Master of Computer Applications (MCA) Course Structure and Scheme of Examination (Old Syllabus)

MCA First Year

Semester-I

S.No.	Course	Pre-requisite course	Lectures	Practical	Total	Univ. Exams	Internal Assessment	Total
MCA-101	Mathematical Foundation of Computer Sc.	Nil	5	-	5	75	25	100
MCA-102	Foundation course in IT & Problem Solving using C	Nil	5	-	5	75	25	100
MCA-103	Computer Organisation & Assembly Language	Nil	5	-	5	75	25	100
MCA-104	PC Software	Nil	4	-	4	75	25	100
MCA-105	Structured System Analysis and Design	Nil	5	-	5	75	25	100
MCA-106	Software Lab-1 (Based on MCA-102)	Practical Examination of MCA-106 & 107 will be conducted on same day in 2 sittings each of 4 hours.		8	8	75	25	100
MCA-107	SoftwareLab-2 (Based on MCA-103 & 104)			8	8	75	25	100
	Total		**24**	**16**	**40**			

Semester-II

S.No.	Course	Pre-requisite course	Lectures	Practical	Total	Univ. Exams	Internal Assessment	Total
MCA-201	Data & File Structure (using C)	MCA-102	5	-	5	75	25	100
MCA-202	Computer Graphics and Multimedia	MCA-103	4	-	4	75	25	100
MCA-203	Analysis & Design of Algorithms	MCA-102	5	-	5	75	25	100
MCA-204	Data Base Management System	Nil	5	-	5	75	25	100
MCA-205	Systems Programming	MCA-102	5	-	5	75	25	100
MCA-206	SoftwareLab-3 (Based on MCA-201, 202)	Practical Examination of MCA-206 & 207 will be conducted on same day in 2 sittings each of 4 hours.		8	8	75	25	100
MCA-207	Software Lab-4 (Based on MCA-204, 205)			8	8	75	25	100
	Total		**24**	**12**	**40**			

MCA Second Year

Semester-III

S.No.	Course	Pre-requisite course	Lectures	Practical	Total	Univ. Exams	Internal Assesment	Total
MCA-301	Relational Database Management System	MCA-204	5	-	4	75	25	100
MCA-302	Operating System	MCA-103	5	-	4	75	25	100
MCA-303	Artificial Intelligence (Using LISP)	MCA-201, 205, 302	5	-	6	75	25	100
MCA-304	Distributed Computing, Networks and Applications	MCA-205, 302	5	-	6	75	25	100
MCA-305	Object Oriented Programming using C++	MCA-205	5	-	4	75	25	100
MCA-306	SoftwareLab-5 (Based on MCA-301,303)	Practical Examination of MCA-306 & 307 will be conducted on same day in 2 sittings each of 4 hours.		8	8	75	25	100
MCA-307	SoftwareLab-6 (Based on MCA-305)			8	8	75	25	100
	Total		**24**	**16**	**40**			

Semester-IV

S.No.	Course	Pre-requisite course	Lectures	Practical	Total	Univ. Exams	Internal Assessment	Total
MCA-401	UNIX and Shell Programming	MCA-302	4	-	4	75	25	100
MCA-402	Web Application Tools and E-Commerce	MCA-304	5	-	4	75	25	100
MCA-403	Software Engineering	MCA-102, 105	5	-	6	75	25	100
MCA-404	Object Oriented Analysis and Design	MCA-305	5	-	6	75	25	100
MCA-405	Visual Languages Programming	MCA-102	5	-	4	75	25	100
MCA-406	SoftwareLab-7 (Based on MCA-401,402)	Practical Examination of MCA-406 & 407 will be conducted on same day in 2 sittings each of 4 hours.		8	8	75	25	100
MCA-407	Software Lab-8 (Based on MCA-404,405)			8	8	75	25	100
	Total		**24**	**16**	**40**			

MCA Third Year

Semester-V

S.No.	Course	Pre-requisite course	Lectures	Practical	Total	Univ. Exams	Internal Assessment	Total
MCA-501	.NET and C# Programming	MCA-102, 304, 402	5	-	4	75	25	100
MCA-502	Software Testing and Quality Assurance	MCA-105, 403	5	-	4	75	25	100
MCA-503	Windows Programming	MCA-102, 402	5	-	6	75	25	100
MCA-504	IT Management	MCA-304, 501	4	-	6	75	25	100
MCA-505	Network Management	MCA-304, 501	5	-	4	75	25	100
MCA-506	SoftwareLab-9 (Based on MCA-501)	Practical Examination of MCA-506 & 507 will be conducted on same day in 2 sittings each of 4 hours.		8	8	75	25	100
MCA-507	SoftwareLab-10 (Based on MCA-503, 505)			8	8	75	25	100
	Total		**24**	**16**	**40**			

Semester-VI

S.No.	Course	Pre-requisite course	Lectures	Practical	Total	Univ. Exams.	Internal Assessment	Total
MCA-601	Major Project	All courses covered till then	0	24	24	375	125	500
			Grand Total of 3 Years			**3000**	**1000**	**4000**

Semester –I

MCA-101 : MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

Max. Marks: 75
Time : 3 Hrs.

Note:

Total 8 questions may be set covering the whole syllabus and the candidate will be required to attempt any 5 questions

Discrete structures and its significance for computer science; Review of Set Theory; Sequences, countable sets etc; Posit, lattices and Boolen algebra.

Prepositional calculus: transformation, conditional statements and methods of proving; Introduction to combinatorics : Pigeon hole principle, permutation, combinations, Recurrence relations etc.; Semigroup, Monoids and groups.

