Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (objective type/short-answer type questions) covering the entire syllabus and will carry 24 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 14 marks.

Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

UNIT-I
Computer Fundamentals: Definition, Block Diagram along with Computer components, characteristics & classification of computers, hardware & software, types of software, firmware.
Planning the Computer Program: Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation.
Techniques of Problem Solving: Flowcharting, decision table, algorithms ,Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming.

UNIT-II
Searching, Sorting, and Merging: Linear & Binary Searching, Bubble, Selection, and Insertion Sorting, Merging.
Overview of C: History of C, Importance of C, Structure of a C Program.
Elements of C: C character set, identifiers and keywords, Data types, Constants and Variables.
Operators: Arithmetic, relational, logical, bitwise, unary, assignment and conditional operators and their hierarchy & associativity.

UNIT-III
Input/output: Unformatted & formatted I/O function in C.
Control statements: Sequencing, Selection: if and switch statement; alternation, Repetition: for, while, and do-while loop; break, continue, goto.
Functions: Definition, prototype, passing parameters, recursion.
Storage classes in C: auto, extern, register and static storage class, their scope, storage, & lifetime.

UNIT-IV
Arrays: Definition, types, initialization, processing an array, passing arrays to functions, Strings.
Pointers: Declaration, operations on pointers, pointers and arrays, dynamic memory allocation, pointers and functions, pointers and strings.
Structure & Union: Definition, processing, Structure and pointers, passing structures to functions.
Data files: Opening and closing a file, I/O operations on files, Error handling during I/O operation, Random access to files.

Text Books:
2. Dromey, R.G., How to Solve it By Computer, PHI

Reference Books:
2. Yashwant Kanetker, Let us C, BPB
4. Leon, Alexis & Leon, Mathews, Introduction to Computers, Leon Tech World
5. Rajaraman, V., Fundamentals of Computers, PHI
6. Rajaraman, V., Computer Programming in C, PHI
MCA-102 COMPUTER ORGANIZATION

Maximum marks: 100
Time: 3 hours

External: 80
Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (objective type/short-answer type questions) covering the entire syllabus and will carry 24 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 14 marks.
Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

UNIT-I
Information Representation: Number systems, BCD codes, Character codes – ASCII, EBCDIC, Unicode, Error Detecting and Correcting codes, Fixed-point and Floating-point representation of numbers. Binary arithmetic, Booths multiplication.
Binary Logic: Boolean algebra, Boolean functions, truth tables, canonical and standard forms, simplification of Boolean functions, Digital logic gates.

UNIT-II
Combinational Logic: Design procedure, Adders, Subtractors, Code Conversion, Analysis procedure, Multilevel NAND & NOR Circuits, XOR & XNOR functions Encoders, Decoders, Multiplexers, Demultiplexers and Comparators, Binary Parallel Adder, BCD Adder

UNIT-III
Sequential Logic: Flip-flops, Shift registers and Counters.
Memory System: Memory parameters, Semiconductor RAMs, ROMs, Magnetic and Optical storage devices, Flash memory.

UNIT-IV
CPU Organization: Processor organization, Machine instructions, instruction cycles, instruction formats and addressing modes, microprogramming concepts, and micro program sequencer.
I/O Organization: I/O interface, Interrupt structure, transfer of information between CPU/memory and I/O devices, and IOPs.

Text Books:

Reference Books:
### MCA-103 DISCRETE MATHEMATICAL STRUCTURE

<table>
<thead>
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<th>Maximum marks:</th>
<th>100</th>
<th>External:</th>
<th>80</th>
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<tbody>
<tr>
<td>Time:</td>
<td>3 hours</td>
<td>Internal:</td>
<td>20</td>
</tr>
</tbody>
</table>

**Note:** Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (objective type/short-answer type questions) covering the entire syllabus and will carry 24 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 14 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

**UNIT –I**

**Groups and subgroups:** Group axioms, Permutation Groups, Subgroups, Cosets, Normal Subgroups, Semigroups, Free Semi-groups, Modular Arithmetic, Grammars, Language, Regular Expressions, Finite State Machine.

**UNIT –II**

**Graphs:** Directed and Undirected Graphs, Chains, Circuits, Paths, Cycles, Connectivity, Adjacency and Incidence Matrices, Algorithms for determining Cycle and Minimal paths, Trees, Polish Notation, Flows in Networks.

**UNIT –III**

**Lattices and boolean algebra:** Relations to partial ordering, Lattices, Hasse Diagram, Axiomatic definition of Boolean Algebra as algebraic structures with two operations, Boolean Functions, Representing Boolean Functions, Switching Circuits, Gate Circuits.

**UNIT –IV**

**Finite fields:** Definition, Representation, Structure, Integral Domain, Irreducible Polynomial, Polynomial Roots, Splitting Field.

**Text Books:**

**Reference Books:**
1. Olympia Nicodemy, “Discrete Mathematics”, Cbs Publisher, Delhi
MCA-104 SOFTWARE ENGINEERING

Maximum marks: 100  
Time: 3 hours
External: 80  
Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (objective type/short-answer type questions) covering the entire syllabus and will carry 24 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 14 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

Unit-I

Unit-II
Software Project Planning: Cost estimation, static, Single and multivariate models, COCOMO model, Putnam Resource Allocation Model, Risk management, project scheduling, personnel planning, team structure, Software configuration management, quality assurance, project monitoring.

Unit-III
Software Design: Design fundamentals, problem partitioning and abstraction, design methodology, Cohesion & Coupling, Classification of Cohesiveness & Coupling, Function Oriented Design, and User Interface Design.
Coding: Programming style, structured programming.
Software reliability: metric and specification, Musa and JM reliability model, fault avoidance and tolerance, exception handling, defensive programming.

Unit-IV
Software Testing: Testing fundamentals, Functional testing: Boundary Value Analysis, Equivalence class testing, Decision table testing, Cause effect graphing, Structural testing: Control flow based and data flow based testing, loop testing, mutation testing, load, stress and performance testing, software testing strategies: unit testing, integration testing, Validation testing, System testing, Alpha and Beta testing, debugging.

Text Books:

Reference Books:
MCA-105 COMPUTER ORIENTED NUMERICAL AND STATISTICAL METHODS

Maximum marks: 100
Time: 3 hours

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (objective type/short-answer type questions) covering the entire syllabus and will carry 24 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 14 marks.
Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting One question from each Unit.

UNIT-I
Computer Arithmetic: Floating-point representation of numbers, arithmetic operations with normalized floating point numbers and their consequences. Error in number representation - pitfalls in computing.

UNIT-II
Numerical Differentiation and Integration: Differentiation formulae based on polynomial fit, Pitfalls in differentiation, Trapezoidal, Simpson's rules and Gaussian Quadrature.

UNIT-III
Interpolation and Approximation: Polynomial interpolation, Difference tables, Inverse interpolation, Polynomial fitting and other curve fitting. Approximation of functions by Taylor series and Chebyshev polynomials.

UNIT-IV
Statistical methods: Sample distributions, Test of Significance: Chi-Square Test, t and F test.
Analysis of Variance: Definition, Assumptions, Cochran's Theorem (only statement), One-way classification, ANOVA Table, Two-way classification (with one observation per cell).

Reference Books: