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

## MCA First Year
### Semester-I

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

Total: 24  16  40
## Semester-II

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

## MCA Second Year

### Semester-III

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Course</th>
<th>Pre-requisite course</th>
<th>Lectures</th>
<th>Practical</th>
<th>Total</th>
<th>Univ. Exams</th>
<th>Internal Assessment</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCA-301</td>
<td>Relational Database Management System</td>
<td>MCA-204</td>
<td>5</td>
<td>-</td>
<td>4</td>
<td>75</td>
<td>25</td>
<td>100</td>
</tr>
<tr>
<td>MCA-302</td>
<td>Operating System</td>
<td>MCA-203</td>
<td>5</td>
<td>-</td>
<td>4</td>
<td>75</td>
<td>25</td>
<td>100</td>
</tr>
<tr>
<td>MCA-303</td>
<td>Artificial Intelligence (Using LISP)</td>
<td>MCA-201, 205, 302</td>
<td>5</td>
<td>-</td>
<td>6</td>
<td>75</td>
<td>25</td>
<td>100</td>
</tr>
<tr>
<td>MCA-304</td>
<td>Distributed Computing, Networks and Applications</td>
<td>MCA-205, 302</td>
<td>5</td>
<td>-</td>
<td>6</td>
<td>75</td>
<td>25</td>
<td>100</td>
</tr>
<tr>
<td>MCA-305</td>
<td>Object Oriented Programming using C++</td>
<td>MCA-205</td>
<td>5</td>
<td>-</td>
<td>4</td>
<td>75</td>
<td>25</td>
<td>100</td>
</tr>
<tr>
<td>MCA-306</td>
<td>SoftwareLab-5 (Based on MCA-301, 303)</td>
<td>Practical Examination of MCA-306 &amp; 307 will be conducted on same day in 2 sittings each of 4 hours.</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>75</td>
<td>25</td>
<td>100</td>
</tr>
<tr>
<td>MCA-307</td>
<td>SoftwareLab-6 (Based on MCA-305)</td>
<td>MCA-305</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>75</td>
<td>25</td>
<td>100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td>24</td>
<td>16</td>
<td><strong>40</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Semester-IV

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Course</th>
<th>Pre-requisite course</th>
<th>Lectures</th>
<th>Practical</th>
<th>Total</th>
<th>Univ. Exams</th>
<th>Internal Assessment</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>UNIX and Shell Programming</td>
<td>MCA-302</td>
<td>4</td>
<td>4</td>
<td>75</td>
<td>25</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>MCA-401</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MCA-402</td>
<td>Web Application Tools and E-Commerce</td>
<td>MCA-304</td>
<td>5</td>
<td>4</td>
<td>75</td>
<td>25</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>MCA-403</td>
<td>Software Engineering</td>
<td>MCA-102, 105</td>
<td>5</td>
<td>6</td>
<td>75</td>
<td>25</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>MCA-404</td>
<td>Object Oriented Analysis and Design</td>
<td>MCA-305</td>
<td>5</td>
<td>6</td>
<td>75</td>
<td>25</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>MCA-405</td>
<td>Visual Languages Programming</td>
<td>MCA-102</td>
<td>5</td>
<td>4</td>
<td>75</td>
<td>25</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>MCA-406</td>
<td>SoftwareLab-7 (Based on MCA-401,402)</td>
<td>Practical</td>
<td>8</td>
<td>8</td>
<td>75</td>
<td>25</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>MCA-407</td>
<td>SoftwareLab-8 (Based on MCA-404,405)</td>
<td>Practical</td>
<td>8</td>
<td>8</td>
<td>75</td>
<td>25</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>24</td>
</tr>
</tbody>
</table>

### MCA Third Year

### Semester-V

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Course</th>
<th>Pre-requisite course</th>
<th>Lectures</th>
<th>Practical</th>
<th>Total</th>
<th>Univ. Exams</th>
<th>Internal Assessment</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCA-501</td>
<td>.NET and C# Programming</td>
<td>MCA-102, 304, 402</td>
<td>5</td>
<td>4</td>
<td>75</td>
<td>25</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>MCA-502</td>
<td>Software Testing and Quality Assurance</td>
<td>MCA-105, 403</td>
<td>5</td>
<td>4</td>
<td>75</td>
<td>25</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>MCA-503</td>
<td>Windows Programming</td>
<td>MCA-102, 402</td>
<td>5</td>
<td>6</td>
<td>75</td>
<td>25</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>MCA-504</td>
<td>IT Management</td>
<td>MCA-304, 501</td>
<td>4</td>
<td>6</td>
<td>75</td>
<td>25</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>MCA-505</td>
<td>Network Management</td>
<td>MCA-304, 501</td>
<td>5</td>
<td>4</td>
<td>75</td>
<td>25</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>MCA-506</td>
<td>SoftwareLab-9 (Based on MCA-501)</td>
<td>Practical</td>
<td>8</td>
<td>8</td>
<td>75</td>
<td>25</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>MCA-507</td>
<td>SoftwareLab-10 (Based on MCA-503, 505)</td>
<td>Practical</td>
<td>8</td>
<td>8</td>
<td>75</td>
<td>25</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>24</td>
</tr>
</tbody>
</table>

