**COMPILER DESIGN**  
**MCA-IV-SEM**  
**MC-43**

**UNIT 1**

Introduction to Compiler: Interpreter, Structure of Compiler, Bootstrapping Compiler, Cross-Compiler, Formal Language, Context-Free grammar, classification of grammar with example.

**UNIT 2**

Lexical Analysis: Role of lexical Analyzer; Design of lexical Analyzer (Transition graph), Regular Expression, Finite Automata, Deterministic finite Automata, Non deterministic finite automata, From regular to NFA, From NFA to DFA, Minimizing the no .of state in a DFA.

**UNIT 3**

Derivation and parse tree: Representation of parse (derivation) tree on Rightmost and Leftmost derivation, Ambiguity grammar, Basic parsing techniques, Parser, Shift-reduce parsing, handles. Operator-precedence parsing and LR. Top-down Parsing-Left Recursion and its removal. Recursion descent parser, Predictive parser. Comparison of parsing methods.

**UNIT 4**

Introduction of Symbol table: Contents of symbol table, Data structure for Symbol table, Run time storage administration, Implementation of Simple Stack allocation scheme, Implementation of block structure language, storage allocation in block structured language, Error handling.

**UNIT 5**

Introduction of Intermediate Code-Three address code, Quadruples, triples. Intermediate code generations, Introduction of code optimization and, Introduction of a code generation.

**REFERENCES**

- 1- Principal of Compiler Design by A.V. Aho & J.D.Ullman
- 2- Compilers by Ravi Sethi, A.V. Aho, & J.D. Ullman
- 3- Theory & Practice of Compiler by Tremblay
- 4- Theory of computer Science by Mishra & Chandrasekaran
- 5- Element of Discreate Mathematic by C.L.Liu

**CRYPTOGRAPHY & NETWORK SECURITY**  
**MCA IV SEMESTER**  
**MC 44**

**Unit-I**

**Introduction to Cryptography:** Introduction To Security: Attacks, Services & Mechanisms, Security, Attacks, Security Services. Conventional Encryption: Classical Techniques, Conventional Encryption Model, And Steganography, Classical Encryption Techniques. Modern Techniques: Simplified DES, Block Cipher Principles, DES Standard, DES Strength, Differential & Linear Cryptanalysis, Block Cipher Design Principles, Block Cipher Modes Of Operation.

**Unit-II**

**Conventional Encryption Algorithms:** Triples DES, Blowfish, International Data Encryption Algorithm, RCS, CAST-128, RC2 Placement & Encryption Function, Key Distribution, Random Number Generation, Placement Of Encryption Function.

**Unit-III**

**Public Key Encryption:** Public-Key Cryptography: Principles Of Public-Key Cryptosystems, RSA Algorithm, Key Management, Fermat's & Euler's Theorem, Primality, The Chinese Remainder Theorem.

**Unit-IV**

**Hash Functions:** Message Authentication & Hash Functions: Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions, Birthday Attacks, Security Of Hash Function & MACS, MD5 Message Digest Algorithm, Secure Hash Algorithm (SHA), Digital Signatures: Digital Signatures, Authentication Protocol, Digital Signature Standard (DSS), Proof Of Digital Signature Algorithm.

**Unit-V**

**Network & System Security:** Authentication Applications: Kerberos X.509, Directory Authentication Service, Electronic Mail Security, Pretty Good Privacy (PGP), S / Mime, Security: Architecture, Authentication Header, Encapsulating Security Payloads, Combining Security Associations, Key Management, Web Security: Secure Socket Layer & Transport Layer Security, Secure Electronic Transaction (Set), System Security: Intruders, Viruses, Firewall Design Principles, Trusted Systems.

**Text Book:**

1. William Stallings, "Cryptography and Network Security: Principles and Practice", Prentice Hall, New Jersey.

**Reference Books:**

1. Johannes A. Buchmann, "Introduction to cryptography", Springer- Verlag.
2. Atul Kahate, "Cryptography and Network Security", TMH

**JAVA PROGRAMMING**  
**MCA IV SEMESTER**  
**MC 45**

**Unit-I**

**Internet:** Internet, Connecting to Internet: Telephone, Cable, Satellite connection, Choosing an ISP, Introduction to Internet services, E-Mail concepts, Sending and Receiving secure E-Mail, Voice and Video Conferencing.

