

# MCA\_Syllabus

## MCA 1001 PROBLEM SOLVING AND PROGRAM DESIGN WITH C

### MODULE - I & II

**Problem Solving and Programming Concepts:** Problem Solving in Everyday Life, Types of Problem, Problem Solving with Computers, Constants and Variables, Data Types, Functions, Operators, Expressions and Equations, Data Storage and Communication with Computer, Organizing the Problem, Computer Software and Software Development Method.

### MODULE - III

**Overview of C:** C Language Elements, Variable Declaration, Data Types, Expressions, Data Files.

**Top-Down Design with Functions:** Top-Down Design and Structure Charts, Functions without Arguments, Functions with Input Arguments.

### MODULE - IV

**Selection Structures:** Problem Solving with Decisions, Control Structures, Conditions, All kinds of if statements, Switch statement.

**Repetition and Loop Statements:** Problem Solving with Loops, Repetition in Programs, while Statement, for Statement, Conditional Loops, Loop Design, Nested Loops, do-while Statement and Flag Controlled Loops.

### MODULE - V

**Modular Programming:** Functions with Simple Output Parameters, Multiple Calls to a Function with Input/Output Parameters, Scope of Names, Formal Output Parameters as Actual Arguments.

**Arrays:** Declaring and Referencing Arrays, Array Subscripts, Using for Loops for Sequential Access, Using Array Elements as Function Arguments, Array Arguments, Multidimensional Arrays.

### MODULE - VI

**Strings:** String Basics, String Comparison, Arrays of Pointer, Character Operations, String-to-Number and Number-to-String Conversions.

**Recursion:** The Nature of Recursion, Tracing a Recursive Function, Recursive Mathematical Functions, Recursive Functions with Array and String Parameters, Problem Solving with Recursion.

### MODULE - VII

**Structure and Union Types:** User-Defined Structure types, Structure Type Data as Input and Output Parameters, Functions Whose Result Values are Structured, Problem Solving with Structure Types, Union types.

**File Processing and Programming in the Large:** Input and Output Files, Binary Files, Using Abstraction to Manage Complexity, Header Files, Implementation Files, Storage Classes, Macros.

### Text Books:

1. M.Sprankle- Problem Solving and Programming Concepts, 7<sup>th</sup> Edn, Pearson Education, New Delhi-2006

2. J.R.Hanly & E.B. Koffman- Problem Solving and Program Design in C, 4<sup>th</sup> Edn, Pearson Education, New Delhi-2004.

**Reference Books:**

1. E.Balagurusamy- Programs in ANSI C, 3<sup>rd</sup> Edn, TMH, New Delhi-2004
2. B.A.Forouzan & R.F. Gilberg- Computer Science: A structured Programming Approach Using C, 2<sup>nd</sup> Edn, Brooks/Cole- Thomson Learning, Indian Reprint, 2003.

**MCA 1003**

**NUMERICAL AND STATISTICAL METHODS**

**Numerical Methods**

**MODULE- I**

**Errors in Numerical Calculations:** Errors & their computation-absolute, relative & percentage.

**Solution of algebraic & transcendental equations:** Introduction, Bisection method, Iterative method, False position method, Newton's Raphson method, Lin Bairstows method. Error analysis & convergence study.

**MODULE - II**

**Interpolation with equal & unequal intervals:** Introduction, finite differences-forward, backward & central, difference tables, differences of polynomials, Newton's formula for interpolation, Gauss's central difference interpolation formula, Divided difference & their properties- Newton's divided differences formula, Lagrange's interpolation formula, Inverse interpolation.

**MODULE - III & IV**

**Numerical differential & integration:** Introduction, derivatives using forward & backward difference formula, Numerical Integration-Trapezoidal rule, Simpson's 1/3 & 3/8 rules Weddle's rule.

**Numerical solution of linear system of equations:** Direct method-Gauss elimination, Gauss-Jordan, LU decomposition methods. Iterative methods-Gauss-Jacobi & Gauss Seidel methods.

**Numerical solution ordinary differential equations:** Taylor Series method, Euler's method, Modified Euler's method, Runge-Kutta methods of 2<sup>nd</sup> & 4<sup>th</sup> order, Predictor-Corrector methods (Milne's method and Adam's methods).

**Statistical Methods**

**MODULE - V**

**Concepts of Probability:** Experiment and Sample Space, Events and Operations with Events, Probability of an Event, Basic Probability Rules, Applications of Probability Rules, Conditional Probability.

**Random Variables:** How Random Variable Arise, Probability Distribution of a Random Variable, Mean or Expected Value of a Random Variable, Probability Histogram Value of a Random Variable, Variance and Standard Deviation of a Random Variable.

**MODULE - VI**

**Binomial Experiments:** Structure of a Binomial Experiment, Binomial Probability Distribution, Use of Binomial Probability Table.

**Normal Curve and Normal Distribution:** Motivation behind a Normal Curve, Properties of a Normal Curve, Normal Probability Distribution, Areas Under a Normal Curve.

**Applications of the Normal Distribution:** Approximating a Binomial Probability, The Normal Theorem and the Central Limit Theorem.

## **MODULE - VII**

**Estimation of Population Parameters:** Parameter and Statistic, Point and Interval Estimation, Interval Estimation of Three Common Parameters.

**Hypothesis Testing for a Single Population:** Concept of a Hypothesis, Tests Involving a Population Mean, Tests Involving a Population Proportion, Tests Involving a Population Standard Deviation.

**Hypothesis Testing to Compare Two Populations:** Comparison of Two Populations, Tests for Two Population Means, Tests for Two Population Means, Tests for Two Population Proportions, Tests for Two Population Variance.

**Bivariate Quantitative Data- Correlation and Regression:** Concepts of a Bivariate Data Set, Correlation Coefficient, Inferences on a Population Correlation Coefficient, The Regression line, Inferences on the Population Regression Line.

### **Text Books:**

1. S.S.Sastry-Introductory Methods of Numerical Analysis-PHI, Private Ltd., New Delhi.
2. N.Pal & S. Sarkar- Statistics: Concepts and Applications, PHI, New Delhi-2005.

### **Reference Books:**

1. R.V.Hogg et.al- Probability and Statistical Inference, 7<sup>th</sup> Edn, Pearson Education, New Delhi-2006.
2. R.L.Burden & J.D.Faires- Numerical Analysis, Thomson Learning-Brooks/Cole, Indian Reprint, 2005.

## **MCA 1005 INTRODUCTION TO COMPUTER SCIENCE & APPLICATIONS**

### **MODULE- I**

**Introduction To Computers:** Introduction, Characteristics of Computers, Evolution of Computers, Evolution of Computers, Generations Of Computers, Classification of Computers, The Computer System, Application of Computers.

**Number Systems And Logic Gates:** Introduction, Number Systems, Conversion Between Number Bases, Arithmetic System, Signed And Unsigned Numbers, Concept of Overflow, Binary Coding, Logic Gates, Boolean Algebra, Combination of Logic Gates.

### **MODULE - II**

**Computer Architecture:** Introduction, Central Processing Unit, Memory, Communication between Various Units of a Computer System, Processor Speed, Multiprocessor Systems.

**Primary Memory:** Introduction, Memory Hierarchy, Random Access Memory (RAM), Types Of RAM, Read Only Memory (ROM), Types Of ROM.

### **MODULE- III**

**Secondary Memory:** Introduction, Classification of Secondary Storage Devices, Magnetic Tape, Magnetic Disk, Optical Disk.

**Input Devices:** Introduction, Keyboard, Pointing Devices, Scanners, Optical Scanners.

**Output Devices:** Introduction, Classification of Output, Hard Copy Output Devices, Printers, Plotters, Soft Copy Output Devices, Monitors, Projectors, Terminals.

### **MODULE - IV**

**Computer Languages:** Introduction, Evolution of Programming Languages, Classification of Programming Languages, Generations of Programming Languages, Features of a Good Programming Language, Selection of a Programming Language.

**Computer Software:** Introduction, Software: Definition, Relationship Between Software And Hardware, Software Categories, System Software, Application Software, Software Terminology.

### **MODULE - V & VI**

**Operating System:** Introduction, Operating System, Evolution of Operating System, Types of Operating System, Functions of an Operating System, Modern Operating Systems.

**Data Communication And Computer Network:** Introduction, Data Communication, Transmission Media, Multiplexing, Switching, Computer Network, Network Topologies, Communication Protocols, Network Devices.

### **MODULE - VII**

**Internet Basics:** Introduction, Evolution of Internet, Basic Internet Terms, Getting Connected To Internet, Internet Applications, Electronic Mail- An Introduction, How E-mail Works, Searching the Web (Search Engines), Languages of Internet, Internet and Viruses.

**Multimedia:** Introduction, Multimedia: Definition, Building Blocks Of Multimedia, Multimedia System, Multimedia Applications, Virtual Reality.

#### **Text book:**

1. Introduction to Computer Science- ITL Education Solutions Limited, Pearson Education, 2004.

#### **Reference Book:**

1. N.Nilsan & S.Schochen-The Elements of Computing Systems, PHI, New Delhi- 2005.

## **MCA 1007**

## **DISCRETE MATHEMATICS**

### **MODULE - I**

**Fundamentals:** Sets and Subsets, Operations on Sets, Properties of Integers, Mathematical Structures.

### **MODULE - II**

**Logic:** Propositions and Logical Operations, Conditional Statements, Methods of Proof, Mathematical Induction.

### **MODULE - III**

**Counting:** Permutation, Combination, Pigeonhole Principle, Elements of Probability.

### **MODULE - IV**

**Relations and Digraphs:** Product Sets and Partitions, Relations and Digraphs, Paths in a Digraph, Properties of Relations, Equivalence Relations, Computer Representation of Relations and Digraphs, Operations on Relations, Transitive Closure and Warshall's Algorithm.

### **MODULE - V**

**Functions:** Functions, Functions for Computer Science, Growth of Functions, Permutation Functions.

**Order Relations and Structures:** Partial Ordered Sets, External Elements of Partially Ordered Sets, Lattices, Finite Boolean Algebra, Circuit Design.

### **MODULE - VI**

**Trees:** Trees, Labelled Trees, Tree Searching, Undirected Trees, Minimum Spanning Trees.

### **MODULE - VII**

**Semigroups and Groups:** Binary Operations, Semigroups, Products and Quotients of Semigroups, Groups, Products and Quotients of Groups.

#### **Text Book:**

1. Discrete Mathematical Structures, Kolman, Busby, Ross, 5<sup>th</sup> Edition, Pearson Education.

#### **Reference Books:**

1. R.Johnsonbargh- Discrete Mathematics, 6<sup>th</sup> Edn, Pearson Education, New Delhi- 2007.
2. K.H.Rosen- Discrete Mathematics and Its Applications, 4<sup>th</sup> Edn, TMH, New Delhi- 2001.

## **MCA 1009**

## **COMPUTER ORGANIZATION & ARCHITECTURE**

### **MODULE - I**

**Introduction:** Organization and Architecture, Structure and Function, Why Study Computer Organization and Architecture?

**Computer Evolution and Performance:** A Brief History of Computers, Designing for Performance, Pentium and PowerPC Evolution.

### **MODULE - II**

**A Top-Level view of Computer Function and Interconnection:** Computer Components, Computer Function, Interconnection Structures, Bus Interconnection, PCI.

### **MODULE - III**

**Cache Memory:** Computer Memory System Overview, Cache Memory Principles, Elements of Cache Design, Pentium 4 and PowerPC Cache Organizations.

**Internal Memory:** Semiconductor Main Memory, Error Correction, Advanced DRAM Organization.

### **MODULE - IV**

**External Memory:** Magnetic Disk, RAID, Optical Memory, Magnetic Tape.

**Input/Output:** External Devices, I/Os, Programmed I/O, Interrupt-Driven I/O, Direct Memory Access, I/O Channels and Processors.

### **MODULE - V**

**Computer Arithmetic:** The Arithmetic and Logic Unit, Integer Representation, Integer Arithmetic, Floating-Point Representation, Floating-Point Arithmetic.

### **MODULE - VI**

**Instruction Sets- Characteristics and Functions:** Machine Instruction Characteristics, Type of Operands, Pentium and PowerPC Data Types, Types of Operations, Pentium and PowerPC Operation Types.

**Instruction Sets- Addressing Modes and Formats:** Addressing, Pentium and PowerPC Addressing Modes, Instruction Formats, Pentium and PowerPC Instruction Formats.

### **MODULE - VII**

**Processor Structure and Function:** Processor Organization, Register Organization, Instruction Cycle, Instruction Pipelining, The Pentium Processor, The PowerPC Processor.

**Reduced Instruction Set Computers:** Instruction Execution Characteristics, The Use of a Large Register File, Compiler-Based Register Optimization, Reduced Instruction Set Architecture, RISC Pipelining, MIPS R4000, SPARC, RISC versus CISC Controversy.

### **Text Book:**

1. William Stallings- Computer Organization & Architecture: Designing for Performance, 7<sup>th</sup> Edn, Pearson Education, New Delhi-2006.

