ELECTIVE SUBJECTS

Elective-I (Any one of the following)

MCA 404 (1) Compiler Design  MCA 404 (2) Cryptography & Network Security
MCA 404 (3) Data Compression  MCA 404 (4) Client Server Computing
MCA 404 (5) Data Mining & Warehousing

Elective-II (any one of the following)

MCA 502 (1) Multimedia System  MCA 502 (2) Distributed Database System
MCA 502 (3) ERP Systems  MCA 502 (4) Object Database
MCA 502 (5) Advanced Concepts in Database System

Elective-III (any one of the following)

MCA 505 (1) Advanced Computer Networks  MCA 505 (2) Real Time Systems
MCA 505 (3) Principles of User Interface Design  MCA 505 (4) Mobile Computing
MCA 505 (5) Neural Networks

MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

MCA 101

Unit-I

Relation: Type and compositions of relations, Pictorial representation of relations, Closures of relations, Equivalence relations, Partial ordering relation.

Function: Types, Composition of function, Recursively defined function

Mathematical Induction: Piano’s axioms, Mathematical Induction

Discrete Numeric Functions and Generating functions

Simple Recurrence relation with constant coefficients, Linear recurrence relation without constant coefficients, Asymptotic Behavior of functions

Algebraic Structures: Properties, Semi group, Monoid, Group, Abelian group, properties of group, Subgroup, Cyclic group, Cosets, Permutation groups, Homomorphism, Isomorphism and Automorphism of groups.

Unit-II


Unit-III

Introduction to defining language, Kleene Closure, Arithmetic expressions, Chomsky Hierarchy, Regular expressions, Generalized Transition graph.

Unit-IV

Conversion of regular expression to Finite Automata, NFA, DFA, Conversion of NFA to DFA, Optimizing DFA, FA with output: Moore machine, Mealy machine, Conversions.

Unit-V

Non-regular language: Pumping Lemma, Myhill Nerode Theorem, Pushdown Automata, and Introduction to Turing Machine and its elementary applications to recognition of a language and computation of functions.

References

1. Liptschutz, Seymour, “Discrete Mathematics”, TMH
ACCOUNTING AND FINANCIAL MANAGEMENT  L T P  3 1 0

MCA 102

Unit-I
Accounting: Principles, concepts and conventions, double entry system of accounting, Ledger posting and Trial balance.
Final accounts: Trading, profit and loss accounts and balance sheet of sole proprietary concern with normal closing entries. Introduction to manufacturing account, final account of partnership firms, limited company.

Unit-II
Financial Management: Meaning, role and scope of financial management.
Basic Financial concepts: Time value of Money, present value, future value of a series of cash flows, annuity. Practical applications of compounding and present value techniques.
Long-term sources of finance: Introduction to shares, debentures, preference shares.

Unit-III
Capital Budgeting: Meaning, importance, difficulties. Introduction to evaluation techniques – Traditional techniques (ARR Payback method). Discounting cash flow techniques (Present value, NPV, IRR)
Ratio Analysis: Meaning, advantages, limitations of ratio analysis, Types of ratios and their usefulness.

Unit-IV
Costing: Nature, importance and types of cost
Marginal costing: Nature, scope and importance of marginal costing, Break-even analysis, its uses and limitations, construction of break-even charts. Practical applications of marginal costing.
Inventory control system: The need, cost of inventory, methods of inventory costing.

Unit-V
Introduction to Computerized Accounting System: Coding logic and codes required, master files, transaction files, introduction to documents used for data collection. Processing of different files and outputs obtained.

References:

COMPUTER ORGANIZATION  L T P  3 1 0

MCA-103

Unit-I  (Representation of Information and Basic Building Blocks)
Introduction to Computer, Computer hardware generation, Number System: Binary, Octal, Hexadecimal, Character Codes (BCD, ASCII, EBCDIC), Logic gates, Boolean Algebra, K-map simplification, Half Adder, Full Adder, Subtractor, Decoder, Encoders, Multiplexer, Demultiplexer, Carry lookahead adder,
Combinational logic Design, Flip-Flops, Registers, Counters (synchronous & asynchronous), ALU, Micro-Operation.
ALU- chip, Faster Algorithm and Implementation (multiplication & Division)

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

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

Unit-IV (I/O Organization)
I/O Controllers, Asynchronous data transfer, Strobe Control, Handshaking.

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

References:

COMPUTER & C PROGRAMMING
MCA-104

Unit – I
Introduction To Computers: Computer hardware Components, Disk Storage, memory, keyboard, mouse, printers, monitors, CD etc., and their functions, Comparison Based analysis of various hardware components.

Unit – II
Basic operating System Concepts: MS-DOS, WINDOWS, Functional Knowledge of these operating systems. Introduction to Basic Commands of DOS, Managing File and Directories in various operating Systems, Introduction to Internet, Basic terms related with Internet, TCP/IP.

Unit – III
Programming in C: History, Introduction to C Programming Languages, Structure of C programs, compilation and execution of C programs, Debugging Techniques, Data Types and Sizes, Declaration of variables, Modifiers, Identifiers and keywords, Symbolic constants, Storage classes (automatic, external, register and static), Enumerations, command line parameters, Macros, The C Preprocessor.

Unit – IV
Operators: Unary operators, Arithmetic & logical operators, Bit wise operators, Assignment operators and expressions, Conditional expressions, Precedence and order of evaluation.
Control statements: if-else, switch, break, continue, the comma operator, goto statement.
Loops: for, while, do-while.
Functions: built-in and user-defined, function declaration, definition and function call, parameter passing: call by value, call by reference, recursive functions, multifele programs.
Arrays: linear arrays, multidimensional arrays, Passing arrays to functions, Arrays and strings.

Unit – V
Structure and Union: definition and differences, self-referential structure.
Pointers: value at (*) and address of (&) operator, pointer to pointer, Dynamic Memory Allocation, calloc and malloc functions, array of pointers, function of pointers, structures and pointers.
**File Handling in C:** opening and closing a data file, creating a data file, read and write functions, unformatted data files.

**References:**
2. Peter Norton’s, “Introduction to Computers”, TMH
3. Hahn, “The Internet complete reference”, TMH
4. Peter Norton’s, “DOS Guide”, Prentice Hall of India
8. Yashwant Kanitkar, “Pointer in C”, BPB
11. E. Balagurusamy, “Programming in ANSI C”, TMH

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**COMPUTER BASED NUMERICAL AND STATISTICAL TECHNIQUES**

**MCA-105**

**Unit-I**

**Floating point Arithmetic:** Representation of floating point numbers, Operations, Normalization, Pitfalls of floating point representation, Errors in numerical computation

**Iterative Methods:** Zeros of a single transcendental equation and zeros of polynomial using Bisection Method, Iteration Method, Regula-Falsi method, Newton Raphson method, Secant method, Rate of convergence of iterative methods.

