MCA101 - Mathematical Foundation of Computer Science

Module 1:- Sets
Basic Concepts
Relations: Binary relations, Equivalence relations and partition.
Functions: Different types of functions, Composition and Inverse, Recursive functions.
Mathematical Induction.

Module 2:- Partial Ordering Relations
Partially ordered set: Representation of Poset - Hasse Diagram, LUB, GLB, well ordered set, meet and join of elements.
Lattices as partially ordered sets: Definition and basic properties, Distributive lattices and complimented lattices.
Boolean Algebra: Definitions, basic theorems and postulates.
Basic Concepts of Automata Theory: Alphabets, Strings, Power of Σ, Languages, DFA, NFA and their representations.

Module 3:- Logic
Mathematical logic, Logical operators – Conjunction, Disjunction, Negation, Conditional and biconditional. Truth tables. Equivalence formula, Tautology, Inference Theory, Validity by truth table, Rules of Inference. Predicate Calculus.

Module 4:- Graph Theory
Basic terminology. Different types of graphs – Directed and undirected, Simple, Multi, Pseudo, Complete, Regular, Bipartite. Incidence and degree, Pendant and Isolated vertex and NULL graph. Isomorphism, Sub graphs, Walk, Path and Circuit, Connected and disconnected graphs and components. Euler Graphs, Fleury's Algorithm, Hamiltonian circuits and paths. Traveling salesman problem. Matrix representation of graphs – Incidence and Adjacency matrices.

Module 5:- Trees & Planar Graph
Trees: Basic properties, Rooted and binary trees, Path length, Spanning Trees, Prims and Kurskals algorithm.
Planar graphs: Kuratowski's two graphs and Euler's formula – statement and corollary. Detection of planarity.

Text Book

1. Discrete Mathematical Structures with Applications to Computer Science by J. P. Tremblay and R Manohar. Tata McGraw-Hill Publications.
2. Graph Theory by Narsingh Deo. Prentice-Hall of India publications.

References

1. Discrete Mathematical Structures, Theory and Applications . D.S. Malik, Thomson Learning , I Edn.
2. Discrete Mathematics for Computer Science, Haggard, Thomson Learning , I Edn.
3. Discrete Mathematics and Its Applications by Kenneth H Rosen. Tata McGraw-Hill Publications.
4. Introduction to Automata Theory, Languages and Computation by Hopcroft and J. D .Ullman. Narosa Publications.
5. Mathematical foundation of Computer Science by Y. N Sings. New Age international Publishers.

MCA 102 - PROBABILITY AND STATISTICS

Module 1:- Probability Theory
Sample space, Events, Axiomatic approach to probability, Addition and multiplication theorem on probability, Independent events, Conditional probability, Bayes Theorem

Module 2:- Random variables and Distribution
Random variables, Probability density functions and distribution functions, Marginal density functions, Joint density functions, discrete probability distributions - Binomial, Poisson distribution, Continuous probability distributions- uniform distribution and normal distribution. Expectation-basic properties

Module 3:-Basic Statistics
Measures of central tendency: - mean, median, mode, measures of dispersion, range, Mean deviation, Quartile deviation and standard deviation, Skewness and Kurtosis, linear correlation, Karl Pearson's coefficient of Correlation, rank correlation and linear regression.

Module 4:- Sampling and Estimation
Theory of Sampling: - Population and sample, Types of sampling
Theory of Estimation: - Introduction, point estimation, methods of point estimation-Maximum Likelihood estimation and method of moments, Central Limit Theorem-Statement only.

Module 5:-Testing of hypothesis and inference
Null and alternative hypothesis, types of errors, level of significance, critical region, one tail and two-tail test. Small sample tests – t Test-for single mean, difference of means. Paired t-test, Chi-square test-Concept of test statistic ns^2/σ^2, F test - test for equality of two population variances. Large sample test-test for single mean and difference of Means

Text Book:
1. Fundamentals of statistics: S.C.Gupta,6^{th} Revised and enlarged edition-April 2004, Himalaya Publications

Reference Books:
1. Introduction to Probability and Statistics, Medenhall, Thomson Learning , 12 Edn
2. Fundamental of Mathematical Statistics by S.C.Gupta ,V.K.Kapoor. Sultan Chand Publications.
3. Introduction to Mathematical Statistics by Robert V. Hogg &Allen T. Craig. Pearson education.

MCA 103 - DIGITAL SYSTEMS AND COMPUTER HARDWARE

Module I - Number Systems and Code:
Introduction - Digital and analog systems. Logic levels and pulse waveforms. Functions of digital logic. Data transmission. Digital integrated circuits.
Number systems - Decimal and binary number systems. Decimal to binary and binary to decimal conversion. Addition, subtraction, multiplication and division of binary numbers. Representation of signed numbers. Addition and subtraction using 2's complement and 1's complement system. Octal number. Hexadecimal number system. Octal and hexadecimal arithmetic. Conversion between binary, octal and hexadecimal number systems.

Binary codes - 8421 BCD code. Excess 3 code. Gray code. Error detecting codes – parity, check sum. Error correcting code – 7 bit Hamming code. Alpha numeric codes.

Module II -Logic gates and combinational circuits:

Logic gates - AND, OR, NOT, NAND, NOR, Exclusive OR, Exclusive NOR gates - Logic symbols, truth tables and Boolean expressions. Inhibit circuits. Logic symbols. Pulsed operation of logic gates. Universal gates. Realisation of AND, OR, NOT functions using universal gates. DeMorgan's theorems.

Combinational circuits- Half adder, Full adder, Half subtracter, Full subtractor, parallel binary adder. Two's complement addition and subtraction using parallel adder. Serial adder. Parity bit generator. Comparator.

Module III - Flip Flops and Shift Registers :

Flip Flops - SR latch using NOR gates and NAND gates. Gated latch. Edge triggered Flip Flops. Generation of narrow spikes. SR, D, JK and T Flip Flops.

Shift registers - Buffer register. Serial in serial out, serial in parallel out, parallel in serial out, parallel in parallel out shift registers – Logic diagram and timing diagram. Bidirectional shift register. Universal shift register. Dynamic shift register.

Module IV - Basic Components of a Computer:

Basic components of a digital computer(block diagram explanation)

CPU & Memory – CPU, ALU, Control Unit & Registers, RAM, Variants of RAM, ROM, Variants of ROM, **Physical Memory organization:** DIP, SIMM, DIMM, SIPP, **ROM BIOS & CMOS –** Boot Up Process, POST

I/O devices: Input and Output devices, Printers, Display Devices, Scanners

Mother Board: CPU socket, Memory and secondary Cache sockets or chips, ROMBIOS and BIOS CMOS, Universal serial bus

Module V - Secondary Storage Devices :

Hard Disk Hard disk drive components, disk platter, read/ write head, head arm/ head slider, spindle motor, logic board, air filter, head actuator mechanism.

Disk Geometry : Sides or heads, track, cylinder, sector

Disk Recording: Data recording method, writing on reading from a magnetic disk, data encoding methods, FM, MFM, RLL, encoding scheme, interleave, skew.

Hard Disk Interfacing : Concepts of Interfacing **Formatting** : Low level and high level.

Other Secondary Storage devices: Floppy disk, CD Family, DVD, ZIP Drive

Text Book

1. Fundamentals of Digital circuits: A. Anand Kumar, Prentice Hall of India
2. All About Hard Disk, Manohar Lotia
3. All About Motherboard, Manohar Lotia

References:

1 . Digital Logic Applications and Design, John M. Yarbarough, Thomson Learning , I Edn
2. Fundamentals of Logic Design, Charles Roth, Thomson Learning , 5 Edn
3. Digital logic and Computer Design, Morris Mano, Prentice Hall of India.

MCA 104 : PRICIPLES OF MANGEMENT AND ACCOUNTING

Module I : Introduction , Planning and Organising

Introduction to Management - Understanding the meaning and definitions and Management, Nature of Management an art or science, Importance of Management in to day's organizations, An overview of management processes - Planning, Organizing, Staffing,

Directing, Coordinating and controlling, Evolution of Management Though - the classical school, the Behaviourial Approach, the Management Science Approach, the Contingency Approach and the systems Approach. Planning - Strategy, plan, policy and programs; purpose of planning; Mission, Vision and goal setting; and SWOT Analysis, Forecasting - need of forecasting in Planning; Types of Planning; Organizing - Principles and structure of organization, Theories and types of organization, Concept of : Authority, Responsibility, Power, Delegation & Centralisation of Authority, Span of Control. Formal and informal organizations

Module II : Staffing, Leading, Controlling

Staffing - Human Resources Management and Selection, Performance Appraisal ,Managing Change through Management and Organisation Development . Leading – Human Factors and Motivation, Leadership. Communication and Controlling - Communications in the Organization, Communication Process, types ,barriers and guidelines for effective communication, Concepts and Principle of Controlling, Basis Control Processes, Feed forward Control Mechanisms, Essentials of a good control system.

Module III : Applications of Managerial Functions

Production and Operations Management - Production planning and control, Quality control. Marketing Management - Overview of Marketing function, Product, Price, Promotion and Distribution strategies, Marketing Research and its role. International Management

Module IV: Introduction to Accounting and Financial Accounting

Accounting Theory, Accounting Process, Financial Statements - Meaning and Types of Financial Statements, Nature of Financial Statements, Limitations of Financial Statements, Analysis and Interpretation of Financial Statements, Depreciation. [Company Final Accounts: Familiarity with the requirements of Schedule VI to the Companies Act 1956, Elementary Knowledge about Items in the Profit & Loss Account and Balance Sheet of a Company.]

Module V: Management Accounting

Management Accounting Theory ,Ratio and Cash Flow Analysis - Classification of Ratios, Profitability Ratios, Turnover Ratios, Financial Ratios, Advantages of Ratio Analysis, Limitations of Ratio Analysis, Break-even Analysis, Capital Budgeting : Theory of Budgeting - principles , functions, advantages and limitations

Text Books:

1. Essentials of Management: Harold Koontz and Heinz Weihrich,6th Edition ,Tata McGrawHill
2. Accounting for Management : N.P.Srinivassan and M. Sakthivel Murugan, S. Chand & Co. , 2004

References:

1. Essentials of Management : Jospeh L. Massie,4th Edition , Prentice Hall of India
2. Management Accounting, Hansen, Thomson Learning , 7 Edn
3. Essentials of Management Accounting : I. M. Pandey, Vikas Publishing House Pvt. Ltd., 2003
4. Finanial Accounting for Managers : T. P. Ghosh, Taxman Allied Services (P) Ltd., 2004.
5. Finanial Accounting , Warren, Thomson Learning , 8 Edn
6. Finanial Accounting Reporting and Analysis , Stice, Thomson Learning , 7 Edn

MCA 105- Problem Solving and Programming in C

Module I

Introduction to programming: Programming languages, Compiler, interpreter, loader and linker, program execution, fourth generation language, fifth generation language, structured programming concept, algorithm and flowchart

Introduction to C Language: The C character set, identifiers and keywords, data types, how floats and doubles are stored, constants, variables and arrays, declarations, expressions, statements, Lvalues and Rvalues , type conversion, symbolic constants

Module II

Operators and expressions: Arithmetic operators, unary operator, relational and logical operator, assignment operators, the conditional operator, , type conversion, Library function

Data input and output: Single character input, single character output, scanf, printf, puts gets functions, interactive programming

Control statement: Branching: if else statement, Looping, nested control structure, switch statement, break statement, continue statement, comma operator, goto statement

Module III

Functions: Overview, function prototypes, passing arguments to a function, recursion.