### **Reference Books:**

1. C. Hamacher- Computer Organization, 5<sup>th</sup> Edn, McGraw Hill, International Education, New Delhi-2002.
2. M.M.Mano- Computer System Architecture, 3<sup>rd</sup> Edn, PHI/Pearson Education, New Delhi-2006.
3. J.P.Hayes- Computer Architecture and Organization, 3<sup>rd</sup> Edn, McGraw Hill, International Edn, New Delhi-1998.

**MCA 2001**

**DATA STRUCTURES**

### **MODULE - I**

**Introduction:** Pseudocode, The Abstract Data Type, A Model for an Abstract Data, Algorithm Efficiency.

**Searching:** List Searches, Hashed List Searches, Collision Resolution.

## **MODULE- II**

**Linked Lists:** Linear List Concepts, Linked List Concepts, Linked List Algorithms, Processing a Linked List, List Applications, Complex Linked List Structures, List Abstract Data Type-Linked List Implementation.

## **MODULE - III**

**Stacks:** Basic Stack Operations, Stack Linked List Implementation, Stack Applications, Stack Abstract Data Type Implementation, Stack ADT- Array Implementation.

**Queues:** Queue Operations, Queue Linked List Design, Queuing Theory, Queue Applications, Queue ADT-Linked List Implementation, Queue ADT-Array Implementation.

## **MODULE - IV & V**

**Recursion:** Factorial - A Case Study, How Recursion Works, Designing Recursive Algorithms, Another Case Study- Fibonacci Numbers, The Towers of Hanoi.

**Introduction to Trees:** Basic Tree Concepts, Binary Trees, Binary Tree Traversals, Expression Trees, General Trees, Huffman Code.

**Search Trees:** Binary Search Trees, AVL Trees, AVL Tree Implementation, AVL Abstract Data Type.

## **MODULE - VI**

**Heaps:** Heap Definition, Heap Structure, Basic Heap Algorithms, Heap Data Structure, Heap Algorithms, Heap Applications.

**Multiway Trees:** m-Way Search Trees, B-Trees, Simplified B-Trees.

## **MODULE - VII**

**Advanced Sorting Concepts:** General Sort Concepts, Insertion Sorts, Selection Sorts, Exchange Sorts, External Sorts.

### **Text Book:**

1. R.F.Gilberg & B.A. Forouzan- Data Structures: A Pseudocode Approach with C++,  
2<sup>nd</sup> Edn, Brooks/Cole- Thomson Learning, Indian Reprint, 2005.

### **Reference Books:**

1. E.Horowitz et.al-Fundamentals of Data Structures in C++, Galgotia Publication,  
New Delhi, 2006.
2. A.M.Berman- Data Structures via C++, Oxford Univ. Press, Inc. Indian Reprint,  
2002.
3. M.T.Goodrich et.al- Data Structures and Algorithms in C++, John Wiley, Inc.  
Indian Reprint, 2004.

**MCA 2003**

**OBJECT ORIENTED DESIGN & PROGRAMMING**

## **MODULE - I**

**Computing and the Object-Oriented Design Methodology:** Basic Computing Terminology, Software, Engineering Software, Object-Oriented Design.

**C++ -The Fundamentals:** Program Organization, A First Program, A Second Program, Comments, Assigning a Value, Fundamental C++ Objects, Constants, Names, Definitions, Expressions, Output Statements, Computing Average Velocity.

## **MODULE - II**

**Modifying Objects:** Assignment, Const Definitions, Input Statements, Computing the Number of Molecules in a Hydrocarbon, Compound Assignment, Increment and Decrement, Estimating Yearly Savings of Change, The String Class, EzWindows, Moving Lawns.

**Control Constructs:** Boolean Algebra, A Boolean Type, Conditional Execution Using the if Statement, Conditional Execution Using the switch Statement, Computing a Requested Expression, Validating a Date, Iteration Using the while Statement, Simple String and Character Processing, Iteration Using the for Statement, Simple Data Visualization, Solving the Lazy Hobo Riddle, Iteration Using the do Construct.

## **MODULE - III**

**Functions Usage Basics and Libraries:** Function Basics, The Preprocessor, Using Software Libraries, The iostream Library, The iomanip Library, The fstream Library, The math Library, Library ctype, The assert macros.

## **MODULE - IV**

**Programmer-Defined Functions:** Basics, A Tasty Problem, Some Useful Functions, Integrating a Quadratic Polynomial, The Logic Scope, Displaying a Price-Interval Chart, Recursive Functions.

**Advanced Parameter Passing:** Reference Parameters, Passing Objects by Reference, Validating Telephone Access Codes, Constant Parameters, Default Parameters, Casting of Function Parameters, Function Overloading, Random Numbers, A Factory Automation Trainer.

## **MODULE - V**

**The Class Construct and Object-Oriented Design:** Introducing a Parameter-Defined Data Type, The Rectangle Shape Class, Using the Rectangle Shape Class, Constructors, Building a Kaleidoscope, Object-Oriented Analysis and Design.

## **MODULE - VI**

**Pointers and Dynamic Memory:** Lvalues and Rvalues, Pointer Basics, Constant Pointers and Pointers to Constants, Arrays and Pointers, Character String Processing, Program Command-line Parameters, Pointers to Functions, Dynamic Objects, A Simple ADT for Representing Lists of Integer Values.

## **MODULE - VII**

**Inheritance:** Object-Oriented Design Using Inheritance, Reuse via Inheritance, A Hierarchy of Shapes, Protected Members and Inheritance, Controlling Inheritance, Multiple Inheritance, A Prettier Kaleidoscope.

**Templates and Polymorphism:** Generic actions and Types, Function Templates, Class Templates, A Simple List Class Using a Class Template, Sequential Lists, Polymorphism, Virtual Function Nuances, Abstract Base Classes, Virtual Multiple Inheritance.

**Text Book:**



1. J.P.Cohoon & J.W.Davidson- C++ Program Design: An Introduction to Programming and Object-Oriented Design, 2<sup>nd</sup> Edn, TMH Edn, New Delhi-2000.

**Reference Book:**

1. F.L.Friedman & E.B.Koffman- Problem Solving, Abstraction, and Design Using C++, 4<sup>th</sup> Edn, Pearson Education, Inc. 2004.

**MCA 2005**

**DATABASE MANAGEMENT SYSTEM**

**MODULE - I**

**Introduction:** Purpose of Database Systems, Data Models, Schemas and Instances, Three-Schema Architecture and Data Independence, Database languages, Database Architecture, Classification of DBMS, relational database, Database users and Administrators, Advantages of DBMS.

**MODULE - II**

**E-R-Model:** Entities and Entity Sets, Relationships and Relationship Sets, Keys, Mapping, Constraints, ER Diagram, Reducing ER Diagram to tables, Generalization and Specialization, Aggregation.

**MODULE - III**

**Relational Model:** Concepts, Constraints and Relational database Schemas, Relational Algebra, Relational Calculus, QUEL, QBE, SQL..

**MODULE - IV**

**Database Design:** Pitfalls in relational database design, Normalization using functional, Multivalued and join dependencies, DKNF, Atomic values, alternative approaches to database design.

**MODULE - V**

**Security & Integrity :**Security & Integrity violations, authorization and views, integrity constants, encryption, Statistical databases.

**MODULE - VI**

**Transaction Processing and Concurrency Control :** Transaction Processing, Schedules and Recovery, Locking and Timestamp Ordering for concurrency control.

**MODULE - VII**

**Distributed Databases :** Concepts and Types of Distributed databases, data fragmentation, Replication and Allocation.

**Text Book:**

1. Fundamentals of Database Systems "Ramez Elmasri", Pearson Education

**Reference Book:**

1. Database Systems Concepts "A. Silberschatz,Korth", McGraw Hill.

**MODULE - I**

**Overview of Operating Systems:** OS and the Computer System, Efficiency, System Performance and User Convenience, Classes of Operating Systems, Batch Processing Systems, Multiprogramming Systems, Time Sharing Systems, Real Time Operating Systems, Distributed Operating Systems, Modern Operating Systems.

**MODULE - II**

**Processes and Threads:** Processes and Programs, Programmer view of Processes, OS view of Processes, Threads, Case studies of Processes and Threads.

**MODULE - III**

**Scheduling:** Preliminaries, Non-preemptive Scheduling Policies, Preemptive Scheduling Policies, Scheduling in Practice, Real Time Scheduling, Scheduling in Unix, Scheduling in Linux, Scheduling in Windows, Performance Analysis of Scheduling Policies.

**MODULE - IV**

**Memory Management:** Managing the Memory Hierarchy, Static and Dynamic Memory Allocation, Memory Allocation to a Process, Reuse of Memory, Contiguous Memory Allocation, Noncontiguous Memory Allocation, Paging, Segmentation, Segmentation with Paging, Kernel Memory Allocation, A Review of Relocation, Linking and Program Forms.

**MODULE - V**

**Virtual Memory:** Virtual Memory Basics, Demand Paging, Page Replacement Policies, Memory Allocation to a Process, Shared Pages, Memory Mapped Files, Unix Virtual Memory, Linux Virtual Memory, Virtual Memory using Segmentation.

**MODULE - VI**

**File Systems:** File System and IOCS, Files and File Operations, Fundamental File Organizations, Directory Structures, File Protection, Interface between File System and IOCS, Allocation of Disk Space, Implementing File Access, File Sharing Semantics, File System Reliability, Virtual File System, Unix File System, Linux File System, Windows File System, Performance of File Systems.

**MODULE - VII**

**Security and Protection:** Overview of Security and Protection, Goals of Security and Protection, Security Attacks, Formal and Practical aspects of Security, Encryption, Authentication and Password Security, Access Descriptors and the Access Control Matrix, Protection Structures, Capabilities, Unix Security, Linux Security, Windows Security.

**Text Book:**

1. D.M. Dhamdhare- Operating Systems: A Concept-Based Approach, 2<sup>nd</sup> Edn, TMH, New Delhi-2006.

**Reference Books:**

1. A. Silberschatz et.al-Operating System Concepts, 6<sup>th</sup> Edn, John Wiley, Indian

- Reprint, 2003.
2. C.Cronsley-Operating Systems: A Design-Oriented Approach, TMH, New Delhi, 2002.
  3. H.M.Deitel-Operating Systems, 2<sup>nd</sup> Edn, Pearson Education, 2003.
  4. A.S.Tanenbaum-Operating System:Design and Implementation, PHI, New Delhi, 2002.m,.

## **MCA 3001**

## **JAVA PROGRAMMING**

### **MODULE-I**

**Fundamentals of Java Programming:** Data in Java Programs, Arithmetic Operators and Expressions, Simple Program Input and Output.

### **MODULE-II**

**Making Decisions with Java:** Comparing Numbers in Java, Comparing Strings in Java, Logical (Boolean) Operators and Order of Precedence, Selection Structures in Java.

### **MODULE-III**

**Repeating Program Statements:** The **while** Statement, The **for** Statement, The **do...while** Statement, Nested Loops, **break**, and **continue**.

### **MODULE-IV**

**Methods and Classes:** Predefined Java Methods, Programmer-Defined Methods. **Arrays:** The One-Dimensional Array, Multidimensional Arrays, Other Array Topics.

### **MODULE-V**

**Characters, Strings, and Formatting:** Working with Characters, Working with Strings, Formatting Data for Output.

**Exceptions and Assertions:** Exception Handling, Assertions.

### **MODULE-VI**

**File Input and Output:** Inputting Data from a Text File, Outputting Data to a Text file, Performing Input and Output with Binary Files.

### **MODULE-VII**

**Graphical User Interfaces:** Creating User Interfaces, Overview of a Java GUI, Developing a Java GUI, Adding Functionality to a GUI , Improving GUI Layout.

### **Text Book:**

1. Richard A. Johnson, “ An Introduction to Java Programming and Object-Oriented Application Development”, 1<sup>st</sup> Edn., Thomson Learning, New Delhi - 2007

### **Reference Books:**

1. Dietel, Dietel - Java How to Program , 5<sup>th</sup> Edn, Pearson Education , New Delhi, 2006

2. E. Balagurusamy - JAVA Programming, TMH, New Delhi, 2005
3. James M. Sleet - Programming and Problem Solving with JAVA, Thomson Learning, Indian Edition, 2007.

## **MCA 3003**

## **SOFTWARE ENGINEERING**

### **MODULE - I**

**Introduction to Software Engineering:** Evolving Role of Software, Changing Nature of Software, Legacy Software, Software Engineering - A layered Technology.

### **MODULE - II**

Process Frame work, Process Patterns, Process Models, Waterfall Model, Incremental Process Models, Evolutionary Process Models, Specialized Process Models, Unified Process Model, Agile Process Model.

### **MODULE - III**

**Requirement Engineering:** A bridge to design and construction, Requirement Engineering Task, Initiating the Requirement Engineering Process, Eliciting Requirements, Developing Use case, Building the Analysis Model, Negotiating Requirements, Validating Requirements.

### **MODULE - IV**

**Design Engineering:** Design Process and Design Quality, Design Concepts, Design Models, Pattern Based Software Design.

