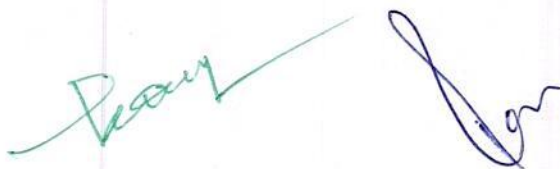


**MAHARAJA AGRASEN
HIMALAYAN GARHWAL UNIVERSITY**

Department of Computer Applications

**MCA -Syllabus & Evaluation Scheme
(Effective from 2022-23)**



Master of Computer Application (MCA)

Programme Structure

SEMESTER - I

MCA101	: Data Base Management System
M CA102	: Computer Networks
M CAE103	: Operating Systems
M CAE104	: Distributed Systems
M CA E105	: Analysis and Design of Algorithms
M CA E106	: Theory of Computation
M CA E107	: Artificial Intelligence
M CA E108	: ERP System
M CA P11	: Data Base Management System
M CA P12	: Computer Networks

Self Study Course***

SEMESTER – II

MCA201	: Graphics and Animation
MCA 202	: Introduction to JAVA Programming
MCA E203	: Multimedia Technology and Applications
MCA E204	: Network Security and Cryptography
MCA E205	: Natural Language Processing
MCA E206	: Unified Modeling Language
MCA E207	: Computer Based Optimization Techniques
MCA E208	: Wireless and Mobile Computing
MCA E209	: Human- Computer Interaction
MCA E210	: Image Processing
MCA E211	: Compiler Designing
MCA P21	: Graphics and Animation
MCA P22	: Java Programming

Self Study Course***

SEMESTER – III

MCA301	: Management Information System
MCA 302	: Unix and Shell Programming
MCA303	: Data Mining

MCA 304 : E-Commerce
MCA E305 : ASP.NET
MCA E306 : Visual Programming
MCA P31 : Unix and Shell Programming
MCA P32 : E305 or E306

SEMESTER IV

MCAPR401 : Project work 6 months duration (Industrial project)
MCA 402 : Seminar

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FIRST SEMESTER:

Subject Code	Subject	Instructional Hrs/Week			Marks			Credit
		L	T	P	ESA	CA	Sub Total	
Theory								
MCA101	Data Base Management System	3	1	-	70	30	100	4
MCA102	Computer Networks	3	1	-	70	30	100	4
Elective I								
M CAE103	Operating Systems	3	1	-	70	30	100	4
M CAE104	Distributed Systems							
Elective II								
M CAE105	Analysis and Design of Algorithms	4	-	-	70	30	100	4
M CAE106	Theory of Computation							
Elective III								
M CAE107	Artificial Intelligence	3	1	-	70	30	100	4
M CAE108	ERP System							
Practical								
M CA P11	Data Base Management System	-	-	6	70	30	100	2
M CA P12	Computer Networks	-	-	6	70	30	100	2
Total		16	4	12	490	210	700	24
Self Study Course***								
	Ethical Hacking (Non Credit Paper but Compulsory to clear)	-	-	-	100	-	100	

ESA : End Semester Assessment
 CA : Continuous Assessment
 Sub. Total : Subject Total




SECOND SEMESTER:

Subject Code	Subject	Instructional Hrs/Week			Marks			Credit
		L	T	P	ESA	CA	Sub Total	
Theory								
MCA201	Graphics and Animation	3	-	-	70	30	100	3
MCA202	Introduction to JAVA programming	3	-	-	70	30	100	3
Elective IV								
MCAE203	Multimedia Technology and Applications	4	-	-	70	30	100	4
MCAE204	Network Security and Cryptography							
MCAE205	Natural Language Processing							
Elective V								
MCAE206	Unified Modeling Language	4	-	-	70	30	100	4
MCAE207	Computer Based Optimization Techniques							
MCAE208	Wireless and Mobile Computing							
Elective VI								
MCAE209	Human- Computer Interaction	3	1	-	70	30	100	4
MCAE210	Image Processing							
MCAE211	Compiler Designing							
Practical								
MCAP21	Graphics and Animation	-	-	6	70	30	100	2
MCAP22	Java Programming	-	-	6	70	30	100	2
Total		17	1	12	490	210	700	22
Self Study Course***								
	Cyber Laws (Non Credit Paper but Compulsory to clear)	-	-	-	100	-	100	

ESA : End Semester Assessment
 CA : Continuous Assessment
 Sub. Total : Subject Total

THIRD SEMESTER:

Subject Code	Subject	Instructional Hrs/Week			Marks			Credit	
		L	T	P	ESA	CA	Sub Total		
Theory									
MCA301	Management Information System	3	1	-	70	30	100	4	
MCA302	Unix and Shell Programming	3	1	-	70	30	100	4	
MCA303	Data Mining	3	1	-	70	30	100	4	
MCA304	E-Commerce	2	1	-	70	30	100	3	
Elective VII									
MCA E305	ASP.NET	3	1	-	70	30	100	4	
MCA E306	Visual Programming								
Practical									
MCA P31	Unix and Shell Programming	-	-	6	70	30	100	2	
MCA P32	Elective- VII	-	-	6	70	30	100	2	
Total		14	5	12	490	210	700	23	

FOURTH SEMESTER:

Subject Code	Subject	Instructional Hrs/Week			Marks			Credit
		L	T	P	ESA	CA	Sub Total	
Practical								
MCAPR401	Thesis/Project Work	-	3	18	400	200	600	20
MCA 402	Seminar	-	-	-	-	100	100	3
Total		-	3	18	400	300	700	23

ESA : End Semester Assessment

CA : Continuous Assessment

Sub. Total : Subject Total

Note: **End Semester Project Work:** One Soft and Hard copy of final project work will have to be submitted in the University by the Institution/College of each student.




