Master of Computer Applications (MCA) Regular Programme
Syllabus and Scheme of Examination
w.e.f. 2009-10
MCA First Year
Semester-I

Paper Code	Course	Course Requirements (Hrs)	University Exams	Internal Assessment	Total
MCA-101	Mathematical Foundation of Computer Science	5	75	25	100
MCA-102	Computer Fundamentals & Programming in C	5	75	25	100
MCA-103	Digital Design	5	75	25	100
MCA-104	Internet and Web Designing	4	75	25	100
MCA-105	Object Oriented Programming Using C++	5	75	25	100
MCA-106	Software Lab-1 i) Programming in C ii) Web Programming Using HTML	8	75	25	100
MCA-107	SoftwareLab-2 i) Programming in C++ ii) Use of MS-Office	8	75	25	100
MCA-108	Soft skills-I	2	-	25	25
	Total	**42**	**525**	**200**	**725**

*Practical Examination of MCA-106 & 107 may be conducted on the same day in 2 sittings each maximum of 4 hours.

Semester-II

Paper Code	Course	Course Requirements (Hrs)	University Exams	Internal Assessment	Total
MCA-201	Data Structures	5	75	25	100
MCA-202	Computer Organisation & Architecture	4	75	25	100
MCA-203	Computer Based Management System & E-Commerce	5	75	25	100
MCA-204	Data Base Management Systems	5	75	25	100
MCA-205	Principles of System Programming & Compiler Design	5	75	25	100
MCA-206	Software Lab-3 i) Data Structure implementation in C/C++ ii) Programming in 8086/88/80x6 Assembly	8	75	25	100
MCA-207	Software Lab-4 i) Oracle & SQL Prog. ii) System Programming Using C/C++	8	75	25	100
MCA-208	Soft skills-II	2	-	25	25
	Total	**42**	**525**	**200**	**725**

*Practical Examination of MCA-206 & 207 may be conducted on the same day in 2 sittings each maximum of 4 hours.

MCA Second Year
Semester-III

Paper Code	Course	Course Requirements (Hrs)	University Exams	Internal Assessment	Total
MCA-301	Computer Graphics & Multimedia	5	75	25	100
MCA-302	Operating Systems	5	75	25	100
MCA-303	Artificial Intelligence & Expert Systems	5	75	25	100
MCA-304	Data Communication & Computer Networks	5	75	25	100
MCA-305	Object Technology	4	75	25	100
MCA-306	SoftwareLab-5 i) Graphics Programming in C/C++. ii) Use of MatLab iii) PROLOG Programming	8	75	25	100
MCA-307	SoftwareLab-6 i) Java Programming	8	75	25	100
	Total	**40**	**525**	**175**	**700**

*Practical Examination of MCA-306 & 307 may be conducted on the same day in 2 sittings each maximum of 4 hours.

Semester-IV

Paper Code	Course	Course Requirements (Hrs)	University Exams	Internal Assessment	Total
MCA-401	Advanced Java Programming	5	75	25	100
MCA-402	Data Warehousing & Mining	5	75	25	100
MCA-403	Software Engineering	5	75	25	100
MCA-404	Advanced Database Systems	5	75	25	100
MCA-405	Visual Languages Programming	4	75	25	100
MCA-406	SoftwareLab-7 i) Advance Java Programming	8	75	25	100
MCA-407	Software Lab-8 i) Visual Programming Using VB ii) ADS (Working with MS SQL Server)	8	75	25	100
MCA-408	Minor Project-I	2	-	25	25
	Total	**42**	**525**	**200**	**725**

*Practical Examination of MCA-406 & 407 may be conducted on the same day in 2 sittings each maximum of 4 hours.

MCA Third Year
Semester-V

Paper Code	Course	Course Requirements (Hrs)	University Exams	Internal Assessment	Total
MCA-501	Advanced Technology	5	75	25	100
MCA-502	Software Testing & Quality Assurance	5	75	25	100
MCA-503	Windows Programming & Visual C++	5	75	25	100
MCA-504	Elective – I* Soft Computing	4	75	25	100
MCA-505	Elective – II* Computer Security	5	75	25	100
MCA-506	Software Lab-9 i) .NET Programming Using C# and/or VB.NET	8	75	25	100
MCA-507	Software Lab-10 i) Windows Programming Using Visual C++	8	75	25	100
MCA-508	Minor Project-II	2	-	25	25
	Total	**42**	**525**	**200**	**725**

*Practical Examination of MCA-506 & 507 may be conducted on the same day in 2 sittings each maximum of 4 hours.

Semester-VI

Paper Code	Course	Course Requirements (Hrs)	University Exams	Internal Assessment	Total
MCA-601	Major Project	24	375	125	500
	Grand Total of 3 Years		**3000**	**1100**	**4100**

ELECTIVE – I*

At present only 'Soft Computing' course (MCA-504) is being offered under Elective-I but depending upon the availability of expertise and the required infrastructure determined by the University, any one of the following subjects could be offered in place of 'Soft Computing'.
-    i)   Simulation and Modeling
-    ii)   Theory of Computation
-    iii)   Unix and Network Programming
-    iv)   Enterprise Resource Planning
-    v)   Object Oriented Analysis and Design
-    vi)   Analysis & Design of Algorithms
-    vii)   Multimedia and Its Applications
-    viii)   Distributed Computing

ELECTIVE – II*

At present only 'Computer Security' course (MCA-505) is being offered under Elective-II but depending upon the availability of expertise and the required infrastructure determined by the University, any one of the following subjects could be offered in place of 'Computer Security'.
-    i)   Digital Image Processing
-    ii)   Software Project Management
-    iii)   Embedded Systems
-    iv)   Bio-Informatics
-    v)   Mobile Computing
-    vi)   Neural Networks
-    vii)   Perl Programming

Semester –I

MCA-101: MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

Max. Marks: 75
Time: 3 Hrs.

Note:

There shall be 8 questions in all, 2 from each Unit and carrying equal marks, and the candidate will be required to attempt 5 questions in all selecting at least one from each Unit.

Unit – I

Relation: Relations, Properties of Binary relation, Matrix representation of relations, Closures of relations, Equivalence relations, Partial order relation. **Function:** Types, Composition of function, Recursively defined function.

Algebraic Structures: Properties, Semi group, Monoid, Group, Abelian group, Subgroup, Cyclic group, Cosets, Normal Subgroups, Lagrange's Theorem, Permutation groups.

Unit – II

Propositional Logic: Prepositions, logical operations, Tautologies, Contradictions, Logical implication, Logical equivalence, Normal forms, Theory of Inference and deduction. Predicate Calculus: Predicates and quantifiers. Mathematical Induction.

Unit – III

Lattices and Boolean Algebra: Introduction, Partially Ordered Set, Hasse diagram, Well ordered set, Lattices, Properties of lattices, Bounded lattices, Complemented and Distributive lattices, Boolean Algebra.

Unit – IV

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

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

Suggested Readings:

1. C.L.Liu: Elements of Discrete Mathematics, McGraw Hill.
2. Lipschutz, Seymour: Discrete Mathematics, Schaum's Series
3. Babu Ram: Discrete Mathematics, Vinayek Publishers, New Delhi.
4. Trembley, J.P & R. Manohar: Discrete Mathematical Structure with Application to Computer Science, TMH.
5. Kenneth H. Rosen: Discrete Mathematics and its applications, TMH.
6. Doerr Alan & Levasseur Kenneth: Applied Discrete Structures for Computer Science, Galgotia Pub. Pvt. Ltd.
7. Gersting: Mathematical Structure for Computer Science, WH Freeman & Macmillan.
8. Hopcroft J.E, Ullman J.D.: Introduction to Automata theory, Languages and Computation, Narosa Publishing House, New Delhi.
9. Any other book(s) covering the contents of the paper in more depth.

Note: Latest and additional good books may be suggested and added from time to time.

MCA-102: COMPUTER FUNDAMENTALS & PROGRAMMING IN C

Max. Marks: 75
Time: 3 Hrs.

Note:

There shall be 8 questions in all, 2 from each Unit and carrying equal marks, and the candidate will be required to attempt 5 questions in all selecting at least one from each Unit.

Unit-I

Evolution of information processing: Concept of data and information, data processing. Hardware – CPU, Storage Devices & Media, VDU, Input – Output, Devices, Type of Software – System Software, Application Software. Overview of OS. Programming Languages and its Classification, Compiler, Interpreter, Linker, Loader.

Range of Applications: Scientific, business, educational, industrial, weather forecasting, remote sensing, planning, multilingual applications. Social concerns of Computer Technology: Positive and Negative Impacts, Computer Crimes, Viruses and their remedial solutions.