Program structure: Storage classes, automatic variables, external variables, static variables, multifile program,

Arrays: Defining an array, passing array to functions, multidimensional arrays, strings: one dimensional character array, array of strings

Module IV

Pointers: Fundamentals, void pointer, null pointer, passing pointers to a function, pointers and one dimensional arrays, dynamic memory allocation, operation on pointers, pointers and multidimensional arrays, array of pointers, pointer to an array, pointers and strings, structure pointer, pointers to function, pointers and variable length arguments list, passing functions to other functions, offsetting a pointer

Structures and unions: Defining a structure, processing a structure, user defined data types, structure and pointers, passing structure to function, self-referential structures, and union

Module V

Data files: Why files, opening and closing a data file, reading and writing a data file, processing a data file, unformatted data file, concept of binary file

Low level programming: Register variable, bitwise operations, bit fields

Addition a features of C: Enumeration, Command line parameters, macros, the c Preprocessor

Text book

Programming with c – Byron s Gottfried second edition – Schaum's outlines

Reference

1. Computer Science: A Structured Programming Approach Using C, Forouzan, Thomson Learning , 2 Edn
2. Programming in c –Pradip Dey, Manas Ghosh – Oxford Higher Education
3. A First Book of ANSI C, Bronson, Thomson Learning , 3 Edn
4. Understanding pointers in c- Yashavant Kanetkar – BPB publication
5. Let us c - Yashavant Kanetkar – BPB publication
6. The c programming language – Brian W Kernighan & Dennis Ritchie IInd edition Eastern Economy Edition

7 C by discovery – l s Foster
8. Working with c - Yashavant Kanetkar – BPB publication
9. Instant c program – Ivor Horton – Wrox
10. The art of programming computer science with 'c' – Steven c Lawlor - Wess

MCA 106 C Programming Lab

Section A

1. Implementation of the various Data Types in C.
2. Demonstration of Data type conversion (Hint: Usage of type casting).
3. Implementation of various Storage Types.
4. Demonstration of for loop.
5. Demonstration of do...while loop.
6. Demonstration of while loop.
7. Demonstration of nested if (Hint: Use logical operators).
8. Demonstration of switch... case structure.
9. Implementation of arrays (Hint: character arrays)
10. Implementation of multidimensional arrays (Hint: implement matrix operation).
11. Implementation of functions (Hint: Demonstrate call by value, call by schemes, passing of arrays).
12. Demonstration of various string operations (Hint: Usage of user defined functions only allowed).
13. Demonstration of pointer operations.
14. Demonstration of macro processing.
15. Demonstration of recursion (Hint: GCD, factorial, Fibonacci series).

Section B

16. Implementation of structures (Hint: simple structure operations, array of structures).
17. Implementation of Union.
18. Implementation of pointers to structures and unions.
19. Demonstration of dynamic allocation of memory (Hint: malloc, calloc, realloc, free).
20. Demonstration of sorting techniques (Hint: selection sort, bubble sort).
21. Demonstration of searching techniques (Hint: linear search, binary search).
22. Demonstration of bitwise operations.
23. Demonstration of various file operations.

MCA 107 - PC HARDWARE LAB

1. Identification of PC Components and Assembling the PC
2. Installation of Operating Systems and formatting the Hard Disk
3. Replacing and fitting of Hard Disk and Floppy Disk on PC
4. Identification of different cards in the PC
5. Setting of jumpers for Interrupt Request on mother Board
6. PC Tools and its use
7. Disc Managers and it's use
8. Virus removal and disc scan
9. Connecting input devises and installing their driver software
10. Replacing and fitting Processors, Motherboards and Memory.

Text Book :

The Complete Reference – PC Hardware – Craig Zacker & John rourke, Edition 2001 Tata McGraw Hill

MCA 201 - Computer Organization & Architecture

Module I

Introduction: Basic structure of computers-Machine Instructions and programs: Memory Locations and addresses, Memory Operations, Instructions and Instruction sequencing, Addressing modes, Basic Input Output Operations, Subroutines

Module II

Input / Output Organization: Accessing I/O devices - Interrupts: Interrupt Handling - Handling multiple devices - Vectored Interrupts - Interrupt nesting - Daisy chaining - Direct memory access (DMA) – Buses – Introduction to I/O interfaces

Module III

The Main Memory: Memory Hierarchy – Main memory - RAM-ROM – Cache Memory – Performance Considerations -Virtual Memory- Memory Management Requirements, Secondary storage

Module IV

Central Processing Unit : Arithmetic & Logic Unit: Number Representation – Addition of positive numbers – Fast Adders – Signed Addition and Subtraction – Multiplication of positive numbers – Multiplication using Booth's algorithm - Fast Multiplication – Floating point numbers and Operations The Processing Unit : Basic Concepts - Instruction execution cycle - sequencing of control signals - hardwired control - PLAs - microprogrammed control - control signals - microinstructions- microprogram sequencing- Branch address modification- Pre fetching of microinstructions

Module V

Introduction to parallel Processing: Parallel processing - Principles and Classification - Pipelining – Arithmetic pipeline – Instruction pipeline – Vector processing – Array Processors – Multiprocessors - Comparison of RISC and CISC.

Text Book :

Computer Organization – V. C. Hamacher – (Mc – Graw Hill International Edition)– Fifth Edition

References :

1. Computer System Architecture – M Morris Mano –(Prentice Hall)- Third Edition
2. Computer Organization and Architecture- William Stallings – Fifth Edition
3. Structured Computer Education – Andrew S Tanenbaum-(Prentice Hall)-Fourth Edition

MCA 202 DATA STRUCTURES

Module I

Introduction: Algorithmic notation, Introduction to algorithm analysis for time and space requirements.

Arrays: Ordered lists – polynomial addition, sparse matrices, representation of array.

Module II

Linked List: Singly linked list, Linked stacks and queues, Polynomial addition, Equivalence relation, sparse matrices, doubly linked list and dynamic storage management, Garbage collection and compaction. Strings – data representation for strings, Pattern matching in strings,

Module III

Stacks and Queues : Definition and concepts, Operations on stacks. Application of stacks-recursion, polish expressions and their compilation, queue, representation of queue, circular queue, deque, priority queue, Application of queues, Linked stacks and queues.

Module IV

Trees : Basic terminology, binary trees, binary tree representation, Binary tree traversal, threaded binary trees, binary tree representation of trees, Application of trees – Set representation, Balanced Trees-B,B+.

Graphs: Terminology and representation, Traversals, Connected components and AVL.

Module V

Internal Sorting and External Sorting: Searching – Linear search, binary search, Fibonacci and interpolation search. Comparison of different methods. Sorting – Insertion, Bubble, Selection, Quick, heap, Radix sort, Merge sort comparison. Sorting with disks - K way merging, Run generation.

Hashing Techniques: Different hashing functions, methods for collision handling

Text Book:

1. Fundamentals of data structures – Ellis Horowitz and Sartaj Sahni (Galgotia)
2. An introduction to data structures with applications – Jean Paul Tremblay, paul G Sorenson(Tata McGraw Hill)

References:

1. Data Structures – E.M Reingald , W Hamen (CBS Publishers and distributors)
2. Data Structures – a psedocode approach with C –Richard F Gilberg, Behrouz A Forouzan, Thomson Learning, 2 Edn.
3. Data Structures and program design – R. L Kruse (Prentice Hall of India)
4. Data structures using C – Tanenbaum and Augustine (Prentice Hall of India)
5. Theory and problems of data structures – Seymour lipschutz (Tata McGraw Hill)
6. Data structures and Algorithms in C++, Adam Drozdek, Thomson Learning, 3 Edn
7. Classic data structures – D Samanta (PHI)

MCA 203 – Microprocessors and Embedded Systems

Module 1 - The Processors : 8086

Register Organization of 8086, Architecture, Signal Description of 8086, Physical Memory Organization, General Bus Operation, I/O Addressing Capability, Special Processor Activities, Minimum Mode 8086 System and Timings, Maximum Mode 8086 System and Timings. Addressing Modes of 8086.

Module 2 - Instruction Set, Assembler Directives and Assembly Language Programming of 8086

Machine Language Instruction Formats – Instruction Set of 8086-Data transfer instructions,Arithmetic and Logic instructions,Branch instructions,Loop instructions,Processor Control instructions,Flag Manipulation instructions,Shift and Rotate instructions,String instructions, Assembler Directives and operators,Example Programs**,**Introduction to Stack, STACK Structure of 8086, Interrupts and Interrupt Service Routines, Interrupt Cycle of 8086, Non-Maskable and Maskable Interrupts, Interrupt Programming, MACROS.

Module 3 - Special Purpose Programmable Devices and their Interfacing
Data transfer schemes-programmed I/O, Interrupt I/O, DMA, DMA Controller 8257, Programmable Interval Timer 8253, Programmable Interrupt Controller 8259A, Programmable Communication Interface 8251 USART

Module 4 - Comparison of various Processors
16 bit,32 bit,64 bit processors-Intel 80286,80386,80486, Pentium,Pentium Pro, Pentium II,Pentium III and Pentium 4

Module 5 - Introduction to Embedded Systems
Embedded system – classification, Components of an Embedded system Hardware-processor, memory, Interfacing processor, and I/O devices, Devices and buses for device networks, Device drivers and interrupt servicing mechanisms.

Text Books :
1. Advanced Microprocessors and Peripherals – Architecture, Programming and Interfacing by A.K. Ray and K.M. Bhurchand, Tata McGraw Hill,2002 Edition
2. Embedded Systems – Architecture, Programming & Design by Raj Kamal -Tata McGraw Hill.

Reference Books :
1. Microprocessors and Interfacing – Programming and Hardware by Douglas V Hall, 2nd Edition, Tata McGraw Hill, 2002.
2. The Intel Family of Microprocessors: Antonakos, Thomson Learning, 1 Edn
3. The 8086 Microprocessor Programming and Interfacing the PC, Kenneth C. Ayala, Thomson Learning, 1 Edn
4. The Intel Microprocessors 8086/8088, 80816/80188, 80286, 80486 Pentium and Pentium Pro Processor – Architecture, Programming and interfacing by Barry B Brey, 4th Edition, PHI
5. Microprocessor x86 Programming by K.R. Venugopal and Raj Kumar – BPB publications
6. Microprocessors and Microcomputer based system design by Mohamed Rafiqussaman.
7. Micro Controllers – [Theory And Applications] by Ajay V. Deshmukh- Tata McGraw Hill.
8. Microcomputer Systems – The 8086/8088 Family Architecture, Programming & Design by Yu Cheng Liu , Glenn A Gibson – PHI Edition.

MCA 204 Object Oriented Programming and C++

Module I
Introduction to Object-Oriented Programming: Evolution of programming methodologies. Procedural Approach Vs Object-Oriented Approach. Encapsulation and Abstraction, Message Passing, Inheritance, Reusability, Extensibility, Polymorphism, Overloading.
Objects and Classes: Access Specifiers. Memory Allocation for Objects, Friend Functions and Friend Classes, Static Data Members; Static Member Functions. this pointer. Comparison of class with structure. Inline functions.
Arrays and Strings: Arrays Within a Class; Arrays of Objects; Objects as Function Arguments; Returning Objects; const Member Functions; Constructing Two-Dimensional Arrays. String Manipulation using objects

Module II

Constructors and Destructors: Purpose of Constructors and Destructors. Default Constructors, Constructors with & without parameters, Constructor Overloading, Copy Constructor. Invoking Constructors and Destructors.