MCA101: Data Base Management System

Introduction: An overview of database management system, Database System Vs File System, Database system concepts and architecture, data models schema and instances, data independence and data base language and interfaces, Data definitions language, DML, Overall Database structure.

Data modeling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables, extended ER model, relationships of higher degree.

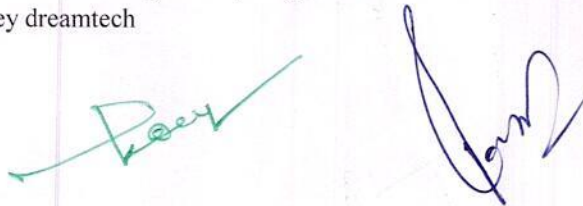
Relational Data Model and Language: Relational data model concepts, integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra, relational calculus, tuple and domain calculus.

Introduction to SQL: Characteristics of SQL, Advantages of SQL, SQL data types and literals, Types of SQL commands, SQL operators and their procedure, Tables, views and indexes Queries and sub queries, Aggregate functions, Insert, update and delete operations, Joins, Unions, Intersection, Minus, Cursors in SQL. PL/SQL, Triggers and clusters.

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

References:

1. Date C.J. "An Introduction to Database System". Addison Wesley
2. Korth, Silbertz, Sudarshan, "Database Concepts" McGraw Hill
3. Database Management System: V. K. Jain, Wiley dreamtech
4. Elmasri, Navathe, "Fundamentals of Database Systems" Addison Wesley
5. Paul Beynon Davis, "Database Systems" Palgrave Macmillan
6. Bipin C. Desai, "An introduction to Database Systems", Galgotia Pub.
7. Beginning SQL: Paul Wilton, Wiley dreamtech



MCA102: Computer Networks

Introduction and The Physical Layer: Uses of Computer Networks, Network Hardware, Network Software, Topology, Network types, Reference Model (OSI, TCP/IP Overview), The Physical Layer, Theoretical Basis for Data Communication, Guided Transmission Media, Wireless Transmission, Communication Satellites, Digital and Analog Signal, FSK, PSK, modulation techniques, Switching techniques.

The Data Link Layer: Data Link Layer Design Issues, Error Detection and Correlation, Flow Control Protocols, Stop-and-wait Flow Control, Sliding – Window Flow Control, Error Control, Stop-and-wait ARQ, Go-back-N, Selective-repeat, Example of Data Link Protocols- HDLC.

The Medium Access Control Sub Layer: The Channel Allocation Problem, Multiple Access Protocols, Ethernet, wireless LANs, Blue Tooth, Data Link Layer Switching.

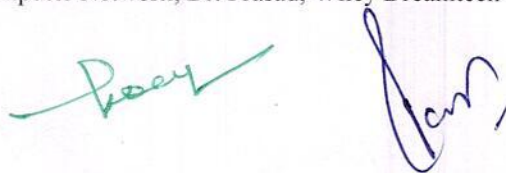
The Network Layer: Network Layer Design Issues, Routing, Quality of Service, Internetworking,

The Transport Layer : The Transport layer Services, Elements of Transport Protocols, A Simple Transport Protocol, The Internet Transport Protocols; UDP, TCP, Performance Issues, Congestion control.

Application Layer: Network Security, DES, RSA algorithms, Domain Name System, Simple Network Management Protocol, Electronic mail, File Transfer Protocol, Hyper Text Transfer Protocol, Cryptography and compression Techniques.

References:

1. A.S. Tanenbaum, "Computer Networks, 3rd Edition," PHI
2. W.Stallings, "Data and Computer Communication" Macmillan Press
3. Comer, "Internetworking with TCP/IP" PHI
4. Comer, "Computer networks and Inter" PHI
5. Forouzan, "Data Communication and Networking:. TMH
6. Principle of Digital Communication and Computer Network, Dr. Prasad, Wiley Dreamtech India.



MCAE103: Operating Systems

Introduction, What is an Operating System, Simple Batch Systems, Multiprogrammed Batches systems, Time-Sharing Systems, Personal-computer systems, Parallel systems, Distributed Systems, Real-Time Systems.

Memory Management: Background, Logical versus Physical Address space, swapping, Contiguous allocation, Paging, Segmentation, Segmentation with Paging Virtual Memory: Demand Paging, Page Replacement, Page-replacement Algorithms, Performance of Demand Paging, Allocation of Frames, Thrashing, Other Considerations, Demand Segmentation.

Processes: Process Concept, Process Scheduling, Operation on Processes, Cooperating Processes, Interprocess Communication

CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multiple- Processor Scheduling, Real-Time Scheduling, Algorithm Evaluation.

Process Synchronization: Background, The Critical-Section Problem, Synchronization Hardware, Semaphores, Classical Problems of Synchronization, Critical Regions, Monitors, Synchronization in Solaris 2, Atomic Transactions.

Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock, Combined Approach to Deadlock Handling.

Device Management: Techniques for Device Management, Dedicated Devices, Shared Devices, Virtual Devices; Device Characteristics-Hardware Consideration, Input or Output Devices, Storage Devices, Channels and Control Units, Independent Device Operation, Buffering, Multiple Paths, Block Multiplexing, Device Allocation Consideration, Secondary-Storage Structure: Disk Structure, Disk Scheduling, Disk Management, Swap-Space Management, Disk Reliability, Stable-Storage Implementation.

Information Management: Introduction, A Simple File System, General Model of a File System, Symbolic File System, Basic File System, Access Control Verification, Logical File System, Physical File System File-System Interface: File Concept, Access Methods, Directory Structure, Protection, Consistency Semantics File-System Implementation: File-System Structure, Allocation Methods, Free-Space Management, Directory Implementation, Efficiency and Performance, Recovery.

