

Department of Computer Science & Information Technology

Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G.

Scheme of Teaching and Examination-M.C.A

MCA-1

S.NO	Subject Code	Subject	Period / Week			Scheme of Exam Theory / Practical			Total Marks
			Period / Week			E.S.E.	IA	Test	
			L	T	P				
1	MCA-101	Introduction to Information Technology	4	1		60	10	30	100
2	MCA-102	Data Structures	4	1		60	10	30	100
3	MCA-103	Introduction to Programming Language Through 'C'	4	1		60	10	30	100
4	MCA-104	Computer Based Numerical Methods	4	1		60	10	30	100
5	MCA-105	Digital Electronics	4	1		60	10	30	100
6	MCA-106	LAB1: - C Programming			3	100			100
7	MCA-107	LAB2: - Unix & Shell Programming			3	100			100
TOTAL			20	5	6	500	50	150	700

MCA-2

S.NO	Subject Code	Subject	Period / Week			Scheme of Exam Theory / Practical			Total Marks
			Period / Week			E.S.E.	IA	Test	
			L	T	P				
1	MCA-201	E- Commerce	4	1		60	10	30	100
2	MCA-202	RDBMS with Oracle	4	1		60	10	30	100
3	MCA-203	Principles of Operating System	4	1		60	10	30	100
4	MCA-204	Computer System Architecture	4	1		60	10	30	100
5	MCA-205	Object Oriented Programming Through C++	4	1		60	10	30	100
6	MCA-206	LAB1: - C++ Programming			3	100			100
7	MCA-207	LAB2: - ORACLE			3	100			100
TOTAL			20	5	6	500	50	150	700

MCA-3

S.NO	Subject Code	Subject	Period / Week			Scheme of Exam Theory / Practical			Total Marks
			L	T	P	E.S.E.	IA	Test	
1	MCA-301	Introduction to JAVA	4	1		60	10	30	100
2	MCA-302	Software Engineering	4	1		60	10	30	100
3	MCA-303	Artificial Intelligence	4	1		60	10	30	100
4	MCA-304	Theory of Computation	4	1		60	10	30	100
5	MCA-305	Computer Network	4	1		60	10	30	100
6	MCA-306	LAB1: - JAVA Programming			3	100			100
7	MCA-307	LAB2: - VB & VC++ Programming			3	100			100
		TOTAL	20	5	6	500	50	150	700

MCA-4

S.NO	Subject Code	Subject	Period / Week			Scheme of Exam Theory / Practical			Total Marks
			L	T	P	E.S.E.	IA	Test	
1	MCA-401	Design Methods and Analysis of Algorithms	4	1		60	10	30	100
2	MCA-402	Compiler Construction	4	1		60	10	30	100
3	MCA-403	Web Technology	4	1		60	10	30	100
4	MCA-404	MIS	4	1		60	10	30	100
5	MCA-405	Operation Research	4	1		60	10	30	100
6	MCA-406	LAB1: - HTML & JAVA Script Programming			3	100			100
7	MCA-407	LAB2: - .Net Technology			3	100			100
		TOTAL	20	5	6	500	50	150	700

MCA-5									
S.NO	Subject Code	Subject				Scheme of Exam Theory / Practical			Total Marks
			Period / Week			E.S.E.	IA	Test	
			L	T	P				
1	MCA-501	Computer Graphics	4	1		60	10	30	100
2	MCA-502	Soft Computing Techniques	4	1		60	10	30	100
3	MCA-503	Data Mining	4	1		60	10	30	100
4	MCA-504	Network Security	4	1		60	10	30	100
5	MCA-505	Advanced Course in Operating System (OS -II)	4	1		60	10	30	100
6	MCA-506	Minor Project	200						200
TOTAL			20	5	5	500	50	150	700
MCA-6									
S.NO	Subject Code	Subject	Total Marks						
1	MCA-601	Major Project (Viva Voce)	500						

MCA- 1ST SEMESTER

MCA-101

Introduction to Information Technology

Introduction to computers: Computer system concept ,characteristics of computer, generations and types of computer, components of computer system, Booting process , classification of digital computer system, organization of computers.

Computer software and hardware - Software: System software ,application software ,firmware , Programming languages classification : machine language, assembly language & high-level language. Evolution of programming languages: first generation, second generation, third generation & fourth generation. Language, Language translator :Compiler, Interpreter , Assembler.

Hardware: Input and Output devices ,Storage devices

Operating System - Definition, Job ,Objective and evolution of operating system ,Types of operating system, Network operating system (NOS) .

Network Communication and Internet : Definition,Criteria ,advantages and limitations of computer networking, Communication process ,Communication types, Electronic data interchange (EDI) ,Types of computer network ,Network topology, LAN and other network related protocols, OSI model, TCP/IP model , Networking Hardware & Software.

