

# **MASTER OF COMPUTER APPLICATION (MCA)**

## **FIRST YEAR - I SEMESTER**

<b>THEORY</b>	<b>MARKS</b>
<b>Name of the subject</b>	
1. Computer Fundamentals and Programming in C	100
2. Computer Aided Managerial Accounting and Financial Management	100
3. Data Structures and Algorithms	100
4. Computer Architecture	100
5. Mathematical Foundation of Computer Science	100
<b>PRACTICAL I</b>	
6. Programming Lab	100

## **FIRST YEAR - II SEMESTER**

<b>THEORY</b>	<b>MARKS</b>
<b>Name of the subject</b>	
1. Computer Communication and Networks	100
2. System Software	100
3. Database Management System	100
4. Numerical and Statistical Methods	100
5. Object Oriented Programming	100
<b>PRACTICAL II</b>	
6. Object Oriented Programming and DBMS Lab	100

## **SECOND YEAR - III SEMESTER**

<b>THEORY</b>	<b>MARKS</b>
1. Advanced Software Engineering	100
2. Operating System	100
3. Object Oriented Analysis and Design	100
4. Unix and Network Programming	100
5. Elective I	100
<b>PRACTICAL III</b>	
6. Unix Lab	100

## **SECOND YEAR - IV SEMESTER**

<b>THEORY</b>	<b>MARKS</b>
1. Internet Programming and Tools	100
2. Advanced Databases	100
3. Visual Programming	100
4. Computer Graphics and Multimedia Systems	100
5. Elective II	100
<b>PRACTICAL IV</b> Visual Programming and Internet Programming Lab	100

## **THIRD YEAR - V SEMESTER**

<b>THEORY</b>	<b>MARKS</b>
1. Advanced Java Programming	100
2. Soft Computing	100
3. Elective III	100
4. Elective IV	100
5. Elective V	100
<b>PRACTICAL V</b>	
6. Elective Lab	100

## **THIRD YEAR - VI SEMESTER**

<b>THEORY</b>	<b>MARKS</b>
1. Project Work	300

# **SEMESTER I**

## **PAPER I - COMPUTER FUNDAMENTALS AND PROGRAMMING IN C**

### **1. NUMBER SYSTEMS**

Number Systems -Conversion from one system to another -complements -1s, 2s, 9s, 10s- Binary codes-Binary storage and registers-Binary logic-Logic gates-Truth tables.

### **2. DIGITAL PRINCIPLES**

Boolean algebra -Axioms-Truth table simplification of Boolean function-Map method MC -Clausky tabulation method (2variable -6 variable methods) Sequential logic - Flip flops- Registers -Shift register-Counters processor design-Design of an Accumulator-introduction to Computer design- System configuration.

### **3. DIGITAL COMPUTERS**

Block diagram of a digital computer-Input, Output Unit-Combinational logic-adders, subtracters, decoders, encoders, multiplexer, demultiplexer..

### **4. INTRODUCTION TO C LANGUAGE**

Expression - Operators - Pointers - Arrays - Statements - Functions & Recursion - Preprocessor Directives – Input Output functions and file handling.

### **5. POINTERS & FILE HANDLING**

Pointers: Declaration of pointer variable – Pointer operator and Expression – Initialization of pointer variables – Use of pointers in arrays – pointer to pointer – Command Line arguments – pointer to function – pointer arithmetic - Linked List – Records: Structure and Union - File Handling.

#### **Text Book**

1. "Digital Logic and Computer Design", M. Morris Mano, PHI 1995.
2. "C for all", S.Thamarai Selvi & R. Murugesan, Anuradha Agencies 2000

#### **References**

1. "Digital principles and Application" Malvino Leech, TMH Edn.4, 1991.
2. "Digital circuits & Logical design", Samuel C.Lee, PHI 1995.
3. Brian W. Kemighan and Dennis Ritchie, "C Programming Language", PHI, 1990.

**PAPER II - COMPUTER AIDED MANAGERIAL ACCOUNTING &  
FINANCIAL MANAGEMENT**

**1. FINANCIAL ACCOUNTING**

Balance sheet - Profit and Loss Statement - Financial Ratio analysis - Cash flow and Funds flow Statements - Working Capital management - Inventory valuation and Inventory management - Depreciation accounting - Use of computers in Financial Accounting.

**2. COST ACCOUNTING**

Cost accounting systems - Overhead allocation - Standard Costing - Variance analysis - other costing methods - Use of Computers in cost Accounting.

**3. BUDGETING**

Fixed and Flexible budgets - Profit budgeting - Zero based budgeting - Use of computers in Budgeting.

**4. INVESTMENTS**

Capital market - Investments - Capital budgeting - Techniques of investment analysis - Simulation and investment decision.

**5. FINANCING MANAGEMENT**

Financing decision - Cost of Capital - Capital Structure - Leverages - Dividend policy - Leasing - Use of Computers in Financial Management.

**Text Book**

1. Pandey I.M., Financial Management, Vikas Publishing House, New Delhi.
2. Charles Horngren.T Introduction to Management Accounting, Prentice Hall of India, New Delhi, 1983

## **References**

1. Bhattacharya S.K. and John Deardon Accounting for Management, Text and cases, Vikas Publishing House, New Delhi, 1984.
2. James Van Home C., Fundamentals of Financial Management, Prentice Hall of India, New Delhi, 1980
3. Prasanna Chandra, Financial Management - Theory and Practice, Tata McGraw-Hill Publishing Co., New Delhi, 1990.

## **PAPER III - DATA STRUCTURES AND ALGORITHMS**

### **1. INTRODUCTION**

Introduction - Linear Data Structure - Arrays - Lists - Stacks - Queues - Linked Lists – Implementation - Applications.

### **2. TREES**

Trees - General and binary trees – Representation - Traversals – Threaded Binary Trees - Search trees - Balanced trees.