References:

1. Abraham Siberschatz and Peter Baer Galving "Operating System Concepts"
2. Milan Milankovic, "Operating Systems, Concept and Design" McGraw Hill
3. R. C. Joshi "Operating System", Wiley dreamtech India Pvt. Ltd.
4. Harvey M Ddeital "Operating System" Addison Wesley



MCAE104: Distributed Systems

INTRODUCTION: Definition of a Distributed system, Goal, Types of distributed System

ARCHITECTURES : Architectural styles, System Architectures, Architectures versus Middleware, Self management in distributed systems

PROCESSES: Threads, Virtualization, Clients, Servers, Code migration.

COMMUNICATION: Fundamentals, Remote Procedure Call, Message Oriented Communication, Stream oriented communication, Multicast communication.

NAMING: Names, Identifiers and Addresses, Flat, Naming, Structured Naming, Attribute based Naming, LDAP

SYNCHRONIZATION: Clock Synchronization, Logical Clocks, Mutual Exclusion Global Positioning of nodes, Election Algorithms.

CONSISTENCY AND REPLICATION: Introductions, Data Centric Consistency Models, Client Centric Consistency Models, Replica Management, Consistency Protocols.

FAULT TOLERANCE: Introduction to fault tolerance, Process resilience, Reliable Client Server Communication, Reliable group, Recovery

DISTRIBUTED FILE SYSTEMS: Architecture, Process Communication, Naming, Synchronization, Consistency and Replication, Fault tolerance, Security.

DISTRIBUTED COORDINATION-BASED SYSTEMS: Introduction to coordination models- Architectures, Processes communication, Synchronization, Consistency and Replication, Fault tolerance, Security.

References:

1. Andrew S. Tanenbaum, Maarten Van Steen, "Distributed System: Principals and Paradigms", 2/E, PHI.
2. George Coulouris, Jean Dollimore and Tim Kindberg, "Distributed Systems Concepts and Design", Fourth Edition, Pearson Education, 2005.
3. Pradeep K. Sinha, "Distributed Operating Systems Concepts and Design", PHI.
4. Galli D.L., "Distributed Operating Systems: Concepts and Practice", Prentice-Hall, 2000



MCAE105 Analysis and Design of Algorithms

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

Elementary Data Structure: Stacks, Queues, Linked list, Binary Search Tree, Hash Table.

Advanced Data Structure: Red Black Trees, Splay Trees, Augmenting Data Structure Binomial Heap, B-Tree, Fibonacci Heap, and Data structure for Disjoint Sets. Union-find Algorithm, Dictionaries and priority Queues, mergeable heaps, concatenable queues.

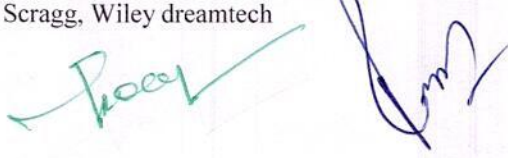
Advanced Design and Analysis Techniques: Dynamic Programming, Greedy Algorithm, Backtracking, Branch-and-Bound, Amortized Analysis.

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

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

References:

1. Horowitz Sahani, "Fundamentals of Computer Algorithms." Galgotia
2. Cormen Leiserson et al, "Introduction to Algorithms", PHI
3. Brassard Bratley, "Fundamental of Algorithms" PHI
4. M.T. Goodrich et al, "Algorithms Design" John Wiley
5. A.V. Aho et al. "The Design and analysis of Algorithms" Person Education
6. Algorithms and Data Structure: Baldwin Scragg, Wiley dreamtech



MCAE106: Theory of Computation

Introduction to the Theory of computation and Finite Automata: Mathematical preliminaries and Notation, three basic concepts, applications, deterministic Finite Acceptors, Nondeterministic finite acceptors, equivalence of Deterministic and Nondeterministic finite acceptors, reduction of the Number of states in Finite Automata.

Regular Languages, regular grammars and Properties of Regular Languages: regular expressions, connection between regular expressions and regular languages, regular grammars, closure properties of regular languages, elementary questions about regular languages, identifying language.

Context-free languages and simplification of context-free grammars and normal forms: context-free grammars, parsing and ambiguity, context-free grammars and programming languages, methods of transforming grammars, two important normal forms.

Pushdown automata and properties of context-free languages: Non-deterministic pushdown automata, pushdown automata and context-free language, deterministic pushdown automata and deterministic context-free languages, two pumping lemmas, closure properties and decision algorithms for context-free language.

Turning machines and other models of turning machines: the standard turning machine, combining turning machines for complicated tasks, Turing's thesis, minor variation on the turning machine, combining turning machines, a universal turning machine .

References:

1. An introduction to Formal Languages and Automata, Peter Linz, Narasa publishing House, 1997.
2. Introduction to Languages and the Theory of Automata- John C Martin MGH 1997
3. Introduction to Automata Languages and Computation,- J P Hopcroft. J D Ullman, Narosa Publication



MCAE107: Artificial Intelligence

Introduction: Definition and meaning of artificial intelligence, A.I. techniques, pattern recognition, Level of, speech recognition representation in A.I. properties of internal representation.

Production System: Different types of tracing, strategies, graph search strategies, Heuristic graph, search procedure, AND/OR graph, relationship between decompositional and compatible systems, searching Gate Tree, min-max search game playing, actual game playing.

Introduction to Predicate Calculus: Predicates and Arguments, connectives, Simplifications of strategies, extracting answers from Resolution Refutation. Control strategies.