Unit-II

Problem Solving: Problem Identification, Analysis, flowcharts, Decision Tables, Pseudo codes and algorithms, Program Coding, Program Testing and Execution.

C Programming:
Concept of variables and constants, structure of a C program. Operators & Expressions: Arithmetic, Unary, Logical, Bit-wise, Assignment & Conditional Operators, Library Functions, Control Statements : while, do..while, for statements, Nested loops, if..else, switch, break, continue and goto statements, Comma operator.

Unit-III

Functions: Defining & Accessing : Passing arguments, Function Prototype, Recursion, Use of Library Functions, Storage Classes: Automatic, External and Static Variables (Register), Arrays: Defining & Processing, Passing to a function, Multidimensional Arrays.
String: Operations of Strings (String handling through built-in & UDF: Length, Compare Concatenate, Reverse, Copy, Character Search using array)
Pointers: Declarations, Passing to a function, Operations on Pointers, Pointers & Arrays, Array of Pointer, Pointer Arithmetic, Array accessing through pointers, Pointer to structure, Pointer to functions, Function returning pointers, Dynamic Memory Allocations.

Unit-IV

Structures: Defining & Processing, Passing to a function, Unions (Array within structure, Array of structure, Nesting of structure, Passing structure and its pointer to UDF, Introduction to Unions and its Utilities)
Data Files: Open, Close, Create, Process Unformatted Data Files. (Formatted Console I/O functions, Unformatted Console I/O functions, Modes Of Files, Use Of fopen(), fclose(), fgetc(), fputc(), fgets(), fprintf(), fscanf(), fread(),fwrite(), Command Line Arguments).

Documentation, debugging, C Processors, Macros. Examples illustrating structured program development methodology and use of a block structured algorithmic language to solve specific problems.

Suggested Readings

1. Kenneth.A.: C problem solving and programming, Prentice Hall.
2. Gottfried, B.: Theory and problems of Programming in C, Schaum Series.
3. Gill, Nasib Singh: Essentials of Computer and Network Technology, Khanna Books Publishing Co., New Delhi.
4. Sanders, D.: Computers Today, Tata McGraw-Hill.
5. Rajender Singh: Application of IT to Business, Ramesh Publishers.
6. Cooper, Mullish :The spirit of C, An Introduction to Modern Programming, Jaico Publ. House, New Delhi.
7. Kerninghan & Ritchie: The C Programming Language, PHI.
8. Gottfried, B.: Theory and problems of Programming in C, Schaum Series.
9. E. Balaguruswamy: Programming in C, Tata McGraw Hill.
10. H. Schildt: C-The Complete Reference, Tata McGraw Hill.
11. Y. Kanetkar: Let us C, BPB Publication
12. Any other book(s) covering the contents of the paper in more depth.

Note: Latest and additional good books may be suggested and added from time to time.

MCA-103: DIGITAL DESIGN

Max. Marks: 75
Time: 3 Hrs.

Note:

There shall be 8 questions in all, 2 from each Unit and carrying equal marks, and the candidate will be required to attempt 5 questions in all selecting at least one from each Unit.

Unit-I

Number System: Binary, Octal, Hexadecimal and Decimal, 1's and 2's Complements, Inter-conversion of numbers. Codes: BCD Code, Excess -3 Code, Gray code, Alphanumeric Codes, Parity Bits, Hamming Code, Floating Point Numbers.

Binary Arithmetic: Basic Rules of Binary Addition and Subtraction, Addition and Subtraction Using 2's Complement Method, Binary Multiplicity – repeated Left Shift and Add Algorithm, Binary Divison – Repeated Right Shift and Subtract Algorithm.

Unit-II

Positive and Negative Logic, Truth Tables, Logic Gates, Fan out of Logic Gates, Logic Families, TTL Logic Family, CMOS Logic Family, ECL Logic Family, NMOS and PMOS Logic Families.

Boolean Algebra vs. Ordinary Algebra, Boolean Expressions- Variables and Literals, Boolean Expressions–Equivalent and Complement, Theorems of Boolean Algebra, Minimisation Techniques, SOPs & POSs Boolean Expressions, Quine- McCluskey Tabular Method, Karnaugh Map Method.

Unit-III

Combinational Circuits, Implementing Combinational Logic, Arithmetic Circuits –Basic Building Blocks, Adder- Subtractor, BCD Adder, Magnitude Comparator, Parity Generator and Checker, De-multiplexers and Decoders, Encoders, Read Only Memory (ROM), Programmable Logic Array (PLA).

R-S Flip Flop, Level Triggered and Edge Triggered Flip Flops, J.K Flip Flop, Master-slave Flip Flops, T-flip Flop, D-flip Flop, Synchronous and Asynchronous Inputs.

Unit-IV

Ripple Counter vs. Synchronous Counter, Modulus of a Counter, Propagation Delay in Ripple Counters, Binary Ripple Counters, Up/Down Counters, Decade and BCD Counters , Pre-settable Counters, Shift Register, Controlled Shift Registers.

RAM Architecture, Static RAM (SRAM), Dynamic RAM (DRAM)

Suggested Readings

1. Mano, M.M.: Digital Logic and Computer Design, Prentice-Hall of India.
2. Gill, Nasib Singh and Dixit J.B: Digital Design and Computer Organisation, University Science Press (Laxmi Publications), New Delhi.
3. Stallings, William: Computer Organisation & Architecture.
4. Mano, M.M.: Digital Design, Prentice-Hall of India.
5. Anand Kumar: Fundamentals of Digital Circuits, PHI.
6. Tokheim: Digital Electronics, TMH.
7. S. Rangnekar: Digital Electronics, ISTE/EXCE.L
8. Any other book(s) covering the contents of the paper in more depth.

Note: Latest and additional good books may be suggested and added from time to time.

MCA–104: INTERNET AND WEB DESIGNING

Max. Marks: 75
Time: 3 Hrs.

Note:

There shall be 8 questions in all, 2 from each Unit and carrying equal marks, and the candidate will be required to attempt 5 questions in all selecting at least one from each Unit.

Unit-I

Introduction to Internet, Internet Services, WWW, Working of Internet, Internet Connection Concepts, Introduction to Intranet, DNS working, Configuring Internet Connection, Connecting LAN to Internet.

Single User, Multi User, Server, Workstation, Client-Sever environment, Computer Network, Types of Computer Network: LAN, WAN, MAN; Network Topologies. Network Protocols, Windows and GUI.

E-Mail Concepts – Configuring E-Mail Program, Sending and Receiving Files through E-Mail, Fighting Spam, Sorting Mail, and avoiding E-Mail viruses.

Unit-II

Web Browsers, Search Engines, Categories of Search Engines, Searching Criterion, Surfing the Net, Hypertext Transfer Protocol (HTTP), URL. Other Internet Tools.

Online Chatting, Messaging, and Conferencing Concepts, E-Mail mailing lists, Usenet newsgroup concepts – Reading usenet newsgroups, Internet Relay Chat, Instant messaging, Web-Based chat rooms and discussion boards, Voice and Video conferencing.

Streamlining Browsing, Keeping track of Favorite Web Sites, Web Security, Privacy, and Site-Blocking. Searching the Web – Audio and Video on the Web.

Unit-III

HTML: Internet Language, Understanding HTML, Create a Web Page, Linking to other Web Pages, Publishing HTML Pages, Text Alignment and Lists, Text Formatting Fonts Control, E-mail Links and link within a Page, Creating HTML Forms.

Unit-IV

Creating Web Page Graphics, Putting Graphics on a Web Page, Custom Backgrounds and Colors, Creating Animated Graphics.
Web Page Design and layout, Advanced Layout with Tables, Using Style Sheets.

Suggested Readings:

1. Dick Oliver: Tech Yourself HTML 4 in 24 Hours, Techmedia.
2. Satish Jain: "O" – Level Information Technology,
3. Craig Zacker: 10 minutes Guide to HTML Style Sheets, PHI.
4. V.K. Jain: "O" – Level Information Technology, BPB Publications.
5. Gill, Nasib Singh: Essentials of Computer and Network Technology, Khanna Books Publishing Co., New Delhi.
6. Margaret Levine Young: Internet – The Complete Reference
7. Harley Hahn: The Internet – Complete Reference, TMH.
8. Any other book(s) covering the contents of the paper in more depth.

Note: Latest and additional good books may be suggested and added from time to time.

MCA-105: OBJECT ORIENTED PROGRAMMING USING C++

Max. Marks: 75
Time: 3 Hrs.

Note:

There shall be 8 questions in all, 2 from each Unit and carrying equal marks, and the candidate will be required to attempt 5 questions in all selecting at least one from each Unit.