Internet: Introduction, Internet basic, Internet protocols, Internet addressing, Browser WWW,E-mail, telnet, ftp, application, benefits and limitation of internet, electronic conferencing, and teleconferencing.

Latest IT Trends and Role of IT - IT Trends : E-Commerce, M-Commerce , Artificial Intelligence , Computational Intelligence , Geographic Information System (GIS) ,Data Mining .

Role of IT : Role of IT in different Area – Education ,Industry, Banking, Marketing ,Public Services and others.

Suggested Books:

1. Computer fundamentals: By V.Rajaram; PHI
2. Fundamentals of IT: Leon and Leon; Leon Tec World

MCA-102**Data Structures**

Basics : Basic terminologies; introduction to basic data Structures: Arrays, linked list, trees, stack, queue, Graph; Data structure operations; time complexity; Records and Pointers; Pointers to structures; Functions; Parameter Passing.

Stacks, Queues and Recursion: Stacks; Array representation of stack; Linked representation of stack; Various polish notation's-Prefix, Postfix, infix; Evaluation of a postfix & Prefix expression; Conversion from one another; Application of stack; Recursion; Towers of hanoi; Implementation of recursive procedures by stacks; Queues; Linked representation of queues; Dqueues; Circular queue; Priority queue; Singly Linked list- Operation on it; Doubly linked list- Operation on it; Circular linked list.

Trees: Binary trees; Representation of binary tree in memory; Traversing binary tree; Traversing using stack; Header nodes; Binary search trees; Searching and inserting in binary search trees; Deleting in a binary search tree; AVL search trees; Insertion and deletion in binary search trees; m-way search trees: searching, insertion ,deletion; B trees: searching, insertion, deletion; Heap.

Searching And Sorting: Searching algorithm: linear search, binary search; Sorting algorithms: Bubble sort, Insertion sort, Selection sort, Quick Sort, Merge sort and Heap sort , Hashing , Hash function.

Graphs: Terminology & representation; Warshall algorithm; Shortest path; Minimum spanning tree; Kruskal & Dijkstara algorithm; Linked representation of graph; Operation on graph; Traversing a graph; poset.

Suggested Books:

- (1) Lipshutz, Data Structure, McGraw Hill.
- (2) Standish, Data Structure, Addison-Wesley.
- (3) A. M. Tennenbaum, Y. Langsam and M. J. Augenstein, Data Structures using C, PHI, 1991.
- (4) S. Lipschutz, Data Structure, Schaum Series.
- (5) Rajni jindal

MCA-103

Introduction to Programming Language Through 'C'

Basic Programming Concepts: Introduction to the basic ideas of problem solving and programming using principles of top-down modular design, Flowcharts, Compilation of a Program.

Introduction to Programming Language C: Data Types, Instruction and its Types, Storage Classes, Operators and Hierarchy of Operations, Expressions in C, Control and Repetitive Statements, break, continue, Functions: User Defined Functions and Library Functions, Local and Global Variables, Parameter Passing, Pointers, Arrays, Strings, C Preprocessors, Structures, Input and Output in C, C-Library.

Suggested Books:

1. A K Saxena , Programming Language C : Anamaya Publishers, New Delhi,
2. Cooper, Siprit of C: Jayco Publishers
3. Y. Kanetkar, Let Us C, BPB Publications.
4. B.S.Gottfried, Schaum's Outline of Theory and Problems of Programming with C, McGraw-Hill.
5. H.Schildt, C Made Easy, Osborne McGraw-Hill.

MCA-104

Computer Based Numerical Methods

Computer Arithmetic – Floating point Numbers- Operations Normalization and their consequences.

Iterative Methods – Roots of a Single transcendental equations and roots of Polynomials using Bisection Methods , False position Method , Newton Raphson Method, Comparison of iterative methods.

Interpolations – Polynomials interpolation Newton Method . Languages method and difference tables.

Least Square Approximations- Linear regression only.

Differentiation And Integration- Formula for Numerical Differentiation and Numerical integration (Trapezoidal Rule) and Simpson's rule only.

Numerical Solution of Differential Equation :- Euler's Method, Tylor series Method, Runge-Kutta Method

Suggested Books:

- 1 Numerical Methods By V. Rajaraman
- 2 Numerical Methods By S.S. Shastri

MCA-105**Digital Electronics**

Number System- Binary, Octal, and Hexadecimal number system, Conversion from one number system to another, Binary arithmetic, Representing negative numbers, BCD codes, ASCII codes, EBCDIC codes, Excess-three code, Gray code, Floating point representation, 1's complement and 2's compliment arithmetic representation of signed binary numbers.

Digital Devices: Logic Gates, Flip-Flops, Latches, Registers, Shift registers, Buffers/ Drivers, Encoders, Decoders, code converters, Counters, Multiplexer, De multiplexers.

Logic Design:- Boolean algebra, Minimum Boolean expression, Karnaugh map method of simplification of logic expression , Arithmetic circuits: Half-adder, Full- Adder, n-bit adder, Adder- subtractor, Multiplication of binary number.