Rule Based Deduction Systems: Forward and backward deduction system, resolving with AND/OR graph, computation, deduction and program synthesis, central knowledge for rules based deduct systems.

Managing Plans of Action: Plan interpreter, planning decisions, execution monitoring and re-planning domain of application robot motion planning and game playing.

Structural Object Representation: Semantic networks semantic market matching deductive operations on structured objects.

Architectural for A.I. Systems: Knowledge, acquisitions representation IMAGES PROCESSING, Natural language processing.

References:

1. Introduction to artificial Intelligence Eugene Charnik Drew MC mott
2. Artificial Intelligence Elaine Rice.
3. Principal of Artificial Intelligence, Nelson, Springer-Verlag.
4. Artificial Intelligence Application Programming: Tim Jones, Wiley dreamtech



MCAE108: ERP System

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

ERP Domain, ERP Benefits classification, Present global and Indian Market scenario, milestones and pitfalls, Forecast, Market players and profiles, Evaluation criterion for ERP product.

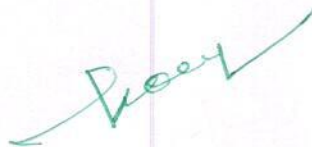
ERP Life Cycle: Adoption decision, Acquisition, Implementation, Use and Maintenance, Evolution and Retirement phases, ERP Modules.

Framework for evaluating ERP acquisition, Analytical Hierarchy Processes (AHP), Applications of AHP in evaluating ERP, Selection of Weights, Role of consultants, vendors and users in ERP implementation; Implementation vendors evaluation criterion, ERP Implementation approaches and methodology, ERP Customization.

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

References:

1. A. Lexis Leon, "Enterprise Resource Planning" TMH
2. Brady, Manu, Wegner, "Enterprise Resource Planning", TMH



MCA201: Graphics and Animation

Graphics Primitives: Display Devices: Refresh Cathode Ray Tube, Raster Scan Display, Plasma display, Liquid Crystal display Plotters, Printers. Input Devices: Keyboard, Trackball, Joystick, Mouse, Light Pen, Tablet, and Digitizing Camera.

Input Techniques: Positioning techniques, Potentiometers, Constraints, Scales and Guidelines, Rubber-Band techniques, Dragging Dimensioning techniques and Graphical Potentiometers, Pointing and Selection: the use of selection points defining a boundary rectangle, multiple selections, Menu selection.

Mathematics for Computer Graphics: Point representation, Vector representation, Matrices and operations related to matrices, Vector addition and vector multiplication, Scalar product of two vectors, Vector product of two vectors.

Line Drawing Algorithms: DDA Algorithms, Bresenham's Line algorithm. Segment and Display files: Segments, Functions for segmenting the display file, Posting and posting a segment, segment naming schemes, Default error conditions, Appending to segments, Refresh concurrent with reconstruction, Free storage allocation, Display file structure.

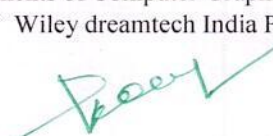
Graphics Operations: Clipping, Point Clipping, Line Clipping, Polygon Clipping. Filling: Inside Tests, Flood fill algorithm, Boundary-Fill Algorithm and scan-line polygon fill algorithm.

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

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

References:

1. Donald Hearn and M Pauline Baker, "Computer Graphics" PHI
2. Steven Harrington, "Computer Graphics: A Programming Approach" TMH
3. Prajapati A.K. "Computer Graphics" PPM Ed2
4. Foley James D, "Computer Graphics" AW Ed2
5. Newman and Sproul, "Principle of Interactive Computer Graphics" McGraw Hill
6. Rogers, "Procedural Elements of Computer Graphics", McGraw Hill
7. Rogers and Adams, "Mathematical Elements of Computer Graphics" McGraw Hill
8. Practical Multimedia "Nigel Chapman" Wiley dreamtech India Pvt Ltd.



MCA202: Introduction to JAVA Programming

Overview of JAVA : The genesis of java, An overview of java, java virtual machine (JVM), Java development kit (JDK), Java Vs C++, Data types, Literals, Variables, and Arrays, Operators, Control statements, Introducing Class, closer look at Methods and class, Nested and inner class ,Exploring Java.lang, String handling ,Constructor, Garbage collection and finalize() method.

Inheritance, Packages and interface- Types of inheritance, Access specifiers class inheritance, using super, method overriding, Abstract class, constructor in multilevel inheritance, using final with inheritance, Dynamic method dispatch, Defining package, CLASSPATH, Access protection, Importing package, Defining and implementing interface, Extending interface, Nested interface.

Exception handling and Multithreading: Using try and catch, multiple catch classes, Nested try statements, throw, throws and finally, Built in exception, Uncaught exception, Creating own exception class, Java Thread Model – Main thread, Creating own Thread, Life cycle of thread, Thread priorities, Synchronization and messaging, Intertribal communication, Suspending, Resuming and stopping thread.

Input Output and Networking : Byte stream and character stream ,Predefined stream, reading console input, writing consol output, PrintWriter class, Reading and writing files Networking – classes and interfaces, Socket and overview, TCP/IP client socket and server, Inet address, URL Connection, Datagram.

Applet, AWT and Event handling – Applet life cycle, Creating an applet, Using image and sound in applet, passing parameter. AWT- Overview of java.awt package, Component and Containers, control component and layout manager. Event handling –The delegation-event model, Event classes, Source of event, Event listener interfaces, handling mouse and keyboard event, Adapter class.

References:

1. Naughton P and schildt H. Java: The complete reference, Osborne Mcgra-Hill, Berkeley, USA, 1997.
2. Simply JAVA :An Introduction to JAVA programming By James R. Levenick ,Firewall Media publication New,Delhi
3. Balguruswami : Java Programming
4. Core JAVA for beginners by Rashmi Kanta Das ,Vikas Publication.