Pointers in C++ : Pointer declaration and Access, Pointer to void, pointer and arrays, pointer to pointer, pointer to functions, call by pointer, pointer arrays, Jagged array, array of pointers to string, memory management – new and delete, pointer to object. self referencing class, wild pointers.

Module III

Polymorphism: Overloading Concepts, Function Overloading: Operator Overloading: Defining Operator Function, Rules for overloading Operators. Overloading unary operators, overloading binary operators, Overloading Comma, [], (), ->, new, delete Operators. Type Conversions – Basic to Class, Class to Basic and One class to another class type, Advanced Type Casting.

Module IV

Inheritance: Basic Concepts, Reusability & Extensibility. Defining derived classes, protected access specified in Base class constructors and destructors in derived classes – Types of Inheritances. Making a Private Member Inheritable; Member Classes: Nesting of Classes.

Virtual Functions: Virtual Base Classes, Normal member functions accessed with pointers, virtual member function access, late binding, pure virtual function, abstract classes.

Module V

Console I/O operations: C++ streams and C++ stream classes – Predefined Objects, unformatted I/O operations, Formatted I/O operations - manipulators - User defined manipulators - Overloading << and >> Operators for Objects.

Disk I/O Operations: Stream Classes, classes for file stream operations, opening and closing a file, file nodes, writing an object to disk, reading an object from disk, binary versus character files, I/O with multiple objects, tellg() and seekg(), seekp() and tellp(). Updating a File : Error Handling During File Operations; Command-Line Arguments ,sequential access to a file, file input/output with stream class,error handling during file manipulations, filter utilities.

Templates: Generic Functions- A generic swap function, Functions with more than one Generic Type, Overloading a Function Template. Generic Classes – A stack generic class, Class template with more than one Generic Type, type name and template keywords, Template Restrictions, The power of Templates.

Exception Handling: Fundamentals of Exception Handling, Catching Class Types, Using Multiple catch statements, Catching All Exception, Restricting Exception, throw statement, Setting the Terminate and Unexpected Handlers, Uncaught exception, bad_exception Classes, and Built-In Exceptions. Exception Vs Error Handling, Assertion in C++.

Text Books:

1. Deitel & Deitel, *C++ How to program*, Pearson Education Asia, 3rd Edition.

Reference Books:

1. Computer Science: A Structured Programming Approach Using C++, Forouzan, Thomson Learning , 2 Edn
2. C++ Programming: Malik, Thomson Learning , 3 Edn
3. K.R Venugopal Rajkumar, *Mastering C++* , TMH.
4. Gaddis Tony, *Starting Out with C++*, dreamtech Press,

5. Sotter A Nicholas and Kleper J Scott, *Professional C++*, Wiley Publishing Inc.
6. Schildt Herbert, *The Complete Reference C++*, Tata McGraw Hill, 4th Edition

MCA 205 Management Information Systems

Module I -Organizations, Management , and The Networked Enterprise

Why Information Systems ? What is an Information System ? The new Role of Information Systems in Organizations : Towards the Digital Firm, Major Types of Systems in Organisations, Systems from a Functional Perspective : Sales and Marketing, Manufacturing and Production Systems, Finance and Accounting Systems, Human Resources Systems, Enterprise Applications. Strategic Information Systems.

Module II : Information Technology Infrastructure

Computer Hardware and IT Infrastructure, Types of Software, Managing Hardware and Software Assets, Managing Data Resources – Organising data in The Database Approach to Data Manage-ment, Database Trends, Telecommunications and Networks – Components and Functions of a Telecommunications System, Communications Networks- LANs, WANs, Network Services and Broadband Technologies, Electronic Business and E-commerce Technologies – Email and Groupware, Electronic Data Interchange, Internet Technology and Services.

Module III : Building Information Systems

Overview of Systems Development : Systems Analysis, Systems Design , Completing Systems Development Process, System – Building Approaches : Traditional Systems Lifecycle, Prototyp-ing, Application Software Packages, Enduser Development, Outsourcing, Object Oriented Development, Rapid Application Development, Managing Implementation, Pitfalls in MIS development

Module IV: Managing Knowledge, Enhancing Management Decision Making

Systems as Planned Organisational Change, Business Process Reengineering and Process Improvement, Total Quality Management and Six Sigma, Knowledge Management in the Organization, Artificial Intelligence, Capturing Knowledge : Expert Systems, Neural Networks, Fuzzy Logic, Intelligent Agents, Decision Support Systems.

Module V: Managing Information Systems

Information Systems Security and Control- Systems Vulnerability and Abuse, Creating a Control Environment- Disaster Recovery Plan, Ensuring System Quality – Software Quality Assurance Methodologies and Tools, Growth of International Information Systems, Ethical and Social Issues related to Systems – Ethics in an Information Society, Moral Dimensions of Information Systems

Text Book :

Management Information Systems – Managing the Digital Firm: Kenneth C. Laudon, Jane P. Laudon , 8th Edition , Prentice Hall of India

Reference :

1. Management Information Systems, Effy Oz, Thomson Learning , 5 Edn
2. Information Systems for Modern Management by Robert G.Murdick, Joel E. Ross & James R. Claggett , 3rd Edition , Prentice Hall of India
3. Management Information Systems : Solving Business Problems with Information Technology: Gerald V. Post, David L. Anderson, Tat McGraw-Hill Publishing Co. Ltd.

4. Management Information Systems - Managerial perspective by D.P.Goyal, Macmillan India
5. Management Information Systems – Mahadeo Jaiswal , Monika Mittal , Oxford University Press

MCA 206 Data Structures LAB

1. Program to represent sparse matrix manipulation using arrays.
2. Program to represent Singly Linked List.
3. Program to represent Doubly Linked List.
4. Program to represent Circular Linked List.
5. Program to represent Linked Stacks.
6. Program to represent Linked Queues.
7. Program to represent string operations.
8. Program to represent Stack operations using array and pointers.
9. Program to represent Queue operations using array and pointers.
10. Program to represent Conversion of infix to postfix.
11. Program to represent Evaluation of Expressions.
12. Program to represent Binary Tree Operations.
13. Program to represent Binary Tree Traversals.
14. Program to represent Searching procedures
15. Program to represent sorting procedures

MCA 207 C++ Lab

1. Program to Implement Classes and Objects.
2. Program to Implement Constructors and Destructors with array of Objects.
3. Program to Implement Passing and returning parameters as objects by reference.
4. Program to demonstrate Function Overloading.
5. Program to overload different operators – incr & decr operators with post & pre forms; new, delete, [], () and arithmetic operators.
6. Program to perform pointer sort operation.
7. Program to demonstrate friend functions and friend classes.
8. Program using objects for String manipulation functions.
9. Program to implement different types of inheritances like Multiple, Multilevel and Hybrid.
10. Program to demonstrate the use of Virtual Functions.
11. Program to demonstrate the use of abstract classes.
12. Program to demonstrate I/O streams and functions.
13. Program to Overload << and >> operators as a member and as a non-member operator functions.
14. Program to create a file to store some records and search for a particular record and display it.
15. Program to demonstrate namespaces and Volatile member functions.
16. Program to perform all possible Type Conversions.
17. Program to create function Templates, and overload the function Templates.
18. Program to create a generic stack class and member functions to perform stack operations.
19. Program to implement Exception Handling with minimum 5 exception classes including two built-in exceptions.

MCA301 COMPUTER GRAPHICS

Module I
Introduction, Overview of Graphics Systems-Display devices, Input devices, Hard-Copy devices, Graphics software, Line Drawing Algorithms-DDA, Bresenham, Parallel line algorithms, Circle Generating Algorithms, Ellipse Generating Algorithms

Module II
Output primitives-Color and Grayscale levels, 2D Transformations-Translation, Rotation, Scaling, Reflection, Shear, Composite Transformations, Two Dimensional viewing- Window-to-view port, Clipping operations- Point, Line, Polygon, Curve, Text clippings

Module III
3D object representations-Polygon surfaces, Polygon tables, Plane equations, Polygon Meshes, Quadric surfaces, Super Quadrics, Blobby objects, Spline representations, Bezier curves and surfaces

Module IV
3D transformations-Translation, Rotation, Scaling, Composite Transformations, 3D viewing- Parallel, Perspective projections, Visible surface detection algorithms-Back Face Detection, Depth-Buffer Method, A-Buffer Method, Scan-line Method, Depth-Sorting method, Area-Subdivision method

Module V
Surface Rendering-light sources, illumination models, OpenGL-Introduction

TEXT BOOKS
1. Donald Hearn and M.Pauline Baker, "Computer Graphics-C Version", Second Edition, Pearson Education,2005
2. Mason Woo, Jackie Neider, Tom Davis, Dave Shreiner , "Open GL –programming Guide", Third Edition, Pearson Education,2003

REFERENCES
1. Foley, Vandam, Feiner, Huges,"Computer Graphics: Principles & Practice", Second edition in C, Pearson Education, 2005
2. Ranjan Parekh, "Principles of Multimedia", ,Tata McgrawHill,2006
3. D.P. Mukherjee, "Fundamentals of Computer Graphics and Multimedia", PHI.
4. Hill Jr, "Computer Graphics using openGL",2nd Edition,PHI
5. "Procedural elements of Computer Graphics", Rogers, Mc-Graw Hill.
6. "Mathematical elements of Computer Graphics", Rogers, Mc-Graw Hill.
7. Computer Graphics- A Programming Approach,Steven Harrington,Second Edition,McgrawHill International

MCA 302 -DATABASE MANAGEMENT SYSTEMS

Module I -Introduction To Database Systems and E-R Model
Overview, A Historical Perspective, Files System versus DBMS, Advantages of DBMS, Describing and storing data in a DBMS Transaction management, Structure of a DBMS, People who work with Databases, Overview of Database Design. Entities, Attributes and Entity Sets, Relationships and Relationship sets, Additional Features of E-R Model: Key Constraints. Conceptual Design with the E-R Model, Overview of Unified Modeling Languages

Module II -Relational Model and Query Languages
Introduction to the Relational Model. Integrity Constraints over Relations : Primary Key, Foreign Key and General Constraints. E-R Model to Relational Model: Entity Sets to Tables,

Relationship Sets to Tables, Translating, Relationship Sets with Key Constraints. Translating Relationship Sets with Participation Constraints, Translating Weak Entity Sets, Translating Class Hierarchies. Translating E-R Diagrams with Aggregation, Introduction to Query Languages, Relational Algebra: Selection and Projection Operations. Set Operations, Renaming, Joins, Division

Module III- Structured Query Language
Overview of SQL, Basic Queries in SQL, Union, Intersect and Except, Nested Queries, Aggregate Operators, Null Values, Complex Integrity Constraints in SQL, Triggers and Views in SQL, Embedded SQL and Cursors

Module IV- Relational Database Design
Introduction to Schema Refinement, Functional Dependencies, Properties of Decomposition, Normal Forms: First Normal Form, Second Normal Form, Third Normal Form, Boyce Codd Normal Form, Fourth Normal Form, Fifth Normal Form

Module V -Transaction Management, Concurrency Control and Distributed System
The ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions: Serialisability, Anomalies Due to Interleaved Execution . Schedules Involving Aborted Transactions, Lock-Based Concurrency Control: 2 PL – Basic & Strict, Dead Locks, Introduction to Crash Recovery, Concurrency Control:2 PL, Serialisability, and Recover-ability,: Introduction to Locking Management: Dealing with Deadlock .Introduction to ARIES, Introduction to Distributed Databases: Advantages & Disadvantages, Transaction Types – Local & Global Transactions, Distributed DBMS Architectures, Design of Distributed Databases: Replication, Fragmentation

Text Books :
Database Management Systems – Raghu Ramakrishnan and Johannes Gehrke, Third Edition, McGraw Hill, 2003

Reference Books :

1. Database Systems: Design , Implementaion and Management, Peter Rob, Thomson Learning, 7Edn.
2. Concept of Database Management, Pratt, Thomson Learning, 5Edn.
3. Database System Concepts – Silberchatz, Korth and Sudarsan, Fifth Edition, McGraw Hill, 2006
4. The Complete Reference SQL – James R Groff and Paul N Weinberg, Second Edition, Tata McGraw Hill, 2003

MCA 303 - System Software

Module I
General concepts-Review of assembly and machine language programming, distinction between system software and application software
Assemblers and macros-Assemblers-assembly language statements-Imperative, declaration and assembler directives- Elements of assembly language programming- two pass and one pass assembler-forward reference problem.
Macros-macro definition, macro call, macro expansion, nested macro calls- macro processors

Module II

Linker-Relocation and linking concepts-self relocating programs.
Loader-Types of loaders
Editor-Types of editors-Components of editor-Debug monitor

Module III

Compiler-The phases of a compiler. Passes and reducing the number of passes. High level programming languages

Lexical Analysis-The role of lexical analyzer. Simple approach to the design of lexical analysis-implementation of transition diagram. regular expression. Finite automata-DFA&NFA-conversion from regular expression to NFA and NFA to DFA.