Graphs Theory: Euler and Hamiltonian path and circuits, Coloring, Directed Graphs, Planar Graphs, Matrix Representation of Graphs, Weighted Graphs, Network flows, Max-flow Min-cut theorem.

Alphabet, strings, graphs, trees and inductive proof; Finite state systems; Basic concepts, non-deterministic finite automaton; Finite state machine and languages, regular languages; Regular expressions; Application of finite automaton; Lexical analysis and text editors; Regular sets, decision algorithm and closures properties. Introduction to Turing Machine.

Suggested Readings :

1.	Kenneth.H.Rosen	:	Discrete Mathematics & its Applications 3rd Edition, McGraw Hill International edition.
2.	Deo, N,	:	Graph Theory with Applications to Engineering and Computer Science, Prentice-Hall Inc.
3.	Schaum Seriers	:	2000 solved problems in Discrete Mathematics, McGraw Hills.
4.	Trembley.J.P. and Manohar,R.P.	:	Discrete Mathematical Structures with Applications to Computer Science, McGraw Hill.
5.	Seymour Lipschutz	:	Theory and Problems of Essentials Computer Mathematics, McGraw Hill.

6. Any other book(s) covering the contents of the paper in more depth.

Note : More books may be added from time to time.

MCA-102 :FOUNDATION COURSE IN IT AND PROBLEM SOLVING USING C

Max. Marks: 75
Time : 3 Hrs.

Note:

Total 8 questions may be set covering the whole syllabus and the candidate will be required to attempt any 5 questions

Essentials of Computer:

Historical Evolution of Computers, Block diagram of a Computer and functions of various units; Classification of Computers; Input/Output devices (Display Devices, Printers, etc.) Memories: RAM, ROM, Cache Memory, Virtual memory; Mass-storage Media: Magnetic Disks, Magnetic Tapes and Optical Disks; Batch processing systems, Time Sharing systems, Multiprocessor, Parallel Processing Systems.

Introduction to Programming languages : 1 GL to 5 GL languages. Software and its types; Operating System and Its functions; Types of operating systems.

Overview of : Information Technology (IT), Data Communication, Computer Networks (LAN, WAN and MAN) and their applications, Introduction to Internet and Intranet technology.

Social concerns of Computer Technology: Positive and Negative Impacts, Computer Crimes, Viruses and their remedial solutions. ***Computer Applications*** : Scientific, Business, Research, Sports, Medicine & Health Care, Engineering, Teaching, etc.

Problem Solving :

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

Computer Programming Language (C Language) :

Concept of variables and constants, structure of a C program, various, operators, expressions and their evaluation using rules hierarchy. Assignment statements, Control structure sequencing, alternation, and iteration. Arrays, Manipulating vectors and matrices. Pointers, String and string functions, structures, user defined functions, Data management, Input/Output and files, Documentation, debugging, C Processors, Macros.

A brief introduction to C ++, object oriented programming techniques, Difference between C & C++

Examples illustrating structured program development methodology and use of a block structured algorithmic language to solve specific problems.

Suggested Readings

1. Gill, Nasib Singh : Essentials of Computer and Network Technology, Khanna Books Publishing Co., New Delhi, 2000.
2. Cooper, Mullish :The spirit of C, An Introduction to Modern Programming, Jaico Publ. House, New Delhi, 1987.
3. Kenneth.A. : C problem solving and programming, Prentice Hall.
4. Gottfried, B. :Theory and problems of Programming in C, Schaum Series.
5. Kerninghan, B.W. &: The C Programming Language, Prentice Hall of International Ritchie, D.M.
6. Kaiker, S. :Programming with C, Macmillan India, 1989.
7. Sanders, D. :Computers Today, Tata McGraw-Hill.
8. Gottfried, B. :Theory and problems of Programming in C, Schaum Series.
9. Any other book(s) covering the contents of the paper in more depth.

Note : More books may be added from time to time.

MCA-103 :COMPUTER ORGANIZATION AND ASSEMBLEY LANGUAGE

Max. Marks: 75
Time : 3 Hrs.

Note:

Total 8 questions may be set covering the whole syllabus and the candidate will be required to attempt any 5 questions

Representation of Information:

Number Systems, Integer and floating point representation, Character Codes (ASCII, EBCDIC), Error detection and correction codes.

Basic Building Blocks:

Boolean Algebra, Flip-flops: RS Latches, D, JK, T and Master-slave, Registers, Buffer, Shift and Controlled shift registers, counters: Ripple. Synchronous and Ring Counters, Half adders and Full adders.

CPU Organisation:

Control Unit Design, Micro-operations, Microprogrammed vs Hardwired Control Unit Implementation, Design of ALU, Peripheral Devices I/O devices (Video Terminals and Printers) and Controllers, I/O Techniques : Programmed and DMA, Storage Devices (Tape and Disks), Memory Hierarchy, Interleaved Memories, Associative memories.

Assembly Language Programming:

Programmers model of a machine, Overview of 8 to 32 bit processors. Assembly Language Programming with 8086/8088: Registers, Addressing modes, Instruction set, development of programs.

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 : Essentials of Computer and Network Technology, Khanna Books Publishing Co., New Delhi, 2000.
4. Mano, M.M. : Digital Logic and Computer Design, Prentice-Hall of India.
5. Mano, M.M. : Digital Design, 2nd ed., Prentice-Hall of India.
6. Abel, P. : IBM PC Assembly Language and Programming, 3rd ed., Prentice-Hall.
7. Detmer : Assembly Language Programming, Galgotia Publications.
8. Wyatt : Using Assembly Language, Prentice Hall.
9. Assembler Manual for the Chosen Machine.
10. Any other book(s) covering the contents of the paper in more depth.