### **3. SORTING**

Sorting - Insertion sort - Quick sort - Merge sort – Iterative Merge Sort – Recursive Merge Sort - Simple Merge Sort - Heap sort - Sorting on several keys - External sorting.

### **4. GRAPHS**

Graphs Representation - Traversal - Topological tables and files - Sorting - Applications - Representation - Marking techniques - Files - Sequential - Index sequential - Random access organization - Implementation.

### **5. ALGORITHM ANALYSIS AND DESIGN**

Algorithms - Time and Space complexity - Sorting - Design techniques - Knapsack - Traveling salesman – Dynamic Programming – Greedy Algorithm – String Matching Algorithm.

#### **Text Book**

1. Jean Paul Tremblay, Paul G.Sorenson, “An Introduction to data structures with Application”, Tata McGraw Hill, 1995.
2. “Computer Algorithms and Introduction to Design and Analysis”, - Sara Base, Allen ran , Gelda 2000 Pearson .

#### **References**

1. Kruse R.L., Leung BP.Tondo C.L, “Data structures and program design in C”, PHI, 1995.
2. Ellis Horowitz, Sahni & Dinesh Mehta, “Fundamental of data structures in C++”, Galgotia, 1999.
3. Tanenbaum A.S, Langram Y., Augestein M.J,”Data structures using C”, PHI, 1992
4. Horowitz, Sahni, S.Rajasekaran, “Computer Algorithms”, Galgotia, 2000.

## **PAPER IV - COMPUTER ARCHITECTURE**

### **1. DATA REPRESENTATION**

Data types – complements - fixed point and floating point representation - other binary codes-  
Micro operations - Register transfer languages - Register transfer - Bus and Memory transfer-  
Arithmetic logic and shift micro operations - Arithmetic logic shift unit-Micro programmed  
control-Control memory - Address Sequencing- Microprogram example -Design of control unit.

### **2. CENTRAL PROCESSING UNIT**

General register and stack organisations, instructions formats-Addressing modes. Data transfer  
and manipulation-Program control - RISC -pipelining-Arithmetic and instruction - RISC pipeline  
- vector processing and Array processors.

### **3. COMPUTER ARITHMETIC**

Addition and Subtraction - Multiplication and division - floating point - decimal arithmetic  
operations.

### **4. INPUT-OUTPUT ORGANISATION**

Peripheral devices - I/O interface - Asynchronous data transfer - modes of transfer - priority  
interrupt - direct memory access - I/O processor - serial communications.

### **5. MEMORY ORGANIZATION**

Memory hierarchy-Main memory-Auxiliary memory - associative - cache and virtual memory -  
memory management hardware-multiprocessors; Interconnection structures - Inter processor  
arbitration - intercommunication and synchronization-Cache coherence.

#### **Text Book**

1. "Computer System Architecture", M. Morris Mano, Edn.3, Pearson Education 1993.

#### **References**

1."Computer System Architecture", John. P.Hayes, MGH, ISE, 1998

2."Computer Organisation", V.Cart Hamacher, Uonko G.Vranesic,Safwat G.Zaky,  
MGH, ISE 1987.

3."Computer Architecture and Parallel Processing", Hwang K.Briggs F.A.MGH, ISE, 1998.

## **PAPER V - MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE**

### **1. LOGIC**

Statements - Connectives - Truth Tables - Normal forms - Predicate calculus - Inference Theory for Statement Calculus and Predicate Calculus.

### **2. COMBINATORICS**

Review of Permutation and Combination - Mathematical Induction - Pigeon hole principle - Principle of Inclusion and Exclusion.

### **3. ALGEBRAIC STRUCTURES**

Semi group - Monoid - Groups (Definitions and Examples only) Cyclic group - Permutation groups ( $S_n$  and  $D_n$ ) - substructures - Homomorphism of semi group, monoid and groups - Cosets and Lagrange Theorem - Normal Subgroups - Rings and Fields (Definition and examples only)

### **4. LATTICES**

Partial ordering - properties of lattices - sublattices - direct product - morphism - special lattices - partially ordered set - Hasse diagram - Boolean Algebra.

### **5. RECURSIVE FUNCTIONS**

Recursive functions - Primitive functions - computable and non - computable functions.

#### **Text Book**

1 .K.H. Rosen, "Discrete Mathematics and its Applications", McGraw Hill, 1999

#### **References**

1. Gersting J.L., Mathematical Structure for Computer Science, 3rd Edition W.H. Freeman and Co., 1993.
2. Lidl and Pitz., Applied Abstract Algebra, Springer - Verlag, New York, 1984.
3. Tremblay J.P, Manohar.R, "Discrete Mathematical Structures with Application to Computer Science", Tata McGraw Hill Publishing Company.

## **PRACTICAL I -PROGRAMMING LAB**

### **1. MS-DOS EDITOR COMMANDS**

Creating file (COPYCON, EDIT command etc ) - Directory related commands (MD,CD,RD) -Disk Related Commands (FDISK, FORMAT, DISKCOPY,XCOPY etc ) Other Commands.

### **2. BASIC C PROGRAMMING**

Simple programs using I/O (Entering Input Data, Writing Output data, gets and puts functions - operators - expressions.

### **3. CONTROL STATEMENTS**

Implementation of programs using control statements (Branching Statements IF - BLOCK IF - NESTED IF - GOTO - SWITCH - WHILE - CONTINUE and etc..)

### **4. FUNCTIONS**

Defining a function - accessing a function - Passing arguments to a function - Recursive function

### **5. ARRAYS AND STRUCTURES**

Processing an array - passing Arrays to a function - Passing portion of an Array to a function - multidimensional Arrays - Defining a structure - Accessing a structure.

### **6. POINTERS**

Declaration and processing pointers - passing pointer to a function - Dynamic memory Allocation - Pointers and one dimensional array.