Unit-I

Introduction to object oriented programming, user defined types, polymorphism, and encapsulation. Getting started with C++ - syntax, data-type, variables, strings, functions, exceptions and statements, namespaces and exceptions, operators. Flow control, functions, recursion. Arrays and pointers, structures.

Unit-II

Abstraction Mechanisms: Classes, private, public, constructors, destructors, member functions, static members, references etc. Class hierarchy, derived classes.

Inheritance: simple inheritance, polymorphism, object slicing, base initialization, virtual functions.

Unit-III

Prototypes, linkages, operator overloading, ambiguity, friends, member operators, operator function, I/O

operators etc. Memory management: new, delete, object copying, copy constructors, assignment operator, this Input/output.

Exception handling: Exceptions and derived classes, function exception declarations, Unexpected exceptions, Exceptions when handling exceptions, resource capture and release etc.

Unit-IV

Templates and Standard Template library: template classes, declaration, template functions, namespaces, string, iterators, hashes, iostreams and other type.

Design using C++ design and development, design and programming, role of classes.

Suggested Books:

1. Herbert Schildt: C++ - The Complete Reference, Tata McGraw Hill Publications
2. Balaguru Swamy: C++, Tata McGraw Hill Publications.
3. Balaguruswamy: Object Oriented Programming and C++, TMH.
4. Shah & Thakker: Programming in C++, ISTE/EXCEL.
5. Johnston: C++ Programming Today, PHI.
6. Olshevsky: Revolutionary Guide to Object Oriented Programming Using C++, SPD/WROX.
7. Object Oriented Programming and C++, R.Rajaram, New Age International.
8. Samanta: Object Oriented Programming with C++ & JAVA, PHI.
9. Subburaj: Object-Oriented Programming with C++, VIKAS.
10. Any other book(s) covering the contents of the paper in more depth.

Note: Latest and additional good books may be suggested and added from time to time.

MCA-201: DATA STRUCTURES

Max. Marks: 75
Time: 3 Hrs.

Note:

There shall be 8 questions in all, 2 from each Unit and carrying equal marks, and the candidate will be required to attempt 5 questions in all selecting at least one from each Unit.

Unit-I

Introduction to Algorithm Design and Data Structures: Design and analysis of algorithm: Algorithm definition, comparison of algorithms. Top down and bottom up approaches to Algorithm design. Analysis of Algorithm; Frequency count, Complexity measures in terms of time and space. Structured approach to programming.

Unit-II

Arrays: single and multidimensional arrays. Address calculation using column and row major ordering. Various operations on Arrays. Vectors. Application of arrays: Matrix multiplication, Sparse polynomial representation and addition,

Stacks and Queues: Representation of stacks and queues using arrays and linked-list. Circular queues, Priority Queue and D-Queue. Applications of stacks: Conversion from infix to postfix and prefix expressions, Evaluation of postfix expression using stacks.

Unit-III

Linked list: Singly linked list; operations on list, Linked stacks and queues. Polynomial representation and manipulation using linked lists. Circular linked lists, Doubly linked lists.

Binary tree traversal methods: Preorder, In-order, Post-ordered traversal. Recursive Algorithms. Traversal methods. Representation of trees and its applications: Binary tree representation of a general tree. Conversion of forest into tree. Threaded binary trees. Binary search tree: Height balanced (AVL) tree, B-trees.

Unit-IV

Sorting: Selection sort, Insertion sort, Bubble sort, Quick sort, merge sort, Heap sort, Radix sort and their complexity, Searching: Sequential search, Binary Search, Binary Search Tree, ASVL trees, B trees, Searching , sorting and complexity, Searching: Sequential and binary searches, Indexed search, Hashing Schemes. Comparison of time complexity.

Graph representation: Adjacency matrix, Adjacency lists, Traversal schemes: Depth first search, Breadth first search. Spanning tree: Definition, Minimal spanning tree algorithms. Shortest Path algorithms (Prim's and Kruskal's).

Suggested Readings:

1. Hubbard JR: Schaum's outline of Data Structures with C++, TMH.
2. R. Sedgewick: Algorithms in C++, Pearson Education Asia.
3. Y.Langsam, M.J.Augenstein and A.M.Tanenbaum: Data Structures Using C and C++, Prentice Hall of India.
4. R.Kruse, C.L.Tonodo and B.Leung: Data Structures and Program Design in C, Pearson Education.
5. S.Chottopadhyay, D.Ghoshdastidar & M.Chottopadhyay: Data Structures Through 'C' Language, BPB Publication.
6. G.L. Heileman: Data Structutes, Algorithms and Object Oriented Programming, Tata McGraw Hill.
7. E. Horowitz, Sahni and D. Mehta: Fundamentals of Data Structures in C++, Galgotia Publiction.
8. Any other book(s) covering the contents of the paper in more depth.

 Note: Latest and additional good books may be suggested and added from time to time.

MCA-202: COMPUTER ORGANIZATION & ARCHITECTURE

Max. Marks: 75
Time: 3 Hrs.

Note:

There shall be 8 questions in all, 2 from each Unit and carrying equal marks, and the candidate will be required to attempt 5 questions in all selecting at least one from each Unit.

Unit-I

Basic organization of the computer and block level description of the functional units as related to the execution of a program. Operational concepts, Bus structures, Von Neumann Concept. Fetch, decode and execute cycle. Role of operating systems and compilers.

Basic Processing: Instruction code, Instruction set, Instruction sequencing, Instruction cycle, Instruction format, Addressing modes, Micro instruction, Data path, Hardwired controlled unit, Micro programmed controlled unit.

Unit-II

Timing and Control Unit, Micro-operations, Instruction cycle, Design of ALU: Binary arithmetic, Addition and Subtraction of signed number, Multiplication of Positive number, Signed operand multiplication, Division, Floating point number representation and arithmetic.

General Register Organization, Stack Organization, Instruction Formats, Addressing Models, Data Transfer and Manipulation, Program control, RISC Vs. CISC architectures.

Programming in Assembly Language for 8086/8088/80x6 micro-processor.

Unit-III

Input/Output Organization: Peripheral Devices, Input-output Interface, Asynchronous Data Transfer, Mode of Transfer, Priority Interrupt, Direct Memory Access, Input-output Processor, Serial Communication, Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware.

Unit-IV

Introduction to parallel processing– Pipelining, Parallelism in unipolar systems, Parallel Computer structures, Architectural classification schemes. Principles of pipelining & Vector processing – Principles of Linear pipelining, Classification of pipeline processors, General pipelines and reservation tables, interleaved memory Organizations, Instruction and Arithmetic pipelines, Principles of designing pipelined processors, Vector processing Requirements. Structures for array processors: SIMD Array processor, SIMD Interconnection networks. Parallel Processing Applications.

Suggested Readings

1. Mano, M.M.: Computer System Architecture, 3rd ed., Prentice-Hall of India.
2. Stallings, William: Computer Organisation & Architecture.
3. Gill, Nasib Singh and Dixit J.B: Digital Design and Computer Organisation, University Science Press (Laxmi Publications), New Delhi.
4. Mano, M.M.: Digital Logic and Computer Design, Prentice-Hall of India.
5. Kai Hwang: Advanced Computer Architecture, McGraw Hill International
6. Any other book(s) covering the contents of the paper in more depth.

Note: Latest and additional good books may be suggested and added from time to time.

MCA-203: Computer Based Management System & E-Commerce

Max. Marks: 75
Time: 3 Hrs.

Note:

There shall be 8 questions in all, 2 from each Unit and carrying equal marks, and the candidate will be required to attempt 5 questions in all selecting at least one from each Unit.

Unit-I

Introduction to Management: The Management Processes: Planning, Organizing, Leading and Controlling. Management Levels: Top, Middle and Bottom. The Management School: Scientific Management, Classical Management, Behavioral Management, Management Science, Systems Approach, Contingency Approach.

Unit-II

Management in 21ˢᵗ Century: Seven – S Model, Organization Structure, Communication Processes. Strategy: Institutional, Operational, Total Quality Control (TQC), Total Quality Management (TQM), Electronic Data Interchange (EDI), Just-In-Time (JIT) Approach.

Unit-III

Applications of Management Information System: Types of Information System in Organizations: Transaction Processing System (TPS), Office System, Knowledge Work System (KWS), Decision Support System (DSS), Management Information System (MIS), Executive Support system (ESS).

Unit-IV

E-Commerce: Overview of E-Commerce, Benefits of E-Commerce, Impact of E-Commerce, Applications of E-Commerce, Business Models of E-Commerce. Electronic Payment System: Introduction to Payment System, Online Payment System, Pre-paid and Post-paid Payment System. Security in E-Commerce: Transaction Security, Cryptology, Authentication Protocol, Digital Signature.