### **MODULE - V**

**Testing Strategies and Testing Tactics:** Strategic Approach to software Testing, Test Strategies for conventional and Object Oriented Software, Validation Testing System Testing, White Box Testing, Basic Path Testing Control Structure Testing, Black Box Testing, Object Oriented Testing Methods.

### **MODULE - VI**

**Metric for process and Estimation Techniques:** Process metrics, Software Measurement, Software Project Estimation, Decomposition Techniques, Empirical Estimation Models, Estimation for Object Oriented Projects Specialized Estimation Techniques.

### **MODULE - VII**

**Software Quality and Configuration Management:** Quality Concepts, Software Quality Assurance, Software Reliability, Software Configuration Management, SCM Repository, SCM Process.

### **Text Book:**

1. Roger S. Pressman - "Software Engineering - A Practitioner's Approach", 6<sup>th</sup> Edn., McGraw Hill.

### **Reference Books:**

1. John Wiley and Sons - "Software Engineering - Principles and Practice - 2<sup>nd</sup> Edn., Haus Van Vliet.

2. Ian Sommerville - “Software Engineering”, 7<sup>th</sup> Edn., Pearson Education.

## **MCA 3005 FUNDAMENTALS OF COMPUTER ALGORITHMS**

### **MODULE - I**

**Elementary Algorithmic:** Introduction, Problems and instances, The efficiency of algorithms, Average and worst-case analyses, What is an elementary operation, why look for efficiency

**Asymptotic Notation :** Introduction, A notation for “the order of”, Other asymptotic notation, Conditional asymptotic notation, Conditional asymptotic notation, Asymptotic notation with several parameters, Operations on asymptotic notation

### **MODULE - II**

**Analysis of Algorithm:** Introduction, Analysing control structures, Using a barometer, Supplementary examples, Average-case analysis, Amortized analysis, Solving recurrences

### **MODULE - III**

**Greedy Algorithms:** General characteristics of greedy algorithms, Graphs: Minimum spanning trees, Shortest paths, The knapsack problem, scheduling

### **MODULE - IV**

**Divide-and-conquer:** Introduction: Multiplying large integers, The general template, Binary search, Sorting, Finding the median, Matrix Multiplication, Exponentiation

### **MODULE - V**

**Dynamic Programming:** Calculation the binomial coefficient, The World Series, Making change, The principle of optimality, The knapsack problem, Shortest paths, Chained matrix multiplication

### **MODULE - VI**

**Exploring Graphs :** Graphs and games: An introduction, Traversing trees, Depth-first search: Undirected graphs, Depth-first search: directed graphs, Breadth-first search, Backtracking, Branch-and-bound, the minimax principle.

### **MODULE - VII**

**Probabilistic Algorithms:** Introduction, Probabilistic does not imply uncertain, Expected versus average time, Pseudorandom generation, Numerical probabilistic algorithms, Monte Carlo algorithms, Las Vegas algorithms

### **Text Book:**

1. G Brassard & P Bratley - Fundamentals of Algorithmics PHI, New Delhi, 2005

### **Reference Books:**

1. E.Horowitz. et.al.- Fundamentals of Computer Algorithms, Galgotia Publication Pvt. Ltd., New Delhi, 2004

2. J.Kleinberg & E. Tardos - Algorithm Design, Pearson Education, New Delhi, 2006
3. T.H. Cormen et.al. - Introduction to Algorithms - PHI, New Delhi, 2005
4. S. Dasgupta et.al. - Algorithm, TMH, New Delhi - 2007
5. S. Sahani - Data Structures, Algorithms and Applications in C++ 2<sup>nd</sup> Edition, Universities Press (India) Pvt. Ltd., 2005

## **MCA 3007**

## **AUTOMATA THEORY**

### **MODULE -I & II**

**Basic Mathematical Objects and Mathematical Induction:** Sets, logic, Functions, Relations, Alphabets, Strings, Languages, Principle of mathematical induction, Recursive definition.

**Regular Expressions and Finite Automata:** Regular languages and Regular Expressions, Memory required to recognize a language, Finite Automata, capability & limitations of FSM, Deterministic Finite Automata, Non-Deterministic Finite Automata, NFA with  $\epsilon$ -moves, regular sets & regular expressions, Equivalence of DFA and NDFA, NFA from regular expressions, regular expressions from DFA, Moore versus Mealy m/c, two way finite automata equivalence with one way, Kleen's Theorem, applications of finite automata.

### **MODULE -III**

**Regular and Non-regular languages:** Criterion for Regularity, Minimal Finite Automata, Pumping Lemma for Regular Languages, Decision problems, Regular Languages and Computers.

### **MODULE-IV**

**Context Free Grammars :** Introduction, definition, Regular Grammar, Derivation trees, Ambiguity, Simplified forms and Normal Forms, Applications.

### **MODULE-V**

**Pushdown Automata :** Definition, Moves, Instantaneous Descriptions, Language recognised by PDA, Deterministic PDA, Acceptance by final state & empty stack, Equivalence of PDA, Pumping lemma for CFL, Interaction and Complements of CFL, Decision algorithms.

### **MODULE -VI**

**Turing Machines:** Definition and examples, Computing Partial Functions with Turing Machine(TM), Combining TMs, Variations of TMs, Multi-tape TMs, Non-deterministic TM, Universal TM, Church Thesis.

### **MODULE -VII**

**Recursively Enumerable Languages:** Recursively Enumerable and Recursive, Enumerating Language, Context Sensitive and Chomsky Hierarchy.

**Unsolvable Problems and Computable Functions:** Nonrecursive Language and unsolvable Problems, Halting Problem, Rice Theorem, Post Correspondence Problem.

**Computational Complexity:** Discussion on P, NP, NPC and NP-Hard Problems.

**Text Books :**

John Martin -“Introduction to Languages and the Theory of Computation”, 3<sup>rd</sup> edition, TMH.

**Reference Books:**

1. K.L.P Mishra & N. Chandrasekharan -“Theory of Computer Science”, PHI
2. Hopcroft JE. And Ullman JD -“Introduction to Automata Theory, Languages & Computation”, Narosa.
3. Lewis H. R. and Papadimitrou C. H -“Elements of the theory of Computation”, PHI.

**MCA 4001**

**COMPILER DESIGN**

**MODULE -I**

**Introduction to Compiler:**

Compilers, Analysis of the source program, The phases of the compiler, Major data structures in a Compiler, Issues in a Compiler Structure, Bootstrapping and Porting .

**MODULE -II**

**Scanning :** Scanning Process, Regular Expression(R.E.), Finite Automata(F.A.), R.E. to DFA , Implementation of Scanner, Use of Lex to generate a Scanner.

**Context Free Grammar and Parsing:** Parsing Process, The role of a parser, Context Free Grammar, Parse trees and Abstract Syntax trees, Ambiguity, EBNF, Formal properties of Context Free Languages.

**MODULE -III**

**Top-down Parsing:** Top down Parsing by Recursive Descent, LL(1), First and Follow sets, Recursive Descent Parser for a Tiny language, Error Recovery in Top-down Parser.

**MODULE - IV & V**

**Bottom-up Parsing :** Overview of Bottom-up Parsing, LR(0) items and LR( 0 ) Parsing, SLR(1), General LR(1) and LALR(1) Parsing, YACC , Error Recovery in Bottom-up Parser.

**Semantic Analysis:** Attributes and Attributes Grammars, Algorithms for Attribute Computation, Symbol Table, Data types and Data type Checking, Semantic Analyzer for Tiny language.

**MODULE -VI**

**Run-time Environments :** Memory organization during program execution, Fully static run-time environment, Stack-based run-time environments, Dynamic memory, Parameter passing mechanism, Run-time environment for Tiny language.

**MODULE-VII**

**Code Generation:** Intermediate code and data structures for code generation, Basic code generation techniques, Code generation of Control statements and Logical expressions, Code generation of Procedure and Function calls, Code generation for a tiny language, A survey of code optimization techniques.

**Text Book:**

1. Kenneth C. Louden -“Compiler Construction - Principle and Practice”, Thomson  
2007.

**Reference Book:**

1. Aho, Sethi, Ullman -“Compiler Principles, Techniques and Tools”, Pearson  
Education, 2007.

**MCA 4003**

**DATA COMMUNICATION AND COMPUTER NETWORKS**

**MODULE - I**

**Multiple Access:** Random Access, CSMA/CD, CSMA/CA, Controlled Access, Reservation, Polling, Token Passing, FDMA, TDMA, CDMA

**MODULE - II**

**Local Area Networks:** Traditional Ethernet, Fast Ethernet, Gigabit Ethernet, Wireless LAN, BLUETOOTH, Virtual Channels, Frame Relay, ATM

**MODULE -III**

**Networks Layer and IP :** IPv4 addresses, IPv6 addresses, Internetworking, IPv4, IPv6, Transition from IPv4 to IPv6, Address Mapping, IGMP, ICMP, Delivery, Forwarding, Unicast Routing Protocols, Multicast Routing Protocols

**MODULE - IV**

**Transport Layer:** Process to Process Delivery, UDP, TCP Congestion Control, QoS, Integrated Services, Differentiated Services

**MODULE - V**

**Application Layer and its Features:** Namespaces, Domain Name Space, Distribution of Name Space, DNS in the Internet, Resolution, DNS Messages, DDNS

**MODULE- VI & VII**

**WWW, HTTP and Multimedia:** Architecture, Web Documents, HTTP, HTTP Transaction, Digitizing audio and Video, Audio and Video Compression, Streaming stored audio/video, Streaming live audio/video, Real Time Interactive audio/video, RTP, RTCP, VOIP

**Text Book:**

1. Forouzan B, ;Data Communications and Networking , 2<sup>nd</sup> Edition, Tata McGraw-Hill, New Delhi, India 2006

**Reference Books:**

1. Stallings W.;Data and Computer Communications, 7th Edition, Prentice Hall India, New Delhi - 2007
2. P.C. Gupta- Data Communications and Computer Networks, PHI, New Delhi, 2006.



**MODULE - I**

Introduction To Artificial Intelligence System, Neural Network, Fuzzy Logic & Genetic Algorithm. Fuzzy Set Theory : Fuzzy Versus Crisp, Crisp Set, Fuzzy Set, Crisp Relation, Fuzzy Relations.

**MODULE- II**

**Fuzzy System:** Crisp Logic, Predicate Logic, Fuzzy Logic, Fuzzy Rule Based System, Defuzzification Methods, Applications.

**MODULE - III**

Genetic Algorithms, Basic Concepts, Creation Of Offspring, Working Principle, Encoding, Fitness Function, Reproduction.

**MODULE - IV**

Genetic Modelling, Inheritance Operations, Cross Over, Inversion And Deletion, Mutation Operator, Bit Wise Operators, Generation Cycle, Convergence Of Genetic Algorithm, Application, Multi Level Optimization, Real Life Problems, Difference And Similarities Between GA And Other Traditional Methods, Advanced In GA.

**MODULE - V**

Fundamentals Of Neural Networks, Basic Concepts Of Neural Network, Human Brain, Model Of An Artificial Neuron, Neural Network Architectures, Characteristic Of Neural Networks, Learning Method, Taxonomy Of Neural Network Architectures, History Of Neural Network Research, Early Neural Network Architectures, Some Application Domains.

**MODULE - VI**

Back Propagation Network Architecture Of Back Propagation Network, Back Propagation Learning, Illustration, Applications, Effect Of Tuning Parameters Of The Back Propagation Neural Network, Selection Of Various Parameters In BPN, Variations Of Standard Back Propagation Algorithm.

**MODULE - VII**

Associative Memory And Adaptive Resonance Theory, Autocorrelators, Heterocorrelators , Multiple Training Encoding Strategy, Exponential BAM, Associative Memory For Real Coded Pattern Pairs, Applications, Introduction To Adaptive Resonance Theory, ARTI, Character Recognition Using ART1

**Text Book:**

S. Rajasekharan & G. A. Vijayalakshmi - “ Neural Network, Fuzzy Logic And Genetic Algorithm Synthesis And Applications”, Prentice Hall Of India Pvt., New Delhi - 2004

**Reference Book:**

Jyh - Shing R Jang, C. T. Sun, E Mizutani - Neuro Fuzzy And Soft Computing - A Computational Approach To Learning And Machine Intelligence”, Prentice Hall Of India - 1997.

**MODULE - I**

Origin, People Interested in Accounts, Concepts & Conventions System of Accounting, Accounting Standards Book-Keeping, Double Entry, Classification of Business Accounts, "Golden Rules", Journal, Subsidiary Books, Ledger Posting & Balancing, Concept of Trial Balance, Errors and Omission, Commission, Principle and Compensating, Final Accounts with Adjustments, Introduction to Financial Accounting, (Tally 7.2), Creating Company Master, Modification & Deletion.

**MODULE - II**

Definition, Aims, Traditional vs. Innovative Management Accounting Practices, Development of Throughput Accounting, An Alternative view of Management Accounting, Lean Accounting(Accounting for Lean), Related Qualifications, Concept of Financial Budgeting, Fund Flow, Cash Flow Statement, C-V-P Analysis, MIS in Report Preparation, SFC and DFD, Working of FM Module of SAP Transaction.