### **7. FILE HANDLING**

Opening and Closing a Data file - Creating a Data file - Processing a Data file -  
Unformatted Data files.

## **8. DATA STRUCTURES**

Stacks - Queues - Linked Lists - Trees - Sparse matrix Manipulations.

# **SEMESTER II**

## **PAPER VI - COMPUTER COMMUNICATION AND NETWORKS**

### **1. INTRODUCTION**

Communication model - Data communications networking - Data transmission concepts and terminology - Transmission media - Data encoding -Data link control.

### **2. NETWORK FUNDAMENTALS**

Protocol architecture - Protocols - OSI - TCP/IP- LAN architecture - Topologies - MAC - Ethernet, Fast Ethernet, Token ring, FDDI, Wireless LANS - Bridges.

### **3. NETWORK LAYER**

Network layer - Switching concepts - Circuit switching networks - Packet switching - Routing - Congestion control - X.25 - Internetworking concepts and X.25 architectural models - IP - Unreliable connectionless delivery - Datagram - Routing IP datagram's - ICMP.

### **4. TRANSPORT LAYER**

Transport layer - Reliable delivery service - Congestion control - connection establishment - Flow control - Transmission control protocol - User datagram protocol.

### **5. APPLICATIONS**

Applications – Sessions and presentations aspects – DNS, Tell Net, r login, FTP, SMTP – www Security – SNMP.

#### **Text Book**

1. William Stallings, “Data and Computer Communications”, 5th edition, Pearson Education, 1997

#### **References:**

- 1 .Larry L.Peterson & Bruce S.Davie, “Computer Networks - A systems Approach”, 2nd Edition, Harcourt Asia/Morgan Kaufmann, 2000
2. “Communication Network – Fundamental concepts and key Architecture”, Leon Garcia and Widjaja.

## **PAPER VII - SYSTEM SOFTWARE**

### **1. INTRODUCTION**

Basic Concepts – Machine Structure – Typical Architectures

### **2. ASSEMBLERS**

Functions - Machine dependent and Machine independent assembler Features - Design and Implementation - Examples.

### **3. LOADERS AND LINKERS**

Functions - Machine dependent and Machine independent loader features - Linkage editors - Dynamic linking - Bootstrap loaders - Implementation - Examples.

### **4. MACRO PROCESSORS**

Functions - Features - Recursive macro expansion - General-purpose macro processors - Macro processing within language translators - Implementation - Examples

### **5. COMPILERS AND UTILITIES**

Introduction to compilers - Different phases of a compiler - Simple one pass compiler - Code optimization techniques - System software tools - Text editors - Interactive debugging systems.

#### **Text Book**

1. Leland L.Beck, “System Software - An Introduction to Systems Programming”, 3rd Edition,Pearson Education, 1999

#### **References:**

1. D.M. Dhamdhere, “System Programming and Operating Systems”, Tata McGraw Hill Company, 1993
2. A.U.Aho,Ravi Sethi and J.D.Ullman, “Compilers Principles Techniques and Tools”, Pearson Education, 1988
3. John J. Donovan, “Systems Programming”, Tata McGraw Hill Edition, 1991.

## **PAPER VIII - DATA BASE MANAGEMENT SYSTEMS**

### **1. INTRODUCTION**

Historical perspective - Files versus database systems - Architecture - E-R model - Security and Integrity - Data models.

### **2. RELATIONAL MODEL**

The Relation – Keys – Constraints - Relational algebra and Calculus – Queries - Programming and triggers

### **3. DATA STORAGE**

Disks and Files - file organizations - Indexing - Tree structured indexing - Hash based indexing.

### **4. QUERY EVALUATION AND DATABASE DESIGN**

External Sorting - Query Evaluation - Query Optimization - Schema refinement and normalization - Physical database design and tuning - Security.

### **5. TRANSACTION MANAGEMENT**

Transaction Concepts - Concurrency control - Crash recovery - Decision support - Case studies.

### **References**

1. Raghurama Krishnan and Johannes behrke, Database Management Systems, MCGraw Hill International Editions, 2000
2. C.J. Date, An Introduction to Database Systems, 7th Edition, Pearson Education, 1997.
3. Abraham Silberschatz, Henry.F.Korth and S.Sudharshan, “Database system Concepts”, 3rd Edition, Tata McGraw Hill, 1997

## **PAPER IX - NUMERICAL AND STATISTICAL METHODS**

### **1. LINEAR SYSTEM OF EQUATIONS**

Solution of systems of equations - Solution of simultaneous linear equations - Gauss Elimination methods - Gauss - Jordan methods, Jacobi and Gauss- Seidal iterative methods.

### **2. NUMERICAL DIFFERENTIATION AND INTEGRATION**

Interpolation, Differentiation and Integration - difference table - Newton's forward and backward interpolation - Lagrangian interpolation - Differentiation formulae - Trapezoidal and Simpson rules – Gaussian - Quadrature.

### **3. DIFFERENTIAL EQUATIONS**

Ordinary Differential Equations - Taylor Series and Euler Methods, Runge Kutta Methods – Predictor - Corrector methods - Milne and Adam - Bashforth Methods - Error analysis.

### **4. PROBABILITY DISTRIBUTIONS**

Probability Distributions - Random Variables - Moment Generating Functions, Characteristic functions - Standard distributions (Discrete and Continuous) - Applications to reliability.

### **5. RANDOM PROCESSES**

Joint Probability Distributions - Conditional and marginal distributions - Elements of random processes - Markov chains.

#### **References:**

1. Thomas J.B., Introduction to Probability Springer Verlag, New York, 1986.
2. Trivedi K.S., Probability and Statistics with reliability and queueing and Computer Science Applications, Prentice Hall of India, 1988.
3. Gerald & Wheatley, Applied Numerical analysis, Addison Wisely, 1994.
4. Jain M.K., et al, Numerical Methods for Scientific and Engineering Computation, New Age International, 1993.