Suggested Readings:

1. Stoner, Freeman, Gilbert: Management, Latest, PHI Publication.
2. Kenneth C. Laudon, Jane P. Laudon: Management Information System, Latest Edition, Pearson Education Publication.
3. P.T. Joseph: E-Commerce - A Managerial Perspective, PHI Publication.
4. Jeffery: Introduction to E-Commerce, TMH.
5. Any other book(s) covering the contents of the paper in more depth.

 Note: Latest and additional good books may be suggested and added from time to time.

MCA-204: DATA BASE MANAGEMENT SYSTEMS

Max. Marks: 75
Time: 3 Hrs.

Note:

There shall be 8 questions in all, 2 from each Unit and carrying equal marks, and the candidate will be required to attempt 5 questions in all selecting at least one from each Unit.

Unit-I

Data base System Applications, data base System Vs. File Processing System, View of Data, Data Abstraction, Instances and Schemas, Data Models – ER Model, Relational Model, Other Models. Database Languages – DDL, DML. Database Access for applications Programs – data base Users and Administrator, Transaction Management, Data base System Structure, Storage Manager, Query Processor, History of Data base Systems. Data base design and ER diagrams – Beyond ER Design Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Concept Design with the ER Model, Conceptual Design for Large enterprises.

Unit-II

Relational Model: Introduction to the Relational Model, Integrity Constraint Over relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design, Introduction to Views, Destroying /altering Tables and Views.

Relational Algebra and Calculus: Relational Algebra, Selection and projection set operations, renaming, Joins, Division, Examples of Algebra overviews. Relational calculus– Tuple relational Calculus, Domain relational calculus, Expressive Power of Algebra and calculus.

Unit-III

Form of Basic SQL Query – Examples of Basic SQL Queries, Introduction to Nested Queries, Correlated Nested Queries Set, Comparison Operators, Aggregative Operators, NULL values, Comparison using Null values, Logical connectivity's – AND, OR and NOT. Impact on SQL Constructs, Outer Joins, Disallowing NULL values, Complex Integrity Constraints in SQL Triggers and Active Data bases.

Schema refinement, Problems Caused by redundancy, Decompositions, Problem related to decomposition, Normalization: FIRST, SECOND, THIRD Normal forms, BCNF, Lossless join Decomposition, Dependency preserving Decomposition, Schema refinement in Data base Design, Multi valued Dependencies, forth Normal Form.

Unit-IV

Overview of Transaction Management: ACID Properties, Transactions and Schedules, Concurrent Execution of transaction, Lock Based Concurrency Control, Performance Locking, Transaction Support in SQL, Introduction to Crash recovery.

Concurrency Control: Serializability, and recoverability, Introduction to Lock Management, Lock Conversions, Dealing with Dead Locks, Specialized Locking Techniques, Concurrency without Locking.

Suggested Readings:

1. Raghurama Krishnan: Data base Management Systems, Johannes Gehrke, Tata McGrawHill Latest Edition.
2. Silberschatz, Korth: Data base System Concepts, McGraw Hill, latest edition.
3. P. Radha Krishna: Database Management Systems, HI-TECH Publications.
4. C.J.Date: Introduction to Database Systems, Pearson Education.
5. Rob & Coronel: Data base Systems design, Implementation, and Management, latest Edition, Thomson.
6. Elmasri Navrate: Data base Management System, Pearson Education.
7. Mathew Leon: Data base Management System Leon Vikas.
8. Connoley: Data base Systems, Pearson education.
9. Any other book(s) covering the contents of the paper in more depth.

 Note: Latest and additional good books may be suggested and added from time to time.

MCA-205: PRINCIPLES OF SYSTEMS PROGRAMMING & COMPILER DESIGN

Max. Marks: 75
Time: 3 Hrs.

Note:

> **There shall be 8 questions in all, 2 from each Unit and carrying equal marks, and the candidate will be required to attempt 5 questions in all selecting at least one from each Unit.**

Unit-I

Evolution of the Components of Systems Programming: Assemblers, Loaders, Linkers, Macros, Compilers.

Software Tools: Variety of software tools, Text editors, Interpreters and program generators, Debug Monitor, Programming environment.

Loader schemes, compile and go loader, general loader schemes, absolute loader, Subroutine linkage, Reallocating loader, Direct Linkage Loader, Binders, Linking loader, overlays.

Unit-II

Compiler: Phases of Compiler, Compiler writing tools, Lexical Analysis, Finite Automata, Regular Expression, From a Regular expression to an NFA, NFA to DFA, Design of Lexical Analyzer.

Syntax Analyzer, CFG, Role of the Parser, CFG, Top Down Parsing, Recursive descent parsing, predictive Parsers, Bottom up Parsing, Shift reduce, operator precedence parsers, LR Parsers.

Unit-III

Syntax directed definition: Construction of Syntax trees, Intermediate code generation, Intermediate Languages, Syntax trees, post fix form.

Symbol table: contents of Symbol table, Data Structures for Symbol table; Runtime storage Administration.

Unit-IV

Code Optimization and code generation: Principles sources of optimization, loop optimization, Dag Representation of Basic blocks. Code generation – problems in code generation, a simple code generator, Register allocation and Assignment, Peephole optimization.

Suggested Readings:

1. Donovan: Systems Programming, Tata McGraw Hill.
2. Dhamdhere: System Software, Tata McGraw Hill.
3. Alfred V.Aho, Ravi Sethi, Jeffrey D.Ullman: Compilers Principles, Techniques and Tools, Addison Wesley.
4. Alfred V.Aho and Jeffrey D.Ullman: Principles of Compiler Design, Addison Wesley.
5. Any other book(s) covering the contents of the paper in more depth.

Note: Latest and additional good books may be suggested and added from time to time.

MCA-301: COMPUTER GRAPHICS & MULTIMEDIA

Max. Marks: 75
Time: 3 Hrs.

Note:

There shall be 8 questions in all, 2 from each Unit and carrying equal marks, and the candidate will be required to attempt 5 questions in all selecting at least one from each Unit.

Unit-I

An Introduction Graphics System: Computer Graphics and Its Types, Application of computer graphics, Graphics Systems: Video Display Devices, Raster Scan Systems, Random Scan Systems, Graphics Monitors and Work Stations, Input Devices, Hard Copy Devices, Graphics Software.

Unit-II

Output Primitives and Attributes of Output Primitives: Output Primitives Points and Lines, Line Drawing Algorithms, Circle Generating Algorithms, Scan-Line Polygon Fill Algorithm, Inside-Outside tests, Boundary-Fill Algorithm, Flood Fill Algorithm, Cell Array, Character Generation, Attributes of Output Primitives: Line attributes, Color and Grayscale Levels, Area fill Attributes, Character Attributes, Bundled Attributes. Anti-aliasing.

Unit-III

Two-dimensional Geometric Transformations: Basic Transformations, Matrix Representations and Homogeneous Coordinates, Composite Transformations, Reflection and Shearing

Two-Dimension Viewing: The viewing Pipeline, Window to view port coordinate transformation, Clipping Operations, Point Clipping, Line Clipping, Polygon Clipping, Text Clipping, Exterior Clipping Three–Dimensional Concepts: Three Dimensional Display Methods, 3D Transformations, Parallel Projection and Perspective Projection.

Unit-IV

Multimedia: Introduction to Multimedia: Classification of Multimedia, Multimedia Software, Components of Multimedia – Audio: Analog to Digital conversion, Sound card fundamentals, Audio play backing and recording Video, Text: Hyper text, Hyper media and Hyper Graphics, Graphics and Animation: Classification of Animation. Authoring Process and Tools.

Case Study: A graphics software MatLab, Use of MatLab in graphics application, Features of MatLab, Generalize application by using MatLab.

Suggested Readings:

1. Donald Hearn and M.Pauline Baker: Computer Graphics, PHI Publications
2. Plastock : Theory & Problem of Computer Graphics, Schaum Series.
3. Foley & Van Dam: Fundamentals of Interactive Computer Graphics, Addison-Wesley.
4. Newman : Principles of Interactive Computer Graphics, McGraw Hill.
5. Tosijasu, L.K. : Computer Graphics, Springer-verleg.
6. S Gokul: Multimedia Magic, BPB Publication.
7. Bufford: Multimedia Systems, Addison Wesley.
8. Jeffcoate : Multimedia in Practice, Pretice-Hall.
9. Any other book(s) covering the contents of the paper in more depth.

Note: Latest and additional good books may be suggested and added from time to time.

MCA-302: OPERATING SYSTEMS

Max. Marks: 75
Time: 3 Hrs.

Note:

There shall be 8 questions in all, 2 from each Unit and carrying equal marks, and the candidate will be required to attempt 5 questions in all selecting at least one from each Unit.