**Unit- II**

**Core Java:** Introduction, Operator, Data type, Variable, Arrays, Control Statements, Methods & Classes, Inheritance, Package and Interface, Exception Handling, Multithread programming, I/O, Java Applet, String handling, Networking, Event handling, Introduction to AWT, AWT controls, Layout managers, Menus, Images, Graphics.

**Unit-III**

**Java Swing:** Creating a Swing Applet and Application, Programming using Panes, Pluggable Look and feel, Labels, Text fields, Buttons, Toggle buttons, Checkboxes, Radio Buttons, View ports, Scroll Panes, Scroll Bars, Lists, Combo box, Progress Bar, Menus and Toolbars, Layered Panes, Tabbed Panes, Split Panes, Layouts, Windows, Dialog Boxes, Inner frame.

**JDBC:** The connectivity Model, JDBC/ODBC Bridge, java.sql package, connectivity to remote database, navigating through multiple rows retrieved from a database.

**Unit-IV**

**Java Beans:** Application Builder tools, The bean developer kit(BDK), JAR files, Introspection, Developing a simple bean, using Bound properties, The Java Beans API, Session Beans, Entity Beans, Introduction to Enterprise Java beans (EJB), **Introduction to RMI (Remote Method**

**Invocation):** A simple client-server application using RMI.

**Unit-V**

**Java Servlets:** Servlet basics, Servlet API basic, Life cycle of a Servlet, Running Servlet, Debugging Servlets, Thread-safe Servlets, HTTP Redirects, Cookies, Introduction to Java Server pages (JSP).

**References:**

1. Margaret Levine Young, "The Complete Reference Internet", TMH
2. Naughton, Schildt, "The Complete Reference JAVA2", TMH
3. Balagurusamy E, "Programming in JAVA", TMH
4. Dustin R. Callway, "Inside Servlets", Addison Wesley
5. Mark Wutica, "Java Enterprise Edition", QUE
6. Steven Holzner, "Java2 Black book", dreamtech

# ARTIFICIAL INTELLIGENCE

## MCA-V-SEM

### MC-51

#### UNIT 1

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 back word chaining, exhaustive searches depth first, breadth first search.

#### UNIT 2

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: Minima search procedure, alpha-beta cutoffs, and additional requirements.

#### UNIT 3

Knowledge Representation: first order predicate calculus, skolemization, resolution principle & unification, interface mechanisms, hornis clauses, semantic networks, frame systems and value inheritance, scripts, conceptual dependencies. Natural Language processing: Parsing techniques, context free grammar, recursive transitions nets (RTN), augmented transition nets (ATN), case and logic grammars, and semantic analysis.

#### UNIT 4

Planning: overview an example domain the block word, component of planning systems, goal stack planning, non-linear planning. Probabilistic reasoning and Uncertainty: Probability theory, bayes theorem and Bayesian networks, certainty factor.

#### UNIT 5

##### Expert System

Introduction to expert system and application of expert systems, various expert system shells, knowledge acquisition, case studies, MYCIN. Learning: Rote learning, learning by induction, explanation based learning. Simple: Programs in LISP/PROLOG.

#### REFERENCES

- Elaine Rich and Kevin knight: AI - Tata McGraw Hill.
- Dan W. Patterson: introduction to AI and Expert system -Prentice India. Nils J. Nilson : Principiles of AI - Narosa Publishing house.

**.NET FRAMEWORK AND C#**  
**MCA V SEMESTER**  
**MC 52**

**Unit-I**

**The .NET framework:** Introduction, Common Language Runtime, Common Type System, Common Language Specification, The Base Class Library, The .NET class library Intermediate language, Just-in-Time compilation, garbage collection, Application installation & Assemblies, Web Services, Unified classes.

**Unit-II**

**C# Basics:** Introduction, Data Types, Identifiers, variables & constants, C# statements, Object Oriented Concept, Object and Classes, Arrays and Strings, System Collections, Delegates and Events, Indexes Attributes, versioning.

**Unit-III**

**C# Using Libraries:** Namespace-System, Input Output, Multi-Threading, Networking and Sockets, Data Handling, Windows Forms, C# in Web application, Error Handling.