**Unit-II**

**Simultaneous Linear Equations:** Solutions of system of Linear equations, Gauss Elimination direct method and pivoting, Ill Conditioned system of equations, Refinement of solution. Gauss Seidal iterative method, Rate of Convergence

**Interpolation and approximation:** Finite Differences, Difference tables
- Polynomial Interpolation: Newton’s forward and backward formula
- Central Difference Formulae: Gauss forward and backward formula, Stirling’s, Bessel’s, Everett’s formula.

**Interpolation with unequal intervals:** Langrange’s Interpolation, Newton Divided difference formula, Hermite’s Interpolation

Approximation of function by Taylor’s series and Chebyshev polynomial

**Unit-III**

**Numerical Differentiation and Integration:** Introduction, Numerical Differentiation, Numerical Integration, Trapezoidal rule, Simpson’s rules, Boole’s Rule, Weddle’s Rule Euler- Maclaurin Formula


**Unit-IV**

**Curve fitting, Cubic Spline and Approximation:** Method of least squares, fitting of straight lines, polynomials, exponential curves etc

**Frequency Chart:** Different frequency chart like Histogram, Frequency curve, Pi-chart.

**Regression analysis:** Linear and Non-linear regression, Multiple regression

**Unit-V**

**Time series and forcasting:** Moving averages, smoothering of curves, forecasting models and methods. Statistical Quality Controls methods

**Testing of Hypothesis:** Test of significance, Chi-square test, t-test, ANOVA, F-Test

Application to medicine, agriculture etc.

**References:**
7. Francis Scheld, “Numerical Analysis”, TMH

COMBINATORICS & GRAPH THEORY
MCA-106

Unit 1
Rules of sum and products, Permutation, Combination, Permutation groups and application, Probability, Ramsey theory, Discrete numeric function and generating function, Combinatorial problems, Difference equation.

Unit II
Recurrence Relation-Introduction, Linear recurrence relation with constant coefficient, Homogeneous solution, Particular solution, Total solution, Solution by the method of generating function.

Unit III
Graphs, sub-graphs, some basic properties, Walks, Path & circuits, Connected graphs, Disconnected graphs and component, Euler and Hamiltonian graphs, Various operation on graphs, Tree and fundamental circuits, Distance diameters, Radius and pendent vertices, Rooted and binary trees, Counting trees, Spanning trees, Finding all spanning trees of a graph and a weighted graph.

Unit IV
Cut-sets and cut vertices, some properties, All cut sets in a graph, Fundamental circuit and cut sets, Connectivity and seperatability, Network flows, mincut theorem, Planar graphs, Combinatorial and geometric dual, Kuratowski to graph detection of planarity, Geometric dual, Some more criterion of planarity, Thickness and Crossings, Vector space of a graph and vectors, basis vectors, cut set vector, circuit vector, circuit and cut set verses sub spaces, orthogonal vector and sub space. Incidence matrix of graphs, sub matrices of A(G), circuit matrix, cut set matrix, path matrix and relationship among \( A_f, B_f, C_f \) fundamental circuit matrix and range of \( B_f \) adjacency matrix, rank nullity theorem.

Unit V
Coloring and covering partitioning of graph, Chromatic number, Chromatic partitioning, Chromatic polynomials, Matching, covering, Four color problem, Directed graph, Types of directed graphs, Directed paths and connectedness, Euler digraph, Trees with directed edges, Fundamental circuit in digraph, Matrices A, B, C of digraph adjacency matrix of digraph, Enumeration and its types, Counting of labeled and unlabeled trees, Polya’s theorem, Graph enumeration with polyas theorem, Graph theoretic algorithm.

References
1. Deo Narsing, “Graph Theory with applications to engineering & computer science”, PHI
2. Tremblay & Manohar, “ Discrete mathematical structures with applications to computer Science”, TMH
4. John Truss, “Discrete mathematics for computer scientist”
5. C. L. Liu, “Discrete mathematics”

ORGANIZATIONAL STRUCTURE AND PERSONNEL
MANAGEMENT
MCA 201

Unit –I
**Organization Structure:** Classical theories of Management: Scientific management theory, Fayol’s 14 principles of Management, Webar’s bureaucratic theory. Definition of organization and organization Structure.

**Some concepts regarding Organization Structure:** Line and Staff authority, Centralization and Decentralization, Span of control, Formal and Informal Organization.
Forms of organization structure and features: Function based, Product based, Geography based, Project based (Matrix)

Organization Design: Mechanistic and Organic Structure, Virtual and Network organization Structure

Unit-II
Motivation: Definition of Motivation, Importance of Motivation, Motivation and behavior, Theories of Motivation – Maslows need Hierarchy, Two- Factor Theory, McClelland ‘s Need Theory, Theory X and Theory Y.

Unit-III
Nature and Scope of Human resource Management: Scope of HRM, HRM– functions and objectives, HRM model.

Personnel Function: Personnel polices and principles, duties and responsibilities of personnel manager, differences between HRM and PM Emerging trends of personnel management in India

Unit-IV
Human Resource Planning: Meaning, definition and importance of HRP.

Job analysis: Meaning and definition, process of job analysis.

Recruitment: Meaning and definition, importance, sources of recruitment. Indian scenario

Selection: Meaning and definition, selection process, types of interview

Unit-V
Training and Development: Nature of training and Development, Inputs in training and Development, importance of training and Development, training process, training of International assignment

Reference Books:
3. Tripathi, Reddy, “Principles of Management”, TMH
7. L. M. Prasad, “Human Recourse Management”, S. Chand

DATA AND FILE STRUCTURE USING ‘C’
MCA 202

Unit -I
Introduction: Basic Terminology, Elementary Data Organization, Data Structure operations, Algorithm Complexity and Time-Space trade-off

Arrays: Array Definition, Representation and Analysis, Single and Multidimensional Arrays, address calculation, application of arrays, Character String in C, Character string operation, Array as Parameters, Ordered List, Sparse Matrices, and Vectors.


Unit - II
Queues: Array and linked representation and implementation of queues, Operations on Queue: Create, Add, Delete, Full and Empty. Circular queue, Deque, and Priority Queue.