Memory Unit -Elementary idea of semiconductor memories, ROM, PROM, EPROM, EEPROM, RAM, SRAMS, DRAMS, Memory cells A to D and D to A converters.

Application of electronics in computers: Register transfer logic, Processor Logic design, Control Logic design, Digital Integrated Circuits.

Suggested Books:

1. Digital Principle and Applications- By ALBERT PAUL, MALVINO AND LEECH (TMH)
2. Digital Logic and Computer Designing- By M.MORRIS MANO

MCA- 2ND SEMESTER

MCA-201

E- Commerce

Introduction, Definition, Objectives, Advantages and disadvantages, Forces driving E-Commerce, Traditional commerce Vs. E-Commerce, E-Commerce opportunities for industries, Growth of E-Commerce.

E-Commerce Models: Business to consumer, Business to Business, Consumer to Consumer, other models – Brokerage Model, Aggregator Model, Info-mediary Model, Community Model and value chain Model.

Electronic Payment Systems: Special features required in payment systems, Types of E-payment systems, E-Cash, E-cheque, credit card, Smart Card, Electronic Purses.

E-Marketing, E-Customer Relationship Management, E-Supply Chain Management.

Security Issues in E-Commerce: Security risk of E-Commerce, Types of threats, Security tools and risk management approach. Cyber laws, Business Ethics, IT Acts.

Suggested Books:

- (1) Bharat Bhaskar, Electronic Commerce – Frameroork Technologies and Applications, Tata McGraw Hill.
- (2) Ravi Kalakota & A.B. Whinston, Frontiers of Electronic Commerce, Pearson Education.
- (3) Ravi Kalakota & A.B. Whinston, Electronic Commerce – A Manager's Guide, Pearson Education.
- (4) Agarwala Kamlesh, N and Agarwala Deeksha, Business on the Net Introduction to the E-Com., Macmillan India.
- (5) P. T. Joseph, E-Commerce: A Managerial Perspective, PHI, 2002.

MCA-202**RDBMS with Oracle**

Overview of Database Management : Data processing versus data management , File oriented approach versus database oriented approach to data management ,Data independence , Database administration,DBMS architecture,Importance of data dictionary ,Contents of data dictionary,Data Models,Object oriented databases

Design Theory for Relational Database:E-R Model,Concept of Keys,Normalization, Functional Dependencies, Decomposition of Relation schemes, Normal Forms for Relations, Multivalued and other kinds of Dependencies.

Query Optimization: Simple SQL commands ,Basic Optimization Strategies, Algebraic Manipulation, Optimization of Selections in System, Exact Optimization for a Subset of Relational Queries, Optimization under Weak Equivalence.

Database Protection:Protecting the database- Integrity, Security and recovery Security in query-by-Example, Domain constraints,Referential integrity,Assertion,Triggers,Security and authorization in SQL.

Concurrent Operations on the Database: Basic Concepts, A simple Transaction Model, Model with Read-and Write-Locks, Read-only, Write-only Model, Concurrency for Hierarchically Structured Items, Protection against Crashes, Optimistic Concurrency Control.

Principles of Distributed Data Bases: Framework for distribution. Translation of global queries into fragment queries. Query optimization and management of distributed transaction. Concurrency control and reliability in distributed databases.,Administration of Distributed Data Bases.

Suggested Books:

- (1) Principles of Database Systems J.D.Ullman, Galgotia, New Delhi.
- (2) Database system concepts By H.Korth and A. Silberschatz ,TMH Publication
- (3) Distributed Databases ,S.Ceri and G. Relagatti, McGraw-Hill.
- (4) The Theory of Database concurrency Control C.Papadimitriou , , Computer Science Press.
- (5) Principles of Distributed Database Systems ,T. Ozsu and P. Valduriez, , Prentice-Hall.

MCA-203**Principles of Operating System**

Introduction: Definition, Design Goals, Evolution; Concept of User, job and Resources; Batch processing, Multi-programming, Time sharing; Structure and Functions of Operating System.

Process Management: Process states, State Transitions, Process Control block, Context Switching, Process Scheduling, Scheduling algorithm, Threads.

Inter process synchronization and communication : need ,Mutual exclusion ,semaphore, hardware support for mutual exclusion ,queuing implementation ,classical problem inconcurrent programming, critical region and conditional critical region, Monitors ,Messages, Deadlock

Memory Management (Contiguous and non contiguous) : Address Binding, Dynamic Loading and Linking Concepts, Logical and Physical Addresses, Contiguous Allocation, Fragmentation, Paging, Segmentation, Combined Systems, Virtual Memory, Demand Paging, Page fault, Page replacement algorithms, Global Vs Local Allocation, Thrashing, Working Set Model, Paging.