**Unit-IV**

**Advanced Features Using C#:** Web Services, Windows services, messaging, Reflection, COM and C#,Localization.

**Unit-V**

**Advanced Features Using C#:** Distributed Application in C#, XML and C#, Unsafe Mode,Graphical Device Interface with C#, Case Study (Messenger Application)

***Text Books***

1. Shibi Panikkar and Kumar Sanjeev, "C# with .NET Frame Work", Firewall Media.
2. Shildt, "C#: The Complete Reference", TMH

***Reference Books***

1. Jeffrey Richter, "Applied Microsoft .Net Framework Programming", (Microsoft)
2. Fergal Grimes, "Microsoft .Net for Programmers", (SPD)
3. TonyBaer, Jan D. Narkiewicz, Kent Tegels, Chandu Thota, Neil Whitlow, "Understanding the .Net Framework", (SPD)
4. Balagurusamy, "Programming with C#", TMH

**COMPUTER GRAPHICS AND ANIMATION**  
**MCA-III**  
**MC 53**

**Unit I**

**Graphics Primitives:** Display Devices: Refresh Cathode Ray Tube, Raster Scan Display, Plasma display, Liquid Crystal display, Plotters, Printers. Input Devices: Keyboard, Trackball, Joystick, Mouse, Light Pen, Tablet, and Digitizing Camera. Input Techniques: Positioning techniques, Positioning Constraints, Scales & Guidelines, Rubber-Band techniques, Dragging, Dimensioning techniques and Graphical Potentiometers, Pointing and Selection: the use of selection points, defining a boundary rectangle, multiple selections, Menu selection.

**Unit II**

**Mathematics for Computer Graphics:** Point representation, Vector representation, Matrices and operations related to matrices, Vector addition and vector multiplication, Scalar product of two vectors, Vector product of two vectors. Line Drawing Algorithms: DDA algorithms, Bresenham's Line algorithm. Segment & Display files: Segments, Functions for segmenting the display file, Posting and unposting a segment, segment naming schemes, Default error conditions, Appending to segments, Refresh concurrent with reconstruction, Free storage allocation, Display file Structure. Graphics Operations: Clipping: Point Clipping, Line Clipping. Polygon Clipping. Filling: Inside Tests, Flood fill algorithm, Boundary-Fill Algorithm and scan-line polygon fill algorithm.

**Unit III**

**Conics, Curves and Surfaces:** Quadric surfaces: Sphere, Ellipsoid, and Torus. Superquadrics: Superellipse, superellipsoid. Spline & Bezier Representations: Interpolation and approximation splines, parametric continuity conditions, Geometric Continuity Conditions, Spline specifications. Bezier curves and surfaces.

**Unit IV**

**Transformation:** 2D transformation, Basic Transformations, Composite transformations: Reflection, Shearing, Transformation between coordinate systems. 3 D Graphics: 3 D Display Methods, 3 D modeling, 3 D transformations, Parallel projection, Perspective projection, Visible lines and surfaces identification, Hidden surface removal

**Unit V**

**Animation :** Introduction to Animation, Principles of Animation, Types of Animation, Types of Animation Systems : Scripting, Procedural, Representational, Stochastic, etc. Animation Tools : Hardware –SGI, PC's, Amiga etc. Software : Adobe Photoshop, Animation studio, Wave front etc. Gif Animator : Microsoft GIF Animation, GIF Construction, GIFmation etc. GKS: GKS Standards, GKS Primitives – Polyline, Polymarker, and Fill area, Text, GKS Workstation and Metafiles.

**References:**

1. Donald Hearn and M. Pauline Baker, "Computer Graphics", PHI
2. Steven Harrington, "Computer Graphics: A Programming Approach", TMH
3. Prajapati A. K, "Computer Graphics", PPM Ed 2
4. Foley James D, "Computer Graphics", AW Ed 2
5. Newman and Sproul, "Principle of Interactive Computer Graphics", McGraw Hill

## **ARTIFICIAL NEURAL NETWORK**

### **MCA-III**

### **MC - 54**

#### **Unit – I**

Introduction: Neural network, Human brain, biological and artificial Neurons, model of Neuron Knowledge representation, Artificial intelligence and Neural network, Network architecture, Basic Approach of the working of ANN – training, Learning and generalization.