Module IV

The syntactic specification of a programming language- context free grammar derivation and parse tree, unambiguous grammar. Basic parsing technique-Bottom up and Top down parsers, representation of a parse tree. Shift reduce parsing-stack implementation of shift reduce parsing-constructing a parse tree

Module V

Intermediate code generation-postfix notation, syntax tree, three-address code.
Intermediate code optimization-local optimization, loop optimization - loop invariant computation, induction variable elimination, reduction in strength. The DAG representation of basic blocks.
Code generation-object program, runtime addresses for names, problems in code generation, simple code generator.

Text Books:

1.Alfred V Aho & Jeffrey D Ullman, 'Principles of Compiler Design'.
2.D M Dhamdhere, 'Systems Programming & Operating Systems'

Reference Book:

JJ Donovan ,'System Programming'

MCA 304-Data Communications and Computer Networks

Module I

Simplified data communications model**.** Electric signals - continuous and discrete signals, periodic signals, Fourier Series Representation of Periodic Signals, Frequency, Spectrum and Bandwidth. Analog and Digital data transmission - data and signals, analog and digital transmission, their comparison, Digital data rate and band width. Transmission impairments - Attenuation, Delay distortion, Noise, Channel Capacity. Transmission Media :- Guided Transmission Media -Twisted pair wires, Coaxial, Optical fiber. Wireless Transmission - Terrestrial microwave, satellite microwave, broad cast Radio, Infrared.

Module II

Data Encoding - Encoding and modulation Technique, Asynchronous and Synchronous transmission, Line Configurations, full duplex and half duplex transmission. Trunks and multiplexing - FDM, TDM, statistical TDM. Modems, ADSL, xDSL, Spread Spectrum-Concept, Frequency Hopping, Direct Sequence , CDMA. Circuit switching techniques -

Datagram, virtual circuit. Effect of packet size on transmission time. Comparison of circuit switching and packet switching, connection oriented and connectionless services.

Module III

Networking concepts:- Simplified network model. Classification of networks : LAN,MAN,WAN and the internet. Protocols and protocol architecture. The OSI ref. Model, TCP/IP ref. Model its origin, the internet layer, the TCP layer, the application layer. Comparison of the OSI and TCP/IP ref. Models.

Data Link Layer: Need for data link control, Flow control - Stop and wait and sliding window protocols, error detection - parity check, CRC, Error control - Stop and wait ARQ, Go back-N ARQ, HDLC protocol, other data link protocols - LAPB, LAPD, PPP.

Module IV

LAN: -LAN protocol architecture (IEEE - 802 reference model), Topologies - Bus, tree, ring and star. Medium access control and logic link control. LAN systems: Ethernet, token bus-token ring. Ethernet - CSMA/CD and its precursors (pure and slotted ALOHA, CSMA), IEEE 802.3, MAC frame format, Fast Ethernet, Gigabit Ethernet, 10 Gbps Ethernet. Token ring LAN (IEEE 802.5) and frame format, IEEE 802.5 FDDI token ring LAN and frame format. Bridges,
Wireless LAN - Technology, IEEE-802.11 Architecture and Services, Medium Access Control, Physical Layer.

Module V

Network Layer: Services of NW layer, Routing in Packet Switching Networks- Characteristics, performance criteria. Routing strategies- Fixed routing, Flooding, Random routing, Adaptive routing, Least cost Algorithms-Dijkstra's Algorithm, Bellman-Ford Algorithm. X.25 Network and Protocols. Frame Relay

Transport Layer: - Connection oriented Transport Mechanisms- for Reliable sequencing Network Services, for unreliable Network Services.

Text Book:

William Stallings, -Data and Computer communications - Prentice Hall of India VIIth Edition.

References:

1. Andrews S. Tanenbaum -Computer Networks, Prentice Hall of India, 4th Edition.
2. Behrouz A Forougan - Data Communications and Networking, 4th ed. McGraw Hill,
3.Youlu Zheng, Shakil, Networks for Computer Scientists and Engineers , Oxford University Press.

MCA 305- Software Engineering

Module I - Introduction to Software Engineering

Challenges and approaches. Software development process models – waterfall model, prototyping, iterative, time boxing, Software implementation and management process-inspection, configuration, change management.

Module II - Software Requirement, Architecture and Planning

Problem analysis, requirements specification, functional specification with use case, validation and quality matrix.. Component and connector view, styles for Component and connector view, evaluating architectures. Planning a software project- effort estimation, scheduling, configuration management, quality, risk and monitoring.

Module III - CASE Tools
Documentation tools, analysis and design tools, programming tools : Integration, Implementation and Testing tools, Maintenance tools: Integrated case Environment.
Specification Phase: Informal specifications, Structured system analysis, entity relationship modeling, finite state machines, petri nets, formal techniques.
Function Oriented design: module revel concepts, structured design methodology

Module IV - Object oriented analysis and design phase
Object oriented analysis- class modeling, dynamic modeling, challenges of object oriented analysis. Design phase- Design abstraction, action oriented design, transaction analysis, formal techniques for detailed design, challenges of the design phase

Module V - Implementation, Testing and Maintenance
Coding – programming principles and guidelines, refactoring, verification, complexity metrics.
Testing – Black box testing, white box testing process, defect analysis, reliability estimation.
Maintenance – why maintenance is necessary? , Management of maintenance, challenges of maintenance phase

Text Books
1. An Integrated Approach to Software Engineering- Pankaj Jalote 3rd edition, Narosa Publishing House
2. Object Oriented and Classical Software Engineering – Stephen R Schach 5th Edition, Tata Mc-Graw Hilll Publishing Co. Ltd.

Reference Books
1. Software Engineering, a Practitioner's Approach- Roger S Pressman 6th Edition, Tata Mc-Graw Hilll Publishing Co. Ltd.
2. Software Engineering – Ian Somerville 6th Edition, Pearson Education
3. Fundamentals of Software Engineering- Ghezzi, Jazayer's and Mandriolli 2nd Edition, PHI
4. Software Engineering principles & Practice- Waman S Jawadekar 2nd Edition, Tata Mc-Graw Hilll Publishing Co. Ltd.

MCA 306 - Microprocessors Lab

1. Programs to get familiarized with Microprocessor Kit.
    a) Program to implement various addressing modes like Immediate, Direct, Indexed, etc.
    b) Program to find one's complement of a 16 bit number.
    c) Program to mask off bits selectively.
    d) Program to perform addition of 2 16 bit numbers.
    e) Program to perform division by 8 and multiplication by 16 using shift and rotate instructions.

2. Program to display a message on screen using Code and Data Segment.

3. Programs to perform arithmetic, logic, shift and string instructions.
    a) Program to display ASCII code and character.
    b) Program to read password and check the validity of the user.
    c) Program to set and get the system date and time.

d) Program to implement delay routine.
e) Program to find sum of n numbers.
f) Program to implement 32 bit arithmetic operations.
g) Program to perform concatenation of 2 strings.

4. Programs to implement modular programming using Stacks, subroutines, macros, etc.
   a) Program to find factorial.
   b) Program to find nCr.
   c) Program to find the Fibonacci series.
   d) Program to implement a 2 digit calculator.
   e) Program to generate a real time clock.
   f) Program to perform sorting.

5. Programs for display/video manipulation.

   a) Program to read a string at location (x1,y1) and display at video location (x2,y2).
   b) Program to clear a portion of a screen.

6. Programs to get familiarized with DOS and BIOS interrupts.
   a) Program to display the current working directory.
   b) Program to change the working directory.

Note:- A minimum of 20 programming examples have to be done.

References :

1. Microprocessor x86 Programming – K.R. Venugopal and Raj Kumar – BPB publications
2. The Intel Microprocessors 8086/8088, 80186/188, 80286, 80386, 80486,Pentium & Pentium Pro Processor Architecture, Programming and Interfacing- Barry B. Brey – PHI Edition
3. Microcomputer Systems – The 8086/8088 Family Architecture, Programming & Design – Yu Cheng Liu , Glenn A Gibson – PHI Edition.

MCA307 COMPUTER GRAPHICS AND MULTIMEDIA LAB

Programs can be set covering the aspects of

1) Line Drawing
2) Circle generation
3) Ellipse Generation
4) Spline curve generation
5) 2D Transformations
6) 2D Clippings
7) 3D Transformations
8) Creating a multimedia presentation incorporating images, audio and video.
9) Basic OpenGL operations- Displaying points, lines, polygons
10) Creation of animation using OpenGL

MCA 401 - OPTIMIZATION TECHNIQUES

Module I

Linear Programming problem Mathematical formulation, assumptions in linear programming, graphical method of solution, simplex method, Big-M method and Two phase method, Dual simplex method.

Module II

Integer Programming Introduction, Gomory's cutting plane method, Fractional cut method-Mixed integer and branch and bound techniques.

Transportation Problem-General transportation problem, Finding an initial basic feasible solution, Loops in transportation tables, Degeneracy, Optimality method-MODI method.

Assignment Problem- Hungarian Method, Traveling salesman problem.

Module III

Game theory Introduction, two-person zero-sum games, some basic terms, the maxmini-minimax principle, games without saddle points-Mixed Strategies, graphic solution of 2 * n and m*2 games, dominance property.

Simulation Introduction, Definition of Monte-Carlo Simulation.

Module IV

Dynamic Programming Introduction, The Recursive equation approach, Algorithm, Solution of a L.P.P by Dynamic Programming.

Sequencing Models-Processing n jobs through 2 machines, n jobs through 3 machines, two jobs through m machines.

Networking Analysis CPM&PERT – Network minimization, shortest route problem, maximal-flow problem, Project scheduling, critical path calculations, PERT calculation.