5. Grewal B.S., Numerical Methods in Engineering and Science, Khanne Publishers, 1994.
6. Carnahan, Lerther Wilkes, Applied Numerical Methods, John Wesley, 1967.

## **PAPER X - OBJECT ORIENTED PROGRAMMING**

### **1. OOP PARADIGM**

Comparison of programming paradigms – Basic concepts of Object Oriented Programming – Benefits of OOP - Object Oriented Design fundamentals - Object Oriented languages.

### **2. INTRODUCTION TO C++**

Comparison with C - Overview of C++ - Classes and Objects - Arrays, pointers, references and dynamic allocation.

### **3. OVERLOADING**

Function Overloading – Friend Function – Function Prototyping - Copy constructors - Default arguments - Operator overloading.

### **4. ADDITIONAL FEATURES**

Inheritance - Virtual functions - Polymorphisms - Templates - Exception handling – I/O Stream – File I/O - STL.

### **5. DESIGN CONCEPTS**

Role of classes - Relationship between classes - Class interface - Components - Study of typical Object Oriented systems.

### **Text Book**

1. Herbert Schildt, “C++ The complete Reference”, III Edition, TMH 1999
2. Stanley B.Lippman, Jove Lajoie, C++ Primer, III Edition, Pearson Education, 1998.

### **References:**

1. Bjarne Stroustrup, “The C++ Programming Language”, III Ed., Pearson Education 2000
2. Balagurusamy. E, “Object Oriented Programming with C++”, TMH
3. Barkakati N, “Object Oriented Programming in C++”, PHI, 1995.

## **PRACTICAL II -OBJECT ORIENTED PROGRAMMING AND DBMS LAB**

### **1. CLASS**

Implementation of a class - constructor - destructor - friend class - friend functions - static member functions.

### **2. OVERLOADING**

Implementation of overloading in functions and operators - unary and binary operators - other operators.

### **3. INHERITANCE**

Implementation of Inheritance - simple - multilevel - multiple - hybrid.

### **4. POLYMORPHISM**

Implementation of polymorphism - Virtual functions - Pure virtual functions.

### **5. TEMPLATE, EXCEPTION HANDLING AND I/O STREAMS**

Implementation of class templates - exception handling - creation and manipulation of files.

### **6. DATA DEFINITION AND UPDATION**

Creation of tables - Views - Insertion - Modification and deletion of elements.

### **7. DATA CONTROL**

Usage of DCL commands.

### **8. DATA RETRIEVAL**

Implementation of queries - sub queries - correlated sub queries.

### **9. ADVANCED QUERIES**

Implementation of joins - Self - equi join - natural join - aggregate functions and set manipulation.

## **10. HIGH - LEVEL CONSTRUCTS**

Implementation of PL / SQL - triggers - cursors and sub programs.

## **11. DATABASE CONNECTIVITY**

Implementation Database Connectivity through Front end Tools – Generation of reports.

# **SEMESTER III**

## **PAPER XI - ADVANCED SOFTWARE ENGINEERING**

### **1. FORMAL SPECIFICATIONS**

Models - Specification languages - Abstraction levels - Domain specification language.

### **2. SOFTWARE MEASUREMENT**

Frame work - Process attributes - Effort, time and cost measurement - Cost estimation - Product attributes - Size - Control flow structure - Modularity - Complexity measures - Technical metrics.

### **3. SOFTWARE REUSABILITY**

Reuse dimensions - Reuse of intermediate products - Reuse and the Software Life cycle - Reuse tools and techniques.

### **4. TOOLS**

Computer aided software Engineering - Project management tools - Analysis and design tools - Programming tools - Integration and testing tools.

### **5. SOFTWARE ENGINEERING STANDARDS**

ISO - SET - Specification - Design - Programming -Testing

### **References:**

1. Hans van Vilet, software Engineering Principles and Practice, John Wiley and Sons Ltd, 2000.
2. Roger Pressman, Software Engineering - A Practitioner Approach, 5th Edition, McGraw Hill, 2000.
3. Normal. E. Fenton, Software Metrics, Chapman and Hall, 1991.
4. J.B.Wordworth, Software Development with Hall, 1991.
5. J.B.Wordworth, Software Development with Z, Addison Wesley, 1992.

## **PAPER XII - OPERATING SYSTEMS**

### **1. INTRODUCTION**

Multiprogramming - Time Sharing - Distributed System - Real Time Systems -I/O structure - Dual mode operation - Hardware Protection - General System Architecture - Operating System Services - System Calls - System Programs - System Design and Implementation.

### **2. PROCESS MANAGEMENT**

Process concept - Concurrent process - Scheduling concepts - CPU scheduling - Scheduling algorithms - Multiple processor scheduling.

### **3. PROCESS SYNCHRONIZATION**

Critical section - Synchronization hardware - Semaphores, classical problem of synchronization - Interprocess communication - Deadlock - Characterization, Prevention, Avoidance, Detection.

### **4. STORAGE MANAGEMENT**

Swapping, single and multiple partition allocation - Paging - Segmentation - Paged segmentation, Virtual memory - Demand paging - Page Replacement and algorithms - Thrashing - Secondary storage management - Disk structure - Free space management - Allocation methods - Disk scheduling - Performance and reliability improvements - Storage hierarchy.

### **5. FILES AND PROTECTION**

File System Organization - File operations - Access methods - Consistency semantics - Directory structure organization - File protection - Implementation issues - Security - Encryption - Case study - UNIX and Windows NT - Introduction to distributed OS design.

#### **References:**

1. Silberschatz and Galvin, Operating System Concepts, 4th Edition, Addison Wesley Publishing Co.,1995.
2. Deital, An Introduction to Operating systems, Addison Wesley Publishing Co., 1985.