#### **Unit – II**

Supervised learning: Single- layer networks, perception-linear separability, limitations of multi layer network architecture, back propagation algorithm (BPA) and other training algorithms, applications of adaptive multi-layer network architecture, recurrent network, feed-forward networks, radial- basis-function (RBF) networks.

#### **Unit – III**

Unsupervised learning: Winner-takes-all networks, Hamming networks, maxnet, simple competitive learning vector-quantization, counter-propagation network, adaptive resonance theory, Kohonen's self organizing maps, principal component analysis.

#### **Unit – IV**

Associated models: Hopfield networks, brain-in-a-box network, Boltzman machine.

#### **Unit - V**

Optimization methods: Hopfield networks for-TSP, solution of simultaneous linear equations, Iterated gradient descent, simulated annealing, genetic algorithm.

#### Text Books:

1. Simon Haykin, "Neural Networks – A Comprehensive Foundation", Macmillan Publishing Co., New York, 1994.
2. K. Mahotra, C.K. Mohan and Sanjay Ranka, "Elements of Artificial Neural Networks", MIT Press, 1997 – Indian Reprint Penram International Publishing (India), 1997

#### Reference Books:

1. A Cichocki and R. Unbehauen, "Neural Networks for optimization and Signal processing", John Wiley and Sons, 1993.
2. J.M. Zurada, "Introduction to Artificial Neural networks", (Indian edition) Jaico Publishers, Mumbai, 1997.
3. Limin Fu. "Neural Networks in Computer Intelligence", TMH.



## **SIMULATION AND MODELLING**

### **MCA-V SEMESTER**

#### **MC -55**

#### **UNIT I**

Basic Simulation Modeling, Role of Modeling in System Analysis, Simulation of single Server Queuing System: Problem statement, program organization and Logic, A'C Language program, Simulation output and discussion; simulation of an Inventory System: Problem statement, program organization and Logic, a 'C Language program, Simulation output and discussion.

#### **UNIT II**

Discrete event simulation, Continuous Simulation, Monte Carlo Simulation, Parallel and distributed Simulation, Simulation across the INTERNET and WEB based Simulation, Steps in a sound simulation study.

#### **UNIT III**

Advantages, Disadvantages, and pitfalls of Simulation, List processing in Simulation, Simulation software; introduction, comparison of simulation packages, classifications of simulation software: GPSS, Arena, Object-oriented Simulation (MODSIM IE)

#### **UNIT IV**

Overview of Random variables and their properties, simulation output data and Stochastic process, the review of replacing a Probability Distribution by its Mean, Generation of Pseudo Random -numbers by linear congruential Generators, testing Random Number Generators (introduction only).

#### **UNIT-V**

Guidelines for determining the Level of Model detail, Verification of Simulation computer programs, techniques for increasing Model Validity and Credibility, Management Role and Analysis in the Simulation Process. A case study in Simulation of Manufacturing system, Production, Finance, Marketing (any one).

#### **REFERENCES:**

- SYSTEM SIMULATION WITH DIGITAL COMPUTER" by N.Deo
- SYSTEM SIMULATION" Gordon, Geoffrey.

**MCA COURSE ELECTIVE**

<b>Syllabus</b>	<b>Subject</b>	<b>Scheme of Instruction Periods Per Week</b>	<b>Scheme of Examination Max Marks</b>	<b>Sessional</b>
<b>Semester Code</b>	Theory			
MC - 44	Cryptography & Network Security	3	70	30
	Data warehousing & Mining	3	70	30
	Distributed System	3	70	30
MC - 52	.Net Framework and C#	3	70	30
	Visual C++ (MFC)	3	70	30
MC – 53	Computer Graphics & Animation	3	70	30
	Digital Image Processing	3	70	30
MC – 54	Artificial Neural Network	3	70	30
	Pattern Recognition	3	70	30

**MCA IV SEMESTER  
ELECTIVE**

**CRYPTOGRAPHY & NETWORK SECURITY  
MCA IV SEMESTER  
MC 44**

**Unit-I**

**Introduction to Cryptography:** Introduction To Security: Attacks, Services & Mechanisms, Security, Attacks, Security Services. Conventional Encryption: Classical Techniques, Conventional Encryption Model, And Steganography, Classical Encryption Techniques. Modern Techniques: Simplified DES, Block Cipher Principles, DES Standard, DES Strength, Differential & Linear Cryptanalysis, Block Cipher Design Principles, Block Cipher Modes Of Operation.