MCAE203: Multimedia Technology and Applications

Evolution of Multimedia and its objects, Scope of multimedia in business and work, production and planning of Multimedia applications. Multimedia hardware, Memory of Storage Devices, Communication Devices, Multimedia Software, Presentation and object generation tools, Video, sound, Image capturing Authoring Tools, Card and Page Based Authoring Tools.

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

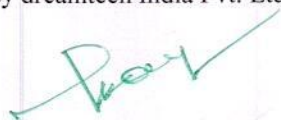
Macromedia products, Basic drawing techniques, Advance animation techniques, Creating Multi layer combining interactivity and multiple scenes, Creating transparency effects using text in Flash, Flash animation.

Digital Audio Concepts, Sampling variables, Loss Less compression, of sound, Lossy compression and Silence compression.

Multimedia monitor bitmaps, Vector drawing , Lossy graphic compression, Image file formatic animations, Image standards, JPEG compression, Zig Zag coding. Video representation, colors, video compression, MPEG standards, MHEG standard, recent development in multimedia. Multimedia Application Planning, Costing, Proposal preparation, and Financing-Case study of a typical industry.

References:

1. Andreas Halzinger, "Multimedia Basics" Vol-I to VOL-III Firewall Media
2. Tay Vaughan, "Multimedia Making It work" Tata McGraw Hill
3. Buford, "Multimedia Systems" Addison Wesley
4. Agarwal and Tiwari, "Multimedia Systems" Excel
5. Rosch, "Multimedia Bible" Sams Publishing
6. Digital Multimedia "Nigel Chapman" Wiley dreamtech India Pvt. Ltd.
7. Sleinreitz, "Multimedia Bible" Sams Publishing
8. Ken Milburn, John Ckroteau, "Flash 4 Web special Effects, Animation and Design Handbook" Dreamtech Press
9. John. Villamil-Casanova and Louis Molina, "Multimedia-Production, Planning and Delivery" PHI
10. Flash MX 2004 Bible: Robert , Wiley dreamtech India Pvt. Ltd.



MCAE204: Network Security and Cryptography

Introduction of Cryptography: Introduction To security: Attacks, Services and Mechanisms, Security, Attacks, Security Services, Conventional Encryption: Classical Techniques, Conventional Encryption Model, and steganography, Classical Encryption Techniques. Modern Techniques: Simplified DES, Block Cipher Principles, DES Standard, DES Strength, Differential and Linear Cryptanalysis, Block Cipher Design Principles, Block Cipher Modes of Operations.

Conventional Encryption Algorithms: Triples DES, Blowfish, International Data Encryption Algorithm, RCS, CAST-128, CR2 Placement and Encryption Function, Key Distribution, Random Number Generation, Placement of Encryption Function.

Public Key Encryption: Public-Key Cryptography: Principles of Public-Key Cryptosystems, RSA Algorithm, Key, Key Management, Fermat's and Euler's Theorem, Primality, Chinese Remainder Theorem.

Hash Functions: Message Authentication and Hash Functions: Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Function Birthday Attacks, Security of Hash Function and MACS, MD5 Message Digest Algorithm, Secure Hash Algorithm (SHA), Digital Signatures: Digital Signature, Authentication Protocol, Digital Signature Standard (DDS) Proof of Digital Signature Algorithm.

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

References:

1. William Stallings, "Cryptography and Network Security: Principles and Practice" Prentice hall, New Jersey
2. Johannes A. Buchmann, "Introduction to Cryptography" Springer-Verlag
3. Atul Kahate, "Cryptography and Network Security" TMH
4. Network Security Bible : Eric Cole, Wiley dreamtech India Pvt. Ltd.
5. Practical Cryptography "Bruce Schneier" Wiley dreamtech India Pvt. Ltd.



MCAE205: Natural Language Processing

Regular expressions and automata, Morphology and Finite State transducers, N – grams.

Word classes and part of speech tagging, Context free grammars for English, Parsing with context free grammars.

Features and Unifications, Lexicalized and Probabilistic parsing.

Semantics: Representing meaning, Semantic analysis, Lexical semantics, Word Sense Disambiguation and Information retrieval.

Pragmatics: Discourse, Dialog and Conversational Agents, Natural Language Generation, Machine Translation.

References:

1. Daniel, Jurafsky and Martin, Speech and Language Processing, Pearson, 2003



MCAE206 : Unified Modeling Language

Introduction: The Evolution of Technology, Structured Analysis and Design, Object-Oriented Technologies, Comparison between the main technologies. The Unified Process and Features: Unified Process, Static Structure: Process Representation, Dynamic Structure: iterative development, an architecture-centric process, A use-case-driven process, Use case models, Notations and Terminology.

Process Components (Workflows): Business Modeling Workflow, Requirement Workflow, Analysis and Design Workflow, Deployment workflow.

Understanding Object –Oriented Technologies, Current status of Object Technologies, The static object model- Class, Collaborations and Object Diagrams, Generalization, Composition, Aggregation, Multiplicity and Association with concept and examples.

Use Case Analysis: Discussion on use cases, terminology, notations and analysis, what they are and aren't, Use case- an example, Use case- formal Scenario template.

Static chart Diagram: Composite states, nested states, Events, Simple transitions.

UML Activity and sequence diagrams: Usage and Syntax, Guarded Transitions, Synchronization Bars, Swim lanes Purpose, Proper Usage of Activity diagram. Transition time sequence diagram: Objective and Modeling guidelines, Objective Interaction, Sequence diagram- UML notation, Object and Stereotypes.