3. Milankovic.M., Operating system Concepts and Design, 2nd Edition, McGraw Hill 1992.
4. Madanick SE and Donovan JJ, Operating System, McGraw Hill, 1974.

## **PAPER XIII - OBJECT ORIENTED ANALYSIS AND DESIGN**

### **1. OBJECT ORIENTED DESIGN FUNDAMENTALS**

The object model - Classes and Objects - Complexity - Classification - Notation - Process - Pragmatics - Binary and Entity Relationship - Object types - Object state - OOSD life cycle.

### **2. OBJECT ORIENTED ANALYSIS**

Overview of Object Oriented Analysis - Shaler/Mellor, Coad/Yourdon, Rumbaugh, Booch - UML - Usecase - Conceptual Model - Behaviors - Class - Analysis Patterns - Overview - Diagrams - Aggregation.

### **3. OBJECT ORIENTED DESIGN METHODS**

UML - Diagrams - Collaboration - Sequence - Class - Design patterns and frameworks - Comparison with other design methods.

### **4. MANAGING OBJECT ORIENTED DEVELOPMENT**

Managing Analysis and Design - Evaluation Testing - Coding - Maintenance - Metrics.

### **5. CASE STUDIES IN OBJECT ORIENTED DEVELOPMENT**

Design of Foundation Class Libraries - Object Oriented Databases - Client/Server Computing - Middleware.

#### **References:**

1. Craig Larman, Applying UML and patterns, Addison Wesley,2000.
2. The Unified Modeling Language User Guide, Grady Booch, James Rumbaugh, Ivar Jacobson, Addison - Wesley Long man, 1999, ISBN 0-201-57168-4.
3. Ali Bahrami, Object Oriented System Development, McGraw Hill International Edition, 1999.
4. Fowler, Analysis Patterns, Addison Wesley,1996.
5. Erich Gamna, Design Patterns, Addison Wesley, 1994.

## **PAPER XIV - UNIX AND NETWORK PROGRAMMING**

### **1. INTRODUCTION & FILE SYSTEM**

Overview of UNIX OS - File I/O - Files and Directories - Standard I/O Library - System Data Files and Information.

### **2. PROCESSES**

Environment of a UNIX Process - Process Control - Process Relationships - Signals - Terminal I/O - Advanced I/O - Threads.

### **3. INTERPROCESS COMMUNICATION**

Introduction - Message Passing - Synchronization - Shared Memory.

### **4. SOCKETS**

Introduction - TCP Sockets - I/O Multiplexing - Socket Options - UDP Sockets - Name and address conversions.

### **5. APPLICATIONS**

Raw Sockets - Debugging Techniques - TCP Echo Client-Server - UDP Echo Client-Server - Ping - Trace Route - Client-Server Applications.

#### **References:**

1. W.Richard Stevens, Advanced programming in the UNIX environment, Addison Wesley,1999.
2. W.Richard Stevens, UNIX Network Programming Volume 1,2, Prentice Hall International,1998.

## **PRACTICAL III - UNIX LAB**

### **1. BASIC COMMANDS**

Learning an Editor-Knowing to use commands like ls, cp, rm, diff, rmdir, cat etc.  
Learning to write a make file-Compiling C programs in Unix.

### **2. IMPLEMENTATION OF SYSTEM CALLS RELATED TO FILE SYSTEM**

To use System Calls - create, open, read, write, close, stat, fstat, lseek.

### **3. PROCESS CREATION, EXECUTION**

Implementation of fork, exec System Calls.

### **4. PIPES**

Implementation of Inter Process Communication using Pipes.

### **5. SEMAPHORES**

Known to use Semaphores. Solving Synchronization Problems.

### **6. MESSAGE QUEUES**

Implementation of inter Process Communication using Message Queues.

### **7. SHARED MEMORY**

IPC using Shared Memory.

### **8. SOCKET PROGRAMMING - TCP SOCKETS**

Client-Server Communication using TCP Sockets.

### **9. SOCKET PROGRAMMING - UDP SOCKETS**

Client-Server Communication using UDP Sockets.

### **10. APPLICATIONS USING TCP , UDP SOCKETS**

Application like File Transfer , Chat using TCP,UDP Sockets.

# **SEMESTER IV**

## **PAPER XVI - INTERNET PROGRAMMING AND TOOLS**

### **1. BASIC INTERNET CONCEPTS**

History of Internet - Internet addressing - TCP/IP - DNS and directory services - Internet Resources - Applications - Electronic mail, Newsgroups, UUCP, FTP, Telnet, Finger.

### **2. WORLD WIDE WEB**

Overview - Hyper Text Markup Language - Uniform Resource Locators - Protocols - MIME Types - Browsers - Plug-ins - Net meeting and chat - Search Engines.

### **3. SCRIPTING LANGUAGE**

Java Script programming -Dynamic HTML - Cascading style sheets - Object model and collections - Event model - Filters and Transitions - ActiveX controls - Multimedia - Client side scripting.

### **4. JAVA**

Java fundamentals - IO Streaming - Object Serialization - Applications - Applets - Networking - Threading - Native Interfaces - Image Processing.

### **5. ADVANCED JAVA**

Remote methods invocation - Multicasting - JDBC - Server side programming - Enterprise Applications - Automated Solutions.

### **References:**

1. D.Norton and H.Schildt, Java2 : the complete reference, TMH 2000.
2. Internet & World wide Web How to program, Deitel & Deitel, Prentice Hall 2000.
3. Java How to program,Deitel & Deitel, Prentice Hall 1999.
4. Core Java Vol.1 and Vol. 2, Gary Cornell and Cay S.Horstmann, Sun Microsystems Press 1999.
5. Active X source Book, Ted Coombs, Jason Coombs and Don Brewer, John Wiley &sons 1996.