File and Secondary Storage Management: File Attributes, File Types, File Access Methods, Directory Structure, File System Organization and Mounting, Allocation Methods, Free Space management; Disk Structure, Logical and Physical View, Disk Head Scheduling, Formatting, Swap Management. Protection & Security., UNIX/ LINUX and WINDOWS as an example of Operating systems.

Suggested Books:

- (1) Silberschatz and Galvin, Operating System Concepts 6/ed, Addison Wesley.
- (2) William Stalling, Operating Systems: Internals and Design Principles 5/ed, PHI.
- (3) Tanenbaum, Modern operating Systems, PHI.
- (4) Peterson and Silberschatz, Operating System Concepts, Addison Wesley.
- (5) P. B. Hansen, Operating System Principles, PHI.
- (6) K. Christian, The UNIX Operating System, John Wiley.

MCA-204**Computer System Architecture**

Register Transfer and Micro Operation: Register transfer language, Bus and memory transfer, Arithmetic micro operation, Logic micro operation, Shift micro operation, Arithmetic logic shift unit

Computer Organization and Design: Instruction codes, Computer registers, Computer instructions, Timing and control, Instruction cycle, Memory reference instruction, I/O and interrupt, Design of basic computer and accumulator logic.

Programming Basic Computer: Machine language, assembly language, Assembler, Programming arithmetic and logic operation, I/O programming.

Control Unit and C.P.U: Micro programmed and hardwired control unit, General register organization of C.P.U, Stack organization, Instruction format, Addressing modes, Program control, RISC.

Pipeline and Vector Processing: Parallel processing, Pipelining, Arithmetic pipelining, Instruction pipeline, RISC pipeline, Vector processing, Memory interleaving, Array processor, multiprocessor.

Input-output Organization: Peripheral devices, I/O interfaces, Asynchronous Data transfer DMA, Priority interrupt, I/O processor, Multiprocessor system organization and Data communication processor.

Memory Organization: Auxiliary memory, Microcomputer, memory, Memory hierarchy, Associative memory, Virtual memory, Cache memory, Memory management hardware.

Suggested Books:

1. D. Sima, T. Fountain, P. Kacsuk, "Advanced Computer Architectures: A Design Space Approach", Addison Wesley, 1997.
2. J. Flynn, "Computer Architecture: Pipelined and Parallel Processor Design", Narosa Publishing House/ Jones
3. K. Hwang, "Advanced Computer Architecture: Parallelism, Scalability, Programmability", McGraw-Hill, Inc
4. Hwang and Briggs, "Computer Architecture and Parallel Processing, McGraw Hill.
5. B. Barnes, Modeling and Performance Measurement of Computer Systems, MIT Press.

MCA-205**Object Oriented Programming Through C++****Principal of OOP**

Procedure oriented Vs Object oriented, OOP paradigm, Features of OOP ,Basic Data types Tokens, Keywords, Constant ,Variables, Operator I/O statements , Structure of C++ program, Arrays, pointers, Object modeling technique (OMT)

Function, Object and Class

Defining class, Abstract class ,Function prototype, Function with parameter ,Passing object as a parameter, Constructor function ,Types of constructor, Destructor Friend function , Friend class, Dynamic allocation operator new and delete.

Polymorphism and Inheritance

Types of polymorphism, Constructor overloading ,Operator overloading, Template function Template class, Types of inheritance ,Private ,protected and public derivation of class ,Resolving ambiguity Pointer to object, This pointer ,Virtual class , virtual function

Input - output and File handling

I/O classes ,File and stream classes ,Opening and closing file Detecting end of file, String I/O, Char I/O, Object I/O, I/O with multiple object ,File pointer, Disk I/O.

Exception handling ,Name spaces and Standard Template library (STL)

Need of Exception handling ,try ,catch and throws keywords , defining namespace ,benefit of namespace, Component of STL.

Suggested Books:

1. C++ programming by E.Balagurusami
2. Mastering C++ by Venugopal
3. C++ Complete reference.
4. Object Oriented programming and C++ By R. Rajaram

MCA- 3RD SEMESTER

MCA-301

Introduction to JAVA

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.

Advance JAVA : JDBC- JDBC architecture, Establishing connection.

Servlet – Overview of servelet,Life cycle of servlet, JAVA servlet architecture , Generic servlet and http servlet ,The servlet interface, Request and response

Suggested Books:

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.

MCA- 302 Software Engineering

Overview of System Analysis & Design , Business System Concept, System Development Life Cycle, Waterfall Model , Prototyping Model, RAD Model Feasibility Analysis, Technical Feasibility, Cost- Benefit Analysis COCOMO model.

System Requirement Specification – DFD, Data Dictionary, ER diagram, Process Organization & Interactions.