Unit-I

Operating System Introduction- Functions, Characteristics, Structures - Simple Batch, Multi programmed, timeshared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating-System services, System Calls, Virtual Machines.

Process and CPU Scheduling - Process concepts and scheduling, Operation on processes, Cooperating Processes, Threads, and Interposes Communication Scheduling Criteria, Scheduling Algorithm, Multiple -Processor Scheduling, Real-Time Scheduling.

Unit-II

Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging. Demand Paging, Performance of Demanding Paging, Page Replacement, Page Replacement Algorithm, Allocation of Frames, Thrashing.

Unit-III

File System Interface and Implementation -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management, Directory Management, Directory Implementation, Efficiency and Performance.

Process Management and Synchronization - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors.

Unit-IV

Deadlocks - System Model, Dead locks Characterization, Methods for Handling Deadlocks Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock.

I/O Management – I/O software and its types, Disk Scheduling.

Shell Programming: Concept of shell, Types of shell, Editors for shell programming (e.g. vi), basics of Shell programming.

Case Study- UNIX, LINUX, and Windows NT.

Suggested Readings:

1. Silberschatz & Galvin: Operating System Concept, Wiley, Latest Edition.
2. Milan Milenkovic: Operating Systems, Tata McGraw – Hill, Latest Edition.
3. William Stallings: Operating Systems, PHI, Latest Edition.
4. Yashawant Kanetkar: Unix Shell Programming, BPB.
5. A.S. Tanenbaum: Modern Operating Systems, latest edition Pearson/PHI.
6. Dhamdhere: Operating Systems, Tata McGraw Hill.
7. Any other book(s) covering the contents of the paper in more depth.

Note: Latest and additional good books may be suggested and added from time to time.

MCA-303: ARTIFICIAL INTELLIGENCE & EXPERT SYSTEMS

Max. Marks: 75
Time: 3 Hrs.

Note:

There shall be 8 questions in all, 2 from each Unit and carrying equal marks, and the candidate will be required to attempt 5 questions in all selecting at least one from each Unit.

Unit-I

Introduction and applications of artificial intelligence, Problem solving: Defining the problem as state space search, Production system, Problem characteristics, Problem system characteristics, Search

techniques: Generate and test, Hill climbing, Best first search, A* algorithm, Problem reduction, Expert system: Definition, Role of knowledge in expert system, Architecture of expert system.

Unit-II

Expert system development life cycle: Problem selection, Prototype construction, Formalization, Implementation, Evaluation, Knowledge acquisition: Knowledge engineer, Cognitive behavior, Acquisition techniques, Knowledge representation: Level of representation, Knowledge representation schemes, Formal logic, Inference Engine, Semantic net, Frame, Scripts.

Unit-III

Perception: Sensing, Speech recognition, Vision, Action, Neural networks : Introduction, Comparison of artificial neural networks with biological neural networks, Learning in neural networks, Perceptrons, Back propagation networks, application of neural networks, Fuzzy logic : Definition, Difference between Boolean and Fuzzy logic, fuzzy subset, fuzzy membership function, fuzzy expert system, Inference process for fuzzy expert system, fuzzy controller.

Unit-IV

Programming in Logic (PROLOG): Introduction, Prolog variables, Using rules, Input and Output predicates, Fail and cut predicates, Recursion, Arithmetic operation, Compound object, Dynamic database, Lists, String, File operations.

Suggested Readings:

1. David W. Rolston: Principles of Artificial Intelligence and Expert System Development, McGraw Hill Book Company.
2. Elaine Rich, Kevin Knight: Artificial Intelligence, Tata McGraw Hill.
3. Carl Townsend: Introduction to Turbo Prolog, BPB
4. Stamations V. Kartalopous: Understanding Neural Networks and Fuzzy Logic, PHI
5. Any other book(s) covering the contents of the paper in more depth.

 Note: Latest and additional good books may be suggested and added from time to time.

MCA-304: DATA COMMUNICATION & COMPUTER NETWORKS

Max. Marks: 75
Time: 3 Hrs.

Note:

> **There shall be 8 questions in all, 2 from each Unit and carrying equal marks, and the candidate will be required to attempt 5 questions in all selecting at least one from each Unit.**

Unit-I
Data Communication: Theoretical basis of data communication; analog and digital signals; asynchronous and synchronous transmission; data encoding and modulation, techniques, broadband and base band transmission; pulse code modulation, bandwidth, channel, baud rate of transmission; multiplexing; transmission medium; transmission errors - error detection and correction.

Unit-II
Network Classification and Data Communication Services: Local area networks, metropolitan area network, wide area network, wireless network, internetworking; switched multi-megabit data services, X.25, frame relay, narrow band and broad band ISDN, asynchronous transfer modes.

Network Reference Models: Layered architectures, protocol hierarchies, interface and services: ISO-OSI reference model, TCP/IP reference model; internet protocol stacks.

Unit-III

Datalink Layer Functions and Protocols: Framing, error-control, flow -control; sliding window protocol; HDLC; Data link layer of internet and ATM.

Medium Access Sublayer: CSMA/CD protocol, switched and fast Ethernet, token ring, FDDI, IEEE standards for LAN and MAN; satellite networks.

Unit-IV

Network functions and protocols: Switching mechanism: Circuit switching, message switching, packet switching, cell switching, routing and congestion control, TCP/IP protocol architecture.

Network Applications: File transfer protocol, electronic mail, World Wide Web.

Suggested Readings:

1. A.S. Tanenbaum: Computer Networks (4th ed.), Prentice-Hall of India.
2. W. Tomasi: Introduction to Data Communications and Networking, Pearson Education.
3. P.C. Gupta: Data Communications and Computer Networks, Prentice-Hall of India.
4. Behrouz Forouzan and S.C. Fegan: Data Communications and Networking, McGraw Hill.
5. L. L. Peterson and B. S. Davie: Computer Networks: A Systems Approach, Morgan Kaufmann.
6. William Stallings: Data and Computer Communications, Pearson Education.
7. Any other book(s) covering the contents of the paper in more depth.

Note: Latest and additional good books may be suggested and added from time to time.

MCA-305: OBJECT TECHNOLOGY

Max. Marks: 75
Time: 3 Hrs.

Note:

There shall be 8 questions in all, 2 from each Unit and carrying equal marks, and the candidate will be required to attempt 5 questions in all selecting at least one from each Unit.

Unit-I

Object-Oriented Languages, Java's History, Creation of Java, Importance of Java for the Internet, Java's Magic: Byte-code, Its Features, Object-Oriented Programming in Java.

Java Program Structure and Java's Class Library, Data Types, Variables, and Operators, Operator Precedence. Selection Statements, Scope of Variable, Iterative Statement. Defining Classes & Methods, Constructors, Creating Objects of a Class, Assigning Object Reference Variables, Variable this, Defining and Using a Class, Automatic Garbage Collection.

Arrays and Strings: Arrays, Arrays of Characters, String Handling Using String Class, Operations on String Handling Using, String Buffer Class.

Unit-II

Extending Classes and Inheritance: Using Existing Classes, Class Inheritance, Choosing Base Class, Access Attributes, Polymorphism, Multiple Levels of Inheritance, Abstraction through Abstract Classes, Using Final Modifier, The Universal Super class-Object Class.

Packages & Interfaces: Understanding Packages, Defining a Package, Packaging up Your Classes, Adding Classes from a Package to Your Program, Understanding CLASSPATH, Standard Packages, Access Protection in Packages, Concept of Interface.

Exception Handling: The concept of Exceptions, Types of Exceptions, Dealing with Exceptions, Exception Objects, Defining Your Own Exceptions

Unit-III

Multithreading Programming: The Java Thread Model, Understanding Threads, The Main Thread, Creating a Thread, Creating Multiple Threads, Thread Priorities, Synchronization, Deadlocks Inter-thread communication, Deadlocks

Input/Output in Java: I/O Basic, Byte and Character Structures, I/O Classes, Reading Console Input Writing Console Output, Reading and Writing on Files, Random Access Files, Storing and Retrieving Objects from File, Stream Benefits.

Creating Applets in Java: Applet Basics, Applet Architecture, Applet Life Cycle, Simple Applet Display Methods, Requesting Repainting, Using The Status Window, The HTML APPLET Tag Passing Parameters to Applets.

Unit-IV

Working with Windows: AWT Classes, Window Fundamentals, Working with Frame, Creating a Frame Window in an Applet, Displaying Information Within a Window.

Working with Graphics and Texts: Working with Graphics, Working with Color, Setting the Paint Mode, Working with Fonts, Managing Text Output Using Font Metrics, Exploring Text and Graphics.

Working with AWT Controls, Layout Managers and Menus.