## **PAPER XVII - ADVANCED DATABASES**

### **1. INTRODUCTION**

Relational databases - ODBC - JDBC - Stored procedures - Triggers - Forms - Reports - Decision support - Databases - Servers

### **2. PARALLEL AND DISTRIBUTED DATABASES**

Parallel databases - I/O parallelism - Interquery and Intraquery parallelism - Intra operation and Interoperation parallelism - Design of parallel databases - Distributed databases - Distributed data storage - Network transparency distributed query processing - Transaction model - Commit protocols - Coordinator selection - Concurrency control - Deadlock handling – Multi database systems.

### **3. SPECIALIZED DATABASES**

Deductive databases - Temporal and Spatial databases - Web databases - Multimedia databases.

### **4. OBJECT ORIENTED DATABASES**

Objects - Storage - Retrieval - Query language - Object relational databases - Architecture - query processing.

### **5. DATA WAREHOUSING AND DATA MINING**

Data warehousing architecture - Implementation - Data mining - Rules - Clustering.

#### **References:**

1. Ramez Eimasri, Shamkant, B.Navathe, Fundamentals of Database Systems, 3rd Edition, Addison Wesley,2000.
2. Abraham Silberschatz, Henry.F.Korth and S.Sudharshan, Database System Concepts, MCGraw Hill International Editions, 1997.
3. Setrag Khosafian, Object Oriented Databases, John Wiley & Sons,1993.

4. Gary W.Hanson and James V.Hanson, Database Management and Design, Prentice Hall of India Pvt Ltd.,1999.

5. M.Tamer Ozsü and Patrick Valduriez, Principles of Distributed Database Systems, Prentice Hall International INC, 1999.

## **PAPER XVIII - VISUAL PROGRAMMING**

### **1. WINDOWS PROGRAMMING**

Conceptual comparison of traditional programming paradigms - Overview of Windows programming - Data types - Resources - Windows messages - Device contexts - Document interface - Dynamic linking libraries - SDK(Software Development Kit) tools - Context help.

### **2. VISUAL BASIC PROGRAMMING**

Form design - Overview - Programming fundamentals - VBX Controls - Graphics application - Animation - Interfacing - File system controls - Data control - Database applications.

### **3. VISUAL C++ PROGRAMMING**

Frame work classes - VC++ components - Resources - Event handling - Message dispatch system - Model and Modeless dialogs - Importing VBX controls - Document view architecture - Serialization - Multiple document interface - Splitter windows - Co-ordination between controls - Sub classing.

### **4. DATABASE CONNECTIVITY**

Mini database application - Embedding controls in view - Creating user defined DLL's - Dialog based applications - Dynamic data transfer functions - User interface classes - Database management with ODBC - Communicating with other applications - Object linking and embedding.

### **5. BASICS OF GUI DESIGN**

Goals of user interface design - Three models - Visual interface - File system - Storage and retrieval system - Simultaneous multiplatform development - Interoperability.

#### **References:**

1. David Kruglinski J., Inside Visual C++, Microsoft Press , 1993.
2. Microsoft Visual C++ and Visual Basic manuals.
3. Petzold, Windows Programming, Microsoft Press, 1992.
4. Alan cooper, The Essentials of User Interface Design, DG Books World Wide Inc., California, USA, 1995.
5. Pappas and Murray, Visual C++: The Complete Reference, TMH,2000.

## **PAPER XIX - COMPUTER GRAPHICS AND MULTIMEDIA SYSTEMS**

### **1. INTRODUCTION**

I/O devices - VGA card - Bresenham technique - DDA - Display files - Clipping algorithms - circle Drawing algorithms.

### **2. 2D TRANSFORMATIONS**

Two dimensional transformations - Interactive Input methods - Polygons - splines - Window viewport mapping.

### **3. 3D TRANSFORMATIONS**

3D Concepts - Projections - Hidden surface and hidden line elimination - visualization and rendering - color models - Texture mapping - animation - morphing.

### **4. OVERVIEW OF MULTIMEDIA**

Overview of hardware and software components - 2D and 3D graphics in multimedia - audio - video - Standards for multimedia authoring and designing - Multimedia project development.

### **5. APPLICATIONS**

Multimedia Information system - MMDB - Image information system -Video conferencing concepts of virtual reality.

### **References:**

1. Foley J.D, Van Dam A, Feiner S.K, Hughes J.F, computer Principles and practice, Addison,Wesley Publication Company, 1993.
2. Siamon J. Gibbs and Dionysios C. Tsichritzis, Multimedia programming, Addison, Wesley, 1995.
3. Tom Vaughan, Multimedia - making it work, Osborne Mc Graw Hill, 1993.
4. Hearn D and Baker M.P, Computer graphics 2nd edition PHI, New Delhi, 1995.
5. John Villamil, Casanova and Leony Fernanadez, Eliar, Multimedia Graphics, PHI, 1998.

## **PRACTICAL IV -VISUAL PROGRAMMING AND INTERNET PROGRAMMING LAB**

### **1. GETTING STARTED WITH APPLICATION WIZARD**

SDI, MDI, Drawing Inside the View Window, Device Context.

### **2. BASIC EVENT HANDLING**

The message map, saving the view's state, initializing a view class data Member. CRect, CPoint and Csize.

### **3. GRAPHICS DEVICE , COLORS AND FONTS**

CmetafileDC, CclientDC, CDC, GDI objects, CBitmap, CBrush, CPG, CFont , Tracking GDI Objects, Stock GDI objects.

### **4. MODAL, MODALESS DIALOGS**

Programming a Modal dialog - dialog style, dialog style, dialog controls, dialog's tabbing order - connecting the dialog to view - onpaint() - Cfile Dialog.

### **5. STATIC AND DYNAMIC CONTROLS**

Progress control, list control, tree control, image list static text, group box , check box, combo box, tab control, list box, radio button, button, edit box.

### **6. DOCUMENT - VIEW ARCHITECTURE**

Keyboard accelerators - Property sheets, Cmenu, Creating floating pop - up menus.