**MODULE - III**

**Voucher Entry:** Receipt Voucher, Payments Voucher, Contra Voucher, Journal Voucher, Physical Stock Voucher, Stores Ledger Book Keeping Through MM Module of SAP Transaction.

**MODULE - IV**

**Inventory Information:** Stock Groups, Unit of Memo, Go Down Items, Warehousing, Displaying and Alterting and Stock Keeping.

**MODULE - V**

**Invoice:** Preparation of Invoice, Entry, Inco-Terms, Tax Implication, CENVAT and Concept of CVED, Printing & Display.

**MODULE - VI**

**Report Generation:** Balance Sheet, Profit and Loss Accounts, Stock Summary, Day Book, Accounts Books.

**MODULE - VII**

**Report Generation:** Cash Book, Bank Book, Ledger, Outstanding Register.

**Text Books:**

1. S.N. Maheshwari- Advance Accountancy, Vikas Publication
2. Amitabh Mukherjee & Md Hanif- Modern Accountancy, TMH Publication

**MODULE - I**

**Introduction:** Image Processing as Picture Analysis, The Advantages of Interactive Graphics, Representative Uses of Computer Graphics, Classification

of Applications, Development of Hardware and Software for Computer Graphics, Conceptual Framework for Interactive Graphics.

**Basic Raster Graphics Algorithms for Drawing 2D Primitives:** Overview, Scan Converting Lines, Scan Converting Circles, Scan Converting Ellipses, Filling Rectangles, Filling Polygons, Filling Ellipse Arcs, Pattern Filling, Thick Primitives, Line Style and Pen Style, Clipping in a Raster World, Clipping Lines, Clipping Circles and Ellipses, Clipping Polygons, Generating Characters, SRGP\_copyPixel, Antialiasing.

## **MODULE- II & III**

**Graphics Hardware:** Hardcopy Technologies, Display Technologies, Raster-Scan Display Systems, The Video Controller, Random-Scan Display Processor, Input Devices for Operator Interaction, Image Scanners.

**Geometrical Transformations:** 2D Transformations, Homogeneous Coordinates and Matrix Representation of 2D Transformations, Composition of 2D Transformations, The Window-to-Viewport Transformation, Efficiency, Matrix Representation of 3D Transformations, Composition of 3D Transformations, Transformations as a Change in Coordinate System.

**Viewing in 3D:** Projections, Specifying an Arbitrary 3D View, Examples of 3D Viewing, The Mathematics of Planar geometric Projections, Implementing Planar Geometric Projections, Coordinate Systems.

## **MODULE -IV**

**Input Devices, Interaction Techniques, and Interaction Tasks:** Interaction Hardware, Basic Interaction Tasks, Composite Interaction Tasks.

**Representing Curves and Surfaces :** Polygon Meshes, Parametric Cubic Curves, Parametric Bicubic Surfaces, Quadric Surfaces.

## **MODULE-V**

**Achromatic and Colored Light:** Achromatic Light, Chromatic Color, Color Models for Raster Graphics, Reproducing Color, Using Color in Computer Graphics.

**The Quest for Visual Realism:** Why Realism?, Fundamental Difficulties, Rendering Techniques for Line Drawings, Rendering Techniques for Shaded Images, Improved Object Models, Dynamics, Stereopsis, Improved Displays, Interacting with Our Other Senses, Aliasing and Antialiasing.

## **MODULE -VI**

**Visible-Surface Determination:** Functions of Two Variables, Techniques for Efficient Visible-Surface Algorithms, Algorithms for Visible-Line Determination, The z-Buffer Algorithms, List-Priority Algorithms, Area-Subdivision Algorithms, Algorithms for Octrees, Algorithms for Curved Surfaces, Visible-Surface Ray Tracing.

**Illumination and Shading:** Illumination Models, Shading Models for Polygons, Surface Detail, Shadows, Transparency, Interobject Reflections, Physically Based Illumination Models, Extended Light Sources, Spectral Sampling.

## **MODULE-VII**

**Advanced Raster Graphics Architecture:** Simple Raster-Display System, Display-Processor Systems, Standard Graphics Pipeline, Introduction to Multiprocessing, Pipeline Front-End Architectures, Parallel Front-End Architectures, Multiprocessor Rasterization Architectures.

**Advanced Geometric and Raster Algorithms:** Clipping, Scan-Converting Primitives, Antialiasing, The Special Problems of Text, Filling Algorithms, Making copyPixel Fast, The Shape Data Structure and Shape Algebra.

**Text Book:**

1. Foley, Van Dam, Feiner, Hughes- Computer Graphics Principles & Practice, 11<sup>th</sup> edn., Pearson Education, New Delhi, 2004.

**Reference Book:**

1. D. Hearn & M.P.Baker- Computer Graphics, PHI, New Delhi, 2006

**MCA 5003**

**SYSTEM SIMULATION & MODELLING**

**MODULE -I& II**

**Introduction to Discrete-Event System Simulation**

**Introduction to Simulation:** When Simulation is the Appropriate Tool, When Simulation is not Appropriate, Advantages and Disadvantages of Simulation, Areas of Application, Systems and System Environment, Components of a System, Discrete and Continuous Systems, Model of a System, Types of Models, Discrete-Event System Simulation.

**Simulation Examples:** Simulation of Queueing Systems, Simulation of Inventory Systems, Other Examples of Simulation.

**Module-III**

**General Principles:** Concepts in Discrete-Event Simulation, List Processing.

**Simulation Software:** History of Simulation Software, Selection of Simulation Software, An Example of Simulation, Simulation in Java, Simulation in GPSS, Simulation in SSF, Simulation Software, Experimentation and Statistical-Analysis Tools.

**MODULE-IV**

**Mathematical and Statistical Models**

**Statistical Models in Simulation:** Review of Terminology and Concepts, Useful Statistical Models, Discrete Distributions, Continuous Distributions, Poisson Process, Empirical Distributions.

**MODULE-V**

**Queueing Models:** Characteristics of Queueing Systems, Queueing Notation, Long-Run Measures of Performance of Queueing Systems, Steady-State Behavior of Infinite-Population Markovian Models, Steady-State Behavior of Finite-Population Models(M/M/c/K/K), Networks of Queues.

**MODULE-VI**

**Random-Number Generation:** Properties of Random Numbers, Generation of Pseudo-Random Numbers, Techniques for Generating Random Numbers, Tests for Random Numbers.

**Random-Variate Generation:** Inverse-Transform Technique, Acceptance-Rejection Technique, Special Properties.

## **MODULE-VII**

### **Analysis of Simulation Data**

**Input Modeling:** Data Collection, Identifying the Distribution with Data, Parameter Estimation, Goodness-of-fit Tests, Fitting a Nonstationary Poisson Process, selecting Input Models without Data, Multivariate and Time-Series Input Models.

**Verification and Validation of Simulation Models:** Model Building, Verification, and Validation, Verification of Simulation Models, Calibration and Validation of Models.

### **Text Book:**

1. J. Banks, J. S. Carson , B.L. Nelson, D.M. Nicol- Discrete-Event System Simulation, 4<sup>th</sup> Edn, Pearson Education, 2007.

### **Reference Book:**

1.A.M. Law & W.D. Kelton - Simulation Modeling and Analysis, 3<sup>rd</sup> Edn. TMH, 2003

## **MCA 5005**

## **OPTIMIZATION THEORY**

### **MODULE - I**

**Operation Research** - An overview, Organ and Development of OR, Nature and Features of OR, Modeling in OR, General Solution Methods for OR models, Scientific method in OR, Methodology of OR, Application, Opportunities and Shortcomings of OR.

### **MODULE - II**

**Linear Programming Problem** : Introduction, Mathematical Formulation of the Problem, Graphical Solution Method, Some Exceptional Cases, General LPP, Canonical and Standard forms of LPP, Simplex Method: Introduction, Fundamental properties of solutions, the Computational Procedure, Use of Artificial variables, Solution to simulation Linear Equations, Inverting a Matrix using Simplex Method.

### **MODULE - III**

**Duality in LPP:** Introduction, General Primal - Dual pair, Formulating a Dual Problem, Primal Dual pair in Matrix form, Duality theorems, Dual simplex method, Post optimal Analysis, Introduction: Variation in cost vector, Requirement Vector, Coefficient Matrix, Structural Variation.

### **MODULE - IV**

**Integer Programming and Advance LPP techniques:** Introduction, Gomory's Method, Construction of Gomory's constraints, Fractional Cut Method: All Integer & Mixed Integer, Revised Simplex Method, Bounded Variable, Parametric LPP, Karmarkar Algorithm.

### **MODULE- V**

**Dynamic Programming & Introduction:** Characteristic of Dynamic Programming, Dynamic Programming Algorithm, Solution of LPP by Dynamic Programming.

## **MODULE - VI**

**NLPP:** Introduction, Formularity a NLPP, General NLPP, Constrained Optimization with Equality Constraints and Inequality constraints, Saddle Points.

## **MODULE - VII**

**NLPP Methods:** Introduction, Graphical solution, Kuhn - Tucker Conditions with Non Negative Constraints, Quadratic Programming, Wolfe's Modified Simplex Method, Separable Convex Programming & Algorithm.

### **Text Book:**

1. Kanti Swarup, P.K. Gupta, Man Mohan - "Opeations Reaearch, Sultan Chand & Sons, New Delhi - 2001

### **Reference Books:**

1. Ronald L. Rardin "Optimization in Operations Research", pearson Education, New Delhi - 2003
2. S.S. Rao, "Optimization Theory & Application", Wiley Eastern Ltd, 1979.

## **MCA 7101**

## **DISTRIBUTED DATABASES**

### **MODULE - I**

**Introduction to Distributed Data Processing:** Advantages of DDB's, Problem areas.

### **MODULE - II**

**Distribute Database Management System Architecture:** DBMS Standardization, Architectural models for DDBMS Distribute DBMS Architecture.

### **MODULE - III**

**Distributed Database Design:** Design Strategies, Distribution design issues, Fragmentation, Allocation.

### **MODULE - IV**

**Semantic Data Control :** view management, data security, Integrity control.

### **MODULE- V**

**Query processing and Optimization:** Quarry Processing Problem, Characterization of Query Processors, Layers of query Processing, Query decomposition, Query Optimization, Centralized query optimization, Join ordering in fragment queries, Distributed Query Optimization Algorithms.

### **MODULE - VI**

**Transaction Management and Concurrency Control:** Introduction, Properties, Serializability Theory, Locking Based Concurrency control Algorithm Time Stamp based concurrency control Algorithms, Dead Lock management.

### **MODULE - VII**

**Recovery and Reliability:** Failues and fault tolerance in distributed system, Distributed & local reliability protocol, Sits failures, network partitioning.

**Text Book:**

1. M. Tamer Ozsee, Patric Valduries - Principle of Distributed Database Systems 2<sup>nd</sup> Edn., Pearson Education Asia, 2001.

**MCA 7109****MULTIMEDIA DATABASES****MODULE- I& II**

Semantic Models for Multimedia Information Systems, Multimedia Semantic Models

**MODULE -III & IV**

Multimedia database Searching, Image Segmentation ,Video Parsing and Segmentation Approaches ,Iconic-Based Grouping and Browsing Approaches , Knowledge-Based Event Modeling Approaches , Characteristics of Video Data Modeling , Motion Detection and Tracking Approaches ,Object Recognition Approaches ,Content-Based Retrieval

**MODULE -V**

Multimedia Browsing, Video Browsing, Key Frame Selections

**MODULE- VI**

Augmented Transition Network Model (ATN), Spatial and Temporal Relations of Semantic Objects, Multimedia Presentations, Multimedia Database Searching, Multimedia Browsing, User Interactions and Loops

**MODULE -VII**

Object Composition Petri Net Model, Interval Based Conceptual Models

**Text Book:**

1. Chen S C, Kashyap R L, Ghafoor A; Semantic Models for Multimedia Database Searching and Browsing, Kluwer Academic Publishers,

**Reference Book:**

1. Muneesawang P ,Guan L-Multimedia Database Retrieval A Human-Centered Approach, Springer Publication, 2006

**MCA 7103****DECISION SUPPORT SYSTEMS****MODULE - I**

**Decision Making Process:** An Over view, Introduction, Managerial decision making and Information System, Need for computerized decision support and the supporting technologies, Framework of DSS, Group Support System, Executive information system, Knowledge management Systems.

**MODULE - II**

**Decision Making, System, Models :** Decision Making - Introduction and Definition, System, Models, previews of modeling process, Decision making - The intelligence phase, the design phase and the choice phase.

**Evaluation** - Multiple Goals, sensitivity analysis, What - if and goal seeking.

**Decision Making** - The implementation phase, Alternative decision making models.

### **MODULE - III**

**DSS** - Configurations, Definitions, Characteristics & Capabilities, Components, The Data management Subsystem, Model Management Subsystem, Knowledge - based management, Subsystem, User interface Subsystem, DSS Classification, DSS H/W, Difference between Management Science and MIS.

### **MODULE - IV**

**Modeling & Analysis** - Modeling for MSS, Static & Dynamic Models, Treating Certainty, Uncertainty and Risk, Interface diags, MSS modeling in spreadsheets, Decision analysis (Decision tables and Decision trees), Optimization via mathematical programming, Meuristic Programming, Multidimensional Modeling - OLAP.