Suggested Readings:

1. The Complete Reference JAVA, TMH Publication.
2. Beginning JAVA, Ivor Horton, WROX Public.
3. JAVA 2 UNLEASHED, Tech Media Publications.
4. JAVA 2(1.3) API Documentations.
5. Any other book(s) covering the contents of the paper in more depth.

 Note: Latest and additional good books may be suggested and added from time to time.

MCA-401: ADVANCED JAVA PROGRAMMING

Max. Marks: 75
Time: 3 Hrs.

Note:

There shall be 8 questions in all, 2 from each Unit and carrying equal marks, and the candidate will be required to attempt 5 questions in all selecting at least one from each Unit.

Unit-I

Introduction to Java Scripts, Objects in Java Script, Dynamic HTML with Java Script.

XML: Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX

Review of Applets, Class, Event Handling, AWT Programming.

Unit-II

Introduction to Swing: JApplet, Handling Swing Controls like Icons – Labels – Buttons – Text Boxes – Combo – Boxes – Tabbed Pains – Scroll Pains – Trees – Tables Differences between AWT Controls & Swing Controls Developing a Home page using Applet & Swing.

Java Beans: Introduction to Java Beans, Advantages of Java Beans, BDK Introspection, Using Bound properties, Bean Info Interface, Constrained properties Persistence, Customizers, Java Beans API.

Unit-III

Introduction to Servelets: Lifecycle of a Serverlet, JSDK The Servelet API, The javax.servelet Package, Reading Servelet parameters, Reading Initialization parameters. The javax.servelet HTTP package, Handling Http Request & Responses, Using Cookies- Session Tracking, Security Issues

Introduction to JSP, The Problem with Servelet. The Anatomy of a JSP Page, JSP Processing. JSP Application Design with MVC Setting Up and JSP Environment: Installing the Java Software Development Kit, Tomcat Server & Testing Tomcat

Unit-IV

JSP Application Development: Generating Dynamic Content, Using Scripting Elements Implicit JSP Objects, Conditional Processing – Displaying Values Using an Expression to
Set an Attribute, Declaring Variables and Methods Error Handling and Debugging Sharing Data Between JSP pages, Requests, and Users Passing Control and Date between
Pages – Sharing Session and Application Data – Memory Usage Considerations

Database Access Database Programming using JDBC Studying Javax.sql.* package Accessing a Database from a JSP Page Application – Specific Database Actions Deploying JAVA Beans in a JSP Page. Introduction to struts framework.

Suggested Readings:

1. Dietel and Nieto: Internet and World Wide Web – How to program?, PHI/Pearson Education Asia.
2. Patrick Naughton and Herbert Schildt: The Complete Reference Java, Latest Edition, Tata McGraw-Hill.
3. Hans Bergstan: Java Server Pages.

4. Bill Siggelkow, S P D O'Reilly: Jakarta Struts, Cookbook.
5. Murach: Murach's beginning JAVA JDK 5, SPD.
6. Wang-Thomson: An Introduction to Web Design and Programming.
7. Knuckles: Web Applications Technologies Concepts- John Wiley.
8. Sebesta: Programming world wide web, Pearson.
9. Building Web Applications-NIIT,PHI.
10. Bai/Ekedaw-Thomas: Web Warrior Guide to Web Programmming.
11. Jon Duckett: Beginning Web Programming, WROX.
12. Pekowsky, Java Server Pages, Pearson.
13. Any other book(s) covering the contents of the paper in more depth.

Note: Latest and additional good books may be suggested and added from time to time.

MCA-402: DATA WAREHOUSING & MINING

Max. Marks: 75
Time: 3 Hrs.

Note:

There shall be 8 questions in all, 2 from each Unit and carrying equal marks, and the candidate will be required to attempt 5 questions in all selecting at least one from each Unit.

Unit-I

Need for data warehouse, definition, goals of data warehouse, Data Mart, Data warehouse architecture, extract and load process, clean and transform data, star, snowflake and galaxy schemas for multidimensional databases, fact and dimension data, Designing fact tables. Partitioning, partitioning strategy – horizontal partitioning, vertical partitioning,

Unit-II

Data warehouse and OLAP technology, multidimensional data models and different OLAP operations, OLAP Server: ROLAP, MOLAP and HOLAP. Data warehouse implementation, efficient computation of data cubes, processing of OLAP queries, indexing OLAP data.

Unit-III

Data preprocessing, data integration and transformation, data reduction, Discretization and concept Hierarchy Generation, Data mining primitives, Types of Data Mining, Data Mining query language, Architectures of data mining. Data generation & Summarization based characterization, Analytical characterization, Mining class comparisons, Mining descriptive statistical measures in large data bases.

Mining Association Rules in large databases: Association rule mining, single dimensional Bookan association rules from Transactional DBS, Multi level association rules from transaction DBS, multidimensional association rules from relational DBS and DWS, Correlation analysis, Constraint based association mining.

Unit-IV

Classification and Prediction: Classification by decision tree induction, Back propagation, Bayesian classification, classification based in association rules, Prediction, classifier accuracy, Cluster analysis, partitioning and hierarchical methods, Denrity based methods, Grid based methods, web mining, Temporal and spatial data mining.

Suggested Readings:

1. W.H.Inmon: Building Data Ware House, John Wiley & Sons.
2. S . Anahory and D.Murray: Data warehousing, Pearson Education, ASIA.
3. Jiawei Han & Micheline Kamber: Data Mining - Concepts & Techniques, Harcourt India PVT Ltd. (Morgan Kaufmann Publishers).
4. Michall Corey, M.Abbey, I Azramson & Ben Taub: Oracle 8i Building Data Ware Housing, TMH.
5. I.H. Whiffen: Data Mining, Practical Machine Cearing tools & techniques with Java (Morgan Kanffmen)
6. Sima Yazdanri & Shirky S. Wong: Data Ware Housing with oracle.
7. A.K. Pujari: Data Mining Techniques, University Press.
8. IBM An Introduction to Building the Data Warehouse, PHI Publication.
9. Pieter Adriaans Dolf Zantinge: Data Mining, Addition Wesley.
10. David Hand, Heikki Mannila, and Padhraic Smyth: Principles of Data Mining, PHI Publication.
11. Anahory S., Murray D. :Data Warehousing in the Real World, Addison Wesley.
12. Any other book(s) covering the contents of the paper in more depth.

 Note: Latest and additional good books may be suggested and added from time to time.

MCA-403: SOFTWARE ENGINEERING

Max. Marks: 75
Time: 3 Hrs.

Note:

There shall be 8 questions in all, 2 from each Unit and carrying equal marks, and the candidate will be required to attempt 5 questions in all selecting at least one from each Unit.

Unit-I

Software Engineering Paradigms: Software Characteristics, Software myths, Software Applications, Software Engineering Definitions, Software Process Models, Process iteration, Process activities, Computer-aided software engineering (CASE) and CASE Tools.

Software Project Management: Management activities, Project planning, Project scheduling, Risk management and activities.

Unit-II

Software Requirements Engineering: Requirements Engineering Processes, Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management.

Software Requirements, Functional and non-functional requirements, User requirements, System requirements, Interface specification, software requirement specification document. Specification languages.

Software Metrics and Measures — Process Metrics, Project metrics, Software Project Estimation Models- Empirical, Putnam, COCOMO models.

Unit-III

Software Design Process, Principles of s/w design, Design Strategies, Levels of s/w Design, Interface Design, Coding, Software Reuse, Computer Aided Software Engineering (CASE), CASE Tools.

Software Testing, Software Reliability, Software Safety, Defect testing, Debugging Tools.

Unit-IV

Software Maintenance and its types, S/w Configuration Management, S/w Reuse, Software Evolution, Software Quality Assurance – plans & activities, Software Documentation.

Suggested Readings:

1. Pressman: Software Engineering, TMH.
2. Gill N.S. : Software Engineering, Khanna Book Publishing Co.(P) Ltd, N. Delhi
3. Jalote, Pankaj: An Integrated Approach to Software Engineering, Narosa Publications.
4. Chhillar Rajender Singh: Software Engineering: Testing, Faults, Metrics, Excel Books.
5. Ghezzi, Carlo: Fundaments of Software Engineering, PHI.
6. Fairley, R.E.: Software Engineering Concepts,McGraw-Hill.
7. Lewis, T.G.: Software Engineering, McGraw-Hill..
8. Shere: Software Engineering & Management, Prentice Hall.
9. Deutsch, Willis: Software Quality Engineering : A Total Technical and   Management Approach, Prentice Hall.
10. Any other book(s) covering the contents of the paper in more depth.

 Note: Latest and additional good books may be suggested and added from time to time.

MCA-404: ADVANCED DATABASE SYSTEMS

Max. Marks: 75
Time: 3 Hrs.