References:

1. UML distilled by Martin Fowler- Pearson Education.
2. Object –Oriented Modeling by James Raumbaugh, PHI.
3. UML a nutshell by Dan Pillone, O'Reilly Publication.
4. The elements of UML by Scott Amber, Cambridge University Press.
5. Designing Object-Oriented Software by Rebecca Wirf Brock, PHI.



MCAE207 : Computer Based Optimization Techniques

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

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

Integer Linear Programming Problems: Integer Linear Programming Problems, Mixed Integer Linear Programming Problems, Cutting Plane Method, Branch and Bound Method, 0-1 integer linear programming problem.

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

Dynamic Programming: Bellman's Principle of optimality of Dynamic Programming, Multistage decision problem and its solution by Dynamic Programming with finite number of stages, Solution of linear programming problems as a Dynamic Programming problem.

References:

1. Hadley, G. "Linear Programming and Massachusetts, Addison-Wesley
2. Taha, H.A. "Operations Research-An Introduction" Macmillian
3. Hiller, F.S., G.J. Lieberman "Introduction to Operations Research
4. Harvey M Wagner, "Principles of Operations Research with Applications to Managerial Decisions, Prentice Hall India Pvt. Ltd.
5. Swarup Ketel, "Operation Research" S.Chand



MCAE208 :: Wireless and Mobile Computing

Existing Wireless Systems: Introduction, Global System for Mobile Communications (GSM), Personal Communications Services (PCS), International Mobile Telecommunications 2000 (IMT-2000). Wireless local area networks. Wireless local loops.

Wireless and Mobile Computing: Overview of the history, evolution, and compatibility of wireless standards; the special problems of wireless and mobile computing.

Mobile Communication Systems: Introduction, mobile Internet protocol; mobile aware adaptation; extending the client-server model to accommodate mobility; mobile data access; the software packages to support mobile and wireless computing; Mobile/Cellular System Infrastructure, Registration, Handoff Parameters and Underlying Support. Roaming Support Using System Backbone. The role of middleware and support tools. performance issues; Multicasting, Security and Privacy.

Satellite Systems: Introduction, Types of Satellite Systems, Characteristics of Satellite Systems, Satellite System Infrastructures, Call Setup, Global Positioning System.

Recent Advances: Introduction, Ultra-Wideband Technology, Multimedia Services Requirements. Mobility Management for Integrated Systems; Multicast in Wireless Networks; MANET Route Maintenance/Repair; Design Issues in Sensor Networks; Bluetooth Networks; Threats and Security Issues.

References:

1. Introduction to Wireless and Mobile Systems , Dharma P. Agrawal.
2. Internetworking with TCP/IP Vol.1: Principles, Protocols, and Architecture, 4/e, Comer, Douglas E., Prentice Hall.
3. Computer Networks and Internets with Applications, 3/e, Comer, Douglas E., PrenticeHall.
4. Computer Networking, Kurose and Ross, Addison-Wesley.
5. Data and Computer Communications 6th ed., Stallings William, Prentice-Hall.
6. Computer Networks 3rd ed., Tanenbaum, Andrew, Prentice-Hall.
7. Principles of Mobile Computing: Hansmann, Wiley dreamtech.
8. Mobile and Wireless design Essentials: Martyn Hallick, Wiley dreamtech.



MCAE209 :: Human- Computer Interaction

Introduction: Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design.

The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.

Design process – Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions.

Screen Designing:- Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

Windows – New and Navigation schemes selection of window, selection of devices based and screen based controls.

Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.

Software tools – Specification methods, interface – Building Tools.

Interaction Devices – Keyboard and function keys – pointing devices – speech recognition digitization and generation – image and video displays – drivers.

References:

1. Human – Computer Interaction. Alan Dix, Janet Fincay, Gre Goryd, Abowd, Russell Bealg, Pearson Education
2. Interaction Design Prece, Rogers, Sharps. Wiley Dreamtech,
3. User Interface Design, Soren Lauesen , Pearson Education.



MCAE210 :: Image Processing

Introduction: Digital Image Processing, The origins of Digital Image Processing, Examples of Digital Image Processing application, Fundamental steps in Digital Image processing, Components of Image Processing system
Fundamentals: Elements of Visual Perception, Light and Electromagnetic Spectrum, Image Sensing and Acquisition, Image Sampling and Quantization, Some basic Relationships between Pixels, Linear and Nonlinear Operations.

Image Enhancement in the spatial domain: Background, Some basic gray level transformation, Introduction of Histogram processing, Enhancement using Arithmetic/Logic operations, Basics of spatial filtering, Smoothing spatial filters, Sharpening spatial filters, Image Enhancement in the Frequency Domain : Introduction.

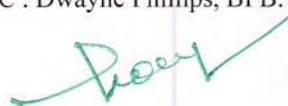
Image Restoration: Model of the Image Degradation/Restoration process, Noise Models, Restoration in the presence of noise only spatial filtering, Inverse filtering, Minimum Mean Square Error (Wiener) filtering, Geometric mean filter, Geometric Transformations, Image Compression: Fundamentals, Lossy Compression, Lossless Compression, Image Compression models, Error-free Compression : Variable length coding, LZW coding, Bit plane coding, Run length coding, Introduction to JPEG.

Morphology: Dilation, Erosion, Opening and Closing, Hit-and Miss transform, Morphological Algorithms : Boundry Extraction, Region filling, Extraction of connected components, Convex Hull,

Image Segmentation: Definition, characteristics of segmentation Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region based segmentation. Introduction to Representation and Description, Introduction to Object Recognition.

References:

1. Digital Image Processing: Rafael C. Gonzalez and Richard E. Woods. Addison Wesley.
2. Fundamentals of Digital Image Processing. Anil K. Jain, PHI.
3. Digital Image Processing and Analysis : B. Chanda and D. Dutta Majumber, PHI.
4. Image Processing in C : Dwayne Phillips, BPB.