### **7. TOOL BARS AND STATUS BARS**

Tool bar and Status bar , Splitter Windows content sensitive help.

### **8. READING & WRITING DOCUMENTS**

SDI with serialization, MDI application.

### **9. DYNAMIC LINK LIBRARIES & COLLECTION CLASSES**

MFC DLL - extension, regular , C Array

## **10. ACTIVEX CONTROLS**

COM, OLE

## **11. DATABASE MANAGEMENT**

CRecordset , CDatabase

## **12. WEB BASED FORM DESIGN**

HTML tags, Form with various controls.

# **SEMESTER V**

## **PAPER XXI - ADVANCED JAVA PROGRAMMING**

### **1. JAVA BASICS REVIEW**

Java streaming - Networking - Event handling - Multithreading - Byte code Interpretation - Customizing application - Data Structures - Collection classes.

### **2. DISTRIBUTED COMPUTING**

Custom sockets - Remote Method Invocation - Activation - Object serialization - Distributed garbage collection - RMI - IIOP - Interface definition language - CORBA - JINI overview.

### **3. JAVA BEANS AND SWING**

Bean concepts - Events in bean box - Bean customization - Persistence - Application - deployment using swing - Advanced swing techniques - JAR file handling.

### **4. JAVA ENTERPRISE APPLICATIONS**

JNI - Servlets - Java Server Pages - JDBC - Session beans - Entity beans - Programming and deploying enterprise Java Beans - Java transactions.

### **5. RELATED JAVA TECHNIQUES**

Java Media Frame work - 3D graphics - Internationalization - Case study - Deploying n-tier application, E- commerce applications.

#### **References:**

1. Deitel & Deitel , "Java How to program" , Prentice Hall , 4th Edition, 2000.
2. Gary Cornell and Cay S. Horstmann, "Core Java Vol 1 and Vol 2", Sun Microsystems Press, 1999.

**1. ARTIFICIAL NEURAL NETWORKS**

**10**

Basic Concepts – single layer perceptron – multilayer perceptron – supervised and unsupervised learning – back propagation networks – counter propagation networks – Hopfield networks.

**2. FUZZY SYSTEMS**

**10**

Fuzzy sets and fuzzy reasoning – fuzzy matrices – fuzzy functions – decomposition – fuzzy control methods – fuzzy decision making.

**3. NEURO FUZZY MODELING**

**10**

Adaptive networks based fuzzy interface systems – classification and regression trees – Data clustering algorithm – rule based structure identification – neuron fuzzy controls.

**4. GENETIC ALGORITHMS**

**10**

Survival of the fittest – fitness computations – cross over – mutation – reproduction – rank method – rank space method.

**5. SOFT COMPUTING AND CONVENTIONAL AI**

**10**

AI search algorithm – predicate calculus – rules of inference – semantic networks – frames – objects – hybrid models – applications.

Total No of periods:

50

**Text Book:**

1. Jang J.S.R., sun C.T. and Mizutani E, “Neuron fuzzy and soft computing”, Prentice hall 1998.
2. Timothy J.Ross, “Fuzzy logic and engineering applications”, McGraw hill, 1997.
3. Nih J.nelson, “Artificial Intelligence – A new synthesis”, Harcourt Asia Ltd., 1998.

**References:**

1. Laurence fausett, "Fundamentals of Neural networks", Prentice hall, 1994.
2. George J.Klir and Bo Yuan, "Fuzzy sets and Fuzzy logic", Prentice hall USA 1995.
3. D.E. Goldberg, "Genetic algorithms: search, optimization and machine learning", Addison wealeym, N.Y. 1989.
4. Zimmerman H.J., "Fuzzy set theory and its applications ", Kluwer academic publishers, 1994.

# **ELECTIVES**

## **HUMAN RESOURCE MANAGEMENT**

### **1. PERSPECTIVES IN HUMAN MANAGEMENT**

Evolution of Human Resource Management - The Importance of the Human Factor - Objectives of Human Resource Management - Role of Human Resource Manager - Human Resource Policies.

### **2. THE CONCEPT OF BEST FIT EMPLOYEE**

Importance of Human Resource Planning - Forecasting Human Resource Requirements - Internal and External sources - Selection process.

### **3. TRAINING AND EXECUTIVE DEVELOPMENT**

Types of training methods - Purpose - Benefits - Resistance. Executive development programmes - common Practices - Benefits - Self Development - Knowledge Management.

### **4. SUSTAINING EMPLOYEE INTEREST**

Compensation Plans - Rewards - Motivation - Theories of motivation career Management - Developing mentor - Protege Relationships.

### **5. PERFORMANCE EVALUATION AND CONTROL PROCESS**

Methods of performance evaluation - Feedback - Industry practices. Promotion, Demotion, Transfer and Separation - Implications of job change. The Control process - Importance -Methods.

### **References:**

1. Decenzo and Robbins, Human Resource Management, Wiley and Sons, Singapore, 1999.
2. Harry Alder, Think like a Leader, Magna Publishing Co. Ltd., Mumbai, 1998.
3. Tom Lambert, Key, Management Solutions, Mac Millan India Ltd., Delhi, 1997.
4. Mamoria C.B. and Mamoria S, Personnel Management, Himalaya Publishing Company, 1997.

5. Philip Burnad, Interpersonal Skills Training, Viva Books Private Limited, New Delhi, 1999.

# **SYSTEM ANALYSIS AND DESIGN**

## **1. INTRODUCTION**

System Concepts - Subsystems - Types of Systems - Systems and the System analyst - Business as a systems - Information systems - systems Lifecycle - Systems Development Stages - Role of system Analyst - Characteristics of System Analyst.

## **2. SYSTEM PLANNING AND INVESTIGATION**

Approaches to system Development - Methods of Investigation - Recording the investigation feasibility assessment.