Note : More books may be added from time to time.

MCA-104: PC SOFTWARE

Max. Marks: 75
Time : 3 Hrs.

Note:

Total 8 questions may be set covering the whole syllabus and the candidate will be required to attempt any 5 questions

Disk Operating System:

The fundamentals of DOS, DOS and Disk, Disk Organisation understanding DOS prompt and Shell Screen using keyboard & mouse, Internal commands; Batch files; Using the screen editor, Printing images, ASCII Files; Indirect printing and spooling; Communicating with other devices, Parallel vs Serial communication; Optimizing DOS, CONFIG, SYS. & AUTOEXEC.BAT files, Freeing up memory at boot time, managing Extended/and Expended memory, RAM disk, Disk Caching, Defragmentation.

Windows:

Window fundamental: Types of windows, anatomy of Windows; Windows Explorer, Customizing windows, Installing a printer, using clipboard, using paintbrush, Control Panel, Taskbar Settings.

MS-WORD:

Introduction to MS-WORD: Menus, Toolbars, Ruler, Scroll Bars, Status Bar; Creating, Saving, Importing, Exporting and Inserting files; Formation, Indents/Outdents, Lists, Tabs, Styles; Working with Frames, Columns, Pictures, Chart/Graphs, Forms, Tools, Equations and Macros.

MS-EXCEL:

Worksheet overview: Rows, Columns, Cell, Menus; Creating worksheets; opening and saving worksheets; Formatting, Printing, Charts, Window, Establishing Worksheet links, Macros, Database, Tables, Using files with other programs.

MS-POWERPOINT:

Overview of MS-PowerPoint, H/w and S/w requirements, Creating slides & presentations, rehearsing presentations, Insert, Tools, Format, Slide-show, Window options.

Disk Management Tools:

PC Tools, Norton Utilities, Norton Disk Doctor, Virus detection, prevention and cure utilities.

Suggested Readings

1. Robbinbs Judd : Mastering DOS 6.0 & 6.2, BPB Publications, 1994.
2. DOS Quick Ref. Manual: BPB Publications.
3. Habraken : MS-Office 2000 8-in-1, Prentice-Hall.
4. Taxali, R.K. : PC Software for Windows Made Simple, Tata McGraw-Hill.
5. Sandler : Teach Yourself MS-Office, BPB Publications.
6. Bangia R. : Learning MS-Office 2000, Khanna Book Pub. Co.
7. Wang W. & Parker R.C. : MS-Office 2000 Windows for Dummies, IDG Books India (P) Ltd.
8. Peter Dyson : Undertaking PC Tools, Sybex/Tech. Asian Edition. Tech.Publications
9. Peter Dyson : Understanding Norton Utilities, 2nd edn., Sybex/Tech.Asian.
10. Any other book(s) covering the contents of the paper in more depth.

Note : More books may be added from time to time.

MCA-105 : STRUCTURED SYSTEM ANALYSIS AND DESIGN

Max. Marks: 75
Time : 3 Hrs.

Note:

Total 8 questions may be set covering the whole syllabus and the candidate will be required to attempt any 5 questions

System Concepts, Business Organization as a system, types of Systems.

Information in business Organization, Framework of Information system, Types of Information system.

System development Life Cycle (SDLC): Chronological phases of SDLC, Recognition of need, Feasibility Study, System analysis, system design and development. System Implementation : post implementation and maintenance, Prototyping.

Tools of structured analysis : Data flow diagram (DFD), Data Dictionary, Decision Trees, Decision Tables, HIPO Charts, traditional Program and system flow charts.

System Analysis: Needs Identification, Fact-Finding and fact analysis, Information Gathering, Physical system model Logical system Model, Data analysis.

Project management techniques and computer system selection criteria; Case Study of a CASE Tool (e.g. Turbo Analyst) and its application.

Suggested Reading :

1.	Jones, Page	:	The Practical Guide to Structured Systems Design, Prentice-Hall India.
2.	Jain, V.K.	:	System Analysis and Design Handbook, IDG Book India, Ptd.
3.	James, A.S.	:	Analysis of Design of Information System, McGraw Hill, 1986.
4.	Ludeberg, M., Gulkuhl, G & Hillson,A	:	Information System Development, A Systematic Approach, Prentice Hall International1981.
5.	Awad	:	System Analysis and Design, Galgotia Publ.,1996.
6.	Lee	:	System Analysis and Design Vol. I, II, Galgotia Publ.
7.	Daniels	:	Practical System Design, Galgotia Publ. Pvt. Ltd.
8.	Davis, W.S.	:	System Analysis and Design, Addison Wesley.
9.	Leslie	:	System Analysis and Design Methods & Invention, PHI.
10.	Whitten	:	System Analysis and Design Methods, TMH.
11.	Any other book(s) covering the contents of the paper in more depth.		

Note : More books may be added from time to time.

MCA-201: DATA AND FILE STRUCTURES (USING C)

Max. Marks: 75
Time : 3 Hrs.

Note:

Total 8 questions may be set covering the whole syllabus and the candidate will be required to attempt any 5 questions

1. Fundamental Notations:
Primitive and composite data types, Time and space complexity of algorithms.

2. Data Structure:
Stacks, Queues, Arrays, Linked lists, trees and Graphs.

3. File Structures:
Concepts of fields, records and files. Sequential file organisation, variable length records and text files. Indexing structures like B-trees, ISAM. Hashing Techniques for direct files. Inverted lists, Multilists.