Linked list: Representation and Implementation of Singly Linked Lists, Two-way Header List, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion to/from Linked Lists, Insertion and deletion Algorithms, Doubly linked list, Linked List in Array, Polynomial representation and addition, Generalized linked list, Garbage Collection and Compaction.
Unit - III


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

Unit - IV

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

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

Unit - V


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

References
2. R. Kruse etal, “Data Structures and Program Design in C” Pearson Education
4. Lipschutz, “Data Structure”, TMH
5. K Loudon, “Mastering Algorithms With C”, Shroff Publisher & Distributors

UNIX AND SHELL PROGRAMMING

MCA-203

Unit-1 Introduction

Introduction to Unix, Unix system organization (the kernel and the shell), Files and directories, Library functions and system calls, Editors (vi and ed).

Unit-2 Unix Shell programming

Types of Shells, Shell Metacharacters, Shell variables, Shell scripts, Shell commands, the environment, Integer arithmetic and string Manipulation, Special command line characters, Decision making and Loop control, controlling terminal input, trapping signals, arrays.

Unit-3 Portability With C

Command line Argument, Background processes, process synchronization, Sharing of data, user-id, group-id, pipes, fifos, message queues, semaphores, shared variables, Introduction to socket programming.

Unit-4 Unix System Administration

File System, mounting and unmounting file system, System booting, shutting down, handling user account, backup, recovery, security, creating files, storage of Files, Disk related commands.

Unit-5 Different tools and Debugger

System development tools: lint, make, SCCS (source code control system), Language development tools: YACC, LEX, M4, Text formatting tools: nroff, troff, tbl, eqn, pic, Debugger tools: Dbx, Adb, Sdb, Strip and Ctrace.

References
1. Parata, “Advanced Unix programming guide”, BPB
PARADIGMS OF PROGRAMMING
MCA 204

Unit I:
Introduction: Characteristics of programming Languages, Factors influencing the evolution of programming language, Development in programming methodologies, desirable features and design issues.
Programming Language processors: Structures and operations of translators, software simulated computer, syntax, semantics, structure, virtual computers, binding and binding time

Unit II:
Elementary and structured data type: Data object variables, constants, data type, elementary data types, declaration, assignments and initialization, enumeration, characters strings.
Structured data type and objects: Specification of data structured types, vectors and arrays, records, variable size data structure, pointers and programmer constructed data structure, Set files.
Imperative Languages: Block structure, Scope rules, Parameter Passing, Construct like co-routines, Tasks etc.

Unit III:
Object Oriented languages: The class notion- Information hiding and data abstraction using classes, derived classes and inheritance– Polymorphism – Parameterized types.

Unit IV:

Unit V:

References:
1. Terrance W Pratt, “Programming Languages: Design and Implementation”, PHI.
5. Tucker Noonan, “Programming languages: Principles and Paradigms”, TMH
6. D. A. Watt, “Programming Languages and Paradigms”, PHI

SYSTEM ANALYSIS AND DESIGN
MCA 205

Unit – I

Unit – II


Unit – III


Unit – IV

Information Gathering: What Kind of Information do we need? Information about the firms, Information gathering tools, The art of Interviewing, Arranging the Interview, Guides to a Successful Interview, Types of Interviews and Questionnaires, The Structured and Unstructured Alternatives.


Unit – V


References

COMPUTER ARCHITECTURE & MICROPROCESSOR
MCA 206

Unit-I
Introduction to Parallel computing; Parallelism in Uniprocessor Systems, Parallel computer structures, Architectural Classification schemes, parallel processing applications. Pipelining Processing: An overlapped parallelism, Instruction and Arithmetic pipelines.

Unit-II
Principles of designing pipelined processors, Internal forwarding and register tagging, Hazard detection and resolution, Job sequencing and collision prevention, Characteristics of Vector processing, Multiple vector task dispatching, SIMD array processors, Masking and Data routing.

Unit-III

Unit-IV
Multiprocessor scheduling strategies and deterministic scheduling models, Introduction to Data Flow computing and data flow Graph. Introduction to 8 Bit and 16 Bit Intel Microprocessor Architecture and Register set.

Unit-V
Assembly language programming based on Intel 8085; Instructions: Data Transfer, Arithmetic, Logic, Branch operations, Looping Counting, Indexing, Programming Techniques, Counters and Time Delays, Stacks and Subroutines, Conditional call and Return Instructions, Advanced Subroutine Instructions.

References:
2. R.S Goankar, “Microprocessor architecture, programming and application with the 8085”, Pen Ram International.
COMPUTER NETWORKS
MCA 301

Unit-I
Introductory Concepts: Goals and Applications of Networks, Network structure and architecture, the OSI reference model, services, networks topology, Physical Layer- transmission, switching methods, Integrated services digital networks, terminal handling.

Unit-II
Medium access sub layer: Channel allocations, LAN protocols, ALOHA Protocols- Pure ALOHA, slotted ALOHA, Carrier Sense Multiple Access Protocols, CSMA with Collision Detection, Collision free Protocols, IEEE standards, FDDI, Data Link Layer- elementary data link protocols, sliding windows protocols, error handling, High Level Data Link Control

Unit-III

Unit-IV

Unit-V

References
3. Comer, “Computer Networks & Internet”, PHI
4. Comer, “Internetworking with TCP/IP”, PHI
5. Forouzan, “Data Communication and Networking”, TMH

DESIGN AND ANALYSIS OF ALGORITHM
MCA 302

Unit-I
Introduction:
Sorting in polynomial Time: Insertion sort, Merge sort, Heap sort, and Quick sort
Sorting in Linear Time: Counting sort, Radix Sort, Bucket Sort
Medians and order statistics

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

Unit-III
Advanced Design and Analysis Techniques: Dynamic programming, Greedy Algorithm, Backtracking, Branch-and-Bound, Amortized Analysis
Unit-IV
Graph Algorithms: Elementary Graph Algorithms, Breadth First Search, Depth First Search, Minimum Spanning Tree, Kruskal’s Algorithms, Prim’s Algorithms, Single Source Shortest Path, All pair Shortest Path, Maximum flow and Traveling Salesman Problem

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

References
2. Coremen Leiserson etal, “Introduction to Algorithms”, PHI

OPERATING SYSTEM
MCA 303

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

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

Unit-III

Unit-IV

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

References
3. Harvey M Deital, "Operating Systems", Addison Wesley  

**DATABASE MANAGEMENT SYSTEM**  
MCA 304

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

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

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

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

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

**References**  
1. Date C J, “An Introduction To Database System”, Addision Wesley  

**OBJECT ORIENTED SYSTEMS AND C++**  
MCA 305

**Unit-I**  
**Object Modeling**
Object & classes, Links and Associations, Generalization and Inheritance, Aggregation, Abstract classes, A sample object model, Multiple Inheritance, Meta data, candidate keys, constraints.