### **MODULE - V**

**DSS Development** - Introduction, The Traditional System Development life cycle, Alternate Development Methodologies, Prototyping, DSS Technology Levels and Tools, DSS Development Platforms, DSS Development Tool Selection, Team Developed DSS, End - User Developed DSS, DSS System Integration.

### **MODULE - VI**

**Collaboration** Communication, Enterprise DSS Group Decision Making - Communication & Collaboration, Communication Support, Collaboration Support - Computer Supported Co-operative work, Group Support System, GSS Technologies.

### **MODULE - VII**

**Enterprise DSS** - Information need concepts & definitions, Evaluation of EIS, Comparing and Integrating EIS and DSS, Data Access, Data Collection, Problem & Quality, DBMS in DSS, Data Warehousing, Data Query, OLAP Multidimensional Analysis and Presentation, Data Visualization and Multidimensionality, Organizational DSS.

#### **Text Book:**

1. E. Turloan & E. Aronson- Decision Support System & Intelligent System, 6<sup>th</sup> Edn., Pearson Education.

#### **Reference Book:**

1. G.M. Marakas- Decision Support Systems, 2nd Edn., Pearson /Prentice Hall of India.

## **MCA 7105**

## **ENTERPRISE RESOURCE PLANNING**

### **MODULE - I**

**Introduction to ERP** : Evolution of ERP, What is ERP, Reasons for the growth of the ERP market, Advantages of ERP, Reasons of Failure.

### **MODULE-II&III**

**Enterprise- An Overview** : Integrated Management information, Business Modeling, Integrated Data Model.

**ERP and Related Technologies** : BRP (Business Process Reengineering), MIS (Management Information System), DSS (Decision Support System), EIS (Executive Information system), OLAP, Supply Chain Management.



#### **MODULE -IV**

**A Manufacturing Perspective :** ERP, CAD/CAM, MRP (Material Requirement Planning), Bill of Material, Closed loop MRP, MRP-II, DRP (Distributed Requirement Planning), Product Data Management, Data Management,

#### **MODULE - V**

**Benefits of PDM :** ERP Modules, Finance, Plant Maintenance, Quality Management, Material Management.

**Benefits of ERP :**

#### **MODULE - VI**

**ERP Market :** SAP, BAAN, Oracle Corporation, People Soft.

**ERP Implementation Life Cycle :**

#### **MODULE - VII**

**Vendors, Consultants & Users's :** In - house Implementation - pros & cons, Vendors, Consultants, End-users.

**Future Directions in ERP.**

**ERP Case Studies.**

**Text Book :**

1. Enterprise Resource Planning by Alexis Leon TMH Fourth Reprint 2001.

### **MCA 7107**

### **DATA MINING AND DATA WAREHOUSING**

#### **MODULE - I**

**Introduction:** Introduction, Data Mining as subject, What motivated Data mining, Why is it important.

**Data warehousing:** Introduction, What is a Data Warehousing Definition, Multidimensional Data Model, OLAP Operation, warehouse Scheme, Data Warehousing, Architecture, Metadata, OLAP ENGINE, Data warehouse Backend Process.

#### **MODULE - II**

**Data Mining:** Introduction, What is Data Mining, Data Mining Definition, KDD Vs. Data Mining, DBMS Vs. DM, Other related area, DM Technique, Other Mining Problem, Issue and challenge is in DM, DM Application area, DM Application, Case Study.

#### **MODULE - III**

**Mining Association Rule in Large Database:** Introduction, what is an Association Rule, Method to discover association Rule, A Priori Algorithm, Partition Algorithm, Pinar- Search algorithm, Dynamic item set Counting Algorithm, FP - Tree Growth Algorithm, Discussion and Different Algorithm, Generalized, Association Rule, Association Rules with Item Constraints.

#### **MODULE - IV**

**Clustering Techniques:** Introduction , Clustering Paradigm, Partition Algorithm, K- Medoid Algorithm, CLARA, CLARANS, Hierarchical Clustering,

DBSCAN, BIRCH, CURE, Categorical Chastereing Algorithms, STIRR, ROCK, CACTUS.

#### **MODULE - V**

**Data Mining Primitives, Language and System Architecture :** Data Mining Primitives, what defines a Data Mining task, Task relevant Data, The Kind of Knowledge to Mined, Concept Hicrechings, Interestingness Measwce, presenation and visualization of Discovered Patterns, Data Mining Query Language.

#### **MODULE - VI**

**Decision Trees:** Introductions, What is decision Tree, Tree Construction Priniciples, Best split splitting Indices, Splitting criteria, Decision Tree Construction with Presenting, Prunesing Technique, Integration of Pruning Technique and Construction.

#### **MODULE - V**

**Temporal and Spatial Data Mining:** Introduction, What is Temporal Data Mining emporal Association Rules, Sequence Mining, The GSP Algorithm, SPIRIT, Spafial Mining, Spatial Clustering, Spatial Trends.

#### **Text Book:**

A.K. Pujari, “A Data Mining Technique”, University press (India) Limited, 2001

#### **Reference Books:**

1. A Hand and M. Kamber, “Data Mining Concept and Technique”, Morgan.  
Kauffmann Publishers, Else river India, New Delhi, 2003.
1. Recherd J, Roiger and Michance W. Creatz, Data Mining: a tutorial Based Primer, Addison Wesley, 2003.
2. M.H. Dienham, Data Mining : Introductory and Advanced Topics, Pentice Hall 2003.

### **MCA 7201**

### **ADVANCED JAVA PROGRAMMING**

#### **MODULE - I&II**

**Components and Facilities or Rich Graphical User Interfaces:** Programming with the JFC, Swing API Components, Jcomponent Class, Windows, Dialog Boxes, and Panels, Labels, Buttons, and Check Boxes, Menus, Toolbars, and Actions, Sliders, Spinners, Progress Bars, and Scrollbars, Lists and Combo Boxes, Text-Entry Components, Color and File Choosers, Tables and Trees, Printing with the 2D API, Java Print Service API.

#### **MODULE - III**

**Using Relational Database:** Introduction, Best Practices for Programming for Databases, JDBC Drivers for RDBM Systems, SQL to Java Type Mappings, Understanding the Database used in this chapter, Using the `java.sql` API, Coding Transactions, Using the `javax.sql` API, Connection Pooling.

#### **MODULE -IV**

**XML:** Introduction, XML Structure, XML Example Document with SAX, Parsing an XML Document with DOM, Generating an XML Document with DOM, Validating XML Documents using DTD and XML Schema, Transforming XML using XSLT.

#### **MODULE - V**

**Network Programming:** Introduction, Working with URLs, Working with Sockets, Remote Method Invocation.

#### **MODULE - VI**

**Building Web Applications:** Introduction, The Technology of the Web, J2EE Web Application Packaging, Servlets, The Servlet API, The User Experience, Building a Web App with Continuity, Java Server Pages, JSP Tags and API, How the Server Processes JSPs, Java Coding in JSPs, Frameworks for Building Web Applications, Building Robust WebApps.

#### **MODULE - VII**

**Enterprise JavaBeans:** Introduction, Enterprise Programming, What are EJBs? Session EJBs, EJB Clients, Entity EJBs, Message-Driven Beans, EJB Transactional Characteristics, EJB Security, Best Practices for Designing EJB-Based Applications.

#### **Text Book:**

1. Wigglesworth & McMillan - Java™ Programming Advanced Topics, 3<sup>rd</sup> Edn., India Edition, Thomson Education, New Delhi, 2007

### **MCA 7202**

### **WEB PROGRAMMING**

#### **MODULE - I**

**XML: Part I:** Creating Basic XML Document, Parsing an XML Document, Writing Well -Formed Documents, Working with Special characters.

**XML: Part II :** Organizing Elements with Namespaces, Defining elements with DTDs, Validating XML Documents Against DTDs, Declaring Elements in a DTD, Declaring Attributes in a DTD.

#### **MODULE - II**

**Visual Basic .NET: Part I:** Understanding the Basic of Visual Studio .NET, Using the Visual Studio .NET Integrated Developer Interface (IDE), Creating the User Interface for a Solution, Using VB .NET Controls, Examining the Structure of a VB .NET Module, Understanding VB .NET Data Types and Variables, Introduction to Event Handlers, Writing Decision-Making Statements, Using Repetition Statements.

#### **MODULE - III**

**Visual Basic .NET: Part II:** Getting Started, An Overview of ADO .NET, Creating the DataAdapter, Storing Data in DataSet and DataTable Objects, Binding Controls to a DataSet, Navigating Through the Records in a Database Table, Modifying a Database Record.

#### **MODULE -IV**

**ASP .NET: Part I:** Building Web Forms Using ASP .NET, Exploring ASP .NET Server Controls, Using ASP .NET Server Controls to Create Web Forms, Understanding the Code Behind the Page.

**ASP .Net Part II:** Working With User Controls, Exposing User Control Properties and Methods, Using ASP .NET Server Controls in User Controls, Using Validation Controls to Improve Web Forms, Uploading Files to a Web Server.

#### **MODULE - V**

**CGI/Perl: Part I:** Writing Your First CGI Script in Perl, Testing a Perl CGI Script, Debugging a Perl CGI Script, Creating a Link to a CGI Script, Using a Link to Send One Item of Data to a CGI Script, Parsing the Data Sent to a Perl CGI Script, Using a Link to Send Multiple Items of Data to a CGI Script.

#### **MODULE - VI**

**CGI/Perl: Part II:** Using a CGI Script to Process Form Data, Planning a CGI Script, Declaring Scalar Variables in Perl, Using Assignment Statements to Assign Values to Variables, Using Arithmetic Operators in Perl, Accessing the Values Received from an Online Form, Including a Dollar sign in a Number, Using the `printf` function.

#### **MODULE - VII**

**PHP: Part I:** Preparing to Use PHP, Exploring PHP for the First Time, Understanding PHP Basics, Displaying PHP Output, Managing PHP Program Flow.

**PHP: Part II:** Examining the Relationship Between PHP and MySQL, Planning a PHP Web Application, Creating and Using a Logon Window, Managing System Data, Updating a PHP Web Application.

#### **Text Book:**

1. Xue Bai, Michael Ekedahl, Joyce Farrell, Don Gosselin, Diane Zak, Shashi Kaparathi, Peter MacIntyre, Bill Morrissey - The Web Warrior Guide to Web Programming, India Edition, Thomson Education

### **MCA 7203**

### **SYSTEMS PROGRAMMING**

#### **MODULE - I**

**Introduction:** System Softwares & its Components, Evolution of System Softwares- Operating System, Loaders, Interpreters, Compilers, Linkers, Assemblers.

#### **MODULE - II**

**Assemblers:** Elements of Assembly Language Programming, Assembly Process, Single Pass Assembler, Design of a 2-Pass assembler for Intel 8088.

#### **MODULE - III**

**Macros & Macro processors:** Macros, Different forms of Macros, Macros using AIF, AGO, REPT. Etc, Design of a Macro Processor, Macro Assembler.

#### **MODULE - IV**

**Loaders:** Basic Loader Functions, Absolute Loader, Compile & go Loader, Relocating Loader, Direct Linking Loader.

## **MODULE - V**

**Linkage Editors:** Linking and Relocation, Program Relocability, Linkage Editor and its Application in IBP-PC, Linking for Program Overlays.

## **MODULE - VI& VII**

**Software Tools:** Spectrum of Software Tools, Text Editors, Interpreter and Program Generators, Debug Monitors, Programming Environments.

### **Text Book:**

1. D.M.Dhamdhare-System Programming and Operating Systems, 2nd Edn., TMH, New Delhi.

### **Reference Book:**

1. J.J. Donovan- System Programming, TMH, New Delhi.

## **MCA 7204**

## **SOFTWARE PROJECT MANAGEMENT**

### **MODULE - I**

**Managing Software Project:** Process & Project Management, Project Management and the CMM, Project Management at Infosys, Introduction to CMMI, PCMM.

**The Project Planning Infrastructure:** The process data base, The process capability Baseline, Process Assets and the Body of Knowledge System.

### **MODULE - II**

**Process Planning:** The Infosys Development Process, Requirement Change Management

**Effort Estimation & Scheduling:** Estimation and Scheduling Concepts, Effort - Estimation, Scheduling.

### **MODULE - III**

**Quality Planning:** Quality Concepts, Quantitative quality Management Planning, Defect Prevention Planning.

**Risk Management:** Concepts of Risks and Risk Management, Risk Assessment, Risk Control, Examples.

### **MODULE - IV**

**Measurement and Tracking Planning:** Concepts in measurement, Measurements, Project tracking.

**Project Management Plan:** Team Management, Customer Communication and Issue Resolution, Structure of the Project Management Plan.

### **MODULE- V**

**Configuration Plan:** Concepts in Configuration Management, Configuration Management Process.

**Reviews:** The Reviews, Review process Data Collection, Monitoring & Control, Introduction of Reviews & the NAH Syndrome.

## **MODULE - VI**

**Project Monitoring & Control:** Project tracing, Milestone Analysis, Activity Level Analysis using SPC, Defect Analysis & Prevention Process Monitoring & audit.