4. Sorting:
Internal and External sorts, Searching techniques, Merging algorithms.

Suggested Readings

1. Loomis : Data Management and File Structures, Prentice Hall.
2. Lipschutz, Seymour : Theory & Problems of Data Structures, Schaums Series.
3. Tannenbaum : Data Structure Using C, Tata McGraw-Hill.
4. Kruse : Data Structure and Program Design in C, Prentice Hall.
5. Jindal R. : Data Structures Using C, Umesh Publications, Delhi.
6. Any other book(s) covering the contents of the paper in more depth.

Note : More books may be added from time to time.

MCA-202 : COMPUTER GRAPHICS AND MULTIMEDIA

Max. Marks: 75
Time : 3 Hrs.

Note:

Total 8 questions may be set covering the whole syllabus and the candidate will be required to attempt any 5 questions

Basic graphics system, graphics devices, Raster Scan and Random Scan graphics, Storage displays, display processors and character generators, colour display techniques, frame buffer and MCAMCA operations concepts in raster graphics.

Graphic File Formats; Points, lines and curves, scan conversion, line-drawing algorithms circle generation, Two-dimensional viewing, basic transformations, co-ordinate systems, Windowing and clipping, segments.

Interactive picture-construction techniques, interactive input/output devices. Three-dimensional concepts, 3-D representations and transformations, use of graphic package.

Introduction to Multimedia Technology : M/M devices, presentation devices and the user interface; M/M presentations and authoring; brief survey of speech recognition and generation.

Digital video and image compression, JPEG image compression standard, MPEG motion video compression, DVI technology, Desktop Virtual Reality.

M/M software environments, M/M file systems and Information representation. Applications of M/M in fields viz. Entertainment, Education, Manufacturing, Business, etc.

Suggested Readings :

1. Hearn, D.,Baker, : Computer Graphics, Prentice Hall.
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, 1980.
5. Tosijasu, L.K. : Computer Graphics, Springer-verleg, 1983.
6. Bufford : Multimedia Systems, Addison Wesley.
7. Jeffcoate : Multimedia in Practice, Pretice-Hall.
8. Any other book(s) covering the contents of the paper in more depth.

Note : More books may be added from time to time.

MCA-203: ANALYSIS AND DESIGN OF ALGORITHMS

Max. Marks: 75
Time : 3 Hrs.

Note:

Total 8 questions may be set covering the whole syllabus and the candidate will be required to attempt any 5 questions

Review of Algorithms and Data Structures :

Writing algorithms in SPARKS, Analyzing algorithms, Stacks and Queues, Trees, heaps and Heap sort Sets and Disjoint set union, Graphs, Hashing.

Divide and Conquer :

General method, Binary Search, Merge sort, Quick sort, Selection sort, Strassen's matrix multiplication algorithms and analysis of algorithms for these problems.

Greedy Method :

General Method, Knapsack problem, Job sequencing with dead lines, Minimum spanning Trees, Single source paths and analysis of these problems.

Dynamic Programming:

General Method, Optimal Binary Search Trees, o/I Knapsack, the travelling Salesperson problem,

Back Tracking :

General Method, 8 queen's problem, Graph colouring, Hamiltonian cycles, Analysis of these problems.

Branch-And-Bound :

Method, o/I Knapsack and Travelling Salesperson problems. Efficiency considerations.

Lower-Bound Theory :

Techniques for Algebraic problems, Some Lower Bounds on parallel Computation.

NP-hard and NP-complete problems :

Basic concepts, Cook's Theorem, NP-hard graph and NP-scheduling problems, Some simplified NP-hard problems.

Suggested Readings

1. Ellis Horowitz and Sartaj Sahni :Fundamentals of Computer Algorithms, Galgotia Publications.
2. Aho A.V.Hopcroft J.E., :The Design and Analysis of Computer Algorithm Addison Wesley.
3. Berlion, P.Bizard, P. :Algorithms-The Construction, Proof and Analysis of Programs, Johan Wiley & Sons, 1986.
4. Bentley, J.L. :Writing efficient programs, Prentice Hall India, Eastern Economy Edition.
5. Goodman, S.E. & Hedetnieni :Introduction to the Design and Analysis of Algorithms, McGraw Hill Book Comp.1977.
6. Knuth, D.E. :Fundamentals of Algorithms : The Art of Computer Programming Vol.-I, Naresh Publ. House, 1985.
7. Any other book(s) covering the contents of the paper in more depth.

Note : More books may be added from time to time.

MCA-204: DATA BASE MANAGEMENT SYSTEM

Max. Marks: 75
Time : 3 Hrs.

Note:

Total 8 questions may be set covering the whole syllabus and the candidate will be required to attempt any 5 questions

1. Data independence, data models; network model, DBTG proposal; data definition and manipulation languages; hierachical and relational models.

2. Storage organisation for relations, relational algebra and calculus; relational query languages; query processor and optimizer.

3. Functional dependencies; normal forms, multivalued dependencies; decomposition, integrity; protection.

4. Security, concurrency, recovery, distributed data bases; available data base system.

Suggested Readings

1. Date, C.J. : An Introduction to Data base Systems, Vol.1 & II, Addison Wesley.
2. Desai, Bipin C. : Introduction to Data base Systems, Galgotia Publ.
3. Ullman, Jeffrey D: Principles of Data base Systems, 2nd Edn.Galgotia Publ.Pvt.Ltd..
4. Whittington, R.P. : Data Base Systems Engineering, Clavendon Press.
5. Kroenke, D.M. : Data base Processing : Fundamentals, Design, Implementation, 2nd Edn. Galgotia Publ. Pvt. Ltd.
6. Wiederhold : Data base Design, MC Graw Hill Book Comp.
7. Martin, James : Data Base Organisation, PHI.
8. Any other book(s) covering the contents of the paper in more depth.

Note : More books may be added from time to time.

MCA-205 : Systems Programming

Max. Marks: 75
Time : 3 Hrs.

Note:

Total 8 questions may be set covering the whole syllabus and the candidate will be required to attempt any 5 questions

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

Formal System- a brief discussion of each of these components, Software Tools : Variety of software tools, Text editors, Interpreters and program generators Debug Monitor, Programming environment.

Compiler: Aspect of compilation, Brief overview of compilation process, Incremental compiler, Assembler: Problem statement, single phase and two phase assembler, symbol table; Loader schemes, compile and go loader, general loader schemes, absolute loader, Subroutine linkage, Reallocating loader, Direct Linkage Loader, Binders, Linking loader, overlays.

Macro language and macro-processor, macro innstructions, features of macro facility, macro instruction arguments, conditional macro expansion, macro calls with macros instruction defining macros.

Suggested Readings:

1. Donova : Systems Programming, TMH.
2. Dhamdhere : System Software.
3. 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-301: RELATIONAL DATA BASE MANAGEMENT SYSTEMS

Max. Marks: 75
Time : 3 Hrs.

Note:

Total 8 questions may be set covering the whole syllabus and the candidate will be required to attempt any 5 questions

1. **Data Base Concepts:**
   Data base vs file oriented approach, Data Base Models, General Architecture of Data base Management Software, Components of a DBMS, Advantages and Disadvantages of DBMS.

2. **Data Base Design :**
   Entities, Attributes, E-R Diagrams, EE-R Diagrams, Conceptual Design of a relational data base model. Designing data bases for commercial applications like inventory control financial management, personnel management etc.

3. **Software Development using FOXPRO**
   Program Design & Development for Library and Hospital Management.

4. **Software Development using ORACLE :**
   Program Design & Development for Inventory, Personnel and Financial Management (Use of Developer-2000 & Designer-2000 should be used for development)

Suggested Readings

1. Desai, B.C. : An introduction to Database Systems, Galgotia Publ. Pvt. Ltd.
2. Date C.J. : Data Base Systems Vol.I & II, Narosa Publ.
3. 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-302 : OPERATING SYSTEMS

Max. Marks: 75
Time : 3 Hrs.

Note:

Total 8 questions may be set covering the whole syllabus and the candidate will be required to attempt any 5 questions

1. **Review of batch Operating System Concepts**: User job, resources, termination file process system.

2. **Memory Management**: Address protection, segmentation, virtual memory, paging, page replacement algorithms, cache memory, hierarchy of memory types, associative memory.

3. **Support for concurrent process**: Mutual exclusion, shared data, critical sections, busy form of waiting, lock and unlock primitives, synchronization, block and wakeup.

4. **Scheduling**: Process states, virtual processors, interrupt mechanism, scheduling algorithms, implementation of concurrency primitive.

5. **System deadlock**: Prevention, detection and avoidance.

6. **Multiprogramming System**: Queue management, I/O supervisors, memory management. File system, disk scheduling.

Suggested Readings:

1.	Tenenbaum	:	Modern Operating Systems, Prentice-Hall.
2.	Godbole	:	Operating System, Tata McGraw-Hill.
3.	Peterson, James L: Silberschatz		Operating System Concepts, Addison Wesley Publ. & Comp.
4.	Deitel, H.M.	:	An Introduction to Operating System, Addison Wesley Publ. Comp.
5.	Milenkovic, M.	:	Operating System – Concepts and Design, McGraw Hill International Editions.
6.	Richie	:	Operating System, BPB Publications.
7.	Madnick and Donovan	:	Operating System, McGraw Hill Book.
8.	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-303 : ARITIFICIAL INTELLIGENCE (Using LISP)

Max. Marks: 75
Time : 3 Hrs.

Note:

Total 8 questions may be set covering the whole syllabus and the candidate will be required to attempt any 5 questions

Artificial Intelligence (AI): Introduction and Application:

History of AI from Alan turning and developments in AI, Overview of Application areas Game playing , Theorems proving, Natural Language Understanding and Pattern Recognition and Robotics.

Problem Solving Concepts and Methods:

State space representation, Problem Characteristics, Breadth – first Search and Depth-First Search methods, Heuristic Search Techniques – Hill climbing , Best first Search, A*, Ao* Technique, Problem Reduction , Constraint satisfaction and means-ends analysis techniques.

Knowledge Representation

Information and knowledge, Knowledge Acquisition and Manipulation, Issues in Knowledge representation, Knowledge Representation methods – Propositional Logic and First Order predicate Logic. Resolution Principal, Horn's clauses, Features of language PROLOG, Semantic networks,
Partitioned Semantic Nets, Frames, Scripts and Conceptual Dependencies.

Game Playing:

Minimax search Procedures, Adding Alpha-Beta Cutoffs.

Expert System :

Definition and Applications, Characteristics of Experts System, Architecture of typical Expert System, Expert System Shells, Building an Expert System, Knowledge Acquisition , Case studies of Expert System like MYCIN, DENDRAL.

Specific Application of AI

Natural Language Understanding (NLU) and Processing : Complexity of the problem, Syntatic processing, Symantic Analysis, Paragmatic processing.
Perception and Action: Real-Time Search Perception, Action, Robot Architectures.

AI Language:

LISP: symbolic expressions, Creating, Appending and modifying the lists, Defining functions, predicates, Conditionals, Recursion, Iteration, Lambda Expressions, Use of Advance functions like MAPCAR,REMOVE-IF,COUNT-IF.