**Unit-II**

**Conventional Encryption Algorithms:** Triples DES, Blowfish, International Data Encryption Algorithm, RCS, CAST-128, RC2 Placement & Encryption Function, Key Distribution, Random Number Generation, Placement Of Encryption Function.

**Unit-III**

**Public Key Encryption:** Public-Key Cryptography: Principles Of Public-Key Cryptosystems, RSA Algorithm, Key Management, Fermat's & Euler's Theorem, Primality, The Chinese Remainder Theorem.

**Unit-IV**

**Hash Functions:** Message Authentication & Hash Functions: Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions, Birthday Attacks, Security Of Hash Function & MACS, MD5 Message Digest Algorithm, Secure Hash Algorithm (SHA), Digital Signatures: Digital Signatures, Authentication Protocol, Digital Signature Standard (DSS), Proof Of Digital Signature Algorithm.

**Unit-V**

**Network & System Security:** Authentication Applications: Kerberos X.509, Directory Authentication Service, Electronic Mail Security, Pretty Good Privacy (PGP), S / Mime, Security: Architecture, Authentication Header, Encapsulating Security Payloads, Combining Security Associations, Key Management, Web Security: Secure Socket Layer & Transport Layer Security, Secure Electronic Transaction (Set), System Security: Intruders, Viruses, Firewall Design Principles, Trusted Systems.

**Text Book:**

1. William Stallings, "Cryptography and Network Security: Principles and Practice", Prentice Hall, New Jersey.

**Reference Books:**

1. Johannes A. Buchmann, "Introduction to cryptography", Springer- Verlag.
2. Atul Kahate, "Cryptography and Network Security", TMH

**MCA IV SEMESTER  
ELECTIVE**

**MC – 44  
MCA IV SEMESTER  
DATA WAREHOUSING & MINING**

**Unit – I**

Dss-Uses, definition, Operational Database. Introduction to DATA Warehousing. Data-Mart, Concept of Data-Warehousing, Multi Dimensional Database Structures. Client/Server Computing Model & Data Warehousing. Parallel Processors & Cluster Systems. Distributed DBMS implementations.

**Unit – II**

DATA Warehousing. Data Warehousing Components. Building a Data Warehouse. Warehouse Database. Mapping the Data Warehouse to a Multiprocessor Architecture. DBMS Schemas for Decision Support. Data Extraction, Cleanup & Transformation Tools. Metadata.

**Unit – III**

Business Analysis. Reporting & Query Tools & Applications. On line Analytical Processing(OLAP). Patterns & Models. Statistics. Artificial Intelligence.

**Unit – IV**

Knowledge Discovery, Data Mining. Introduction to Data-Mining. Techniques of Data-Mining. Decision Trees. Neural Networks. Nearest Neighbor & Clustering. Genetic Algorithms. Rule Introduction. Selecting & Using the Right Technique.

**Unit – V**

Multimedia Data-Mining, Multimedia-Databases, Mining Multimedia Data, Data-Mining and the World Wide Web, Web Data-Mining, Mining and Meta-Data. Data Visualization & Overall Perspective. Data Visualization. Applications of Data-Mining.

**References:**

1. Berson, "Data Warehousing, Data-Mining & OLAP", TMH
2. Mallach, "Decision Support and Data Warehousing System", TMH
3. Bhavani Thura-is-ingham, "Data-Mining Technologies, Techniques Tools & Trends", CRC Press
4. Navathe, "Fundamental of Database System", Pearson Education
5. Margaret H. Dunham, "Data-Mining. Introductory & Advanced Topics", Pearson Education
6. Pieter Adriaans, Dolf Zantinge, "Data-Mining", Pearson Education

**MCA IV SEMESTER  
ELECTIVE**

**MC - 44  
MCA IV SEMESTER  
DISTRIBUTED SYSTEM**

**Unit-1**

Introduction to Distributed Data system, Distributed Database Architecture, Distributed Data base Design, Transaction processing Concurrency Control techniques, Security.

**Unit-2**

Types of Data Fragmentations, Fragmentation and allocation of fragments, Distribution transparency, access primitives, integrity constraints.

**Unit-3**

Grouping and aggregate function, Query processing , Equivalence transformation of queries.

