Maths

MCA-BC2-Foundation for Mathematics and Architecture

Max. Marks: 100
Time: 3 Hrs.
Note: There shall be nine questions in all. Question no. 1 shall be compulsory, consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Student will have to attempt one question from each unit.
Each question shall carry equal marks.

Unit-1
Set and its Operation : Set theory ,Sets and their representations; empty set; finite and infinite sets; equal and equivalent sets; subsets; power set; universal set; Venn diagrams; complement of a set operation on sets; applications of sets.
Mathematical Logic, Basic Logical connections; Conjunction; Disjunction; Negation; Negation of Compound Statements; Truth tables. Tautologies; Logical Equivalence.

Unit-II
Algebra, Matrix and statistics: Modern algebra Binary Operation; Addition Modulo n; Multiplication modulo n,
Matrices and Determinants Definition of a matrix; Operations on matrices; Square Matrix and its inverse; determinants; the inverse of a matrix, basics
Statistics Measures of central Tendency; Standard Deviation; Variance.

Unit-III
Digital Logic and Computer Organization: Computer Evolution: Brief history of Computer, Classification of Computer, Structure of a Computer System, Arithmetic Logic Unit, Control Unit, Bus Structure, Von Neumann Architecture, Bootstrapping.
Number Systems:
Decimal, Binary, Octal, Hexadecimal conversion from one to another, Basic Arithmetic Operations: Integer Addition and Subtraction, Signed numbers, Binary Arithmetic, 1"s and 2"s Complement Arithmetic, Fixed and Floating point numbers, Floating point representation.

Unit-IV

Digital Logic: Logic gates, Boolean Algebra, Basic theorem and Properties of Boolean algebra. Basic concepts on Combinational Circuits and Sequential circuits.

Control Unit Design: Basic Concepts - Instruction execution cycle - sequencing of control signals.

Memory Organization and I/O: Characteristics of Memory Systems, Main Memory, Types of Random-Access Memory and ROM, Organization, Static and dynamic memories. Understanding Cache Memory and Virtual Memory, Input / Output Organization: Accessing I/O devices – Understanding Programmed I/O, Interrupt I/O and Direct memory access (DMA)

References:

1. Discrete Mathematics & Structures by Satinder Bal Gupta, Laxmi Publications
2. Digital Electronics by A.P. Godse, Technical Publications.
3. Computer Fundamentals by P.K.Sinha, BP B Publications.
4. Computer System Architecture by M. Morris Mano, Pearson Publications.
5. Any other book(s) covering the contents of the paper in more depth