Suggested Readings :

1. Rich Elaine and Knight Kevin : Artificial Intelligence, 2nd edition, Tata McGraw Hill .
2. Tani Moto : Introduction to AI using LISP.
3. Patterson : Artificial Intelligence and Expert Systems.
4. Winston, P.H. and B.K.P. : LISP
5. Sangal Rajeev : LISP Programming, Tata McGraw Hill.
6. Balagurusamy : Artificial Intelligence & Technology.
7. Mishkoff, Henry C: Understanding Artificial Intelligence, BPB Publ.
8. Bharti & Chaitenya: Natural Language Processing, PHI.
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-304: DISTRIBUTED COMPUTING, NETWORKS AND APPLICATIONS

Max. Marks: 75
Time : 3 Hrs.

Note:

Total 8 questions may be set covering the whole syllabus and the candidate will be required to attempt any 5 questions

Distributed Processing Potential :

Forms of Distributed Processing Strategies, hexagon diagrams.

Communications :

Concepts of data transmission, signal encoding, modulation methods, synchronization, multiplexing and concentration, coding method, cryptography.

Networks :

Communication system architecture, OSI reference model, Network Topology types, selection, design, Local Area Networks (LAN), CSMA/CD, token bus, token ring techniques. Link Level Control (LLC) protocols, Medium Access Control (MCA protocol, Wide Areas Networks (WAN), Physical layer description (X.21), data link layer protocols, HDLC, analysis of protocols and performance, concepts in network layer, switching techniques, routing methods.

Suggested Readings

1. Gill, Nasib Singh :Essentials of Computer and Network Technology, Khanna Books Publications, New Delhi, 2000
2. Tannanbaum, A.S. :Computer Networks, Prentice Hall.
3. Martin, J. :Computer Networks and Distributed Processing, Prentice Hall.
4. Martin, J. :Design and Strategy for Distributed Data Processing, Prentice Hall.
5. Stallings, Willam :Local Networks: An Introduction Macmillan Publishing Co.
6. Black :Computer Networks: Protocols, Standards and Interfaces, Prentice Hall International (Paper Back edition)
7. Black :Data Networks: Concepts, Theory and Practices, Prentice Hall International.
8. 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-305: OBJECT ORIENTED PROGRAMMING USING C++

Max. Marks: 75
Time : 3 Hrs.

Note:

Total 8 questions may be set covering the whole syllabus and the candidate will be required to attempt any 5 questions

1. Introduction to object Oriented Programming-Objects, Classes, Data abstraction, Data Encapsulation, Inheritance (Single, Multiple, Hierarchical, Multilevel, Hybrid) Polymorphism, Dynamic binding, Message Passing.

2. Tokens, Expressions, Data Types, Variables, Operators, Control Statements, Arrays, Constructors & Destructors.

3. Classes, Objects, Functions & Methods.

4. File Handling, Exception Handling, Templates.

Suggested Readings:

1. Parsa, N.R. : OOPs with C++ from the Foundation, IDG Books India(P), Ltd.
2. E.Balagurusamy :Object Oriented Programming with C++, TMH.
3. Strostrup : The C++ Programming Language, Addison Wesley.
4. Robert Lafore :OOP in Turbo C++, Galgotia Pub.
5. 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-401: UNIX AND SHELL PROGRAMMING

Max. Marks: 75
Time : 3 Hrs.

Note:

Total 8 questions may be set covering the whole syllabus and the candidate will be required to attempt any 5 questions

Theoretical Concepts of UNIX operating system:

Basic Features of Operating System; File Structure: CPU Scheduling; Memory Management : Swapping, Demand paging; File System: Blocks and Fragments, Inodes, Directory Structure; User to User Communication.

Getting Started with UNIX:

User Names and Groups, Logging in; Format of UNIX commands; Changing your Password; Characters with Special Meaning; UNIX Documentation; Files and Directories; Current Directory, looking at the Directory contents, Absolute and Relative Pathnames, Some UNIX Directories and Files; Looking at File contents; File Permissions; Basic operation on Files; Changing Permission Modes; Standard files, Standard output; Standard Input, Standard Error; Filters and Pipelines; Processes: Finding out about Processes; Stopping Background Process; UNIX Editor vi.

Test Manipulation

Inspecting Files; File Statistics; Searching for Patterns; Comparing Files; Operating on Files; Printing Files; Rearranging Files; Sorting Files; Spliting Files; Translating characters; AWK utility.

Shell Programming

Programming in the Borne and the C-shell; Wild cards; Simple Shell Programs; Shell Variables; Shell Programming Constructs; Interactive Shell Scripts; Advanced Features.

System Administration

Definition of System Administration; Booting the System; Maintaining user Accounts; File Systems and Special Files; Backups and Restoration; role and functions of a system manager.

Overview of LINUX Operating System.

Suggested Readings

1. Brain Kernighen & Rob Pike: The UNIX Programming Environment, Prentice Hall.
2. Maurice Bach :Design of the UNIX Operating System, Prentice Hall.
3. Stephen Prato :Advanced UNIX-Programmer's guide, BPB.
4. Sumitabha Das : UNIX Concepts and Applications – Featuring SCO UNIX and LINUX, 2nd Ed., TMH.
5. 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-402: WEB APPLICATION TOOLS AND E-COMMERCE

Max. Marks: 75
Time : 3 Hrs.