## **MODULE- VII**

**Project Closure:** Project closure Analysis.

### **Text Book:**

1. Pankaj Jalote - Software Project Management in Practice, Pearson Education, New Delhi, 2002

### **Reference Books:**

1. B.Huges and M.Cotterell - Software Project Management, 3/e, Tata Mcgraw Hill, New Delhi, 2004.
2. Pankaj Jalote - CMM in Practice, Pearson Education, New Delhi, 2002
3. W. Humphrey - Managing the Software Process, Addison - Wesley, 1989.

## **MCA 7205 PROGRAMMING LANGUAGE DESIGN AND CONCEPTS**

### **MODULE-I**

#### **Introduction:**

**The Role of Programming Languages:** Toward Higher-Level Languages, Programming Paradigms, Languages Implementation: Bridging the Gap.

**Language Description: Syntactic Structure:** Expression Notations, Abstract Syntax Trees, Lexical Syntax, Context- Free Grammars, Grammars for Expressions.

### **MODULE-II& III**

#### **Imperative Programming:**

**Statements: Structured Programming:** The Need for Structured Programming, Syntax-Directed Control Flow, Design Considerations: Syntax, Handling Special Cases in Loops, Programming with Invariants, Proof Rules for Partial Correctness, Control Flow in C.

**Types: Data Representation:** The Role of Types, Basic Types, Arrays: Sequences of Elements, Records: Named Fields, Unions and Variant Records, Sets, Pointers: Efficiency and Dynamic Allocation, Two String Tables, Types and Error Checking.

**Procedure Activations:** Introduction to Procedures, Parameter- Passing Methods, Scope Rules for Names, Nested Scopes in the Source Text, Activation Records, Lexical Scope: Procedures as in C.

### **MODULE-IV& V**

#### **Object-Oriented Programming:**

**Grouping of Data and Operations:** Constructs for Program Structuring, Information Hiding, Program Design with Modules, Modules and Defined Types, Class Declarations in C++, Dynamic Allocation in C++, Templates: Parameterized Types, Implementation of Objects in C++.

**Object-Oriented Programming:** What is an Object?, Object-Oriented Thinking, Inheritance, Object-Oriented Programming in C++, Derived Classes and Information Hiding, Objects in Smalltalk, Smalltalk Objects have a Self.

#### **MODULE-VI& VII**

##### **Functional Programming:**

**Elements of Functional Programming:** A Little Language of Expressions, Types: Values and Operations, Approaches to Expression Evaluation, Lexical Scope, Type Checking.

**Functional Programming in a Typed Language:** Exploring a List, Function Declaration by Cases, Functions as First-Class Values, ML: Implicit Types, Data Types, Exception handling in ML.

**Functional Programming with Lists:** Scheme, Dialect of Lisp, The Structure of Lists, List Manipulation, A Motivating Example: Differentiation, Simplification of Expressions.

##### **Text Book:**

1. R.Sethi & K.V. Viswanathan- Programming Languages Concepts & Constructs, 2<sup>nd</sup> Edn., Pearson Education, 2007.

#### **MCA 7207**

#### **ASSEMBLY LANGUAGE PROGRAMMING**

##### **MODULE - I**

**Introduction to PC H/W and S/W:** The Processor, Internal Memory, Segments & Addressing, Registers, Operating System Characteristics, The Boot Process, DOS-BIOS Interface, System Programming Loader, The Stack, Program Addressing, Memory of Register References.

##### **MODULE - II**

**Execution of Instructions:** The Debug Program, Viewing Memory Locations, Entering a symbolic Assembly Program, Using the INT instruction, Saving a Program from within DEBUG, The PTR Operator.

##### **MODULE - III**

**Fundamentals of Assembly Language:** (a) **Requirements:** Assembler & Compilers, Assembly language, Comments, Reserved words, Identifiers, Statements, Direction, Initializing a Program for Execution, Initializing for Protecting Mode, Simplified Segment Directives, Data Definition, Directive for Defining Data, The EQU Directive.

Assembling, Linking, and Executing a Program, Processor Instruction & Addressing, Writing Com Programs, Program Logic & Control.

##### **MODULE - IV**

**Screen & Keyboard Operation :** Selecting the Cursor, Clearing the screen, DOS Function 02H, 09H, 0AH, Use of Control Characters for Displaying, File Handling, File Handles for keyboard Input, Advance Setting video Mode, Text Mode, Screen Pages, BIOS Interrupt 10H for Text Mode, Blinking, Reverse video & Scrolling, BIOS Interrupt 10H for Graphics, Setting & Displaying Graphics Mode.

**Advance Keyboard Processing:** DOS Interrupt 21H, 16H, 09H, Keyboard Buffer, Extended Function Keys & Scan codes, Selecting from Menu.

## **MODULE - V**

**Data Manipulation:** Repeat String Prefix, Move String, Load String, Store String, Transferring Data, Compare String, Scan String, Scan & Replace, Duplicating a pattern, Right Adjusting on the screen.

**Processing Binary Data:** Addition & Subtraction, Multiword Arithmetic, Unsigned & Signed Data, Multiplication with Stiffling, Division & Division with Stiffling, Reversing the Sign, Numeric Data Processing.

## **MODULE - VI**

**Input / Output:** Disk Storage Organization, Disk Processing (Writing & Reading files), DOS operations for Supporting Disk & files, BIOS Disk operations, Printing.

## **MODULE - VII**

**Advance Programming:** Writing Macros, Linking to Subprograms, DOS Memory Management.

### **Text Book:**

1. Pelter Abel, "IBM PC Assembly Language & Programming", 4<sup>th</sup> Edn, PHI.

### **Reference Book :**

1. Brey & Borry, Intel Microprocessor 8080,86,186,286, 386,486, Pentium,5<sup>th</sup> Edn., PHI.

## **MCA 7301**

## **NATURAL LANGUAGE PROCESSING**

### **MODULE-I& II**

**Introduction to NLP :** Definition, issues and strategies, application domain, tools for NLP, Linguistic organisation of NLP, NLP vs PLP.

**Word Classes** Review of Regular Expressions, CFG and different parsing techniques

**Morphology:** Inflectional, derivational, parsing and parsing with FST, Combinational Rules

**Phonology:** Speech sounds, phonetic transcription, phoneme and phonological rules, optimality theory, machine learning of phonological rules, phonological aspects of prosody and speech synthesis.

### **MODULE-III & IV**

**Pronunciation, Spelling and N-grams:** Spelling errors, detection and elimination using probabilistic models, pronunciation variation (lexical, allophonic, dialect), decision tree model, counting words in Corpora, simple N-grams, smoothing (Add One, Written-Bell, Good-Turing), N-grams for spelling and pronunciation.

**Syntax :** POS Tagging: Tagsets, concept of HMM tagger, rule based and stochastic POST, algorithm for HMM tagging, transformation based tagging

### **MODULE-V**

**Sentence level construction & unification:** Noun phrase, co-ordination, sub-categorization, concept of feature structure and unification.



## **Semantics:**

**Representing Meaning:** Unambiguous representation, canonical form, expressiveness, meaning structure of language, basics of FOPC

**Semantic Analysis:** Syntax driven, attachment & integration, robustness

## **MODULE-VI**

**Lexical Semantics:** Lexemes (homonymy, polysemy, synonymy, hyponymy), WordNet, internal structure of words, metaphor and metonymy and their computational approaches

**Word Sense Disambiguation:** Selectional restriction based, machine learning based and dictionary based approaches.

## **MODULE-VII**

**Pragmatics:** Discourse: Reference resolution and phenomena, syntactic and semantic constraints on Co-reference, pronoun resolution algorithm, text coherence, discourse structure.

**Dialogues:** Turns and utterances, grounding, dialogue acts and structures

**Natural Language Generation:** Introduction to language generation, architecture, discourse planning (text schemata, rhetorical relations).

## **Text Book:**

1. D. Jurafsky & J. H. Martin - "Speech and Language Processing - An introduction to Language processing, Computational Linguistics, and Speech Recognition", Pearson Education

## **Reference Books:**

1. Allen, James - "Natural Language Understanding". Benjamin/Cummings, 2<sup>nd</sup> Edn., 1995
2. Bharathi, A., Vineet Chaitanya and Rajeev Sangal., Natural Language Processing- "A Pananian Perspective", Eastern Economy Edition, PHI, 1995
3. Eugene Cherniak: "Statistical Language Learning", MIT Press, 1993.
4. Manning, Christopher and Heinrich Schutze, "Foundations of Statistical Natural Language Processing". MIT Press, 1995

## **MCA 7302**

## **ARTIFICIAL INTELLIGENCE**

## **MODULE-I&II**

**Introduction:** Overview Of Artificial Intelligence- Problems Of AI, AI Technique, Tic - Tac - Toe Problem.

**Intelligent Agents:** Agents & Environment, Nature Of Environment, Structure Of Agents, Goal Based Agents, Utility Based Agents, Learning Agents.

**Problem Solving :** Problems, Problem Space & Search: Defining The Problem As State Space Search, Production System, Problem Characteristics, Issues In The Design Of Search Programs.

## **MODULE-III**

**Search Techniques:** Solving Problems By Searching, Problem Solving Agents, Searching For Solutions; Uniform Search Strategies: Breadth First Search, Depth First Search, Depth Limited Search, Bidirectional Search, Comparing Uniform Search Strategies.

**Search Techniques :** Solving Problems By Searching :Problem Solving Agents, Searching For Solutions; Uniform Search Strategies: Breadth First Search, Depth First Search, Depth Limited Search, Bidirectional Search, Comparing Uniform Search Strategies.

**Heuristic Search Strategies:** Greedy Best-First Search, A\* Search, Memory Bounded Heuristic Search: Local Search Algorithms & Optimization Problems: Hill Climbing Search, Simulated Annealing Search, Local Beam Search, Genetic Algorithms; Constraint Satisfaction Problems, Local Search For Constraint Satisfaction Problems.

#### **MODULE-IV**

**Adversarial Search :** Games, Optimal Decisions & Strategies In Games, The Minimax Search Procedure, Alpha-Beta Pruning, Additional Refinements, Iterative Deepening.

**Knowledge & Reasoning :** Knowledge Representation Issues, Representation & Mapping, Approaches To Knowledge Representation, Issues In Knowledge Representation.

#### **MODULE-V**

**Using Predicate Logic :** Representing Simple Fact In Logic, Representing Instant & ISA Relationship, Computable Functions & Predicates, Resolution, Natural Deduction.

**Representing Knowledge Using Rules :** Procedural Verses Declarative Knowledge, Logic Programming, Forward Verses Backward Reasoning, Matching, Control Knowledge.

#### **MODULE-VI**

**Probabilistic Reasoning:** Representing Knowledge In An Uncertain Domain, The Semantics Of Bayesian Networks, Dempster-Shafer Theory, Fuzzy Sets & Fuzzy Logics.

**Planning :** Overview, Components Of A Planning System, Goal Stack Planning, Hierarchical Planning, Other Planning Techniques.

**Natural Language Processing :** Introduction, Syntactic Processing, Semantic Analysis, Discourse & Pragmatic Processing.

#### **MODULE-VII**

**Learning :** Forms Of Learning, Inductive Learning, Learning Decision Trees, Explanation Based Learning, Learning Using Relevance Information, Neural Net Learning & Genetic Learning.

**Expert Systems :** Representing And Using Domain Knowledge, Expert System Shells, Knowledge Acquisition.

#### **Text Book:**

1. Ritch & Knight -Artificial Intelligence, TMH

#### **Reference Books:**

1. S. Russel and P. Norvig- Artificial Intelligence A Modern Approach, Pearson Education.
2. Patterson -Introduction to Artificial Intelligence & Expert Systems, PHI

## **MODULE - I**

**Introduction:** Biological Background, Conventional Genetic Algorithms, Theory and Hypothesis, Modifications to Genetic Algorithms, Chromosome representation, Objective and Fitness Function, Selection method, Genetic Operators, Replacement Schemes, A Game of Genetic creative (Example).

## **MODULE - II**

**Intrinsic Characteristics :** Parallel Genetic Algorithm, Multiple Objective, Robastness, Multimodel, Constraints Hierarchical Genetic Algorithm, Biological Inspiration, Hierarchical Chromosome Formulation, Genetic operations, Multiple Objective Approach.

## **MODULE - III**

**Application of Genetic Algorithms:** Genetic Algorithm in speech Recognition Systems, Genetic Algorithm in Communication Systems.

## **SWARM INTELIGENCE**

## **MODULE - IV**

**Introduction:** social insets, modeling collective behavior in social inset - modeling and designing, self-organization in social insets, stinger, Modeling as an interface from Algorithms to Robotics.

## **MODULE - V**

**Ant Foraging Behavior Combinational Optimization and Routing in Communication Networks:** Overview, Foraging Strategies in ANTS, Natural Optimization, Rapid patterns of Array Ants, Ant colony optimization, The traveling salesman problem, Ant system, Ant colony system, The Quadratic assignment problem.