System Design – Problem Partitioning, Top-Down And Bottom-Up design ;Decision tree, decision table and structured English; Functional vs. Object- Oriented approach. [5L]

S/W Quality Assurance : Quality Concepts, Matrix for Software Quality, Quality Movement, S/W Q A, S/W Review, Formal Technical Reviews, Formal Approaches to Sqa, S/W Reliability, ISO 9000quality Standards

S/W TESTING MODELS : S/W Testing Fundamentals, Test Case Design, White and Black Box Testing, Basic Path Testing, Control Structure

S/W TESTING STRATEGIES : Strategic Approach To S/W Testing, Unit Testing, Integration Testing, Validation Testing, System Testing, Debugging

COMPUTER AIDED S/W ENGINEERING: Introducing of Case, Building Block For Case, Taxonomy Of Case Tools, Integrating Case Environment, Integrating Architecture, Case Repository

- 1. R. G. Pressman – Software Engineering, TMH
- 4.Pankaj Jalote – An Integrated Approach to Software Engineering, NAROSA.
- 8.Sommerville, Ian – Software Engineering, Pearson Education

Reference:

- 1. IEEE Standards on Software Engineering.
- 2. Kane, Software Defect Prevention, SPD

Suggested Books:

- 1. Software Engineering – Pressman
- 2. Analysis and Design of Information System – James Seann
- 3. System Analysis and Design – Parthsarthy – Khalkar.

MCA-303

Artificial Intelligence

Introduction: Definitions and approaches, Foundations of A.I., History of AI, Areas and state of the art in A.I., A.I. Programming languages, Concept of Intelligent Agents.

Problem Solving: Problem solving as state space search, production system, control strategies and problem characteristics; Search techniques: Breadth First and Depth-first, Hill-climbing, Heuristics, Best-First Search

Knowledge Representation and Reasoning: Syntactic and Semantic representations, Predicate and propositional logic, Resolution, Unification, Semantic Net, Frames

Pattern Recognition : Meaning of pattern, Pattern Recognition, Classification, Supervised & Unsupervised Learning of classification , K-NN, K-MEANS,

Expert Systems: Introduction only

Suggested Books:

1. E. Rich and K. Knight, Artificial Intelligence, Tata McGraw Hill.
2. Nilsson, Artificial Intelligence: A New Synthesis, Morgan Kaufmann.
3. R.O. Duda, Hart, Stork (2001) Pattern Classification 2nd Edition, John wiley, New York.
4. Shinghal (2006) Pattern Recognition : Technique and Applications, Oxford University Press,New Delhi

MCA-304**Theory of Computation**

Theory of Automata: Definition of an automaton, Transition system, Acceptability of a string by FA, Nondeterministic finite state machine, equivalence of DFA and N DFA, Mealy and Moore models, Minimization of Finite Automata.

Formal Languages, Regular Sets and Regular Grammars: Definition, Languages and their relation, Chomsky classification of language, Recursive and recursive enumerable sets, Regular expression, and Finite automaton, Pumping Lemma for regular sets, Application of Pumping lemma, Closure property of regular sets, Regular sets and regular grammar.

Context-free Language: Context free language and derivation trees, ambiguity in context free languages, Simplification of context free languages: (left recursion, unit production elimination, eliminating null values), Normal forms of context free languages, Pumping lemma.

Pushdown Automation: Definition, Acceptance by pda, Push down automation and Context-free languages, Parsing and Pushdown automata.

Turing Machine: Turing Machines model, Representation of TM, Languages acceptability by TM , design of TM, Universal Turing Machines (UTM), Turing machine and type) grammars, Halting problem, Linear bounded automata and languages.

Suggested Books:

1. J.E.Hopcraft, R. Motwani and J.D. Ullman, "Introduction to Automata Theory, Languages and Computation", Pearson Education
2. Cohen, "Introduction to Computer Theory", John Wiley.
3. M. Sipser, Introduction to Theory of Computation, PWS Publishing Corporation, 1997.
4. J.E. Hopcroft, J.D. Ullman, Introduction to Automata Theory, Languages and Computation, Addison-Wisley, 1979.
5. T.C. Martin, Theory of Computation, Tata McGraw-Hill
6. H.R. Lewis, C.H. Papadimitrou, Elements of the Theory of Computation, PHI.

MCA-305**Computer Networks****Introduction**

Goal and application Network Hardware and Software , Protocol Hierarchies, Design Issue of the layers, Interfaces and services, Connection oriented and connection less services, Service Primitives,

Reference Models – The OSI Reference model, The TCP/IP Reference Model ,Types of computer Network :LAN,MAN,WAN, Topologies, Transmission mode .

Physical Layer

Transmission Media ,Concept of data transmission

Switching Techniques ,Communication Satellites – Geosynchronous Satellite – VSAT, Low Orbit Satellites, ISDN and ATM.

Data Link Layer

Data Link Layer design issues ,Framing, Flow control, Error Detection and Correction

DLC protocol :Stop and Wait Protocol, Sliding window protocol, A Simplex protocol for noisy channel, Medium access sublayer: Channel allocation –static and dynamic ,Multiple access protocol FDDI, Data Link Layer in the Internet – SLIP,PPP.