Module V

Queuing Theory Introduction, Queuing system, Elements of Queuing system, Characteristics of Queuing system, Classification of Queuing Models, Poisson Queuing systems-Model I (M/M/1): (∞:FIFO)-Characteristics of Model I and waiting time characteristics. Characteristics of (M/M/1):(N/FIFO), (M/M/C):(∞ /FIFIO), (M/M/C):(N/FIFO)-all without derivation

Text Books

1. Operation Research by Kanti Swarup, P.KGuptha , Man Mohan 11th edition Sultan Chand & Sons Publication.

References

1. Operation Research-An introduction by Hamdy A Taha. Prentice Hall.
2. Introduction To Management Science, Anderson, Thomson Learning, 11Edn.
3. Operation Research Applications and Algorithms, Winston, Thomson Learning, 4Edn.
4. Introduction to Operation Research by Hiller/Lieberman. McGraw Hill.
5. Operation Research by Dr. Kalavathy.S. Vikas Publishing

MCA 402 - Operating Systems

Module I

Evolution of operating systems:-Serial processing, Batch Processing, multiprogramming. Types of operating systems-Batch-multi programming-Time sharing -Real time and distributed operating systems.

File Management:-File structure, File types, File access, File attributes, File operations. Directories-Flat directory systems, hierarchical directory systems. File system implementation-Allocation methods-contiguous allocation, linked allocation, indexed allocation.

Module II

Processor Management:-Job and process concept, Concurrent Processes. Operating system view of processes, process-state transition diagram, PCB (Process control block), Threads, Process scheduling, Operations on Processes, Operating system services.

Process Scheduling:-Types of schedulers, scheduling and performance criteria, scheduling algorithms, multiple processor scheduling

Inter process synchronization and communication-Concurrent Processes-Precedence graph-hierarchy of process, need for inter process synchronization, critical section problem, mutual exclusion-mutual exclusion algorithms, semaphores-definition busy wait implementation, hardware implementation of semaphores-test and set instruction, monitors, inter process communication using messages.

Module III

Memory Management:-Preliminaries-address binding , dynamic linking and loading, Overlays. logical versus physical address space, Swapping, Contiguous allocation Paging-principles of page allocation. structure of page table- hardware support, multi level paging, hierarchical paging, inverted page table, shared pages.

Segmentation-principles of operation, hardware, implementation of segment table, protection and sharing, fragmentation, segmentation with paging.

Virtual Memory-Demand paging –performance. Page replacement-page replacement algorithms. Thrashing, Segmentation and paging implementation of virtual memory, hierarchical address translation tables and MMUS.

Module IV

Deadlocks: -Definition –Deadlock characterization-Resource allocation graph, methods for handling deadlocks, deadlock prevention, deadlock avoidance-safe state-resource allocation graph algorithm-Banker's algorithm, deadlock detection, recovery from deadlock, combined approach to deadlock handling.

Module V

Device Management:-Disk structure, Disk scheduling-FCFS-SSTF-C-Scan-Look, Disk management, Swap space management, Disk reliability,Protection- goals of protection,policies and mechanisms-Access matrix and its implementations , dynamic protection-language base protection. Security-security.

Case Study: -Brief discussion on Unix Operating System

Text Book

Abraham Silberschatz and Peter Baer Galvin, 'Operating System Concepts', (Fifth Edition) Addison Wesley.

Reference

1.Bach M 'The design of the Unix Operating system', Prentice Hall India
2.Understanding Operating systems, Flynn, Thomson Learning, 4Edn.
3. Guide to Operating systems, Palmer, Thomson Learning, 1Edn.
4. Milan Milenkovic 'Operating systems' TATA Mc GrawHill

MCA403 ALGORITHM ANALYSIS AND DESIGN

Module I

Introduction – Algorithms-design strategies-concepts in performance analysis – space complexity, time complexity- asymptotic notation- practical complexities, performance measurement.

Module II

Divide and conquer method – General method, Finding the maximum and minimum, merge sort, Quick sort, Selection sort, Strassen's matrix multiplication.

Module III

Greedy Method and Dynamic programming method – The general method, Knapsack problem, Job sequencing with dead lines, Minimum cost spanning tree- prim's algorithm and kruskal's algorithm, optimal storage on tapes. Dynamic programming- General method, multistage graphs, All pairs shortest paths, The traveling salesperson problem.

Module IV

Backtracking and branch and bound techniques – The general method, The 8 queens problem, Sum of subsets. Branch and Bound- least cost search, control abstraction for LC search.

Module V

Lower bound theory and NP Hard problem – Comparison trees- searching, sorting and selection. Concepts of NP hard and NP-complete problems, non deterministic algorithms, Classes of NP hard and NP complete. COOK'S theorem.

Text Book:

Fundamentals of computer algorithms- Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajeshekharan (Galgotia)

References:

1. Fundamentals of algorithms – Gilles Brassard, Paul Bratley (PHI)
2. Introduction to the design and analysis of algorithms – Anany Levitin (Pearson)
3. Computer algorithms – Introduction to design and analysis – Sara Baase, Allen Van Gelder (Pearson)

MCA 404 - Java and Web Programming

Module-I

Introduction to Java: Overview of java, why java is important to the internet, Java's magic: The Byte code, The java buzzwords, Lexical issues. **Data types, variables and arrays:** Different data types, literals, variables, type conversion and casting, automatic type promotions in expression, arrays **Operators:** arithmetic operators, bitwise operators,

relational operators, Boolean logical operators, assignment operators, the ? Operator, operator precedence. **Control statement:** Selection statement, iteration statement, jump statement

Module- II

Introducing classes: class fundamentals, constructors, garbage collections, overloaded methods and constructors, Object parameter, recursion, understanding final and static keywords, nested and inner class, command line arguments **Inheritance:** Basics, super, multilevel hierarchy, method overriding, dynamic method dispatch, abstract classes **Packages and interfaces:** packages, access protection, importing package, interface

Module- III

Exception Handling: Exception handling fundamentals, multiple catch clauses, nested try statements, built-in exceptions, creating our own exception. **Multithreaded programming:** Java thread model, creating thread, creating multiple threads, thread priorities, synchronization, interthread communication **I/O Basics:** reading and writing console base input and output, rereading and writing files, String Handling, java.lang package.

Module-IV

Event Handling: the delegation Event model, Adapter class, Working with AWT controls layout managers and menus, applet programming

Module-V

Java database programming: Different JDBC drivers, ODBC and JDBC – JDBC Overview JDBC implementation – Connection class – Statements – Other JDBC classes **HTML, JavaScript:** Introduction, Eventhandlers, javascript in forms and frames. **Java Servlets:** Java Servlets and CGI programming, Benefits, Lifecycle of a Servlet, simple java servlet, reading data from a client, Reading Http Request Header, sending data to a client and writing the HTTP Response Header, working with Cookies, tracking sessions, Security Issues. **JSP:** JSP basics, tags, Request string, Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods, Cookies, Session Object, Sharing Data Between JSP pages, Error handling in JSP

Text book

1. JAVA The Complete Reference- Patrick Naughton and Herbert Schidt.- fifth Edition Tata McGraw Hill.
2. The Complete reference J2SE - Jim Keogh – Tata McGraw Hills

References:

1. Programming and Problem Solving With Java, Slack, Thomson Learning, 1Edn.
2. Java Programming Advanced Topics, Wigglesworth, Thomson Learning, 3Edn.
3. Java Programming, John P. Flynt , Thomson Learning, 2Edn.
4. Ken Arnold and James Gosling, The Java Programming language, Addison Wesley, 2nd Edition, 1998
5. Patrick Naughton and Herbert Schidt.- The Complete Reference, JAVA fifth Edition Tata McGraw Hill.
6. Maydene Fisher, Jon Ellis, Jonathan Bruce; JDBC API Tutorial and Reference, Third Edition, Publisher: Addison-Wesley Professional,2003
7. Java Servlets IInd edition Karl Moss Tata McGraw Hils
8. Professional JSP – Wrox
9 Thinking java – Bruce Eckel – Pearson Education Association
10. JavaScript: A Beginner's Guide, Second Edition **By John Pollock,** McGraw-Hill Professional – Publisher

MCA 405(A) - VISUAL PROGRAMMING
(ELECTIVE-I)

Module 1
Parts of Visual C++ program - application object – main window object, view object document object. Event oriented window programming , device context. Elements of GUI & Visual design, Designing and Creating a Visual C++ Program, Project work spaces, Debug and Release Targets, Cleaning up, various features of the Visual C++ IDE.

Module 2
Basics of MFC & MFC-based executables. Event Handling : Reading keystrokes, handling mouse , creating menus, tool bars, buttons, status bar prompts, dialog box, check box, radio buttons, list boxes, combo boxes, sliders, serialization , file handling, multiple documents.

Module 3
Understanding Message maps and message loops, Events and Event handling, Mouse events, Keyboard events, Dynamic data Exchange and verification, creating Menus, Modeless dialog boxes. Device contexts, working with images, bitmaps and icons, creating bitmap buttons, creating and using Pens, Brushes, and Fonts.

Module 4
Document - View Architecture basics, the document class and view class, creating SDI applications, Multitasking, creating MDI Applications, Working with menu in documents, Toolbar and status bar.

Module 5
Basics of Windows Architecture, SDK & SDK Executables, Window creation, Toolkits, Application development using SDK

TEXT BOOK

1. Yeshwant Kanetkar , Visual C++ Programming , BPB

REFERENCES

1. Jeff Prosise, Programming Windows with MFC, Microsoft Press, 2000
2. Charles Petzold, “Programming Windows”, 5th Edition, Microsoft Press, 1999.
3 Holzner Steven, “Visual C++ 6 in record time”, BPB publications
4 Mickey Williams , David Bennett,Visual C++ 6 Unleashed (Hardcover) , SAMS
5 Yeshwant Kanetkar,Visual C++ Projects.
6 David Kruglinski, George Shepherd & Scot Wingo, Programming Visual C++, Microsoft Press Indian Reprint, 2000
7 Chuck Sphar, Learn Visual C++ Now, Microsoft Press/Phi, 1999
8 Ivor Horton, Programming Visual C++ Standard Edition, Wrox Press, 1999
9 Herbert Schildt,MFC Programming for the GROUND UP,Second Edition, Tata McgrawHill,2000
10 Richard.C.Leinecker and Tom Archer,Visual C++ Programming Bible, Wiley Dream Tech, 2005

MCA 405(B) - CLIENT SERVER COMPUTING
(Elective I)

Module I
Overview of Client Server computing, Evolution of Client Server systems, c/s Vs. Heterogenous computing, advantages and disadvantages,Fat Servers, Fat clients,2-Tier and 3-Tier architecture, Types of servers and clients

Module II
Components of Client/ Server Applications
Client, - Role of Client, Client Services, Request for service – Remote Services, utility services, Database Services DDE, OLE, CORBA. Server- Role of Server, Server Functionality in Detail, Network Operating System, Available Platforms, Server Operating System
Connectivity: Open System Interconnect, Communication Interface Technology, Interprocess Communication, Wide Area Network Technologies, Network Management.

Module III
Client Server Systems Development –
Software- Factors driving demand for Application software development, Need to improve Productivity, platform migration, re-engineering of existing system, common Interface Across Platforms, Development methodology, project management, Architecture , productivity measures, CASE, OOP. Hardware, Service and Support.

Module IV
Understanding Middleware,Database Connectivity Challenge, Basic View of Middleware, Highlevel Middleware communication type, Types of Middleware. Object oriented Development with client Server

Module V
Future Trends and applications:- OLTP, OLAP, TP monitors, DTP, Groupware , Distributed objects and components , Intranet, Hardware and Software trends – peer to peer technologies, Mobile computing.