Unit-II
Dynamic Modeling
Events and States, Operations and Methods, Nested state Diagrams, Concurrency, Relation of Object and Dynamic Models, advanced dynamic model concepts, a sample dynamic model.

Unit-III
Functional Modeling
Functional Models, Data flow Diagrams, Specifying Operations, Constraints, a sample functional model.

Unit-IV
Programming in C++
Classes and objects in C++, Functions, Constructors, Destructors, Inheritance, Functions overloading, Operator Overloading, I/O Operations.
Real life applications, Extended Classes, Pointer, Virtual functions, Polymorphisms, Working with files, Class templates, Function templates.

Unit-V
Translating object oriented design into an implementation, OMT Methodologies, examples and case studies to demonstrate methodology, comparison of Methodology, SA/SD, and JSD.

References
2. Bjarne Stroustrup, “C++ Programming Language”, Addison Wesley

COMPUTER BASED OPTIMIZATION TECHNIQUES
MCA 306

Unit I
Preliminaries: Inventory Models and Replacement problems: Inventory models --various costs-deterministic inventory models, Single period inventory model with shortest cost, stochastic models, Application of inventory models, Economic lot sizes-price breaks, Replacement problems-capital equipment-discounting costs-replacement in anticipation of failure- group replacement-stochastic nature underlying the failure phenomenon.

Unit II
Linear Programming Problems (LPP): Definition of LPP, Graphical Solutions of Linear Programming Problems, Simplex Method, and Artificial Variable Method, Two Phase Method, Charnes’ Big-M Method, Sensitivity Analysis, Revised Simplex Method, Duality, Dual Simplex Method

Unit III

Transportation Problems: Introduction to Transportation Model, Matrix Form of TP, Applications of TP Models, Basic Feasible Solution of a TP, Degeneracy in TP, Formation of Loops in TP, Solution Techniques of TP, Different Methods for Obtaining Initial Basic Feasible Solutions viz. Matrix Minima Method, Row Minima Method, Column Minima Methods, Vogel’s Approximation Method, Techniques for Obtaining Optimal Basic Feasible Solution.

Assignment Problems: Definition, Hungarian Method for AP.

Unit IV
Introduction to NLP: Definition of NLP, Convex Programming Problems, Quadratic Programming Problems, Wolfe’s Method for Quadratic Programming, Kuhn-Tucker Conditions, Geometrical Interpretation of KT-Conditions, KT-Points etc.
**Dynamic Programming**: Bellman’s Principle of optimality of Dynamic Programming, Multistage decision problem and its solution by Dynamic Programming with finite number of stages, Solution of linear programming problems as a Dynamic Programming problem

**Unit V**

**Queuing Theory** Introduction to Queues, Basic Elements of Queuing Models, Queue Disciplines, Memoryless Distribution, Role of Exponential and Poisson Distributions, Markovian Process, Erlang Distribution, Symbols and Notations, Distribution Of Arrivals, Distribution of Service Times, Definition of Steady and Transient State, Poisson Queues.

**References:**
1. Hadley, G., “Linear Programming, and Massachusetts”, Addison-Wesley
5. Swarup K etal, “Operation Research”, S. Chand

**MANAGEMENT INFORMATION SYSTEM**

**MCA 401**

**Unit 1: Foundation of Information Systems**: Introduction to information system in business, fundamentals of information systems, Solving business problems with information systems, Types of information systems, Effectiveness and efficiency criteria in information system.

**Unit 2: An overview of Management Information Systems**: Definition of a management information system, MIS versus Data processing, MIS & Decision Support Systems, MIS & Information Resources Management, End user computing, Concept of an MIS, Structure of a Management information system.

**Unit 3: Concepts of planning & control**: Concept of organizational planning, The Planning Process, Computational support for planning, Characteristics of control process, The nature of control in an organization.


**Unit 5: Managing Information Technology**: Enterprise & global management, Security & Ethical challenges, Planning & Implementing changes.


**Text Books**
1. O Brian, “Management Information System”, TMH
2. Gordon B. Davis & Margrethe H. Olson, “Management Information System”, TMH.

**References**
1. O Brian, “Introduction to Information System”, MCGRAW HILL.
4. Jain Sarika, “Information System”, PPM
5. Davis, “Information System”, Palgrave Macmillan

**MODELING AND SIMULATION**

**MCA 402**

**Unit-I**
System definition and components, stochastic activities, continuous and discrete Systems, System modeling, types of models, static and dynamic physical models, Static and dynamic mathematical models, Full corporate model, types of system study.

**Unit-II**
System simulation, Why to simulate and when to simulate, Basic nature of simulation, technique of simulation, comparison of simulation and analytical methods, types of system simulation, real
time simulation, hybrid simulation, simulation of pure-pursuit problem single-server queuing system and an inventory problem, Monte Carlo simulation, Distributed Lag models, Cobweb model.

**Unit-III**
Simulation of continuous systems, analog vs. digital simulation, simulation of water reservoir system, simulation of a servo system, simulation of an autopilot
Discrete system Simulation, Fixed time-step vs. event-to-event model, generation of random numbers, Test for randomness, Generalization of non-uniformly distributed random numbers, Monte-Carlo computation vs. stochastic simulation.

**Unit-IV**
System dynamics, exponential growth models, exponential decay models, modified exponential growth models, logistic curves, generalization of growth models, System Dynamics diagrams, Feedback in Socio-Economic systems, world model.

**Unit-V**
Simulation of PERT networks, Critical path computation, uncertainties in Activity duration, Resource allocation and consideration.
Simulation software, Simulation languages, continuous and discrete simulation languages, Expression based languages, object-oriented simulation, general-purpose vs. application-oriented simulation packages, CSMP-III, MODSIM-III.