Network Layer

The Network Layer Design Issue, comparison of virtual circuits and datagram subnets, connectionless internetworking, Tunnelling, Internetwork routing,Routing algorithm , Fragmentation, The Network Layer in the Internet – The IP Protocol, IP Address, subnets, Internet control protocols, internet multicasting.

Transport Layer

The Transport layer services, The concept of client and server in terms of socket addressing Quality of service, Transport service primitives and buffering, Multiplexing, Crash Recovery.

The Internet Transport Protocols (TCP/IP) – The TCP Service Model, The TCP protocol, The TCP segment header, TCP connection management, TCP transmission policy, TCP congestion control, TCP timer management, UDP.

Presentation and Application Layer

Network Security – Traditional Cryptography, Two fundamental Cryptographic Principles, Secret Key Algorithms, Authentication protocols,DNS ,SNMP,E-mail.

Suggested Readings :

1. Computer Networks : A.S. Tanenbaum
2. Data Communications and Networking : Forouzan, Tata McGraw Hill Company
3. Computer Network By S.S.Shinde ,New Age International Publisher.
4. Data and computer Communication by Shashi banzal ,Firewall media .

MCA- 4TH SEMESTER

MCA-401

Design Methods and Analysis of Algorithms

Basic: Algorithm analysis, Analyzing algorithms, Worst- case and Average case Analysis, Asymptotic Notations, Recurrence: substitution method, master method.

Design Methods : General Consideration, Algorithm design paradigms and representative problems.

Divide and Conquer: Binary search, Merge sort, Quick sort, Arithmetic with large integers, etc.

Greedy Method: Minimal spanning tree, Shortest Paths, Knapsack, etc.

Dynamic Programming: Chained matrix multiplication, Optimal storage on tapes, Shortest paths, Optimal search trees, etc.

Backtracking 8-queens problem, Graph colouring, Hamiltonian cycles, etc.

Branch and Bound: 0/1 Knapsack problem, Traveling salesperson, etc.)

Approximation (Graph colouring, Task scheduling, Bin packing, etc.)

Probabilistic Algorithms (Numerical integration, Primality testing, etc.).

Graph Algorithms: BFS, DFS and its applications.

Intractable Problems : Basic concepts, Nondeterministic algorithms, NP Completeness, Cook's theorem, Examples of NP-Hard and NP-Complete problems, Problem reduction.

Lower Bound Techniques: Comparison tree, Reduction, Adversary argument.

Suggested Books:

- (1) A.Aho, J. Hopcroft and J.Ullman, The Design and Analysis of Computer Algorithms, Addison Wesley.
- (2) E. Horowitz and S. Sahani, Fundamentals of Computer Algorithms, Galgotia, New Delhi.
- (3) S.E.Goodman and S.T.Hedetniemi, Introduction to the Design and Analysis of Algorithms, McGraw Hill.
- (4) G.Brassard and P.Bratley, Algorithmics, PHI.
- (5) S.K.Basu, Design Methods and Analysis of Algorithms, PHI, 2005.

MCA-402**Compiler Construction**

Basics: Compilers and Translators, Bootstrap compiler, Phases of Compiler, compiler writing tools, Bootstrapping, overview of one pass compiler.

Finite Automata and Lexical Analysis: Basics of DFA, NFA, regular sets and regular expressions.

syntax analysis & parsing techniques: Basics of context free grammars and derivation of parse trees, top down parsing and its implementation, Operator precedence parsing, predicative top down parser, Bottom up parsing, Handel of right sentential form, LR parser, Canonical collection of sets, Construction of parsing action and GOTO table, construction of LALR parsing table, Handling ambiguous grammar.

Syntax directed definition and Translation: L-attributed definition, syntax directed translation scheme, Intermediate code generation, Representing three address statements, syntax directed translation scheme to specify the translation of various programming language construct, Implementing increment and decrement operators, array reference, switch/case, procedure call.

Symbol table management & storage management: Various approaches to symbol table organization, representation of scope information in symbol table, storage allocation activation of procedure and record, static allocation and stack allocation.

Error Handling: Error recovery, recovery from lexical phase, recovery from syntactic phase, error recovery in LR parsing, Predicative parsing error recovery.

Code Optimization: Introduction, Loop optimization, eliminating induction variable, eliminating local common sub expression, DAG, Eliminating global common sub expression, loop unrolling, loop jamming.

Code Generation: Problems hindering code generation, straight forward code generation, using DAG for code generation, peephole optimization.

Suggested Books:

- (1) Aho, Ullman and Sethi, Principles of Compiler Design, Addison Wesley.
- (2) J. P. Trembley and P. G. Sorensen, The Theory and Practice of Compiler Writing, McGraw Hill.
- (3) Holub, Compiler Design in C, PHI.