Text book:
1. Smith, Patrick. N, and Steven LGuengerich. Client/Server Computing . SAMS
2. Jenkins, Neil. Client/Server Unleashed . Bk&CD-Rom ed. SAMS

Reference:
1. Orfali, Robert, Dan Harkey , and Jeri Edwards. Essential client/server survival guide. Wiley

MCA 405(C) NEURAL NETWORKS AND FUZZY LOGIC
(Elective –I)

Module I
Introduction: Principles, artificial neuron, activation functions, single layer and multilayer networks, training artificial neural networks, Perception, Representation, Linear separability, Learning Training Algorithms.

Module II
Back Propagation**:** Training algorithm, applications, network configurations Network paralysis, local minima, temporal instability.
Counter Propagation Networks**:** Kebenon layer, Training the cohenen layer, pre initializing the wright vectors, statistical properties, Training the Grosbery layer, full counter propagation network - Application.

Module III

Statistical method**:** Boltgmann's Training cauche training, Artificial specific heat methods, applications to general non-linear optimization problems.

Hopfield nets:- Relcurrent networks, stability, Application, Thermo dynamic systems, statistical Hopfield networks, Bidirecitional associative memories, continous BAM , Adaptive resource theory, Architecture classification, Implementation.

Module IV

Introduction to crisp sets and fuzzy sets, basic fuzzy set operation and approximate reasoning. Introduction to fuzzy logic modeling and control. Fuzzification, inferencing and defuzzification. Fuzzy knowledge and rule bases. Fuzzy modeling and control schemes for nonlinear systems.

Module V

Self-organizing fuzzy logic control. Fuzzy logic control for nonlinear time-delay system. Implementation of fuzzy logic controller using Matlab fuzzy-logic toolbox. Stability analysis of fuzzy control systems

Text Book

1. Neural Computing Theroy & Practice –Philip D Wasserman
2. Fuzzy Logic Intelligence, Control and Information - John Yen and Reza Langari.

Reference:-

1. Neural Networks- Simon Hayking
2. Adaptive Pattern Recognition & Neural Networks –Pay Y. II
3. An Introduction to neural Computing –Chapman & Hall
4. Fuzzy Logic: Dispatches from the Information Revolution- Matthew Friedman

MCA 405(D) -**BUSINESS DATA PROCESSING AND COBOL PROGRAMMING (Elective-I)**

Module-I

INTRODUCTION

Business Data Processing,Types of COBOL, Mainframe COBOL,Transaction Files, Master Files, File Processing, Coding Format for cobol Program, Structure of a Cobol Program, Charecter set, Cobol words, Data names and identifiers, Literal, Figurative Constants, Continuation of lines and notations. IDENTIFICATION , ENVIRONMENT DIVISION AND DATADIVISION :General formats, Configuration section, Input-output section, Level Structure, Data description entries, Picture clause, Value clause, File section, Working - Storage Section, Editing charecters of different data and examples, special-names paragraph, Classes and categories of data.

Module-II

PROCEDURE DEVISION, VERBS AND CLAUSES

Structure of procedure devision, Data movementverb and otheroptions of move state-ments, Arithemetic verbs, Sequence control verbs, Input & Output verbs, conditional verb : simple IF, Categories of COBOL statements. Usage Clause, Synchronized clause, Justified clause, Redefines clause and Renames clause, qualification of datanames,sign clause, Elementary and Group moves, corresponding option : Move Corresponding, Add Corresponding & Substract Corresponding, Rouded option, On size error option, compute verb.

Module-III

COMPUTETION AND DECISION MAKING

In teractive processing using screen sections, Intrinsic Functions, Conditions: Relational, class, Condition-name, compound, sign, IF statements, Alter statements, Perform statements, Exit statements.

Module-IV

ARRAY PROCESSING AND TABLE HANDLING

Occurs clause, subscripting, Assingning valuesto tableelements, Multidimensional tables, Perform & table handling, Indexed tables & Indexing. Set verb, search verb, Occurs depending clause, Index data item.

Module-V

SEQUENTIAL,INDEXED & RELATIVE FILE PROCESSING, REPORT WRITER AND SUBROUTINES

File charectoristics, file control entires, file description. Statemetns for sequential files, Sequential file with variable length records, I/O control paragraph, Simple sort verb, file updation, variation of updation, Simple merge verb, input and output procedure in sort statements, Merge verb with output procedure.File control paragragh,for relative files, Procedure devision statements for relative files, Indexed sequential files, General format of a report, File section, Report clause, Outline of a report section, Report section - report description entry, report group, procedure devision statements, Sample program, Structure of COBOL subroutine, Callinh of a Subroutine, State of subroutine and cancel statement, Advantages and Disadvantages of cobol subroutines.

Text books

1.M.K Roy and d Ghosh Dastigar, COBOL Programming, including MS COBOL and COBOL 85, Tata McGraw Hill 1997

2.Nancy Stern and Robert a Stern, Structered COBOL Programming, 8th Edition, john Wiley 1997

3. Structured Cobol Programming , Shelly Cashman , Thomson aLearning 2Edn.

MCA 405(E) Entrepreneurship

(Elective I)

Module-I

Entrepreneurship and free Enterprise

An Entrepreneurship perspective, Defining Entrepreneurship, Business Innovation and Entrepreneurship , Perspective on Small , Environment risk and Failure, Corporate Entrepreneurship – Intrapreneurship . A model for New ventures: feasibility Planning

Module-II

Product and service concepts for new ventures

A macro view, product and Technology, Identifying Opportunities, The product Development process . Product Protection: patents , Trademarks, and copyrights. Services: The Human side of Enterprise, Information Technology Enabled service Ventures , case studies

Module-III

Marketing and new venture development

The Marketing Concept, Marketing research for new ventures, market intelligence, Competitive Analysis, Marketing: functions and Strategies , International Markets: New venture opportunities

Module-IV

Organizing and financing the new venture

The Entrepreneurial Team and Business formation , Human Resources Needs and skills marketing , legal forms of Business in Perspective, Sole Proprietorship, Partnership, Corporations, Business Acquisitions and Franchising , financial resources for new ventures. Asset management, Equity Financing Venture Capital, debt Financing, Government programs for new ventures in India .

Module-V

Marketing Growth and Transition

The Organization Life cycle , changing Entrepreneurial Roles, Strategic Management, Implications for entrepreneurial Careers , case studies

Test Book:

Entrepreneurship – New venture Creation : By David H.Holt, Prentice Hall of India Pvt Ltd.

Reference Books :

1. Dynamics of Entrepreneurial Development and Management- vasant desai, millennium Edition , Himalaya Publishing house
2. Entrepreneurship , Kuratko, Thomson Learning 6Edn.
3. Entrepreneurship Ideas and Action, Greene, Thomson Learning 1Edn.
4. Entrepreneurship – Madhurima lal, Shikha sahai, First Edition, Excel Books
5. Entrepreneurship Management – Dr. Aruna Kabgud, Vikas Publishing House

MCA 405(F)- Enterprise Resource Planning

(Elective-I)

Module I

ERP overview- Basics of ERP-pros and cons of ERP. Comprehensive Enterprise Application –CRM- webbased CRM – ERP and Supply Chain Management., Core ERP benefits, Business Process Value Chains, ERP Optimization, ERP Strategic Planning, Parallel Capabilities, Action Plans

Module-II

ERP Selection- Selection Process - Initial Vendor Screening- Best Practices for Selection-Selection Phases-Cost of ERP - RFI Approach - Vendor Analysis -ERP Life Cycle Management

Module-III

Executing ERP- ERP Project Management -factors for success of ERP- ERP Change Management- ERP Implementation Methodology, ERP Infrastructure Considerations

Module-IV

ERP upgrades- Reasons to ERP Application Upgrades , ERP Upgrade Impact Analysis – ERP Transition Model – Post ERP Implementation - Continuous Business improvements -

ERP Risk Management - Major ERP Security Concerns- ERP/IT Framework –COBIT , ITL, ISO 17799, Case Studies

Text books:

1. Enterprise Resource Planning in Practice- Jagan Nathan Vaman, TATA McGraw Hill Publishing
2. Concepts in Enterprise Resource Planning – Joseph A. Brady, Ellen F. Monk, Bret J. Wagner, Thomson Course Technology
3. Enterprise Resource Planning Concepts and Practice –Vinod Kumar , N K Venkitakrishnan, Prentice Hall of India Pvt Ltd.
4. Enterprise Resource Planning-Alexis Leon, TATA McGraw Hill Publishing

MCA 405(G) OBJECT ORIENTED MODELING AND DESIGN
(Elective I)

Module 1

Concepts :- Objects, Attributes and Methods, Encapsulation and Information Hiding Messages, Class Hierarchy, Inheritance, Polymorphism, Genericity.
Object Oriented System Development, Methodology.

Module 2

Unified Modeling Language:- Introduction, UML diagrams, Class diagrams, Use-Case Diagrams, UML Dynamic Modeling.

Module 3

Analysis:- Object Oriented Analysis Process, Object Analysis: Classification, Identifying Relationships, Attributes & Methods.

Module 4

Design:- The Object Oriented Design process & design Axioms, Designing classes, Access layer: Object Storage & Object Interoperability, View Layer: Designing Interface.

Module 5

Implementation:- S/W Implementation, Component diagrams, Deployment diagrams, S/W Testing and Maintenance.

Text Book :-

Object-Oriented Modeling and Design., Rumbaugh, Blaha, Lorensen., Pearson Education

References:-

1. Object Oriented System Analysis and Design, Satzinger, Thomson Learning 1Edn.
2. Object Oriented System Development using the Unified Modeling Language., Bahrami A., McGraw-Hill
3. Page-Johns, Meilir., Fundamentals of Object oriented Design in UML, Pearson Education Asia,2000.
4. Object Oriented System Analysis and Design using UML., Bennet, McRobb and Farmer., McGraw-Hill
5. The Unified Modeling Language *Reference Manual., Rumbaugh, Jacobson and Booch.,* Pearson Education Asia.

MCA 406 - DBMS LAB

1. Table Design- Using foreign key and Normalization

2. Practice SQL Data Definition Language(DDL) commands
   a) Table creation and alteration(include integrity constraints such as primary key, referential integrity constraints, check, unique and null constraints both column and table level
   b) Other database objects such as view, index, cluster, sequence, synonym etc.

3. Practice SQL Data Manipulation Language (DML) commands
   a) Row insertion, deletion and updating
   b) Retrieval of data
      i) Simple select query
      ii) Select with where options (include all relational and logical operators)
      iii) Functions: Numeric, Data, Character, Conversion and Group functions with having clause.
      iv) Set operators
      v) Sorting data
      vi) Sub query (returning single row, multiple rows, more than one column, correlated sub query)
      vii) Joining tables(single join, self join, outer join)

4. Practice Transaction Control Language (TCL) commands (Grant, revoke, commit and save point options)

5. Usage of triggers, functions and procedures

6. Development of sample applications using Oracle as Back End Sample applications may include
   i). Payroll Information
   ii). Student Information System
   iii). Bank Transaction
   iv). Library Information System etc.

MCA 407 Java and Web Programming Lab

1. Programs to illustrating classes, objects, methods, constructors, destructors etc.
2. Programs to implement overloading, polymorphism, inheritance
3. Programs demonstrating the usage of packages
4. Program using files, streams, exception handling
5. Programs using threads, synchronization and string handling
6. Programs using AWT package
7. Programs to create simple applets
8. Programs using JDBC
9. Programs demonstrating networking
10. Web page design using HTML
11. Programming exercises on JavaScript, form validation etc.
12. Programs using Servlets and JSP

MCA 501 - SOFTWARE PROJECT MANGEMENT

Module I: Introduction, Project planning and evaluation
Introduction to software project management: importance, activities, categorization, stakeholders. Stepwise overview of project planning. Program management and project evaluation: allocation of resources, cost benefit analysis, evaluation techniques, risk evaluation.