**References**
2. Narsingh Deo, “System Simulation with digital computer”, PHI

**INTERNET & JAVA PROGRAMMING**
**MCA 403**

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

**Unit-II**

**Unit-III**

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

**Unit-IV**

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

**References**
1. Margaret Levine Young, “The Complete Reference Internet”, TMH
2. Naughton, Schildt, “The Complete Reference JAVA2”, TMH
3. Balagurusamy E, “Programming in JAVA”, TMH  
4. Dustin R. Callway, “Inside Servlets”, Addison Wesley  

COMPILER DESIGN  
MCA 404/(1)

Unit-I  
Compiler Structure: Compilers and Translators, Various Phases of Compiler,  
Pass Structure of Compiler, Bootstrapping of Compiler  
Programming Languages: High level languages, The lexical and syntactic structure of a language, Data elements, Data Structure, Operations, Assignments, Program unit, Data Environments, Parameter Transmission.  
Lexical Analysis: The role of Lexical Analyzer, A simple approach to the design of Lexical Analyzer, Regular Expressions, Transition Diagrams, Finite state Machines, Implementation of Lexical Analyzer, Lexical Analyzer Generator: LEX, Capabilities of Lexical Analyzer

Unit-II  
The Syntactic Specification of Programming Languages: CFG, Derivation and Parse tree, Ambiguity, Capabilities of CFG.  
Basic Parsing Techniques: Top-Down parsers with backtracking, Recursive Descent Parsers, Predictive Parsers, Bottom-up Parsers, Shift-Reduce Parsing, Operator Precedence Parsers, LR parsers (SLR, Canonical LR, LALR)  
Syntax Analyzer Generator: YACC

Unit-III  
Intermediate Code Generation: Different Intermediate forms: three address code, Quadruples & Triples. Syntax Directed translation mechanism and attributed definition. Translation of Declaration, Assignment, Control flow, Boolean expression, Array References in arithmetic expressions, procedure calls, case statements, postfix translation.

Unit-IV  
Run Time Memory Management: Static and Dynamic storage allocation, stack based memory allocation schemes, Symbol Table management  
Error Detection and Recovery: Lexical phase errors, Syntactic phase errors, Semantic errors.

Unit-V  
Code Optimization and Code Generation: Local optimization, Loop optimization, Peephole optimization, Basic blocks and flow graphs, DAG, Data flow analyzer, Machine Model, Order of evaluation, Register allocation and code selection

References:

CRYPTOGRAPHY AND NETWORK SECURITY  
MCA 404/(2)
Unit-I

Unit-II

Unit-III

Unit-IV

Unit-V

Text Book:

Reference Books:

DATA COMPRESSION
MCA 404/(3)

Unit-I


Unit-II
Huffman coding: The Huffman coding algorithm, minimum variance Huffman codes, length of Huffman codes, extended Huffman codes, non binary Huffman codes, Adaptive Huffman codes: Update procedure, Encoding procedure, decoding procedure, Golomb codes, Rice codes, Tunstall codes, Applications: loss less image compression, Text compression and Audio compression.

Unit-III

Unit-IV
Mathematical Preliminaries for Lossy Coding: -Distortion criteria, Models. Scalar Quantization, the Quantization problem, Uniform Quantization, adaptive Quantization, Non uniform Quantization.

Unit-V

Text Book:

Reference Book:

Client Server Computing
MCA 404(4)

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

Unit II
Components of Client/Server application: The client: services, request for services, RPC, windows services, fax, print services, remote boot services, other remote services, Utility Services & Other Services, Dynamic Data Exchange (DDE), Object Linking and Embedding (OLE), Common Object Request Broker Architecture (CORBA).
The server: Detailed server functionality, the network operating system, available platforms, the network operating system, available platform, the server operating system.

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

Unit IV
Data Storage: magnetic disk, magnetic tape, CD-ROM, WORM, Optical disk, mirrored disk, fault tolerance, RAID, RAID-Disk network interface cards.
Network protection devices, Power Protection Devices, UPS, Surge protectors.


Unit V
Client/Server System Development: Training, Training advantages of GUI Application, System Administrator training, Database Administrator training, End-user training.
The future of client server Computing Enabling Technologies, The transformational system.

References:
2. Dawna Travis Dewire, “Client/Server Computing”, TMH

Data Mining & Warehousing
MCA 404(5)

Unit – I

Unit – II

Unit – III

Unit – IV

Unit – V

References:
1. Berson, “Data Warehousing, Data-Mining & OLAP”, TMH
5. Margaret H. Dunham, “Data-Mining. Introductory & Advanced Topics”, Pearson Education

FOUNDATION OF E-COMMERCE
MCA 405

Unit 1

Network Infrastructure for E-Commerce: Internet and Intranet based E-commerce- Issues, problems and prospects, Network Infrastructure, Network Access Equipments, Broadband telecommunication (ATM, ISDN, FRAME RELAY).

Unit II

Unit III
Unit IV
Encryption: Encryption techniques, Symmetric Encryption- Keys and data encryption standard, Triple encryption, Asymmetric encryption- Secret key encryption, public and private pair key encryption, Digital Signatures, Virtual Private Network.

Unit V
Electronic Payments: Overview, The SET protocol, Payment Gateway, certificate, digital Tokens, Smart card, credit card, magnetic strip card, E-Checks, Credit/Debit card based EPS, online Banking. EDI Application in business, E-Commerce Law, Forms of Agreement, Govt. policies and Agenda.

References
  2. Bajaj and Nag, “E-Commerce the cutting edge of Business”, TMH

COMPUTER GRAPHICS AND ANIMATION
MCA 406

Unit I
Input Devices: Keyboard, Trackball, Joystick, Mouse, Light Pen, Tablet, and Digitizing Camera.

Unit II
Segment & Display files: Segments, Functions for segmenting the display file, Posting and unposting a segment, segment naming schemes, Default error conditions, Appending to segments, Refresh concurrent with reconstruction, Free storage allocation, Display file Structure.
Graphics Operations: Clipping: Point Clipping, Line Clipping, Polygon Clipping.

Unit III

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

Unit V
Animation: Introduction to Animation, Principles of Animation, Types of Animation, Types of Animation Systems: Scripting, Procedural, Representational, Stochastic, etc.
Animation Tools: Hardware – SGI, PC’s, Amiga etc.
Software: Adobe Photoshop, Animation studio, Wave front etc.
Gif Animator: Microsoft GIF Animation, GIF Construction, GIFmation etc.
References:

WEB TECHNOLOGY
MCA 501

Unit-I

Unit-II
Communication Issues, the Client, Multi-departmental & Large scale Websites, Quality Assurance and testing, Technological advances and Impact on Web Teams.