Note:

Total 8 questions may be set covering the whole syllabus and the candidate will be required to attempt any 5 questions

1. Introduction to HTML/DHTML/XML/Java scripting.
2. Active Server Pages (ASP)
3. Introduction to Java - Java vs. C++, Bytecode.
4. Tokens, Data Types, Variables, operators, Control Statements, String Handling, Arrays and Vectors.
5. Methods and Classes, Inheritance, Packages.
6. I/O, Exception Handling.
7. Multithreading, Applet and Graphics Programming.
8. Introduction to Electronic Commerce.
9. Legal and Security issues in Electronic Commerce.

Suggested Readings

1. Patrick Naughton & Herbert Schildt. : Java 2.0 : The Complete Reference, TMH.
2. Holzner Steven : Java 2, Swing, Servlets, JDBC & Java Beans Programming (Black Book), IDG Books India (P) Ltd.
3. Hatman & Eden : ASP with VBScript, SQL and HTML Programming Reference, IDG Books India(P), Ltd.
4. Jackson, J. : Java by Example, Sunsoft Press.
5. Wiber, J. : Using Java 2 Platform, PHI.
6. Harold, E. : Java Secrets, Comdex.
7. Zolli, A. : Mastering Java, BPB.
8. TiHel, E. :Discover Java, Comdex.
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-403 : SOFTWARE ENGINEERING

Max. Marks: 75
Time : 3 Hrs.

Note:

Total 8 questions may be set covering the whole syllabus and the candidate will be required to attempt any 5 questions

Introduction:

Software Engineering goals, Characteristics of well-engineered software, Software Process, Management Process, Models, Human Factors in Software Engineering.

Software Specifications:

Software,Requirements, Definition, System Modelling, Requirements Specifications, Software Prototyping, Formal Specifications, Algebraic Specifications, Model Based Specifications.

Software Design:

The Design Process, Design Strategies, Design Quality, Object Oriented Design (OOD), Real-Time Systems Design, User Interface Design.

Programming Techniques and Tools:

Programming for Reliability, Software Reuse, Computer Aided Software Engineering, Software Development Environments, Study of C++ Programming language for implementing OOD.

Software Validation:

Verification and Validation, Software Reliability, Software Safety, Defect testing, Testing and Debugging Tools, Static Verification.

Software Management:

Project Planning and Scheduling, Software Cost Estimation, Software Maintenance, Configuration Management, Documentation, Software Quality Assurance.

Suggested Readings:

1. Jalote, Pankaj : An Integrated Approach to Software Engineering, Narosa Publ.
2. Pressman : Software Engineering, TMH.
3. Ghezzi, Carlo : Fundaments of Software Engineering, PHI.
4. Fairley, R.E. : Software Engineering Concepts,McGraw-Hill.
5 Lewis, T.G. : Software Engineering,McGraw-Hill..
6. Shere : Software Engineering & Management, Prentice Hall.
7. Deutsch, Willis : Software Quality Engineering : A Total Technical and Management Approach, Prentice Hall.
8. 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-404 : OBJECT-ORIENTED ANALYSIS AND DESIGN

Max. Marks: 75
Time : 3 Hrs.

Note:

Total 8 questions may be set covering the whole syllabus and the candidate will be required to attempt any 5 questions

Object modeling: object and classes; links and association, Generalization and inheritance; Grouping construct, Aggregation, generalization as extension and restriction.

Multiple inheritance, Meta data, candidate Keys.

Dynamic Modelling : Events and states nesting Concurrency; Functional modelling : data flow diagram, specifying operations; Analysis : object modeling, functional modeling adding operations, iteration.

System design: Subsystem, concurrency. Allocation to Processor and tasks. Management of data storesd. Control implementation. Boundary condition. Architectural Framework.

Object design: optimization, Implementation of control. Adjustment of inheritance . Design of associations, Documentations, Comparison of methodologies; Implementation: Using a programming language, a data base system. Programming styles, reusability, extensibility, and robustness. Programming-in the large.

Few Case Studies.

Suggested Readings:

1. Rambaug & Others : Object-Oriented Modeling and Design, Prentice Hall.
2. Sengupta & Chaudhuri : Object-Oriented Programming : Fundamentals and Applications, Prentice-Hall.
3. 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-405: Visual Languages Programming

Max. Marks: 75
Time : 3 Hrs.

Note:

Total 8 questions may be set covering the whole syllabus and the candidate will be required to attempt any 5 questions

Concept of procedure & event oriented languages; Low and high level languages.

Visual architecture: methods, statement and properties; Basic concepts of visual program design and comparison with non-visuals.

Visual programming environment and development of visual programs.

Project window, forms, code properties & event procedures.

Program design including case solution, run time properties.

Programming using Visual Basic and Visual C++.

Suggested Readings :

1. McBride, P.K. : Programming in Visual Basic, BPB Publ..
2. Holzner Steven : Visual Basic ^ Programming, IDG Books India Ltd.
3. Leavens, Allex : Visual C++(A Developer Guide), BPB Publ.
4. Artiken : Visual Basic for Programming Explorer, Comdex.
5. 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-501: .NET AND C# PROGRAMMING

Max. Marks: 75
Time : 3 Hrs.

Note:

Total 8 questions may be set covering the whole syllabus and the candidate will be required to attempt any 5 questions

Philosophy of .NET: Overview of Distributed Computing, Origin of .NET Technology, Understanding .NET platform, Do's and Don'ts of .NET, Benefits and Limitations of .NET, Building blocks of .NET framework, .NET Programming Languages, Role of MSIL and Metadata, .NET types and .NET Namespaces.

Visual Studio.NET and its major components; Understanding CLR, CTS, and CLS; Developing C# Applications Using Visual Studio .NET.