Note:

There shall be 8 questions in all, 2 from each Unit and carrying equal marks, and the candidate will be required to attempt 5 questions in all selecting at least one from each Unit.

Unit-I

The Extended Entity Relationship Model and Object Model: The ER model revisited, Motivation for complex data types, User defined abstract data types and structured types, Object-Oriented Databases: Overview of Object-Oriented concepts, Object identity, Object structure, and type constructors, Encapsulation of operations, Methods, and Persistence, Type hierarchies and Inheritance, Type extents and queries, Complex objects; Database schema design for OODBMS; OQL, Persistent programming languages; OODBMS architecture and storage issues; Transactions and Concurrency control, Example of ODBMS.

Unit-II

Object Relational and Extended Relational Databases: Database design for an ORDBMS - Nested relations and collections; Storage and access methods, Query processing and Optimization; Advance Querying and Information Retrieval Decision Support Systems, Information Retrieval Systems Data Analysis and OLAP, Data Mining.

Unit-III

Parallel and Distributed Databases and Client-Server Architecture: Architectures for parallel databases, Parallel query evaluation; Parallelizing individual operations, Sorting, Joins; Distributed database concepts, Data fragmentation, Replication, and allocation techniques for distributed database design; Query processing in distributed databases; Concurrency control and Recovery in distributed databases

Unit-IV

Databases on the Web and Semi Structured Data: Web interfaces to the Web, Overview of XML; XML applications; The semi structured data model, Implementation issues. Enhanced Data Models for Advanced Applications: Active database concepts. Temporal database concepts; Spatial databases, Concepts and architecture; Deductive databases and Query processing; Mobile databases, Geographic information systems, Multimedia databases.

Suggested Readings:

1. Elmasri and Navathe, Fundamentals of Database Systems, Pearson Education
2. Korth, Silberchatz, Sudarshan , Database System Concepts, McGraw-Hill.
3. C.J.Date, Longman, Introduction To Database Systems, Pearson Education.
4. Any other book(s) covering the contents of the paper in more depth.

Note: Latest and additional good books may be suggested and added from time to time.

MCA-405: VISUAL LANGUAGES PROGRAMMING

Max. Marks: 75
Time: 3 Hrs.

Note:

There shall be 8 questions in all, 2 from each Unit and carrying equal marks, and the candidate will be required to attempt 5 questions in all selecting at least one from each Unit.

Unit-I

Client Server Basics: Discover Client-Server and Other Computing Architectures, Understand File Server Versus Client-Server Database Deployment, Learn About the Two Tier Versus Three Tire Client-Server Model.

Visual Basic Building Blocks And Default Controls: Forms, Using Controls, Exploring Properties, Methods And Events, Introduction To Intrinsic Controls, Working With Text, Working With Choices, Special Purpose Controls.

VB Advance Controls: Events, Menu bar, Popup Menus, Tool bar, Message Box, Input Box, Built-in Dialog Boxes, Creating MDI, Working with Menus.

Unit-II

VB Programming Fundamentals And Variables: Introduction to Variables, Variable Declaration, Arrays, Introduction to Constants And Option Explicit Statement, Assignment Statements, Working With Math Operations, Strings, Formatting Functions.

Controlling And Managing Program : All Control Statements, Loops, Error Trapping, Working With Procedures, Functions, Controlling How Your Program Starts, Common controls and control arrays: Introduction to common controls: Treeview, listview, tabstrip Creating and working with control arrays.

Visual Basic and databases: Understanding the Data Controls And Bound Controls, Introduction to Data Form Wizard, Introduce DAO, Working With Recordsets, Record Pointer, Filters, Indexes, Sorts And Manipulation of Records

Unit-III

Remote And ActiveX Data Objects: Working With ODBC, Remote Data Objects And Remote data Control, Introducing ADO, ADO Data Control, Using DataGrid Control And ActiveX Data Objects .

ActiveX Controls, Extending ActiveX Controls And Classes: Creating, Testing, Compiling, Enhancing And User Drawn ActiveX Controls, Using ActiveX Control Interface Wizard And Property Pages Wizard, Introducing Ambient, Extender Objects, Creating Property Pages, Building Class Modules, ActiveX DLL

Unit-IV

Client-Server Development Tools: COM, Services Models, Development Tools Included with VB 6, Working With Source Safe Projects Reports And Packaging: Data Reports And Crystal Reports, Packaging A Standard EXE Project.

VB And Internet: Introduction to VBScript, Tools used with VBScript and VBScript Languages, Introduction to Active Server Pages, ASP Objects.

Suggested Readings :

1. McBride, P.K.: Programming in Visual Basic, BPB Publ..
2. Holzner Steven: Visual Basic Programming, IDG Books India Ltd.
3. Artiken: Visual Basic for Programming Explorer, Comdex.
4. Visual Basic 6 Client/Server How-To
5. Using Visual Basic 6
6. Any other book(s) covering the contents of the paper in more depth.

Note: Latest and additional good books may be suggested and added from time to time.

MCA-501: ADVANCED TECHNOLOGY

Max. Marks: 75
Time: 3 Hrs.

Note:

There shall be 8 questions in all, 2 from each Unit and carrying equal marks, and the candidate will be required to attempt 5 questions in all selecting at least one from each Unit.

Unit-I

Basic of the .net framework: .net architecture, managed code, assemblies, CLR, execution of assemblies code, IL, JIT, .NET framework class library, common type system, common language specification, interoperability with unmanaged code.

Unit-II

Introduction to VB.Net and C#:

VB.Net: Net features, Data Types

C#: Data Types, Operators, Garbage Collection, Jagged Array, Collection (Array list, Hash table), Indexer(One Dimension) and property, Delegates and events (Multicasting, Multicasting Event), Exception Handling.

Unit-III

ADO.Net & Object Oriented Concepts (Using VB.Net or C#): Basic window control, Architecture of ADO.Net, Comparison with ADO, .Net Data provider, Data Adapter, Data Set, Data Row, Data Column,

Data Relation, command, Data Reader, Data Grid Constructor, Destructor, Abstraction, interface, polymorphism (Over loading and over ridding)

Unit-IV

ASP.Net : Anatomy of ASP.NET Page, Server Controls : label, dropdown list box, validation controls, list box, text box, radio button, check box, State Management: session, caching, Authentication (window,.Net Passport, Forms Based), Authorization, web services, Advance Grid Manipulation.

Suggested Readings:

1. Jeffrey Richter, Francesco Balena: Applied .Net Frmework Prog. In MS VB.Net, TMH Publication.
2. Herbert Schildt: Complete Reference C#, TMH Publication.
3. Michael Halvorsan: Microsoft Visual Basic.NET step by step, PHI Publication.
4. G.Andew Duthie: Microsoft ASP.Net With C#.Net step by step, PHI Publication.
5. Any other book(s) covering the contents of the paper in more depth.

 Note: Latest and additional good books may be suggested and added from time to time.

MCA-502: SOFTWARE TESTING & QUALITY ASSURANCE

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Max. Marks: 75
Time: 3 Hrs.
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Note:

There shall be 8 questions in all, 2 from each Unit and carrying equal marks, and the candidate will be required to attempt 5 questions in all selecting at least one from each Unit.

Unit-I

Software Testing and the related concepts: significance and potential; Testability and features of Test cases.

Software Testing techniques; WBT, BBT, Ticking Box testing; static analysis, symbolic testing, program mutation testing, input space , partitioning, functional program testing, data flow guided testing.

Unit-II

Software Testing Strategies: Approach, Issues; integration, incremental, System, alpha, Beta testing etc; Comparative evaluation of techniques: Testing tools; Dynamic analysis tools, test data generators, Debuggers, test drivers etc..

Technical Metrics for Software: Quality Factors, framework; Metrics for analysis, design, testing source code etc.

Unit-III

Object Oriented Testing: OOT strategies and issues, Test Case design, interface testing.

Software Quality Assurance: concept, importance and essence; FTR, structured walk through technique etc.

Unit-IV

SW Reliability, validation, Software Safety and Hazards Analysis; Features affecting software quality, SQA Plan.

Using project management software tools, Quality management, issue, standards and methods. ISO Quality models: ISO 9000 and SEI-CMM and their relevance.

Suggested Readings:

1. Meyers, G.: The art of Software Testing, Wiley-Inter-Science.
2. Deutsch, Willis: Software Quality Engineering: A Total Technical and Management Approach, Prentice Hall.
3. Pressman : Software Engineering, TMH.
4. Gill N.S.: Software Engineering – Reliability, Testing and Quality Assurance, Khanna Book Publishing Co.(P) Ltd, N. Delhi
5. Ghazzi, Carlo: Fundaments of Software Engineering, PHI.
6. Chhillar Rajender Singh: Software Engineering: Testing, Faults, Metrics, Excel Books.
7. Jalote, Pankaj: An Integrated Approach to Software Engineering, Narosa Publications.
8. Doug Bell, Ian Murrey, John Pugh: Software Engineering-A Programming Approach, Prentice Hall.
9. Any other book(s) covering the contents of the paper in more depth.