**Unit-4**

Evaluation, parametric queries, Query optimization, Join and general queries.

**Unit-5**

Management of Distributed transaction and concurrency control: Distributed Date base Administration, Catalogue Management Authorisation, Security and protection. Examples of distributed database systems. Cost Analysis .

References:

1. Ceri & Palgathi, "Distributed Database System", McGraw Hill.
2. Raghurama Krishna and Johannes Gehrke, "Database Management Systems", McGraw Hill.
3. Date C. J, "An Introduction to Database System, Vol1 & II", Addison Wesley.
4. Korth, Silbertz, Sudarshan , "Database Concepts", McGraw Hill.
5. Elmasari , Navathe, "Fundamentals of Data Base Systems", Addison Wesley.
6. Date C. J , "An Introduction to Database System" , Addison Wesley
7. RamaKrishnan , Gehrke, "Database Management System", McGraw Hill

**MCA V SEMESTER  
ELECTIVE**

**.NET FRAMEWORK AND C#  
MCA V SEMESTER  
MC 52**

**Unit-I**

**The .NET framework:** Introduction, Common Language Runtime, Common Type System, Common Language Specification, The Base Class Library, The .NET class library Intermediate language, Just-in-Time compilation, garbage collection, Application installation & Assemblies, Web Services, Unified classes.

**Unit-II**

C# Basics: Introduction, Data Types, Identifiers, variables & constants, C# statements, Object Oriented Concept, Object and Classes, Arrays and Strings, System Collections, Delegates and Events, Indexes Attributes, versioning.

**Unit-III**

C# Using Libraries: Namespace-System, Input Output, Multi-Threading, Networking and Sockets, Data Handling, Windows Forms, C# in Web application, Error Handling.

**Unit-IV**

Advanced Features Using C#: Web Services, Windows services, messaging, Reflection, COM and C#, Localization.

**Unit-V**

**Advanced Features Using C#:** Distributed Application in C#, XML and C#, Unsafe Mode, Graphical Device Interface with C#, Case Study (Messenger Application)

***Text Books***

1. Shibi Panikkar and Kumar Sanjeev, "C# with .NET Frame Work", Firewall Media.
2. Schildt, "C#: The Complete Reference", TMH

***Reference Books***

1. Jeffrey Richter, "Applied Microsoft .Net Framework Programming", (Microsoft)
2. Fergal Grimes, "Microsoft .Net for Programmers", (SPD)
3. TonyBaer, Jan D. Narkiewicz, Kent Tegels, Chandu Thota, Neil Whitlow, "Understanding the .Net Framework", (SPD)
4. Balagurusamy, "Programming with C#", TMH

**MCA V SEMESTER  
ELECTIVE**

**VISUAL C++  
MCA V SEMESTER  
MC 52**

**UNIT 1:**

Windows 98 Overview : Key features of windows 98 , Difference form preview of windows . The components of a window , How windows 98 & your program interact , some windows 98 Application Basics.

**UNIT 2 :**

SDK Programming

API function , DLL , Device contexts, What are messages , Learning different message macro , message boxes , Introducing menus , Including a menu in your program , Responding to menu in your program , responding to menu selections, A closer look at WM-COMMAND.

**UNIT 3**

Dialog Boxes , Working with text , Working with Graphics , pens , & brushes , multitasking , creating terminating suspending & resuming a thread.

**UNIT 4:**

MFC programming

What is MFC , MFC class hierarchy , MFC member function , MFC global Functions, MFC application skeleton , processing Messages – MFC style , learning about different message macros , message boxes.

**UNIT 5:**

Working with graphics , Dialog Boxes , working with text, Thread based multitasking, creating document/view Application , VC ++ App Wizard & Class Wizard for Database options.

***Reference Books***

- |  |                  |
|--|------------------|
| 1 Windows 98 Programming from the ground UP by | Herbert Schidt   |
| 2 MFC Programming from the ground UP by        | Herbert Schidt   |
| 3 Let us VC++                                  | Yaswant Kanitkar |
| 4 Windows 2000 Programming                     | Herbert Schidt   |

**MCA V SEMESTER  
ELECTIVE**

**DIGITAL IMAGE PROCESSING  
MCA V SEMESTER  
MC 53**

**UNIT 1:**

Introduction to IP, Digital image processing , Element of DIP , Image Acquisition , Elements of Visual Perception , A simple image model, sampling , and Quantization , some basic relationship between pixels, imaging geometry.