Unit-III
HTML: Formatting Tags, Links, List, Tables, Frames, forms, Comments in HTML, DHTML.
JavaScript: Introduction, Documents, Documents, forms, Statements, functions, objects in JavaScript, Events and Event Handling, Arrays, FORMS, Buttons, Checkboxes, Text fields and Text areas.

Unit IV

Unit V
Common Gateway Interface (CGI), PERL, RMI, COM/DCOM, VBScript, Active Server Pages (ASP).

Text Book:
2. Sharma &Sharma, “Developing E-Commerce Sites”, Addison Wesley

References:
2. DON Box, “Essential COM”, Addison Wesley.

MULTIMEDIA SYSTEM
MCA 502(1)

Unit I
Evolution of Multimedia and its objects, Scope of multimedia in business & work, Production and planning of Multimedia applications.

Unit II
Production and Planning of Multimedia building blocks, Text, sound (MIDI), Digital Audio, Audio File Formats, MIDI under Windows environment, Audio & Video Capture.

Unit III
Macromedia products, Basic drawing techniques, Advance animation techniques, Creating multi layer combining interactivity and multiple scenes, Creating transparency effects using text in Flash, Flash animation.

Unit IV

Unit V
Multimedia Application Planning, Costing, Proposal preparation, and Financing-Case study of a typical industry.

References:
5. Rosch, “Multimedia Bible”, Sams Publishing

DISTRIBUTED DATABASE SYSTEM
MCA 502(2)

Unit-1
Introduction to Distributed Data system, Distributed Database Architecture, Distributed Database Design, Transaction processing Concurrency Control techniques, Security.

Unit-2
Types of Data Fragmentations, Fragmentation and allocation of fragments, Distribution transparency, access primitives, integrity constraints.

Unit-3
Grouping and aggregate function, Query processing, Equivalence transformation of queries.

Unit-4
Evaluation, parametric queries, Query optimization, Join and general queries.

Unit-5
Management of Distributed transaction and concurrency control: Distributed Data base Administration, Catalogue Management Authorisation, Security and protection. Examples of distributed database systems. Cost Analysis

References:

ERP SYSTEMS
MCA 502(3)

Unit-I
Enterprise wide information system, Custom built and packaged approaches, Needs and Evolution of ERP Systems, Common myths and evolving realities, ERP and Related Technologies, Business Process Reengineering and Information Technology, Supply Chain Management, Relevance to Data Warehousing, Data Mining and OLAP, ERP Drivers, Decision support system.

Unit-II
Unit- III
Framework for evaluating ERP acquisition, Analytical Hierarchy Processes (AHP), Applications of AHP in evaluating ERP, Selection of Weights, Role of consultants, vendors and users in ERP implementation; Implementation vendors evaluation criterion, ERP Implementation approaches and methodology, ERP implementation strategies, ERP Customization, ERP-A manufacturing Perspective.

Unit- IV
Critical success and failure factors for implementation, Model for improving ERP effectiveness, ROI of ERP implementation, Hidden costs, ERP success inhibitors and accelerators, Management concern for ERP success, Strategic Grid: Useful guidelines for ERP Implementations.

Unit- V
Technologies in ERP Systems and Extended ERP, Case Studies Development and Analysis of ERP Implementations in focusing the various issues discussed in above units through Soft System approaches or qualitative Analysis tools, Learning and Emerging Issues, ERP and E-Commerce.

References

ADVANCED CONCEPTS IN DATABASE SYSTEMS
MCA 502(5)

Unit-I
Query Processing, Optimization & Database Tuning:
Algorithms For Executing Query Operations, Heuristics For Query Optimizations, Estimations Of Query Processing Cost, Join Strategies For Parallel Processors, Database Workloads, Tuning Decisions, DBMS Benchmarks, Clustering & Indexing, Multiple Attribute Search Keys, Query Evaluation Plans, Pipelined Evaluations, System Catalogue In RDBMS.

Unit-II
Extended Relational Model & Object Oriented Database System:
New Data Types, User Defined Abstract Data Types, Structured Types, Object Identity, Containment, Class Hierarchy, Logic Based Data Model, Data Log, Nested Relational Model And Expert Database System.

Unit-III
Distributed Database System:
Structure Of Distributed Database, Data Fragmentation, Data Model, Query Processing, Semi Join, Parallel & Pipeline Join, Distributed Query Processing In R * System, Concurrency Control In Distributed Database System, Recovery In Distributed Database System, Distributed Deadlock Detection And Resolution, Commit Protocols.

Unit –IV
Enhanced Data Model For Advanced Applications:

Unit-V
Introduction To Expert Database And Fuzzy Database System:
Fuzzy Databases: Fuzzy Set & Fuzzy Logic, Use Of Fuzzy Techniques to Define Inexact and Incomplete Databases.

References
1. Majumdar & Bhattacharya, “Database Management System”, TMH.
NET FRAMEWORK AND C#
MCA 503

Unit-I

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

Unit-III

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

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

Text Books
2. Shildt, “C#: The Complete Reference”, TMH

Reference Books
4. Balagurusamy, “Programming with C#”, TMH

SOFTWARE ENGINEERING
MCA 504


Software-Design: Design principles, problem partitioning, abstraction, top down and bottom up-design, Structured approach, functional versus object oriented approach, design specifications and verification, Monitoring and control, Cohesiveness, coupling, Forth generation techniques, Functional independence, Software Architecture, Transaction and Transform Mapping, Component – level Design, Forth Generation Techniques

Unit-III Coding: Top-Down and Bottom –Up programming, structured programming, information hiding, programming style and internal documentation.

Testing: Testing principles, Levels of testing, functional testing, structural testing, test plane, test case specification, reliability assessment, software testing strategies, Verification & validation, Unit testing, Integration Testing, Alpha & Beta testing, system testing and debugging.

Unit-IV Software Project Management: The Management spectrum- (The people, the product, the process, the project), cost estimation, project scheduling, staffing, software configuration management, Structured Vs. Unstructured maintenance, quality assurance, project monitoring, risk management.
Unit-V Software Reliability & Quality Assurance: Reliability issues, Reliability metrics, Reliability growth modeling, Software quality, ISO 9000 certification for software industry, SEI capability maturity model, comparison between ISO & SEI CMM.