Module II: Different models revisited and Software Effort Estimation
Revisiting waterfall model, V process model, spiral model, software prototyping.
Software effort estimation: software effort estimation techniques, Albrecht function point analysis, Function points Mark II, COSMIC full function points, procedural code oriented approach, COCOMO model.

Module III: Activity Planning and Risk Management
Activity Planning: objectives, projects and activities, sequencing and scheduling activities, network planning models, formulating a network model, forward pass, backward pas, identifying critical path, activity float. Risk management: categories, risk identification, assessment, planning, management, applying PERT techniques, Monte Carlo simulation, critical chain concepts. Resource Allocation: Identifying resource, requirements, scheduling resources, creating critical paths, cost schedule.

Module IV: Monitoring, Control and Team Management
Monitoring and Control: creating framework, collecting data, visualizing progress, cost monitoring, earned value analysis, priority monitoring, change control, Project Closure-role of Closure analysis, performing closure analysis, closure analysis report.
Managing Teams: organizational behaviour, Oldham-Hackman job characteristics model, becoming a team, motivation, decision making, leadership, organizational structures, dispersed and virtual teams.

Module V: Software Quality and Configuration Management
Software Quality: importance, designing, ISO 9126,quality measures, product versus process quality management, external standards, techniques to enhance quality, quality plan .Configuration Management: concepts, configuration management process-planning and set up, performing configuration control, status monitoring and audits.

Text Book:

1. Software Project Management: Bob Hughes& Mike Cotterell. 4th Edition, TataMcGrawHill.

References:

1. Software Project Management: Pankaj Jalote, Pearson Education
2. Software Project Management –A Unified Framework: Walker Royce,Pearson Education.
3. Software Project Management –S A Kelkar .Prentice Hall India
4. Information Technology and Project Management, Schwalbe, Thomson Learning 4Edn.

MCA 502 INTERNET TECHNOLOGY AND APPLICATIONS

Module – 1

Internetworking(Host to Host delivery):- Principles, TCP/IP reference model, Connectionless Internetworking, Internet Protocol(IP). IP addressing: Classful addressing, Classless addressing, Subnetting, Supernetting. Other Network layer Protocols: ARP, RARP, ICMP, IGMP. Autonomous Systems. Unicasting, Unicast Routing Protocols : Interior Gateway Routing Protocol- RIP, OSPF. Exterior Gateway Routing Protocols - BGP.

Module – 2

Multicasting, Multicast applications, Multicast Routing Protocols: MOSPF, DVMRP. Host Configuration Protocols: BOOTP, DHCP.

IPv6 and ICMPv6- Comparison of IPv4 and IPv6.

UDP: Process to Process Communication, User Datagram and Header format, UDP operation, Use of UDP.

TCP:- TCP Services, TCP features, TCP Segment Header, TCP Connection management, TCP State Transition Diagram, Flow Control, Error Control Silly Window Syndrome, TCP Congestion control, TCP timer management.

Module – 3

Domain Name System(DNS) :- Name space, Domain name space, Distribution of name space, DNS in the Internet, Resolution, DNS messages, Types of Records, Compression, DDNS.

TELNET:- Concept, Network Virtual Terminal, Embedding.

File Transfer Protocol(FTP):- Connections, communication, File Transfer, Anonymous FTP.

Trivial File Transfer Protocol (TFTP): Messages, Connection, Data Transfer.

Module – 4

Electronic Mail: Architecture, User agent - Sending Mail, Receiving Mail. Multipurpose Internet Mail Extensions (MIME). Mail transfer agent: SMTP. Mail access protocols: POP and IMAP. Web-based Mail.

World Wide Web- Hypertext and Hypermedia- Browser Architecture- Static documents- HTML- Dynamic Documents- Common Gateway Interface(CGI)- Active Documents.

HTTP:- Transactions, Request messages, Response message, Headers, Some other features.

WAP – Architecture, protocol stack and features.

Module – 5

Multimedia:- Digitizing Audio and Video, Audio and Video compression, Streaming Stored Audio/Video, Streaming Live Audio/Video, Real –Time interactive Audio/Video- Real Time Transport Protocol (RTP), Real Time Transport Control Protocol (RTCP), Video On Demand, Voice Over IP.

Private Networks, Virtual Private Network and Network Address Translation(NAT).

Text books:

Behrouz A. Forouzan - TCP/IP Protocol Suite- Third Edition- Tata McGraw Hill

References:

1. Andrew S Tanenbaum- Computer Networks- PHI- Fourth Edition.
2. Behrouz A. Forouzan – Data Communications and Networking- Fourth Edition- Tata McGraw Hill
3. William Stallings- Data and computer communications- PHI- Seventh Edition.
4. Douglas E. Comer- Internetworking with TCP/IP- Volume I- PHI- Third Edition.
5. Comer, Douglas. The Internet Book: Everything you need to know about computer networking and how the Internet works, 4th Ed., 2007

MCA 503 Linux Internals

Module I

Introduction to Linux - History, Architecture, Comparison with UNIX, Features and Facilities of Linux, Shells in Linux, Different Variants of Linux — Red Hat, Ubuntu, Mandrake, Debian, Susse

Module II

Files and File Structure - Linux File System, File naming Conventions, Path, Types of file names and Users, Directory Commands, File Commands in Linux, Text Editors-Functions of a Text Editor, Various Editors, vi Editor, emacs Editor, joe Editor, Locating Files, Standard Files, Redirection, Filters, Pipes

Module III

File Access Permissions [FAP], Viewing and Changing FAPs, Introduction to Shells, Shell variables- Local and Global Variables, Command Substitution - expr command, arithmetic expansion, Conditional Execution Constructs, Iterations, Parameter Handling in shell scripts, shift command, controlling process execution, sheduling tasks

Module IV

Backup, restore and Compress utilities, tar, cpio, dump and restore utilities, Communication in Linux — mesg, who-T, talk, write, wall, finger, chfn, ping, traceroute utilities, FTP , ncftp command, email facilities

Module V

X-Window System - X desktop, GNOME desktop Environment - features, GNOME panel, Control Center — Capplets, Document Handlers, Multimedia Capplet, Peripherals, File Manager K Desktop environment — Interface, Desktop, Panel, Konqueror, Koffice, Kmail, KDE Control Center, Kjots, Kdiskfree.

Text Book

Operating System - Linux, NUT Press, PHI Publisher, 2006 Edition

Reference

1. Introduction to Unix / Linux, Diaz , Thomson Learning 1Edn.
2. Unix - Shell Programming, Yeshwant Kanetkar, BPB Publishers

MCA 504 : DATA MINING AND WAREHOUSING

Module I - Introduction to Data mining & Date Warehouse

What is Data mining, Data mining -On What kinds of Data, Data mining Functionalities, Classification of Data mining Systems, Data Mining Task Primitives, Integration o Data mining systems, Major issues of Data mining, What is Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data warehouse Implementation, From Data Warehouse to Data mining.

Module II -Classification and Prediction

Introduction to Classification and Prediction, Issues Regarding Classification and Prediction
Classification by Decision Tree Induction: Decision Tree induction, Tree Pruning, Scalability and Decision Tree Induction, **Rule Based Algorithms**: Using If - Then rules of Classification, Rule Extraction from a Decision Tree, Rule Induction Using a Sequential Covering algorithm
Prediction : Linear Regression, Nonlinear Regression, Other Regression-Based Methods

Module III -Association Rules and Clustering

Basic Concepts, Efficient and Scalable Frequent Item set Mining Methods : Apriori Algorithm, Generating association Rules from Frequent Itemsets, Improving the Efficiency of Apriori, **Mining Various Kinds of Association Rules:** Mining Multilevel Association Rules, Mining Multilevel association Rules from Relation Databases and Data Warehouses, From Association Mining to Correlation Analysis
What is Cluster Analysis, Requirements of Cluster Analysis' Types of Data in Cluster Analysis, Categorization of Major Clustering Methods, **Partitioning Methods** :k-Meeans and k- Medoids, From K-Medoids to CLARANS , **Hierarchical Method** : Agglomerative and Divisive Hierarchical Clustering, BIRCH, ROCK, Chameleon, **Grid Based Methods:** STING : STatistical INformation Grid, Wave Cluster

Module IV -Mining Complex Data

Spatial Datamining: Spatial Data cube construction and Spatial OLAP, Mining Spatial association and Co-location patterns, Spatial clustering methods, Spatial classification and spatial trend analysis, Mining raster databases.
Multimedia Datamining: Similarity search in multimedia data, Multidimensional analysis of multimedia data, Classification and prediction analysis of multimedia data, Audio and Video Datamining.
Text Mining : Text data analysis and information retrieval, Dimensionality reduction for text, Text mining approaches,
Mining the World Wide Web : Mining the web page layout structure, Mining the web's link structure to identify authoritative web pages, Web usage mining.

Module V-Applications and Trends in Data Mining

Data Mining Applications : Data Mining for Financial Data Analysis, Data Mining for the Retail Industry, Data Mining for the Telecommunication Industry, Data Mining for Biological Data Analysis, Data Mining in Other Scientific Applications, Data Mining for Intrusion Detection, Social Impacts of Data Mining, Trends in Data Mining

Text Books:
Data Mining Concepts and Techniques – Jiawei Han and Micheline Kamber, Second Edition, Elsevier, 2006

Reference Books:
1. Data Mining – BPB Editorial Board, BPB Publications, First Edition, 2004
2. Data Warehousing , Data Mining, & OLAP – Alex Berson, Stephen J Smith, Tata McGraw Hill, 2004
3. Data Warehousing, Sinha, Thomson Learning , 1Edn.

MCA 505(A) - ADVANCED COMPUTER ARCHITECTURE & PARALLEL PROCESSING
(Elective-II)

Module- I
Parallel Processing : Evolution of Computer systems- Parallelism in Uniprocessor-Parallel Computer Structures-Architectural Classification Scheme-Parallel Processing Applications

Module- II
Principles of pipelining and vector processing:,Linear pipelining-classification of pipeline processors-general pipelines, instructions and arithmetic pipelines dynamic pipelines,vector processing requirements
Pipeline Computers and Vectorization methods Architecture of CRAY-I, Vectorization & Optimization Methods

Module- III
Array Processors:SIMD Array Processors, Interconnection Networks, Parallel Algorithm for Array Processors, Associative Array Processing

Module- IV
Multiprocessor Architecture and Programming: Functional Structures ,Interconnection Networks, Parallel Memory Organizations, Multi Processor Operating Systems, Exploiting Concurrency for Multi Processing

Module- V
Data Flow Computers: Data driven Computing and Languages, Data Flow Computers Architectures
Case study of any one modern Microprocessor

Textbooks:
1.. Computer Architecture and parallel processing-Kai Hwang & Faye A Briggs(McGraw Hill), International Edition 1985

References:
1. Computer Architecture, Michael. J Flynn, Narosa Publications

MCA 505(B) Distributed Computing
(Elective-II)

Module I
Introduction :definitions, motivation Communication Mechanisms communication protocols, RPC, RMI, stream oriented communication

Module II
Distributed Algorithms :snapshots, leader election, etc. Naming generic schemes, DNS,naming and localization Synchronization traditional synchronization, lock free, clocks (vector clocks)

Module III
Replication and Coherence consistency models and protocols Fault Tolerance
group communication, two- and three-phase commit, checkpointing

Module IV
Security :threats, control mechanisms, systems Distributed File Systems NFS, Coda, etc. Parallel Architecture Systems

Module V
Middleware :Publish/Subscribe, CORBA, Jini, mobile systems

Text Books

1. Tannenbaum , Andrew S, and Maarten VanSteen. Distributed Systems: Principles and Paradigms. 4th ed. Prentice Hall India,
2. Garg, Vijay K. Elements of Distributed Computing. Wiley,

CA 505(C) - ARTIFICIAL INTELLIGENCE
(Elective – II)

Module I
Introduction to Artificial Intelligence.
Overview of AI - AI Problems, Assumptions, Techniques, Level of Model, and Criteria for success.
Problems, Problem spaces and Search - Problem Definition, Production systems, Problem characteristics, Production system characteristics.
AI languages – Introduction to LISP & PROLOG

Module II
Knowledge Representation Schemes.
Formalized Symbolic Logics - Syntax and Semantics of Propositional and Predicate logic, Properties of WFFS, Conversion to clausal form, Inference rules, Resolution, Non- Deductive Inference Method.