## **MODULE- VI**

**Devison of Labor and Task Allocation:** Overview, Division of Labor in social insects, Response thneshold, introduction, model with one task, Fomal analysis of the model, Determinastic equations, Model with several tasks adaption task allocation.

## **MODULE - VII**

**Self Organization and Templates:** Overview, the interplay of self organization and templates, AReaction Diffusion model of the construction of the Royal Chamber, Wall building in Laptotheras albepennis, Applications, Data Analysis, Graph Partitioning, Nest Building in social insects, Strigmerry and Self organization, Discrete stignersy.

## **Text Books:**

1. Eric Bonabeau, Marco Dorigo, Guy Theraulaz - "Swarm Intelligence From Natural to Artificial Systems", Oxford University Press, 1999.
2. K.F. Man, K.S. Tang, S. Kwong - "Genetic Algorithms : Concepts and Designs, Springer - verlag, 1999.

## **Reference Book:**

1. David E. Goldberg - "Genetic Algorithms in Search, Optimization and Machine Designing, Pearson Education, 1989.

**MODULE - I**

What Is Digital Image Processing ,Fundamental Steps in Digital Image Processing ,Components of an Image Processing System , Elements of Visual Perception , Light and the Electromagnetic Spectrum , Image Sensing and Acquisition , Image Sampling and Quantization , Some Basic Relationships Between Pixels, Linear and Nonlinear Operations.

**MODULE - II**

**Enhancements in Spatial Domain:** Some Basic Gray Level Transformations , Histogram Processing , Enhancement Using Arithmetic/Logic Operations , Basics of Spatial Filtering , Smoothing Spatial Filters , Sharpening Spatial Filters , Combining Spatial Enhancement Methods

**MODULE - III**

**Enhancements in Frequency Domain:** Introduction to the Fourier Transform and the Frequency Domain , Smoothing Frequency-Domain Filters , Sharpening Frequency Domain Filters , Homomorphic Filtering

**MODULE- IV**

**Image Restoration:** A Model of the Image Degradation/Restoration Process , Noise Models. Restoration in the Presence of Noise Only-Spatial Filtering , Periodic Noise Reduction by Frequency Domain Filtering. Linear, Position-Invariant Degradations , Estimating the Degradation Function. Inverse Filtering , Minimum Mean Square Error (Wiener) Filtering , Constrained Least Squares Filtering. Geometric Mean Filter , Geometric Transformations.

**MODULE- V**

**Image Compression:** Fundamentals , Image Compression Models , Elements of Information Theory , Error-Free Compression , Lossy Compression

**MODULE - VI & VII**

**Morphological Image Processing and Segmentation:** Preliminaries , Dilation and Erosion , Opening and Closing , The Hit-or-Miss Transformation. Some Basic Morphological Algorithms , Detection of Discontinuities , Edge Linking and Boundary Detection , Thresholding , Region-Based Segmentation.

**Text Book:**

1. Gonzalez R., Woods R.; Digital Image Processing, 2<sup>nd</sup> Edition, Prentice Hall of India, New Delhi

**Reference Book:**

1. Jain, A. K. ; Fundamentals of Digital Image Processing, Prentice Hall of India, New Delhi

## **MODULE-I&II**

**Attacks on Computers and Computer Security:** Introduction, The Need for Security, Security Approaches, Principles of Security, Types of Attacks.

**Cryptography: Concepts and Techniques:** Introduction, Plain Text and Cipher Text, Substitution Techniques, Transposition Techniques, Encryption and Decryption, Symmetric and Asymmetric Key Cryptography, Steganography, Key range and Key Size, Possible Types of Attacks.

## **MODULE-III**

**Symmetric Key Algorithms and AES:** Introduction, Algorithm Types and Modes, An Overview of Symmetric Key Cryptography, Data Encryption Standard (DES), International Data Encryption Algorithm (IDEA), RC4, RC5, Blowfish, Advanced Encryption Standard (AES).

## **MODULE-IV**

**Asymmetric Key Algorithms, Digital Signatures and RSA:** Introduction, Brief History of Asymmetric Key Cryptography, An Overview of Asymmetric Key Cryptography, The RSA Algorithm, Symmetric and Asymmetric Key Cryptography Together, Digital Signatures, Knapsack Algorithm, Some Other Algorithms.

## **MODULE-V**

**Digital Certificates and Public Key Infrastructure(PKI):** Introduction, Digital Certificates, Private Key Management, The PKIX Model, Public Key Cryptography Standards (PKCS), XML, PKI and Security, Creating Digital Certificates Using Java.

## **MODULE-VI**

**Internet Security Protocols:** Introduction, Basic Concepts, Secure Socket Layer (SSL), Transport Layer Security (TLS), Secure Hyper Text Transfer Protocol (SHTTP) , Time Stamping Protocol (TSP) , Secure Electronic Transaction (SET), SSL versus SET, 3-D Secure Protocol, Electronic Money, Email Security, Wireless Application Protocol (WAP) Security, Security in GSM, Security in 3G.

## **MODULE-VII**

**User Authentication and Kerberos:** Introduction, Authentication Basics, Passwords, Authentication Tokens, Certificate-based Authentication, Kerberos, Key Distribution Center (KDC), Security Handshake Pitfalls, Single Sign on (SSO) Approaches.

**Network Security, Firewalls and Virtual Private Networks (VPN):** Introduction, Brief Introduction to TCP/IP, Firewalls, IP Security, Virtual Private Networks (VPN), Intrusion.

## **Text Book:**

1. A.Kahate- Cryptography and Network Security , 2<sup>nd</sup> Edn., Tata McGraw Hill Publication, New Delhi, 2007

## **Reference Books:**

1. B.A. Foronzan - Cryptography & Network Security, TMH, New Delhi, 2007
2. S. Stallings - Cryptography and Network Security, Pearson Edn., New Delhi, 2006

**Sec A: Parallel Computing****MODULE-I**

**Introduction:** Computational Demand of Modern Science, Advent of Practical Processing, Parallel Processing Terminology- Contrasting Pipelining and Data Parallelism, Control Parallelism, Scalability, Control-Parallel Approach, Data-Parallel Approach with I/O.

**MODULE-II**

**PRAM Algorithm:** A Model of Serial Computation, The PARAM Model of Parallel Computation, PARAM Algorithm- Parallel Reduction, Prefix Sums, List Ranking, Preorder Tree Traversal, Merging Two Sorted Lists, Graph Colouring, Problem defining Fast Solutions on PRAMS.

**MODULE-III**

**Elementary Parallel Algorithm:** Classifying MIMD Algorithm, Reduction.

**Matrix Multiplication:** Sequential Matrix Multiplication, Algorithms for Processor Array, Algorithms for Multiprocessors.

**MODULE-IV**

**Solving Linear Systems:** Terminology, Back Substitution, ODD-EVEN Reduction, Gaussian Elimination, The JACOBI Algorithm, The Gauss-Seidel Algorithm, Jacobi Overrelaxation and Successive Overrelaxation, Mulyigrid Methods, Conjugate Gradient.

**Sec B: Distributed Computing****MODULE-V**

**Basic Algorithms in Message-Passing Systems:** Formal Models for Message Passing Systems, Broadcast and Convergecast on a Spanning Tree, Flooding and Building a Spanning Tree, Constructing a Depth-First Search Spanning Tree for a Specified Root, Constructing a Depth-First Search Spanning Tree without a Specified Root.

**Leader Election in Rings:** The Leader Election Problem, Anonymous Rings, Asynchronous Rings, Synchronous Rings.

**MODULE-VI & VII**

**Mutual Exclusion in Shared Memory:** Formal Model for Shared Memory Systems, The Mutual Exclusion Problem, Mutual Exclusion using Powerful Primitives, Mutual Exclusion using Read/Write Registers.

**A formal Model for Simulations:** Problem Specifications, Communication Systems, Processes, Admissibility, Simulations, Pseudocode Conventions.

**Broadcast and Multicast:** Specification of Broadcast Services, Implementing a Broadcast Service, Multicast in Groups, An Application: Replication

**Distributed Shared Memory:** Linearizability Shared Memory, Sequentially Consistent Shared Memory, Algorithms, Lower Bounds.

**Text Books:**

1. H. Attiya & J. Welch- Distributed Computing- Fundamentals, Simulations and Advanced

- Topics, 2<sup>nd</sup> Edn., Wiley India Publication, New Delhi, 2006.
2. M.J. Quinn-Parallel Computing-Theory and Practice, 2<sup>nd</sup> Edn., McGraw Hill Inc., New York.

## **MCA 7403**

## **GRID COMPUTING**

### **MODULE-I**

**Introduction:** Motivation; Definitions of Grid Computing; Evolution of the Grid; Differences with similar efforts (Meta, cluster, heterogeneous, Internet); Examples of usage; Research possibilities / scope in Grid Computing; Thrust areas.

### **MODULE-II**

**High Performance computing :** PACX-MPI, MPI-Connect, P-MPI; I-WAY experiment.

### **MODULE-III**

**Earliest Grid Tools / Projects :** Condor Part 1, Part 2; Globus Part 1, Part 2; Nimrod.

### **MODULE-IV**

**Grid Basics - Technologies / Challenges:** Security - Different models: SSL, Kerberos, SASL, GSI, Others; Information Services: NWS.

### **MODULE-V & VI**

**HPC and Grids :** Scheduling HPC applications in Grids: AppLeS, Scheduling Parameter sweep applications, Metascheduling Part1, Part2; Grid RPC mechanisms - Part1, Part2; Rescheduling; Computational Steering, Scientific visualization of Grid applications; Grid Applications - Everywhere and Cactus experiments; Data management: Data distribution, Redistribution, Data cache maintenance.

### **MODULE-VII**

**Recent Efforts / Challenges :** Grid economy; Grid simulation - SimGrid, GridSim, MicroGrid; Grid standards and forums - OGSA, GGF and Other topics.

### **Text Books:**

1. [Module: 1]  
**Ian Foster, Carl Kesselman;** The Grid: Blueprint for a New Computing Infrastructure (2nd edition); Morgan Kaufmann Publishers; 2<sup>nd</sup> edition, 2003.
2. [Module: 2, 3, and 4]  
**Francine Berman, Geoffrey Fox, Tony Hey;** Grid Computing: Making the Global Infrastructure a Reality; John Wiley & Sons, 2003.
3. [Modules: 5, 6, and 7]  
**Jarek Nabrzyski, Jennifer M. Schopf, Jon Weglarz;** Grid Resource Management: State of the Art and Future Trends; Kluwer Academic Publishers, 2003.

**MODULE-I**

**Mobile Computing Architecture:** Internet - The ubiquitous network; Schematic representation of mobile computing environment; The Three-Tier mobile computing architecture; Design considerations for mobile computing; Mobile computing through Internet; Making existing applications mobile-enabled.

**MODULE-II**

**Mobile Communications:** Introduction; The GSM architecture; Call routing in GSM; Network aspects in GSM; GSM frequency allocation; Authentication and security; GPRS system architecture and routing.

**MODULE-III**

**Mobility Management:** Mobility management; Location Management Principles and Techniques; Location Management Case studies: PCS, Mobile IP.

**MODULE-IV**

**Data Dissemination and Management:** Challenges; Data Dissemination; Mobile Data Caching; Mobile Cache Maintenance Schemes; Mobile Web Caching; Case studies.

**MODULE-V**

**Mobile Middleware:** Introduction; Adaption: The spectrum of adaption, Resource monitoring, Characterizing adaption strategies, Odyssey-An application aware adaption architecture, Sample Odyssey application; Mobile Agents: Agent architectures, Migration strategies, Communication strategies.

**MODULE-VI**

**Service Discovery Middleware:** Middleware services: Universally unique identifiers, Standardization, Textual Descriptions, Interfaces for standardization; Discovery and Advertisement Protocols: Unicast discovery, Multicast discovery and advertisement, Service catalogs; Garbage collection: Leasing, Advertised expirations; Eventing; Security: Jini, Service location protocol, Ninja; Interoperability.

**MODULE-VII**

**Device Operating System:** Introduction to Symbian Operating System; Symbian OS architecture; Applications for Symbian; Special feature:- Event Driven Multitasking using Active objects; Client-Server framework model on Symbian OS.

**Text Books:**

1. [Modules: 1, 2, and 7]

Asoke K Talukder and Roopa R. Yavagal; Mobile Computing - Technology, Applications and Service Creation; TMH Publication, New Delhi, 2006

2. [Modules: 3, 4, 5, and 6]

Frank Adelstein et.al.; Fundamentals of Mobile and Pervasive Computing; TMH



## **MCA 7405**

## **WIRELESS TECHNOLOGY**

### **MODULE-I**

**Introduction to Networking :** Technology and Change, The Internet, Reference Models, Layering, and Protocols, OSI and Other Models, Network Types, Network Media, Network Topologies, Connectivity Devices, Evolution of Networking.

**Introduction to Wireless Communications:** Why Wireless?, Types and Range of Wireless Communications, Growth of Wireless Communications, Wireless Technologies, Wireless LANs, Satellite Communications, Wireless Application Protocol, Other Wireless Systems.