MCAE211 : Compiler Designing

Compiler Structure: Compilers and Translators, Various Phases of Compiler, Pass Structure of Compiler, Bootstrapping of Compiler.

Programming Language: High level languages, lexical and syntactic structure of a language, Data elements, Data Structure, Operations, Assignments, Program unit, Data Environments, Parameter Transmission. Lexical Analysis: The role of Lexical Analyzer, A Simple approach to the design of Lexical Analyzer, Regular Expressions, Transition Diagrams, Finite state Machines, Implementation of Lexical Analyzer, Lexical Analyzer Generator: LEX, Capabilities of Lexical Analyzer.

The Syntactic Specification of Programming Languages: CFG, Derivation and Parse tree, Ambiguity, Capabilities of EFG.

Basic Parsing Techniques: Top-Down parsers with backtracking, Recursive descent Parsers, Predictive Parser, Bottom-up Parsers, Shift-Reduce Parsing, Operator Precedence Parsers, LR parsers (SLR, Canonical LR, LALR) Syntax Analyzer Generator: YACC

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

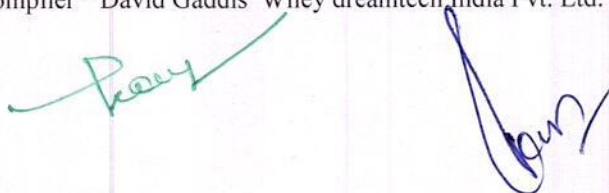
Run Time Memory Management: Static and Dynamic storage allocation, stack based memory allocation schemes, Symbol Table management.

Error Detection and Recovery: Lexical phase errors. Syntactic phase errors, semantic errors.

Code Optimization and Code Generation: Local optimization, Peephole optimization, Basic blocks and flow Graphs, DAG, Data flow analyzer, Machine Model, Order of evaluation, Register allocation and code selection.

References:

1. Alfred V Aho, Jeffrey D. Ullman, "Principles of Compiler Design", Narosa
2. A.V. Aho, R. Sethi and J.D.Ullman, "Compiler Principle, Tech and tools" AW
3. H.C. Holub "Compiler Design in C", Printice Hall Inc.
4. Apple, "Modern Computer Implementation in C: Basic Design" Cambridge Press
5. Modern Compiler Design: Dick Grune, Wiley dreamtech India Pvt. Ltd.
6. Starting Out with Modern Compiler " David Gaddis Wiley dreamtech India Pvt. Ltd.



MCA301: Management Information System

Management Information System : Definition, MIS as an evolving concept, MIS and other Academic Disciplines, Subsystems of an MIS.

Structure of MIS : Elements of an Information System, MIS support for Decision making, MIS Structure.

Hardware, Software, and communications Technology for Information Systems.

System and Design : Systems Development Initiative, Different Methodologies - Life Cycle and Prototype approach, Detailed study on Life Cycle Design and Implementation. Case Study.

Managerial Decision Making : Decision Making Process, Group Decision Support Systems, Architecture of GDSS, Categories of GDSS.

Decision Support System : Definition and Components of DSS (Data Base Management System, Model Base Management System, Support Tools), Applications of DSS, Functions of DSS.

A study of Computerization in different functional areas of a typical manufacturing/business organization i.e Marketing, production, material, financial, personal.

References:

1. Management Information Systems Gordon B. Davis and Margerethe H. Olson Mc-Graw-Hill



MCA302: Unix and Shell Programming

Basic Unix Commands: The Unix editors and vi; Redirection, Piping, Tees and filters; The Unix Utilities grep, sed, etc.

Overview of Unix Architecture: The kernel and the Shell; Processes and Time Sharing files and Directories; Peripheral Device as files.

Introduction the Shell Scripts: The Bourne and C-shells; Shell variables, scripts meta-characters and environment; the if and case statements; for, while and until loops.

System calls and the „C“ library: Discussion of the Unix system calls and „C“ library functions, the standard I/O Package; file handling; math library; command line parameters etc. The Unix „C“ interface; „C“ files and Graphics.

Introduction of systems Administration under Unix: The system Manger OLE and functions.

Different Tools: Debugging language development, System development different print formatting UNIX Tools.

Bourne Shell: Shell meta characteristics, shell variable, scripts, facilities, commands and environments, shell archive, idea about restricted shell, ROLC program.

Korn Shell: Shell variables and scripts, built in EDITOR, built in integer arithmetic, string manipulation capabilities, Command Aliasing, Array Job control.

C-Shell: Shell variables and scripts, shell facilities, history Integer Arithmetic Decision making and job control.

References:

1. Stephan Prata: Advanced Unix – A Programmers Guide – BPB PUB.
2. Kernighlan and Pike : The Unix Programming Environment – PHI.
3. The Unix System Manuals.

Prata

Kernighan

MCA303: Data Mining

Introduction to data mining, need for data warehousing and data mining, application potential, keywords and techniques. Data Warehousing and On-line analytical Processing (OLAP): Aggregation operations, models for data warehousing, star schema, fact and dimension tables, conceptualization of data warehouse and multidimensional databases, Relationship between warehouse and mining.

Data mining primitives: Data preprocessing, data integration, data transformation. Definition and specification of a generic data mining task. Description of Data mining query language with examples. Association analysis: Different methods for mining association rules in transaction based data bases. Illustration of confidence and support. Multidimensional and multilevel association rules. Classification of association rules. Association rule algorithms – A priori and frequent pattern growth.

Classification and Prediction: Different classification algorithms. Use of genie index, decision tree induction, Bayesian classification, neural network technique of back propagation, fuzzy set theory and genetic algorithms.