## **3. SYSTEM DESIGN**

Analyzing user requirements - Logical system Definition - Physical Definition - Physical Design of Computer subsystem - File Design - Database Design - Output and Input Design - Computer Procedure Design - system security. Form Design - dialogue design - code design - system implementation - Changeover - Maintenance and review.

## **4. PROJECT DOCUMENTATION**

Communication skills - Problems in communication written reports - Principles of report writing with structure - standard documentation - study Proposal - System Proposal - User system Specification - Program and Suit Specification - User Manual - Operational Manual - Test Data file - Changeover - Instructions - System audit report.

## **5. MANAGEMENT INFORMATION SYSTEMS**

Introduction to MIS - Survey of IS Technology - Conceptual foundation - IS Requirements - Development - Implementation and Management of IS Resources.

### **References:**

1. James A Senn, Analysis and Design of Information Systems, McGraw Hill,1989.,
2. Igor Gawryszkiewicz, Introduction to system analysis and design, PHI, New Delhi,2000.
3. V.Rajaraman, Analysis and Design of information Systems, PHI, New Delhi,2000.

# **ELECTRONIC COMMERCE**

## **1. INTRODUCTION**

Infrastructure for Electronic Commerce - Networks - Packet switched networks - TCP/IP internet protocol - Domain name services - Web service protocol - Internet applications - Intranets and Extranets - Virtual private network - Strategies for e-commerce - Organizational and business barriers.

## **2. E-COMMERCE ARCHITECTURE**

Electronic commerce models - Shopping cart technology - E-commerce solutions using IIS architecture - Domain model - Site server application - Intelligent agents - Internet marketing - XML and E-Commerce - Development of B2B and B2C web sites.

## **3. ELECTRONIC PAYMENT SYSTEM**

Real World Payment System - Electronic funds transfer - Digital payment - Internet Payment System - Micro payments - Credit Card transactions - Case studies.

## **4. SECURITY**

Threats to Network security - Public key cryptography - Secured sockets layer - Secure electronic transactions - Network security solutions - Firewalls.

## **5. INTER/INTRA ORGANIZATIONAL ELECTRONIC COMMERCE**

EDI-EDI application in business legal, Security and Privacy issues - EDI and Electronic commerce - Standards - Internet commerce - Workflow automation and coordination - Customization and Internet commerce - Supply chain management - Back-End integration.

### **References:**

1. Ravi Kalakota and Andrew B. Whinston, "Frontiers of Electronic Commerce", Addison Wesley, 1996.
2. Pete Loshin, Paul A. Murphy, "Electronic Commerce , II Edition", Jaico Publishers, 1996.

3. David Whiteley, "Electronic Commerce: Strategy, Technologies and Applications" – McGraw Hill, 2000.

## **DATA MINING AND DATA WAREHOUSING**

### **1. INTRODUCTION**

relation to statistics, databases, machine learning - Taxonomy of data mining tasks - Steps in data mining process - Overview of data mining techniques.

### **2. VISUALIZATION AND STATISTICAL PERSPECTIVES**

Visualization - Dimension reduction techniques - Data summarization methods - Statistical Perspective - Probabilistic - Deterministic models - Clustering - Regression analysis - Time service analysis - Bayesian learning.

### **3. PREDICTIVE MODELING**

Predictive Modeling - Classification - Decision trees - Patterns - Association rules - Algorithms.

### **4. DATA WAREHOUSING**

Design - Dimensional Modeling - Meta data - Performance issues and indexing - VLDB issues - Development life cycle - Merits.

### **5. APPLICATIONS**

Tools - Applications - Case Studies.

#### **References:**

1. Usama M.Fayyad, Gregory Piatetsky - Shapiro, Padhrai Smyth and Ramasamy Uthurusamy, "Advances in Knowledge Discovery and Data Mining", The M.I.T Press, 1996.
2. "Data Mining: Concepts and Techniques", Jiawei Han, Micheline Kamber Morgan Kaufmann Publishers, 2000.

3. Ralph Kimball, "The Data Warehouse Life Cycle Toolkit", John Wiley & Sons Inc., 1998.
4. Sean Kelly, "Data Warehousing in Action", John Wiley & Sons Inc., 1997.

## **SOFTWARE QUALITY MANAGEMENT**

### **1. INTRODUCTION**

Software Process assessment overview - Assessment phases - Assessment principles - Assessment conduct - Implementation consideration - Quality management - Quality assurance plan - Considerations - Verification and Validation.

### **2. CONFIGURATION MANAGEMENT**

The need for configuration Management - Software product nomenclature - Basic configuration management functions - Baselines - Responsibilities - Need for automated tools - Configuration management plan - SCM support functions - The requirement phase Design control - The implementation phase - Test phase - SCM for Tools - Configuration accounting and audit.

### **3. SOFTWARE STANDARDS AND INSPECTION**

Definitions - The Reason for software standards - Benefits of standards - Establishing standards - Guidelines - Types of reviews - Inspection of objectives - Basic inspection principles - The conduct of inspection - Inspection training.

### **4. TESTING AND MANAGING SOFTWARE QUALITY**

esting principles - Types of tests - Test planning - Test development - Test execution and reporting - Test tools and methods - Real Time testing - quality management paradigm - Quality motivation - Measurement criteria - Establishing a software quality program - Estimating software quality.

## **5. DEFECT PREVENTION**

Principles of software defect prevention - Process changes for defect prevention - Defect prevention considerations - Managements role - Framework for software process change - Managing resistance to software process change - Case studies.

### **References:**

1. Watts S. Humphrey, Introduction to the Team Software Process, Addison Wesley, 2000.
2. Watts S. Humphrey, Introduction to the Personal Software Process, Addison Wesley, 2000.
3. Watts S. Humphrey, Managing the Software Process, Addison-Wesley, 1999.