### **MODULE-II**

**Technical Foundation of Wireless Technologies:** What is Wireless? Antennas, Narrowband and Spread Spectrum Technology, Accessing Channels: Spread Spectrum and Cellular Telephony, Propagation, Frequencies and Spectrum, Signals, Personal Communications System, How an Organization Gets a Piece of Spectrum.

### **MODULE-III & IV**

**Wireless Application Protocol:** Background, History, Design and Principles of Operation, WAP Architecture Requirements, WAP Architecture Overview, The WAP Model, WAP Architecture Components, Compliance and Interoperability, WAE Overview, The WWW Model, The WAE Model, WAE Services and Formats, Internationalization, Security and Access Control, WTA Architecture Overview, WTA Framework Components, Telephony-Specific Exchanges, Wireless Telephony Application Interface Specification, Supported Content Formats, Wireless Session Protocol Specification, Wireless Transaction Protocol Specification, Wireless Transport Layer Security Specification, Handshake Protocol Overview, Wireless Datagram Protocol Specification, Wireless Control Message Protocol Specification, The Future.

### **MODULE-V & VI**

**Bluetooth :** Purpose and Beginnings, Design and Principles of Operation, Transmitter Characteristics, Spurious Emissions, Baseband Characteristics, Physical Channel, Physical Links, General Format, Transmit/Receive Timing, Channel Control, Bluetooth Security, Link Manager Protocol, Logical Link Control and Adaptation Layer Protocol, General Operation, Data Packet Format, Service Discovery Protocol, Rfcomm, Telephony Control Protocol Specification, Interoperability Requirements for Bluetooth as a WAP Bearer, Alternatives to Bluetooth, The Outlook, Recent Events in the Bluetooth World.

**Cellular Telephony:** History of Cellular Telephony, Design and Principles of Cellular Operation, Cellular Telephony Operations, Analog Cellular Telephones, Digital Cellular Telephones, The Digital Network, Personal Communications System, Third Generation, Recent Events in the Cellular World.

### **MODULE-VII**

**Public Services:** Interoperability in Communications, Aspects for the Law Enforcement Community, Incident Response Plans, Design and Principles of Operation, Specialized Mobile Radio.

**Wireless LANs:** Introduction, Benefits of WLANs, Design and Principles of Operation, WLAN Configurations, Microcells and Roaming, Types of WLANs, WLAN Customer Considerations, Wireless LAN Standard IEEE 802.11, 802.11b, and 802.11a, Planning for a New Network, Selecting a WLAN, Microwave LANs, Recent Events.

**Text Book:**

1. Gary S. Rogers, John Edwards, "An Introduction to Wireless Technology", 1<sup>st</sup> Edn., Pearson Education, New Delhi - 2007

**Group V : Applications of Information Technology**

**MCA 7501**

**BIOINFORMATICS**

**MODULE - I**

**Bioinformatics:** An Introduction : Introduction, Bio informatics Application, Major Database in Bio informatics, Molecular Biology and Bio informatics. Control Dogma of Molecular Biology.

**Genome Analysis and Gene Mapping:** Introduction, Genome Analysis, Genome Mapping, Genetic Mapping and Linkage Analysis, Cloning the Entire Genome, Genome Sequencing.

**MODULE - II**

**Alignment of Pairs of Sequence:** Introduction, Biological Motivation and alignment Problems, Methods of Sequence Alignment, Using Scoring Matrix, Measuring Sequence Detection Efficiency.

**MODULE - III**

**Alignment of Multiple Sequence and Phylogenetic Analysis:** Introduction, Methods of Multifile sequence alignment, Evaluating of Multiple Alignment, Application of Multiple Alignment, Phylogentic Analysis, Method of Phylogentic analysis, Problem of Phylogenetic Analysis.

**MODULE - IV**

**Tools for similarity search and Sequence Alignment:** Introduction, Working with FASTA, Working with BLAST, Filtering and Gapped BLAST, FASTA and BLAST Algorithm comparison.

**Profile and Hidden Markov Models:** Introduction, Using Profile, Hidden Marker Models (HMMs)

**MODULE - V**

**Gene Identification, Predication and Gene Expression:** Introduction, Basis of Gene Prediction, Pattern Recognition, Gene Prediction Methods, Gene Prediction Tools, Clustering Gene Expression Profile.

## **MODULE - VI**

**Protein Classification and Structure Visualization:** Introduction, Overview of protein structure, Protein Structure Visualization, Structure based Protein classification, Protein Structure database, Protein Structure alignment, Tools for Plotting Protein - Ligand Interaction.

## **MODULE - VII**

**Protein Structure Prediction:** Introduction, Protein Identification and Characterization, Primary Structure analysis and Prediction, Secondary Structure analysis and Prediction, Motif, Profile, Pattern and Fingerprint Search, Methods of Sequence based protein Prediction, Methods of 2D Structure Prediction, Protein Function Prediction.

### **Text Book:**

1. S. C. Ratogi, N. Mendiratha, P Rastogi, "Bioinformatics Methods and Applications", PHI, New Delhi, 2005.

### **Reference Books:**

1. D. E. Krane & M. L. Ragner - Fundamental of Concept of Bioinformatics, Pearson Education, New Delhi - 2003.
2. V. R. Srinivas - Bioinformatics : A Modern Approach, PHI, New Delhi - 2005
3. A. M. Lesk - Introduction to Bioinformatics, Oxford ( Indian Edn ) New Delhi - 2004

## **MCA 7502**

## **MULTIMEDIA AND ANIMATION**

### **MODULE- I**

**Introduction:** Multimedia Elements and Applications, Multimedia Systems Architecture, Defining Objects for Multimedia Systems, Multimedia Data Interface Standards, Multimedia databases

### **MODULE- II**

**Compression and Decompression:** Types of Compression, Binary Image Compression Schemes, CCITT Group 3 1-D, 2-D, 3-D, JPEG, Video Image Compression, MPEG, Motion Compensation, Vector Quantization, Audio Compression, Adaptive DPCM

### **MODULE- III**

**Data and File formats:** Rich Text formats, TIFF, Resource Interchange File Format (RIFF), MIDI File format, RIFF file format, TWAIN

### **MODULE- IV**

**Multimedia Input Output Technology:** Electronic Pen, Video and Image Display Systems, Print Output Technology, Image Scanners, Video Images and Animation, Full motion video

### **MODULE- V**

**Multimedia Application Design:** Multimedia Application Classes, Types of Multimedia Systems, Virtual Reality, Application Workflow Design Issues

## **MODULE- VI**

**Multimedia Authoring:** Multimedia Authoring Systems, Hypermedia Application Design Considerations, Linking and Embedding, CORBA

## **MODULE- VII**

**Multimedia Content Development Tools:** HTML, XML, Macromedia Flash, Shockwave, Modelling and Animation concepts

### **Text Books:**

1. Andleig P. K.& Thakrar K.- Multimedia Systems Design, Prentice Hall of India, New Delhi , India 2004
2. Parekh R.-Principles of Multimedia, Tata McGraw Hill, New Delhi, India, 2004

**MCA 7503**

**E-COMMERCE**

## **MODULE-I**

**Introduction to Electronic Commerce :** Electronic Commerce, Scope of Electronic Commerce, Definition of Electronic commerce, Electronic Commerce and Tmade cycle, Electronic Market, Electronic Data Interchange, Internet Commerce.

## **MODULE-II**

**Business Strategy in an Electronic Age :** Value Chain, Supply Chains, Porter's Value Chain Model Inter organizational Value chains Competitive advantage, Competitive strategy, Porter's Model, First Mover advantage, Competitive advantage using e-commerce.

## **MODULE-III**

**Business Strategy:** Introduction to Business Strategy, Strategic implications of IT, Technology, Business Environment, Business Capability, Existing Business strategy, Strategy Formulation and Complementation Planning, e-commerce implementation, e-commerce & evaluation.

**Case Study :** Case Study, e-commerce in passenger Air Transport.

## **MODULE-IV**

**Business to Business Electronic Commerce :** Inter-organisational Transactions.

**Electronic Market :** Markets, Electronic Markets, Usage of electronic markets, Advantages and Disadvantages of electronic market.

**Future of electronic markets :** Electronic Data Interchange (EDI), Introduction, Definition, Benefits, Examples, EDI Technology, EDI Communications, EDI implementation, EDI Security, EDI Business.

## **MODULE-V**

**Inter Organizational :** e- commerce, Transaction, Purchasing on line.

**Business to Consumer Electronic Commerce:** Consumer Trade Organizations, Internet e-commerce, e-shop, e-commerce Technology, Advantages & Disadvantages.

## **MODULE-VI & VII**

**Electronic Data Interchange (EDI)** : Introduction, Definition, Benefits, Examples, EDI Technology, EDI Communications, EDI implementations, EDI Security, EDI and Business.

**Inter Organizational e-commerce** : Transactions, Purchasing on line.

**Internet** : Internet, TCP/IP, Internet Components.

**Page on the Web** : TAIL Basic, introduction.

**Elements of E-Commerce** : Elements, e-shop, Online Payments, Internet e-commerce security.

**E-Business** : Introduction, Grocery Supplies, Internet Banking, Online share dealing, Gambling on the Net, e-diversity.

### **Text Book :**

1. David Whiteley -E-COMMERCE Strategy, Technologies and Applications, TMH ,2000

### **Reference Book :**

1. Ravi Kalakota & Andre B. Whinston -“Electronic Commerce A Manager’s Guide” , Pearson Education Asia.

## **MCA 7504**

## **SUPPLY CHAIN MANAGEMENT**

### **MODULE-I**

#### **Supply Chain Management: An Overview**

**Introduction to Supply Chain Management:** Introduction, What is Supply Chain Management?, Why is Supply Chain Management Important?, The Origins of Supply Chain Management, Important Elements of Supply Chain Management, , Future Trends in Supply Chain Management.

### **MODULE-II**

#### **Purchasing Issues in Supply Chain Management**

**Purchasing Management:** Introduction, The Role of Purchasing in an Organization,

The Purchasing process, Sourcing Decisions: The Make-or-Buy Decision, Roles of Supply Base, Supplier Selection, How many Suppliers to Use, Purchasing Organization: Centralized versus Decentralized Purchasing, International Purchasing/Global Sourcing.

**Creating and Managing Supplier Relationships:** Introduction, Developing Successful Partnerships, Supplier Evaluation and Certification, Supplier Development, Supplier Awards, Supplier Relationship Management Software.

### **MODULE-III**

**Strategic Sourcing for Successful Supply Chain Management:-**Introduction, Developing Successful Sourcing Strategies, Supply Base Reduction Programs, Evaluating and Selecting Key Suppliers, Strategic Alliance and Supplier Certification Programs, Outsourcing Programs, Early Supplier Involvement, Supplier Management and Alliance Development, Managing and Developing Second-Tier Supplier Relationships, Use of e-procurement Systems, Rewarding Supplier Performance, Benchmarking Successful Sourcing Practices, Using Third-Party Supply Chain Management Services, Assessing and Improving the Firm’s Purchasing Function.

#### **MODULE-IV**

##### **Operations Issues in Supply Chain Management**

**Demand Forecasting and Collaborative Planning, forecasting, and Replenishment:** Introduction, Matching Supply and Demand, Forecasting Techniques, Qualitative Methods, Quantitative Methods, Forecast Accuracy, Collaborative Planning, Forecasting, and Replenishment, Software Solutions.

#### **MODULE-V**

**Enterprise Resource Planning Systems:-** Introduction, The Development of Legacy Materials Requirement Planning Systems, The Development of Enterprise Resource Planning Systems, The Rapid Growth of Enterprise Resource Planning Systems, Implementing Enterprise Resource Planning Systems, Advantages and Disadvantages of Enterprise Resource Planning Systems, Enterprise Resource Planning Software Applications, Enterprise Resource Planning Software Providers.

#### **MODULE-VI**

**Process Management:Just-in-Time and Total Quality Management Issues in Supply Chain Management:** Introduction, Just-in-Time and Supply Chain management , the Elements of Just-in-Time, total Quality Management and Supply Chain Management, Total Quality Management and Supply Chain Management.

##### **Distribution Issues in Supply Chain Management**

**Domestic and International Transportation:** Introduction, The Impact of Transportation on Supply Chain Management, The Fundamentals of Transportation, Warehousing, International Transportation Issues, Transportation Management, e-Commerce and Transportation.

#### **MODULE-VII**

**Customer Relationship Management :-** Introduction, Defining Customer Relationship Management, Customer Relationship Management's Role in Supply Chain Management, Key Tools and Components of Customer Relationship Management, Designing and Implementing a Successful Customer, Relationship Management Program, Some Customer Relationship Management Application Providers, Future Trends in Customer Relationship Management.

**Facility Location Decision:-** Introduction, Location Strategies, Critical Location Factors, Facility Location Models, Helpful On-Line Information for Location Analysis, Business Clusters.

**Service Response Logistics :-** Introduction, An Overview of Service Operations, Supply Chain Management is Services, The Primary Concerns of Service Response Logistics.

#### **Text Book:**

1. J. D. Wisner, G. Keong Leong & K. Tan- Principles of Supply Chain Management, 1<sup>st</sup> Edn., Thomson Education, New Delhi, 2007