Clustering: Partition based clustering, hierarchical clustering, model based clustering for continuous and discrete data. Scalability of clustering algorithms. Parallel approaches for clustering.

Web mining: Web usage mining, web content mining, web log attributes. Data mining issues in object oriented data bases, spatial data bases and multimedia data bases and text data bases.

References:

1. J. Han, M. Kamber, "Data Mining Concepts and Techniques", Harcourt India Pvt Ltd, 2001
2. M. Dunham, "Data Mining : introductory and Advanced Topics", Pearson Pub, 2003
3. A.K. Pujari, "Data Mining Techniques", Universities Press.



MCA304: E-Commerce

Introduction: Electronic Commerce - Technology and Prospects, Definition of E-Commerce, Economic potential of electronic commerce, Incentives for engaging in electronic commerce, forces behind E-Commerce, Advantages and Disadvantages, Architectural framework, Impact of E-Commerce on business.

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

Mobile Commerce: Introduction, Wireless Application Protocol, WAP Technology, Mobile Information device, Mobile Computing Applications.

Web Security: Security Issues on web, Importance of Firewall, components of Firewall, Transaction security, Emerging client server, Security Threats, Network Security, Factors to consider in Firewall design, Limitation of Firewalls.

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

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

References:

1. Ravi Kalakota, Andrew Winston, "Frontiers of Electronic Commerce" Addison Wesley.
2. Bajaj and Nag, "E-Commerce the cutting edge of Business". TMH.
3. P. Loshin, John Vacca, "Electronic Commerce" Firewall Media, N.Delhi.
4. E Business and Commerce: Brahm Cazner, Wiley dreamtech.



MCAE305: ASP.NET

Introduction to ASP: Introduction to ASP. Types of Path. Examples using Response object of ASP. Working with FORM tag. Important Points about the FORM submission. Problem with ASP.

Validation Controls: BaseValidator, ValidationSummary, RequiredFieldValidator, CompareValidator, RangeValidator, RegularExpressionValidator, CausesValidation Property of Button, Grouping Controls for Validation

Applying Themes and Styles to Controls : Working with CSS ,Using Themes to Customize a Site , Named Skins within a Theme, Server-side Styles using Themes , Contents of a Theme and Skin, Themes and Profiles

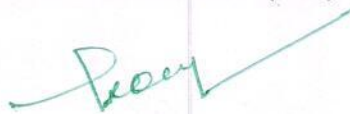
ASP.NET Architecture: What is AppDomain, Life cycle of a WebForm when requested by a client., How does a control manages its state, EnableViewState property, Event Handling in WebForms ,Writing / Using Custom Classes in WebApplication

Page Navigation Options: Response.Redirect, Server.Transfer, CrossPagePostBack property of Button a. Accessing controls of PreviousPage b. Accessing Properties of PreviousPage c. PreviousPageType page directive

Creating a Layout Using Master Pages: Why Master Pages. , Significance of ContentPlaceHolder Tag in MasterPage and Content Tag in WebForm. How a control of MasterPage can be accessed / programmed in WebForm. a. Master.FindControl b. Public property in MasterPage and <%@MasterType directive in WebForm. Load and LoadComplete events of the Page and MasterPage classes. Understanding ClientID and UniqueID properties.

References:

- 1 Xue Bssai, Michael Ekedah, The Web Warrior Guide to Web Programming, Thomson (2006)
- 2 Kogent Solutions Inc .Net Programming Black Book, Dream Tech (2008)
- 3 Joe Duffy Professional.Net Programming 2.0 Wiley
- 4 George Shepherd ASP.NET 3.5 Microsoft PHI (2008)



MCAE306: Visual Programming

WINDOWS PROGRAMMING: The windows programming Model, Event driven programming, GUI concepts ,Overview of Windows programming, Creating and displaying the window, Windows procedure , Window messages and Message Loop, Resources, An Introduction to GDI, Device context.

INTRODUCTION TO VC++ and MFC: IDE, resource editor, resource files, Application wizard and class wizard, message handling, tools in VC++, DLL and API, Message, User, GDI and kernel, MFC fundamentals, Structure of MFC applications, Creating Main window using MFC.

VC++ APPLICATIONS : Introduction to building a basic application, getting started with Visual C++, reading Keystrokes from keyboard, Centering text in a window, Adding a Caret to a window, handling mouse in VC++, creating menus, Toolbars buttons.

COMPONENT OBJECT MODEL (COM) : Introduction to OLE, OLE feature and specifications, Container, Embedding objects, Introduction to COM and DCOM, DDE to COM+, COM+ features, Features in Windows 2000, Transactions and queues- MTS and MSMQ, Types of program file-Com, EXE, DLL and other types of files.

ADVANCE VC++ : , Program execution control- process and thread, multithreading, Synchronization, Creating Internet Programs- including a Web Browser, Building and Using Active X controls in VC++, Data Access Objects (DAO), ActiveX Data Objects (ADO), Open Database Connectivity (ODBC), Database Building Overview, Building a simple Database Applications

Reference Books

1. Murray, et.al "The Visual C++ Handbook", 2nd edition. Osborne McGraw Hill, New York, 1996.
2. Visual C++ 6 programming in Record Time, Steve Holzner, BPB Publications.
3. VC++ 6 Programming Bible, Wiley dreamtech India Pvt. Ltd.
4. Windows Programming by Herbett Schildtz, TMH.
5. Windows Programming by Charles Petzold, Microsoft Press.
6. COM/DCOM Primer Plus by Waite Group (Techmedia).
7. Visual Basic Developer"s Guide to COM and COM+ , Wayne S. Freeze, BPB Publications.