MCA-403**Web Technology****Internet Concept:**

Fundamental of Web ,History of Web, Web development overview, Domain Name System (DNS), DHCP,and SMTP and other servers ,Internet service provider (ISP), Concept of IP Address, Internet Protocol, TCP/IP Architecture and protocol (IP) ,Web Browser and Web Server.

HTML and DHTML

HTML Tag, Rules of HTML, Text Formatting & Style, List, Adding Graphics to Html Document, Tables and Layout , Linking Documents, Frame, Forms, Project in HTML, Introduction to DHTML, CSS, Class & DIV, External Style Sheet.

Scripting Languages

Java Script (JS) in Web Page, Advantage of Java Script, JS object model and hierarchy ,Handling event , Operators and syntax of JS, Function, Client side JS Vs Server side JS ,JS security Introduction to VB Script, Operator & Syntax of VB Script, Dialog Boxes, Control & Loop, Function in VBS.

XML

Introduction to XML, XML in Action, Commercial Benefits of XML, Gaining Competitive advantage with XML, Programming in XML, XML Schema ,XSLT ,DOM structure model ,XML quires and transformation .

Active Server Page (ASP)

Introduction ,Internet Information System (IIS),ASP object ,Server object File system object ,session ,Accessing data base with an ASP page ,ODBC – ADO connection object, common methods and properties ,ADO record set object .

Suggested Books::

1. The complete Reference By Thomos A. Powell ,TMH publication
2. XML By Example, Sean Mc Grath Pentice Hall Publication
- 3.Java Script :The definite Guide By Flangam .O'
- 4."Introduction to XML" IDG Publication
- 5."Mastering VB Script" BPB Publication

MCA-404

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 & Design :Systems Development Initiative, Different Methodologies - Life Cycle & Prototype approach, Detailed study on Life Cycle Design & 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.

Suggested Books:

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

MCA-405

Operation Research

Introduction to OR, The Nature and Meaning of OR, History, Management Applications of OR Modeling, Principles, Characteristics, Scope of OR. Development of OR In India. Role of Computers in OR.

Linear Programming-Introduction and Applications of LP, Limitations of LP Formulation of a LP Model, Graphical Solution of a LPP, Simplex Method, Two Phase Method, Big-M Method.

Transportation Problem – Introduction, Mathematical Formulation, Feasible Solution and Optimum Solution.

Assignment Problem – Introduction, Mathematical Formulation, Traveling Salesman Problem.

Replacement Problems- Capital Equipment, Discounted Cost, Replacement in Anticipation of Failure.

Project Management by PERT-CPM – Introduction, History & Applications, Basic Steps, Network Diagram Representation, Rules, Time Estimates and Critical Path in Network Analysis, Uses and Applications of PERT/CPM.

Suggested Books:

1. Operations Research: H.A.Taha
2. Operations Research: V.K.Kapoor

MCA- 5TH SEMESTER

MCA-501 Computer Graphics

Basics: origin of graphics, working of interactive graphics, Random scan methods, Raster scan methods, Pixels and frame buffer, color display techniques, Graphics Primitives, Display file structure.

Output primitives: Points & lines, Line drawing DDA algorithm, Bresenham's line drawing algorithm, circle generation algorithm, Character generation, text display, filling polygon.

Display description: Line and polygon clipping, Viewing algorithms- Windows and viewpoints, windowing, zooming and panning, Homogeneous co-ordinate, Two dimensional and three dimensional transformation, Concatenation.

Interactive Graphics: CRT, graphical input devices, Graphical input techniques, event handling, input functions

Segmented display file: Segments, functions for segmenting the display file, posting and un posting a segment, segment naming schemes, appending to segment.

Three dimensional graphics: Geometric models, Introduction to realism, perspective depth, Introduction to shading and illumination: Phong shading, Gouraud shading, Projection, Types of projection

Hidden Surface elimination: Back face removal and algorithm, Depth buffer algorithm, Area Subdivision algorithm, Scan line algorithm

Curves and surfaces: Parametric functions, Cubic spline Bezier methods, B- Spline Methods, displaying curves and surfaces.

Suggested Readings:

1. R. Steinmetz and K. Nahrstedt, Multimedia: Computing, Communications and Applications, Prentice Hall P T R, 1995.
2. Computer Graphics (Principles and Practice) by Foley, van Dam, Feiner and Hughes, Addison Wesley (Indian Edition)
3. Computer Graphics by D Hearn and P M Baker, Prentice Hall of India (Indian Edition).
Mathematical Elements for Computer Graphics by D F Rogers

MCA-502

Soft Computing Techniques

Introduction to Genetic Algorithm, Genetic Operators and Parameters, Genetic Algorithms in Problem Solving, Theoretical Foundations of Genetic Algorithms, Implementation Issues.

Neural Model and Network Architectures, Perceptrons Learning, Supervised Hebbian Learning, Back propagation, Associative Learning, Competitive Networks, Hopfield Network, Computing with Neural Nets and applications of Neural Network.