Inconsistencies and Uncertainties – Non-monotonic reasoning, Truth Maintenance system, Default reasoning and the closed world assumption.
Structured Knowledge - Associative Networks, Frame Structures, Conceptual Dependencies and scripts
Overview of Object Oriented Systems - Objects, Classes, Messages and Methods.

Module III
Knowledge Organization and Management
Search and Control Strategies - Examples of search problem, Uniformed or Blind search, Informed search, Searching AND-OR graphs.
Matching Techniques - Structures used for matching, Measures for Matching, Matching like patterns, Fuzzy matching algorithm, RETE Algorithm.
Knowledge Organization and Management – Indexing and retrieval techniques, Integrating knowledge in memory, Memory organization systems.

Module IV
Knowledge Acquisition
General Concepts in Knowledge Acquisition - Types of learning, Difficulty in Knowledge Acquisition, General learning model, Performance measures.
Early work in Machine Learning – Perceptrons, Checkers playing example, Learning automata, Genetic algorithms, Intelligent editors.
Analogical and Explanation Based Learning – Analogical Reasoning and learning, Examples, Explanation based learning.

Module V
AI Application
Natural Language Processing - Overview of Linguistics, Grammars and Languages, Basic Parsing Techniques, Semantic Analysis and Representation structures, Natural Language generation, Natural language systems.
Patterns Recognition - Recognition and Classification process, Classification pattern, Recognizing and Understanding speech.
Experts system Architectures – Rule-based system, Non production system, Dealing with uncertainty, Knowledge acquisition and validation, Knowledge system Building Tools.

Text Books

1. Introduction to Artificial intelligence and expert systems by Dan W. Patterson, Prentice Hall India (All Modules).
2. Artificial Intelligence, Elaine Rich, Mc Graw Hill (Module 1).

References

1. Principles of Artificial Intelligence, Nilson. N.J, Springer Verlag
2. Introduction to Artificial Intelligence, Charvanak E. and Mc Dermoti D, Addison Wesley
3. Artificial Intelligence and Intelligent Systems by N.P Pandhy. Oxford Publications.

MCA 505(D) -Crypotgraphy & Network Security
(Elective-II)

Module I

Introduction. CONVENTIONAL ENCRYPTION,Conventional Encryption: Classical Techniques.
Conventional Encryption: Modern Techniques. Conventional Encryption: Algorithms. Confidentiality Using Conventional Encryption.

Module II

PUBLIC-KEY ENCRYPTION AND HASH FUNCTIONS. Public-Key Cryptography and RSA, Introduction to Number Theory, Message Authentication and Hash Functions, Hash and Mac Algorithms., Digital Signatures and Authentication Protocols, Key Management , Secret Sharing , Interactive proof

Module III

NETWORK and SYSTEM SECURITY PRACTICE. Authentication applications, Electronic Mail Security. ,IP Security.and/or Web Security

Module IV

Hardware Solutions: Cryptographic Accelator, Authentication Tokens, Smart Cards, Biometrics

Module V

Intruders and Viruses ,Firewalls , Digital cash ,Secret sharing schemes ,Zero-knowledge techniques, Folklore

Text book:

1. Stallings, W., Cryptography and Network Security. Principles and Practice, 4th edition, Prentice Hall.
2. Steve Burnett & Stephen Paine RSA Security's Official Guide to Cryptography, Tata Mc GrawHill

References:

1. Information Security- Intelligence: Cryptographic Principles and Applications. Calabrese, Thomson Learning 1Edn.
2. Kaufman, C., Perlman, R., Speciner, M., Network security. Private communication in a public worls, Prentice Hall, 2002.
3. Trappe, W., Washingotn, L.C., Introduction to Cryptography with coding theory, Pearson-Prentice Hall, 2006.
4. Tanenbaum, A.S., Computer Networks, 4th edition, Prentice Hall,
   Stinson, D., Cryptography. Theory and Practice, 2nd edition, CRC Press.

Online resources

1. Online resources of Stallings's Cryptography and Network Security. Principles and Practice http://williamstallings.com/Crypto3e.html

2. Online resources of Menez, van Oorschot, Vanstone's Handbook of Applied Cryptography available at http://www.cacr.math.uwaterloo.ca/hac/

MCA 505(E) - MULTIMEDIA SYSTEMS
(Elective-II)

Module 1
Multimedia-Introduction, Multimedia Presentation and Production, Characteristics, Hardware and Software requirements, Uses of Multimedia, Analog Representation, Digital Representation, A-D Conversion, D-A Conversion, Sampling Rate, Bit Depth, Quantization Error, Fourier Representation

Module 2
Text-Types, Font, Text Compression, File Formats, Image-Types, Color Models, Steps in image processing, Interface standards, Specifications of digital images, CMS, File Formats, Audio-Acoustics, Nature of Sound waves, Elements of Audio systems, MIDI, Sound Card, Audio File Formats, Video-Video camera, Transmission of video signals, Digital video standards, Video File formats

Module 3
Animation-Keyframes, Tweening, types, Animation on Web,3D Animation, File Formats, Compression-CODEC, Lossless compression techniques, Lossy compression techniques,JPEG,MPEG-1 Audio,MPEG-1 Video, CD-Technology-Compact Discs, Magneto optical discs, Laser Disc, DVD,DVD Formats

Module 4
Multimedia Architecture-User interfaces, Hardware support, Streaming Technologies, MMDBS, Object oriented approach Multimedia Documents-SGML, ODA, MHEG

Module 5
Multimedia Application Development-Software Life Cycle overview, Story, Flowline, Script, Storyboard, Case study, Virtual Reality-VR Applications, software requirements, VRML

TEXT BOOK

1. Ranjan Parekh, “Principles of Multimedia”, Tata McgrawHill,2006

REFERENCES

1. Nigel Chapman & Jenny Chapman, “Digital Multimedia”, Wiley Publications.
2. Ralf Steinmetz and Klara Nahrstedt, “Multimedia Systems”, Springer,2004
3. Tay Vaughan, “Multimedia: Making it work”, Seventh Edition, Tata McGraw-Hill Publishing company Ltd, 2007
4. Fred Halsall, “Multimedia Communication-Application Networks, Protocols and Standard”, Addison-Wesley, 2001.
5. Steve Heath ,Multimedia and Communication Technology,,Second Edition,Elsevier,2003
6. Rosch ,"Multimedia Bible" Sams Publishing
7. Fred T.Hofstetter, “Multimedia Literacy”,Third Edition, Tata McGraw-Hill, 2005
8. Multimedia:Computing,Communications and Applications, Ralf Steinmetz and Klara Nahrstedt,Pearson Education,2006.

MCA 505(F) BIOINFORMATICS
(Elective II)

Module I
Biology for Bioinformatics :- Basic concepts - cells- Archaebacteria, Biomembranes, Nucleus, Organelles, Mitochondria, Chloroplasts, Viruses, BacterioPhage,
Genetic contents of a cell - Viral Proteins - Amino acid, DNA and RNA - Forms of DNA.

Module II
Genetic Code :- Genome - Gene Expressions - Protein Synthesis - Transcription RNA - Processing- Capping- Splicing - Editing, Cell Signalling, DNA cloning Genomic library - cDNA library - Probes - Screening.

Module III
Databases :- Characteristics of Bioinformatics, Database - Categorizing, Navigating, Information Retrieval systems, Sequence Databases, Structure Databases.

Module IV
Other Databases :- Enzyme Databases, MEROPS, BRENDA, Pathway Databases: CAZy, Disease Databases, Literature Databases, Other specified Databases.

Module V
Python for Bioinformatics.

Text Books :-
1. BIOINFORMATICS Databases, Tools and Algorithms., Orpita Bosu, Simminder Kaur Thukral., Oxford University Press.
2. Learning Python., Mark Lutz & david Ascher., O'Reilly.

References :-
1. Introduction to Bioinformatics., T. K. Attwood, D J Parry-Smith., Pearson Education.
2. Essential Bioinformatics., Jin Xiong., Cambridge University Press.
3. Fundamental Concepts of Bioinformatics., Dan E. Krane, Michael L. Raymer., Pearson Education.

MCA 505(G) - Digital Image Processing
(Elective –II)

Module I
Introduction: What is Digital Image Processing(DIP), origin, examples, fundamental steps in DIP, components.
Digital Image Fundamentals: Elements of visual perception, image sensing and acquisition, image sampling and quantization, basic relationships between pixels.

Module II
Image enhancement in the spatial domain: Basic gray level transformations, basics of spatial filtering, smoothing of spatial filtering, sharpening spatial filters.

Module III
Image enhancement in the frequency domain: Introduction to the Fourier transform and frequency domain, smoothing frequency domain filters, sharpening frequency domain filters.

Module IV
Image restoration: A model of the image degradation/restoration process, noise models, restoration in the presence of noise only-spatial filtering, periodic noise reduction by frequency domain filtering, estimating the degradation function, inverse filtering.
Color image processing: Color fundamentals and models, basics of full-color image processing, color transformations, smoothing and sharpening, color segmentation, noise in color images, color image compression.

Module V
Image compression: Fundamentals, image compression models, error-free compression, lossy compression, image compression standards.
Image segmentation: Detection of discontinues, edge linking and boundary detection, thresholding, region-based segmentation, segmentation by morphological watersheds, use of motion in segmentation.

Text Book:
Digital Image Processing, 2nd Edition, by Rafael C. Gonzalez and Richard E. Woods, Pearson Education, Inc., 2002.

Reference
1. Image Processing Analysis and Machine Vision, Milan Sonka, Thomson Learning 2Edn.
2. Fundamentals of Digital Image Processing**,** by Anil K. Jain, Prentice-Hall, 1989.

MCA 506 Linux Lab

1. Installing Linux OS - Logging in and out, Creating user accounts, Changing passwords, getting help with MAN command

2. Basic Overview about the various commands - cal, chm, date, finger, groups, help, hostname, hwclock, rwho, tzselect, uname,w,whatis, whoami, bash, bind, kill, nice, set, source, fc, echo, cd, file, find, his, vdir, xargs, chgrp, In, mkdir, rmdir, safedelete, we, touch, compress, gpg, bunzip2, mcrypt, mount, unmount, cksum, eqn, strfile, grep, fgrep, groff, troff, zcat, uniq, rev, awk, sed

3. Navigating the Linux file system
4. Creating files and directories
5. Using Text editors - emacs, joe, vi, pico
6. Working with Hard disk drives and Peripherals
7. Basic shell programming — Shell Scripts, Writing Shell programs, using shell variables, make options,
8. Managing users and groups
9. Using LILO and LOADLIN, GRU