References
5. Alexis, Leon and Mathews Leon, “Fundamental of Software Engineering”, Vikas

ADVANCED COMPUTER NETWORKS
MCA 505(1)

Unit 1:
Introduction: Overview of computer network, seven-layer architecture, TCP/IP suite of protocol, etc. Mac protocols for high-speed LANS, MANs & WIRELESS LANs. (For example, FDDI, DQDB, HIPPI, Gigabit Ethernet, Wireless Ethernet etc.)
Fast access technologies. (For example, ADSL, Cable Modem, etc.)

Unit 2:

Unit 3:
IP Multicasting. Multicasting routing protocols, address assignments, session discovery, etc.

Unit 4:
TCP extensions for high-speed networks, transaction-oriented application, other new option in TCP.

Unit 5:
Network security at various layers. Secure-HTTP, SSL, ESP, Authentication header, Key distribution protocols. Digital signatures, digital certificates.

References:

REAL TIME SYSTEM
MCA 505(2)

Unit-I

Unit-II

Unit-III
Characterizing Real Time Systems and Task, Task Assignment & Scheduling Theory, Fixed and Dynamic Priority Scheduling
Uniprocessor (RM and EDF), Multiprocessor (Utilization Balancing, Next-fit for RM & Bin-Packing Assignment for EDF) Scheduling
Unit IV
Programming Languages and Tools, Real Time Databases

Unit V

References

PRINCIPLES OF USER INTERFACE DESIGN
MCA 505(3)


Unit IV Multiple-Windows, Computer-Supported Cooperative work, Information’s search and www
Multiple-Windows Strategies: Introduction, Individual-Window Design, Multiple-window Design, Coordination by Tightly-Coupled Windows, Image Browsing and Tightly-Coupled Windows, Personal Role Management and Elastic Windows Computer-Supported Cooperative Work; Introduction, Goals of Cooperation, Asynchronous Interactions: Different Time, Different Place, Synchronous Distributed: Different Place, Same Time, Face to Face: Same Place, Same Time, Applying CSCW to Education.


References:
1. Ben Shneiderman, “Designing the User Interface”, Addison-Wesley
MOBILE COMPUTING
MCA 505(4)

Unit I

Unit II
Data Management Issues: Mobility, Wireless Communication and Portability, Data Replication and Replication Schemes, Basic Concept of Multihopping, Adaptive Clustering for Mobile Network, Multicluster Architecture.

Unit III
Location Management, Location Based Services, Automatically Locating Mobile Uses, Locating and Organizing Services, Issues and Future Directions, Mobile IP, Comparison of TCP and Wireless.

Unit IV
Transaction Management, Data Dissemination, Cache Consistency, Mobile Transaction Processing, Mobile Database Research Directions, Security Fault Tolerance for Mobile N/W.

Unit V
What is Ad-hoc Network? , Problems with Message Routing in Wireless Ad-hoc Mobile Networks, Routing scheme based on signal strength, Dynamic State Routing (DSR), Route Maintenance and Routing error, Fisheye Routing (FSR), Ad-hoc on Demand Distance Vector (ADDV)

Text Books & References:

NEURAL NETWORK
MCA 505(5)

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

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

Unit – III

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

Unit - V

Text Books:

(27)
Reference Books:
3. Limin Fu. “Neural Networks in Computer Intelligence”, TMH.

PROGRAMMING LAB
MCA 171

- Write C program to find largest of three integers.
- Write C program to check whether the given string is palindrome or not.
- Write C program to find whether the given integer is
  (i) a prime number
  (ii) an Armstrong number.
- Write C program for Pascal triangle.
- Write C program to find sum and average of n integer using linear array.
- Write C program to perform addition, multiplication, transpose on matrices.
- Write C program to find fibonacci series of iterative method using user-defined function.
- Write C program to find factorial of n by recursion using user-defined functions.
- Write C program to perform following operations by using user defined functions:
  (i) Concatenation
  (ii) Reverse
  (iii) String Matching
- Write C program to find sum of n terms of series:
  \[ n - n^*2/2! + n^*3/3! - n^*4/4! + \ldots \]
- Write C program to interchange two values using
  (i) Call by value.
  (ii) Call by reference.
- Write C program to sort the list of integers using dynamic memory allocation.
- Write C program to display the mark sheet of a student using structure.
- Write C program to perform following operations on data files:
  (i) read from data file.
  (ii) write to data file.
- Write C program to copy the content of one file to another file using command line argument.

ORGANIZATION LAB
MCA 172

- Study and Bread Board Realization of Logic Gates. K-Map, Flip-Flop equation, realization of characteristic and excitation table of various Flip Flops.
- Implementation of Half Adder, Full Adder and Subtractor.
- Implementation of Ripple Counters and Registers.
- Implementation of Decoder and Encoder circuits.
- Implementation of Multiplexer and D-Multiplexer circuits.

NUMERICAL TECHNIQUES LAB
MCA - 173

Write programs in C

- To implement floating point arithmetic operations i.e., addition, subtraction, multiplication and division.
• To deduce errors involved in polynomial interpolation.
  Algebraic and transcendental equations using Bisection, Newton Raphson,
  Iterative, method of false position, rate of conversions of roots in tabular form
  for each of these methods.
• To implement formulae by Bessels, Newton, Stirling, Langranges etc.
• To implement method of least square curve fitting.
• Implement numerical differentiation.
• Implement numerical integration using Simpson's 1/3 and 3/8 rules,
  trapezoidal rule.
• To show frequency chart, regression analysis, Linear square fit, and polynomial
  fit.
NOTE- Institutions are required to add four more experiments as per available expertise
with them

DATA STRUCTURE LAB
MCA - 271
Write Program in C or C++ for following:
• Sorting programs: Bubble sort, Merge sort, Insertion sort, Selection sort, and Quick sort.
• Searching programs: Linear Search, Binary Search.
• Array implementation of Stack, Queue, Circular Queue, Linked List.
• Implementation of Stack, Queue, Circular Queue, Linked List using dynamic memory allocation.
• Implementation of Binary tree.
• Program for Tree Traversals (preorder, inorder, postorder).
• Program for graph traversal (BFS, DFS).
• Program for minimum cost spanning tree, shortest path.

UNIX/LINUX LAB
MCA - 272
• Write Shell Script for UNIX environment.
• Understanding of basic commands of UNIX administration, user authorization, grant of users rights
  and privileges, backup and recovery.
• Source Code Control System understanding Lex and Yacc, debugger tools (Lint, make etc.)
• Write program in C for Process Creation, Parent/Child process relationship, forking of process.
  Inter Process Communication and socket programming implementation of exec system call, pipe,
  semaphore and message queue.