Introduction to Fuzzy Sets, Operations on Fuzzy sets, Fuzzy Relations, Fuzzy Measures, Applications of Fuzzy Set Theory to different branches of Science and Engineering.

Suggested Books:

- (1) M. Mitchell, An Introduction to Genetic Algorithms, Prentice-Hall, 1998.
- (2) D. E. Goldberg, Genetic Algorithms in Search, Optimization, and Machine Learning, Addison-Wesley, 1989.
- (3) N.K. Sinha & M. M. Gupta(Eds), Soft Computing & Intelligent Systems: Theory & Applications, Academic Press, 2000.
- (4) M.T. Hagan, H. B. Demuth, And M. Beale, Neural Network Design, Thompson Learning, 1996.
- (5) Simon Haykins : A Comprehensive Foundation to Neural Networks, Prentice Hall
- (6) G. J. Klir, and B. Yuan, Fuzzy Sets and Fuzzy Logic: Theory and Applications, Prentice-Hall, 1995.

MCA-503

Data Mining

Meaning of Data Mining

Data Mining on different types of databases

Relational ,Data Warehouses ,Transactional ,Object oriented, Object relational, Spatial ,
Temporal and time series, Text and multimedia (i) Heterogeneous and legacy

Meaning of Data Warehouse

Data Preprocessing

Noisy data, Inconsistent data, Data integration, Data transformation, Data cube, Dimensionality
reduction, Data compression, Clustering and discretization.

Classification and Prediction

Meaning ,Classification by decision tree induction, Neural networks, Fuzzy sets, K-nearest
neighbor classifiers, Genetic Algorithms

Suggested Books:

1. Data Mining: Concepts and Techniques - Jiawei Han, Micheline Kamber, Morgan Kaufmann, Harcourt India 2001.
2. Data Mining Methods for Knowledge Discovery - Cios, Pedrycz, Swiniarski, Kluwer Academic Publishers, London - 1998

MCA-504 Network Security

Foundations of Cryptography and security:

Security trends, The OSI Security architecture Security attack, services and mechanism Ciphers and secret messages, Mathematical tools for cryptography: substitution techniques, modular arithmetic, Euclid's algorithm, finite fields, polynomial arithmetic.

Symmetric Cipher

Symmetric cipher model, Design Principles of Block Ciphers, Theory of Block Cipher Design, Feistel cipher network structure, Data Encryption Standard (DES), Strength of DES Triple DES , Modes of operation.

Advance encryption Standard (AES)- Evaluation criteria of AES, AES cipher ,key distribution.

Public Key cryptography and Hash function

Prime numbers and testing for primality, factoring large numbers, Principles of public key cryptosystem , RSA algorithm. Key management: Diffi-Helman Key exchange, elliptic curve arithmetic, elliptic curve cryptography, Hash and Message authentication Code (MAC), Hash and MAC algorithms, Digital signature and Authentication protocol.

IP and Web security protocols:

Authentication application 400, E-mail security , IP security and virtual private networks, secure socket layer and transport layer security. System security, Firewall and Intrusion Detection system (IDS)

Suggested Books:

1. William Stallings, Cryptography and Network Security, Pearson 2004
2. Bruce Schneier., Applied cryptography - protocols and algorithms, Springer Verlag 2003

MCA-505

Advanced Course in Operating System (OS -II)

Distributed Systems, Communication in distributed systems, processes and processors in distributed systems. Threads, systems Models, Process allocation, scheduling in distributed systems, fault tolerance, real-time distributed systems.

Theoretical issues in distributed systems: Logical clock, mutual exclusion, deadlock detection, agreement protocols, resource security and protection, concurrency control.

Distributed File System: Design and implementation, trends.

Distributed shared Memory, consistency models, page-based distributed shared memory, shared variable distributed shared memory, object-based distributed shared memory.

Multiprocessor OS, Database OS: General features and theoretical issues.

Case Studies: Amoeba, Mach, chorus, DCE, etc.

Multimedia Operating Systems: Process scheduling, File system, caching, Disk scheduling for multimedia.

Suggested Books

1. A.S. Tanenbaum, Distributed Operating System, Prentice-Hall, 1995.
2. A.S. Tanenbaum, Modern Operating Systems, Pearson Education Asia, 2001.
3. M. Singhal and N. G. Shivaratri, , Advance Concepts in Operating Systems, McGraw-Hill, 1994.
4. J. W. S. Liu, Real-Time Systems, Pearson Education, 2000.

MCA- 6TH SEMESTER

MCA-601 Major Project (Viva Voce)

Abbreviations

E.S.E. End Semester Examination

IA Internal Assessment

Test Class Test

L :- Lecture T :- Tutorial P :- Practical

Signature Faculty Members

Dr. Ashish Rastogi : -----

Dr. H.S. Hota : -----

Mrs. P.L. Pujari : -----

Date: 03 September 2009

HEAD

Dr. (Prof.) A.K. Saxena