### Semester-VI
<table>
<thead>
<tr>
<th>S.No.</th>
<th>Course</th>
<th>Pre-requisite course</th>
<th>Lectures</th>
<th>Practical</th>
<th>Total</th>
<th>Univ. Exams.</th>
<th>Internal Assessment</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MCA-601 Major Project</td>
<td>All courses covered till then</td>
<td>0</td>
<td>24</td>
<td>24</td>
<td>375</td>
<td>125</td>
<td>500</td>
</tr>
</tbody>
</table>

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 Boolean 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:

2. Deo, N, : Graph Theory with Applications to Engineering and Computer Science, Prentice-Hall Inc.
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.


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
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 ASSEMBLY LANGUAGE

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
2. Stallings, William : Computer Organisation & Architecture
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:

Suggested Readings:

5. Sandler: Teach Yourself MS-Office, BPB Publications.
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.


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


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

Suggested Reading:

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

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:

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, 0/1 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, 0/1 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
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; hierarchical 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

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

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


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.


Suggested Readings:

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.
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:

Knowledge Representation:

Game Playing:
Minimax search Procedures, Adding Alpha-Beta Cutoffs.

Expert System:

Specific Application of AI:
Natural Language Understanding (NLU) and Processing: Complexity of the problem, Syntactic processing, Semantic Analysis, Pragmatic processing.

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

Suggested Readings:
2. Tani Moto : Introduction to AI using LISP.
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
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.
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
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.
8. Introduction to 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.
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


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


Suggested Readings:

2. Pressman : Software Engineering, TMH.
3. Ghezzi, Carlo : Fundaments of Software Engineering, PHI.
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.
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.


Few Case Studies.

Suggested Readings:

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:

2. Holzner Steven : Visual Basic Programming, IDG Books India Ltd.
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, Inheritance 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.


Suggested Readings:
2. Andrew Troelson : C# and the .NET plateform, a! Apress.
5. Gunnerson Eric : A Programmer’s Introduction to C#, IDG Book’s 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:

3. Pressman : Software Engineering, TMH.
4. Ghazzi, Carlo : Fundaments of Software Engineering, PHI.
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.


Suggested Readings:
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.


Suggested Readings:

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.
Master of computer applications (M.C.a). Course structure and scheme of valuation w.e.f. 2016-17, I Semester. Code MCA 1.1 MCA 1.2 MCA 1.3 MCA 1.4 MCA 1.5 MCA 1.6. MCA 1.7. Name of the subject. Periods/week Theory Lab.

### I Semester

<table>
<thead>
<tr>
<th>Code</th>
<th>Name of the Subject</th>
<th>Periods</th>
<th>Exam. Max. Marks</th>
<th>Credits</th>
<th>Theory</th>
<th>Lab.</th>
<th>Uty.</th>
<th>Sessional</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCA 1.1.1</td>
<td>Discrete Mathematical Structures</td>
<td>3</td>
<td>70</td>
<td>3</td>
<td>100</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MCA 1.1.2</td>
<td>Computer Organization</td>
<td>3</td>
<td>70</td>
<td>3</td>
<td>100</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MCA 1.1.3</td>
<td>Problem Solving &amp; Programming</td>
<td>3</td>
<td>70</td>
<td>3</td>
<td>100</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MCA 1.1.4</td>
<td>Probability, Statistics &amp; Queuing</td>
<td>3</td>
<td>70</td>
<td>3</td>
<td>100</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MCA 1.1.5</td>
<td>Management Accountancy</td>
<td>3</td>
<td>70</td>
<td>3</td>
<td>100</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MCA 1.1.6</td>
<td>Computer Organization Lab.</td>
<td>-</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>100</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MCA 1.1.7</td>
<td>C Programming Lab.</td>
<td>-</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Instruction: 3 Periods & 1 Tut/week.