Evolution of C#: Comparison among C++, Java and C#, Benefits of C#, Object-oriented programming using C#.

C# Programming: Introduction to C# , Creating a C# program, Types in C#, Classes, Inheritence and Polymorphism, Methods, Statements and Control, Arrays and Strings, Interfaces, Abstract and Base Classes, Properties and Indexers, Delegates and their usefulness, Attributes, I/O in C#, Exception and Error Handling in C#, C# and Windows Applications.

ADO .NET: Comparison of ADO and ADO .NET, Introduction to data access with ADO .NET Components of ADO .NET, Overview of XML, XML and ADO .NET.

Web Development and ASP .NET: Comparison of ASP and ASP .NET, Features of ASP .NET, Benefits of ASP .NET, Features provided by ASP .NET, Web forms and their Components, overview of Web Services.

Suggested Readings:

1. Jain V.K. : The Complete Guide to C# Programming, IDG Books India(P) Ltd.
2. Andrew Troelson :C# and the .NET plateform, a! Apress.
3. Pappas & Murray: C# Essentials Prentice Hall of India.
4. E. Balaguruswammy: Programming in C#, Tata McGraw Hill.
5. Gunnerson Eric :A Programmer's Introduction to C#, IDG Book's India (P) Ltd.
6. Wakefield : C## .NET Wen Developers Guide, IDG Book India(P) Ltd.
7. 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-502 : SOFTWARE TESTING AND QUALITY ASSURANCE

Max. Marks: 75
Time : 3 Hrs.

Note:

Total 8 questions may be set covering the whole syllabus and the candidate will be required to attempt any 5 questions

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.

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.

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

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

SW Reliability, validation, safety and Hazards Analysis; Features affecting quality of software ; SQA Plan.

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. Ghazzi, Carlo : Fundaments of Software Engineering, PHI.
5. Jalote, Pankaj : An Integrated Approach to Software Engineering, Narosa Publ.
6. Doug Bell, Ian Murrey John Pugh : Software Engineering-A Programming Approach, Prentice Hall.
7. 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 PROGRAMMING

Max. Marks: 75
Time : 3 Hrs.

Note:

Total 8 questions may be set covering the whole syllabus and the candidate will be required to attempt any 5 questions

Windows basic concepts, window API, DEF Files, creating windows, message, x-windows; Mouse and keyboard.

Introduction to resources, designing and creating menus, pop-up menus, user defined resources.

Bitmaps and dialogues; Windows animation; Font basics; Window controls; Font display, static controls, edit controls, list boxes; Psychic windows.

Overview and structure of windows programming, coding conventions; Displaying text, mouse, graphics device interfaces.

Suggested Readings:

1. Any other book (s) covering the contents of the paper in more depth.

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

MCA-504 : IT MANAGEMENT

Max. Marks: 75
Time : 3 Hrs.

Note:

Total 8 questions may be set covering the whole syllabus and the candidate will be required to attempt any 5 questions

Concept of Management and administration Management as art and profession; IT and Management: Role, Relationship, etc., Functional areas of management, finance, personnel, production and marketing.

IT in Management: Function of management; planning, organizing, staffing, directing, control, leadership communication; Organizations: forms, principles.

Managing Information resources and technologies: Managers and information Technology, Information resource Management, Operational Management, Resource Managment, Technology Management, Distributed Management. Organizational Planning, Information Systems Planning, Computer-Aided Planning Tools. Information System Controls, Ethical and Societal challenges of Information Technology.

Suggested Readings:

1. James A.O'Brien: Management Information System, Galgotia Pub. Pvt. Ltd., New Delhi
2. Effy Oz : Management Information System, Vikas Publishing House.
3. Murdick, Ross & Claggett: Information Systems for Modern Management, 3rd Edi., Prentice Hall.
4. Lucas : IT For Management, Latest Edition, Tata McMcgraw-Hill.
5. William Shower Huthuison : Using IT, Tata Mc Graw Hill.
6. C.B.Gupta : Management Theory & Practices, Sultan Chand Publications.

7. Any other book (s) covering the contents of the paper in more depth.

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

MCA-505: NETWORK MANAGEMENT

Max. Marks: 75
Time : 3 Hrs.

Note:

Total 8 questions may be set covering the whole syllabus and the candidate will be required to attempt any 5 questions

Data communication and network management overview: Distributed computing environment, TCP/IP based Network, Network Management goals and functions, Network Topology Types; LANs, WANs, MANs. Different Network Node components and transmission technologies. Network Management standards and Models.

SNMP Management Versions: SNMP V1 Network Management-Organization, information, communication and functional Models, SNMP V2- Modification in SNMPV2, System Archtecture and Structure of Management Information, SNMPV2 MIB, Protocol and its complexity with SNMPV. - SNMPV3 Architecture Applications and Management Information base. SNMPV3 Security Models and access Controls, SNMP Management RMON.

Broad band Network Management: ATM Networks, ATM Technologies, ATM Network Management and Interface. Broadband Access Network, HFC Technology and Management, DSL Technology, Asymetric DSL Technology and Management. Telecommunication Management Network, Models, Standards, Architecture and its implementation issues, Network Management tools and Applications.Web based Management, Window Management Instrumentation and JAVA Management extensions. Communication Protocol, Internet Protocol, Novel Network Systems, System Network Architecture, Overview of Brakely Sockets and Data gram Communication.

Suggested Readings:

1. Subramanian: Network Management, Pearson Education Pvt. Ltd.
2. UNIX Programming by Stevens.
3. Any other book (s) covering the contents of the paper in more depth.

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