Note : Latest and good books may be added from time to time.

MCA-503: WINDOWS PROGRAMING & VISUAL C++

Max. Marks: 75
Time: 3 Hrs.

Note:

There shall be 8 questions in all, 2 from each Unit and carrying equal marks, and the candidate will be required to attempt 5 questions in all selecting at least one from each Unit.

Unit-I

Introduction to Windows Program. Message processing in Windows Programming. Message boxes, Menu and Accelerators. Dialog Box. Creating Icons, Cursor and Bitmaps.

Introduction to Child Window Controls. Check boxes, Static control, Radio Buttons, Scroll bars, Advance Window Controls : Toolbars up down controls, Spin control, Progress bar, Tree view, Tab controls, Text and Font.

Unit-II

Working with Graphics, Consoles, Multitasking Process and Threads. Clipboard Drag and Drops, Advance features of Windows Programming GDI Metafiles, Sound API, DLL.

Unit-III

Visual C++ Basic: Introduction, Building a Basic Application, SDI and MDI, View Document Architecture Using Microsoft Foundation Class (MFC) Library, Visual C++ Resources: Application Wizard, Accelerators and Menus, Toolbars.

Unit-IV

Visual C++ And Database Management: MFC programming without View Document Architecture,. Data Access Objects (DAO) versus Open Database Connectivity (ODBC), Database Building Overview, Building a Database Application using ODBC, Building a Database Application Using

Suggested Readings:

1. Charles Petzold: Windows Programming, Microsoft Press.
2. Herbett Schildts: Windows Programming, TMH.
3. Murray: VC++, TMH.
4. Steve Holzner: Introduction to VC++.
5. Any other book(s) covering the contents of the paper in more depth.

Note: Latest and additional good books may be suggested and added from time to time.

MCA-504: SOFT COMPUTING

Max. Marks: 75
Time: 3 Hrs.

Note:

There shall be 8 questions in all, 2 from each Unit and carrying equal marks, and the candidate will be required to attempt 5 questions in all selecting at least one from each Unit.

Unit-I

Introduction: Introduction to soft computing; introduction to biological and artificial neural network; introduction to fuzzy sets and fuzzy logic systems.

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

Unit-II

Artificial neural networks and applications: Different artificial neural network models; learning in artificial neural networks; neural network applications in control systems. Neural Nets and applications of Neural Network.

Unit-III

Fuzzy systems and applications: fuzzy sets; fuzzy reasoning; fuzzy inference systems; fuzzy control; fuzzy clustering; applications of fuzzy systems.

Neuro-fuzzy systems: neuro-fuzzy modeling; neuro-fuzzy control.

Unit-IV

Applications: Pattern Recognitions, Image Processing, Biological Sequence Alignment and Drug Design, Robotics and Sensors, Information Retrieval Systems, Share Market Analysis, Natural Language Processing.

Suggested Books:

1. M. Mitchell: An Introduction to Genetic Algorithms, Prentice-Hall.
2. J.S.R.Jang, C.T.Sun and E.Mizutani: Neuro-Fuzzy and Soft Computing, PHI, Pearson Education.
3. Timothy J.Ross: Fuzzy Logic with Engineering Applications, McGraw-Hill.
4. Davis E.Goldberg: Genetic Algorithms: Search, Optimization and Machine Learning, Addison Wesley.
5. S. Rajasekaran and G.A.V.Pai: Neural Networks, Fuzzy Logic and Genetic Algorithms, PHI.
6. D. E. Goldberg: Genetic Algorithms in Search, Optimization, and Machine Learning, Addison-Wesley.
7. Z. Michalewicz: Genetic Algorithms+ Data Structures = Evolution Programs, Springer-Verlag.
8. N.K. Sinha & M. M. Gupta(Eds): Soft Computing & Intelligent Systems: Theory & Applications, Academic Press.
9. M.T. Hagan, H. B. Demuth, And M. Beale: Neural Network Design, Thompson Learning.
10. C. Lau (Ed): Neural Networks, IEEE Press.
11. J. Freeman and D. Skapura: Neural Networks: Algorithms, Applications, and Programming Techniques, Addison-Wesley.
12. G. J. Klir and T. A. Folger: Fuzzy Sets, Uncertainty, and Information, PHI.
13. A. Konar: Computational Intelligence Principles, Techniques and Applications, Springer.

14. Kishan Mehrotra, Chilukuri K. Mohan and Sanjay Ranka: Elements of Artificial Neural Networks, Penram, Mumbai.
15. J.S.R. Jang, C.T. Sun, E. Mizutani: Neuro-Fuzzy and Soft Computing: A Computational Approach to Learning and Machine Intelligence, Prentice Hall.
16. Mitchell, Melanie: An Introduction to Genetic Algorithms, PHI.
17. David E Goldberg: Genetic Algorithms in Search, Optimization & Machine Learning, Addison Wesley.
18. Any other book(s) covering the contents of the paper in more depth.

Note: Latest and additional good books may be suggested and added from time to time.

MCA-505: COMPUTER SECURITY

Max. Marks: 75
Time: 3 Hrs.

Note:

There shall be 8 questions in all, 2 from each Unit and carrying equal marks, and the candidate will be required to attempt 5 questions in all selecting at least one from each Unit.

Unit-I

The Security Problem in Computing: The meaning of Computer Security, Computer Criminals, Methods of Defense, Elementary Cryptography: Substitution Ciphers, Transpositions, Making "Good" Encryption Algorithms, The Data Encryption Standard, The AES Encryption Algorithm, Public Key Encryptions, Uses of Encryption.

Unit-II

Program Security: Secure Programs, Non-malicious Program Errors, viruses and other malicious code, Targeted Malicious code, controls Against Program Threats, Protection in General-Purpose operating system protected objects and methods of protection, File protection Mechanisms, User Authentication Designing Trusted O.S : Security polices, models of security, trusted O.S. design, Assurance in trusted OS. Implementation examples.

Unit-III

Data base Security: Security requirements, Reliability and integrity, Sensitive data, Inference, multilevel database, proposals for multilevel security.

Security in Network: Threats in Network, Network Security Controls, Firewalls, Intrusion Detection Systems, Secure E-mail.

Unit-IV

Administering Security: Security Planning, Risk Analysis, Organizational Security policies, Physical Security. Legal Privacy and Ethical Issues in Computer Security:

Protecting Programs and data, Information and the law, Rights of Employees and Employers, Software failures, Computer Crime, Praia, Ethical issues in Computer Security, Case studies of Ethics.

Suggested Readings:

1. P. Pfleeger, Shari Lawrence Pfleeger Charles: Security in Computing, PHI.
2. William Stallings: Cryptography & Network Security, Pearson Education.

3. Charlie Kaufman, Radia Perlman, Mike Speciner: Network Security, Private communication in a public world, PHI.
4. Douglas R.Stinson: Cryptography – Theory and Practice, CRC Press.
5. Bruce Schneier , Niels Ferguson: Practical Cryptography, Wiley Dreamtech India   Pvt Ltd.
6. Any other book(s) covering the contents of the paper in more depth.

Note: Latest and additional good books may be suggested and added from time to time.

SOFT SKILS-I (MCA-108) & II (MCA-208)

To develop following skills by way of self-study, student seminars, workshops, Extension Lecturers, etc.
  ➢ Communication Skills
  ➢ Presentation Skills
  ➢ Behavioral Skills
  ➢ Active Listening
  ➢ Body Language
  ➢ Managerial Skills
  ➢ Group Working Culture Skills
  ➢ Giving and Receiving Feedback

- Head of the Department/Director/Principal shall assign the task of assessment of soft skills of students to Faculty Member(s) and each student will be evaluated on the basis of the soft skills and shall award marks out of 25 for each student as Internal Assessment.

MINOR PROJECT - I (MCA-408) & II (MCA-508)

(GUIDELINES FOR MINOR PROJECT)

- The aim of the Minor Project(s) is to lay a foundation for Major Project to be carried out by the student during 6th Semester of MCA Programme.
- Each student should carry out Minor Project(s) using the software development tools/languages/technologies that they have learnt and/or have studied during the concerned semester.
- It should be compulsorily done by the student in-house under the supervision of the staff(s) assigned by Head of the Department/Director/Principal.
- The Minor Project(s) will be assessed by the concerned supervisor(s) and shall award marks out of 25 for each student as Internal Assessment.