**UNIT 2:**

Image Presentation – Raster scan , Printer photography , 3 –D managing using color to enhance monochrome output , Image Transformation , Fourier transform , properties of two dimensional FT, FFT .

**UNIT 3:**

Image Enhancement , introduction , point processing enhancement , spatial filtering , color image processing .

**UNIT 4 :**

Image restoration , Designing of model , algebraic approach, inverse filtering , weaver filter , Interactive restoration , Geometric Transformer.

**UNIT 5 :**

Image Compression and Segmentation, introduction to image compression model, error free compression , Image comparison standards , detection of discontinuities , threshing , region – oriented segmentation .

***Reference Books***

1 DIP RAFAEL      C Gonzalez Richard E Woods



**MCA V SEMESTER  
ELECTIVE**

**ARTIFICIAL NEURAL NETWORK**

**MCA-III**

**MC - 54**

**Unit – I**

Introduction: Neural network, Human brain, biological and artificial Neurons, model of Neuron Knowledge representation, Artificial intelligence and Neural network, Network architecture, Basic Approach of the working of ANN – training, Learning and generalization.

**Unit – II**

Supervised learning: Single- layer networks, perception-linear separability, limitations of multi layer network architecture, back propagation algorithm (BPA) and other training algorithms, applications of adaptive multi-layer network architecture, recurrent network, feed-forward networks, radial- basis-function (RBF) networks.

**Unit – III**

Unsupervised learning: Winner-takes-all networks, Hamming networks, maxnet, simple competitive learning vector-quantization, counter-propagation network, adaptive resonance theory, Kohonen's self organizing maps, principal component analysis.

**Unit – IV**

Associated models: Hopfield networks, brain-in-a-box network, Boltzman machine.

**Unit - V**

Optimization methods: Hopfield networks for-TSP, solution of simultaneous linear equations, Iterated gradient descent, simulated annealing, genetic algorithm.

**Text Books:**

1. Simon Haykin, "Neural Networks – A Comprehensive Foundation", Macmillan Publishing Co., New York, 1994.
2. K. Mahotra, C.K. Mohan and Sanjay Ranka, "Elements of Artificial Neural Networks", MIT Press, 1997 – Indian Reprint Penram International Publishing (India), 1997

**Reference Books:**

1. A Cichocki and R. Unbehauen, "Neural Networks for optimization and Signal processing", John Wiley and Sons, 1993.
2. J.M. Zurada, "Introduction to Artificial Neural networks", (Indian edition) Jaico Publishers, Mumbai, 1997.
3. Limin Fu. "Neural Networks in Computer Intelligence", TMH.

**MCA V SEMESTER  
ELECTIVE**

**PATTERN RECOGNITION**

**MCA-V**

**MC - 54**

**Unit-I**

Introduction: Basics of pattern recognition, Design principles of pattern recognition system, Learning and adaptation, Pattern recognition approaches, Mathematical foundations – Linear algebra, Probability Theory, Expectation, mean and covariance, Normal distribution, multivariate normal densities, Chi squared test.

**Unit-II**

Statistical Pattern Recognition: Bayesian Decision Theory, Classifiers, Normal density and discriminant functions

**Unit – III**

Parameter estimation methods: Maximum-Likelihood estimation, Bayesian Parameter estimation, Dimension reduction methods -Principal Component Analysis (PCA), Fisher Linear discriminant analysis, Expectation-maximization (EM), Hidden Markov Models (HMM), Gaussian mixture models.

**Unit -IV**

Nonparametric Techniques: Density Estimation, Parzen Windows, K-Nearest Neighbor Estimation, Nearest Neighbor Rule, Fuzzy classification.

**Unit -V**

Unsupervised Learning & Clustering: Criterion functions for clustering, Clustering Techniques: Iterative square-error partitional clustering – K means, agglomerative hierarchical clustering, Cluster validation.

References:

1. Richard O. Duda, Peter E. Hart and David G. Stork, "Pattern Classification", 2Edition, John Wiley, 2006.
2. C. M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2009.
3. S. Theodoridis and K. Koutroumbas, "Pattern Recognition", 4Edition, Academic Press, 2009. 17