

M.Sc. (I.T.)
SEMESTER – 1
Paper No.: 1

Title of the Paper: *Computer System Organization*

Credits: 5

Marks: 100

Marks: Semester End Examination: 70 Marks

Continuous Internal Evaluation: 30 Marks

Unit-1: Introduction

Block Diagram of a simple computer and its different functional units, Representation of Information, Number Systems, Integer & Floating Point representation, Character codes (ASCII & EBCDIC).

Unit-2: Processors, Memory and Input / Output.

Instruction Execution, CPU organization, Parallel Instruction Execution, Microprocessor chips & Buses, Example of a typical Microprocessor, Memory: Main memory, Secondary memory, Types & Organization, Input / Output: Common types of I/O devices, Controllers.

Unit-3:

Gates and Boolean Algebra, Gates, Boolean Algebra, Truth Tables, Preparing truth table for given circuit, Preparing circuit for given truth table (SOP & POS), De Morgan's Theorems, use of De Morgan's theorems to implement (i) SOP using NAND gates, and (ii) POS using NOR gates.

Unit-4: Basic Digital Logic Circuits.

Integrated circuits, Combinational Circuits - Encoder, Decoder, Multiplexer, De-multiplexer, comparator, Arithmetic Circuits - Half adder, full adder, binary adder binary adder/subtractor

Unit-5: Registers & Counters.

Flip flops, Registers & Counters.

REFERENCE BOOKS:

1. Tanenbaum A. S.: Structured Computer Organization, Prentice-Hall of India Pvt. Ltd.
2. Malvino A. P.: Digital Computer Electronics, 2nd Edition, Tata McGraw-Hill Publishing Co. Ltd.

M.Sc. (I.T.)
SEMESTER – 1
Paper No.: 2

Title of the Paper: *Discrete Mathematics*

Credits: 5

Marks: 100

Marks: Semester End Examination: 70 Marks

Continuous Internal Evaluation: 30 Marks

Unit 1:

Poset, Hasse Diagrams, Lattices, Boolean Algebra, Application to switching Circuits.

Unit 2:

Permutation, Combination, Recurrence Relations, Generating Functions, Principle of Inclusion and Exclusion

Unit 3:Logic

Logic operators AND, OR etc., Truth tables, Theory of inference and deduction, mathematical Inductions

Unit 4:

Basic Concepts of Graphs and Trees, Adjacency and Incidence Matrices, Spanning Tree, Transitive Closure, Shortest Path, Planar Graphs

Unit 5:

Graph Colouring, Applications of Graph Theoretic Concepts to Computer Science

REFERENCE BOOKS:

1. J. P. Trembley and R. P. Manohar, Discrete Mathematical Structures with Applications to Computer Science, McGraw Hill.
2. N. Deo, Graph Theory with Applications to Engineering and Computer Science, PHI.
3. Ian Anderson, A first course in Combinatorial Mathematics, Clarendon Press, Oxford, 1974.
4. R. P. Grimaldi, Discrete and Combinatorial Mathematics, Pearson Education, 1999.
5. K. H. Rosen, Discrete Mathematics and Its Applications, Tata McGraw Hill, 2003

M.Sc. (I.T.)
SEMESTER – 1
Paper No.: 3

Title of the Paper: *Data Structures and Algorithm*

Credits: 5

Marks: 100

Marks: Semester End Examination: 70 Marks
Continuous Internal Evaluation: 30 Marks

Unit 1: Basic Concepts of Data Representation

Abstract data types, Fundamental and derived data types, Representation, Primitive data Structures.

Unit 2 Introduction to Algorithm Design and Data Structures

Design and analysis of Algorithm, Algorithm definition, Comparison of Algorithms, Top-down and bottom-up approaches to Algorithm design, Analysis of Algorithm, Frequency count, Complexity measures in terms of time and space, Structured approach to programming.

Unit 3: Arrays

Representation of arrays, Single and multidimensional arrays, Address calculation using column and row major ordering, Various Operations on Arrays, Vectors, Applications of arrays, Matrix multiplication, Sparse polynomial representation and addition.

Unit 4: Stacks and Queues

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

Unit 5:

Singly linked list, Operations on list, Linked stacks and queues, Polynomial representation and manipulation using linked lists, Circular linked lists, Doubly linked lists, Generalized list structure, Sparse Matrix representation using generalized list structure.

REFERENCE BOOKS:

1. Dr. Madhulika Jain, Shashi Singh and Satish Jain, Data Structure Through 'C' Language, BPB Publications.
2. Y. Langsam, M. J. Augenstein and A. M. Tenenbaum, Data Structures Using C and C++, PHI
3. Y. Kanetkar, Data Structure Through C, BPB Publications.

Title of the Paper: Programming Lab-I
Marks: 100

Credits: 5

Practical Based On
Paper 3: Data Structure and Algorithm {30%}
Numerical Methods {30%}
C Language {40%}

Numerical Methods:

Interpolation

Interpolation with Equal Intervals - Forward, backward and central difference Tables, Gregory-Newton formula for forward & backward Interpolation, Gauss central difference formula, forward and backward, Interpolation for Unequal Intervals-Newton's general interpolation formula, Lagrange Interpolation.

Numerical Integration & Differential Equations

Numerical integration - Geometric meaning of integration, Trapezoidal rule, Simpson - 1/3 & 3/8 rules, Numerical solution of differential equations. Euler's method, Euler's modified method, Runge-Kutta methods.

REFERENCE BOOKS:

1. Rajaraman V.: Computer Oriented Numerical Methods, Prentice Hall of India Pvt. Ltd., 1983.
2. C. K. Kumbharana and N. N. Jani, Computer Oriented Numerical Methods (CONM), Saurashtra University, Rajkot.

C Language:

Introduction to Programming Language C, Data Type, Operators and Expressions in C, Control and Repetitive Statements: IF-THEN-ELSE, SWITCH, WHILE, FOR, DO. Break and Continue Statements. Input and Output functions, Function and Program Structure in C, Parameter passing, Pointers, Array, String handling, Structures, C-Library.

REFERENCE BOOKS:

1. B. W. Kernighan and D. M. Ritchie, The C Programming Language, PHI.
2. R. Sethi, Programming Languages, Addison-Wesley, 1996
3. D. Appleby and J. J. VandeKopple, Programming Languages, Tata McGraw-Hill, 1991.