MICROPROCESSOR LAB
MCA - 273
• Study of 8085 and 8086/8088 Kit.
• Assembly Language Programs for 8088 kit
  (i)  address and data transfer.
  (ii) addition, subtraction.
  (iii) block transfer.
  (iv)  find greatest numbers.
  (v)   find r's and (r-1)'s complements of signed and unsigned number
• Assembly Language Programs for 8086/8088
  (i) Multiplication of two decimal/binary/hexadecimal/octal numbers.
  (ii) Division of two decimal/binary/hexadecimal/octal numbers.
  (iii) Conversion of lower case to upper case character.
• Test the performance of Booth's Algorithm for
  (i) Signed numbers.
  (ii) Unsigned numbers.
DBMS LAB
MCA - 371

L T P 0 0 3

The programme to be implemented using SQL
1. Create Table, SQL for Insertion, Deletion, Update and Retrival using aggregating functions.
2. Write Programs in PL/SQL, Understanding the concept of Cursors.
3. Write Program for Join, Union & intersection etc.
5. Creating Forms, Reports etc.
6. Writing codes for generating read and update operator in a transaction using different situations.
8. Developing code for understanding of distributed transaction processing.

Students are advised to use Developer 2000 Oracle 8+ version for above experiments. However, depending on the availability of Software’s students may use power builder/SQL Server/DB2 etc. for implementation.

OOPS & ++ LAB
MCA - 372

L T P 0 0 3

Write programs in C/C++ for
1. Program illustrating overloading of various operators.
2. Program illustrating use of Friend, Inline, Static Member functions, default arguments.
3. Program illustrating use of destructor and various types of constructor.
4. Program illustrating various forms of Inheritance.
5. Program illustrating use of virtual functions, virtual Base Class.
6. Program illustrating how exception handling is done.
7. Program implementing various kinds of sorting algorithms, Search algorithms & Graph algorithms.

DESIGN AND ANALYSIS OF ALGORITHMS (DAA) LAB
MCA - 373

L T P 0 0 2

Write Programs in C/C++ for
1. Creation of a binary search tree and insertion & deletion into it.
2. Creation of a Red Black tree and all the associated operations on it.
3. Implementing an AVL tree and all the associated operations on it.
5. Solving Knapsack problem.
6. Implementing shortest path algorithms (Dijkstra’s and Bellman Ford Algorithm).
7. Finding the minimum cost Spanning Tree in a connected graph.
8. Solving 8 Queen’s problem.
9. Finding the number of connected components in a Graph.

**MIS Lab**

**MCA-471**

- Use of designer tools like for making DFD/ERDs using **process analyst tool** or any other tool etc.
- Laboratory experiments in use of interactive SQL and other 4GLs.
- Designing and implementing fully functional information system by using any language.
- Develop software for implementation of information system for the supply chain management.
- Develop the software module for the testing of the software routines.

Note: Students are advised to use **Oracle 9i, JAVA2, and Visual Basic 6**. However depending upon the availability of software’s, Mini project may also be planned & carried out through out the semester to understand the important concepts of database and testing until the end of semester.

**Java Programming Lab**

**MCA-472**

1. Write a program in Java for illustrating, overloading, over riding and various forms of inheritance.
2. Write programs to create packages and multiple threads in Java.
3. Write programs in Java for event handling Mouse and Keyboard events.
4. Using Layout Manager create different applications.
5. Write programs in Java to create and manipulate Text Area, Canvas, Scroll Bars, Frames and Menus using swing/AWT.
6. Using Java create Applets.
8. Write a program in java to read data from disk file.

**Computer Graphics Lab**

**MCA-473**

**Write program in any suitable language**

1. Write a program to draw a line using DDA algorithm.
2. Write a program for implementing Bresenham’s algorithm for line generation.
3. Write a program for generation of circle.
4. Write a program to demonstrate Cohen-Sutherland line clipping method.
5. Write a program to implement Sutherland-Hodgeman polygon clipping algorithm.
6. Write a program to rotate a triangle. (By asking the user to input the coordinates of the Triangle and the angle of rotation).
7. Write a program to perform one point perspective projection of an object.
8. Write a program to implement Depth-Buffer method to display the visible surfaces of a given polyhedron.
9. Write a program to implement 3-D rotation of an object.
10. Write a program to draw polyline using any algorithm.
11. Write a program to draw a Bezier curve and surface.

Note: Students are advised to use C, C++ language for writing program; Use of open GL is desirable.

Web Technology Lab
MCA-571

1. Design a HTML page to display your CV
2. Design a HTML form to reserve a railway ticket.
3. Write a Java Script program that finds the greatest common divisor of two numbers.
4. In the form mentioned in problem 2 to reserve a railway ticket add the following validations using java Script.
   • From city and to city are two different cities.
   • Age of passengers should not be greater than 150.
   • Name of the passenger should be a string of a maximum length 20.
5. Write a program for illustrating client/server side scripting with help of ASP.
6. Write a piece of code in XML for creating DTD, which specifies set of rules.
7. Create style sheet in CSS/XSL and display the document in Internet Explorer.
8. **Mini Project**: Develop a web portal for your college.

**Net Frame Work & C# Lab**

* MCA-572

Write programs in C# illustrating

1. The use of sequence, conditional and iteration construct.
2. Various operators like logical, arithmetical, relational, etc.
3. Overloading of various operators.
4. Use of Fried, Inline, and Static Member functions, default arguments.
5. Use of destructor and various types of constructor.
6. Various forms of Inheritance.
7. Use of virtual functions, virtual Base Class, delegates.
8. File operation.
10. Use of Active X controls.

Note: Students are advised to develop a small project illustrating the handling of database and screens in order to fully understand the C#.

**Software Engineering Lab**

* MCA-573

1. Program for Configuration Management.
2. Perform SA/SD for the following software.
   - Hotel Automation System
   - Book Shop Automation Software.
   - Word processing Software.
   - Software Component Cataloguing Software.
3. Design and development of test cases for testing.
5. Development of Software tool for Halstead Analysis.
6. Perform Cost/Benefit analysis.
7. Illustration of various activities of Software development using MS Project 2000.
8. Lab exercise involving development of various practical applications using software like VJ++VB, SYBASE, JDK.

   Students are to be given a major assignment to be completed using one or more of these tools. Student’s exposure to any CASE tool is desirable.
U.P. TECHNICAL UNIVERSITY
LUCKNOW

Syllabus

[Effective from the session : 2004-05]

MASTER OF COMPUTER APPLICATION