

(2½ hours)

Total Marks: 75

- N. B.: (1) **All** questions are **compulsory**.  
 (2) Make **suitable assumptions** wherever necessary and **state the assumptions** made.  
 (3) Answers to the **same question** must be **written together**.  
 (4) Numbers to the **right** indicate **marks**.  
 (5) Draw **neat labeled diagrams** wherever **necessary**.  
 (6) Use of **Non-programmable** calculators is **allowed**.

Q 1 **Attempt any three of the following:**

15

- What is an Algorithm? Explain properties of an algorithm.
- Write an algorithm for searching the element in an array.
- What is data structure? Explain primitive and non-primitive data structure.
- What is time and space complexity? Explain Big O and Big Theta notation.
- Write an algorithm for sorting the elements of an array.
- Write an algorithm for merging two arrays.

Q 2 **Attempt any three of the following:**

15

- Explain the structure of single linked list.
- Explain algorithmically the traversal of single linked list.
- Write an algorithm for reversing the single linked list.
- Explain the structure of double linked list.
- Explain in brief the working mechanism of circular linked list.
- Explain how polynomials are presented using linked list.

Q 3 **Attempt any three of the following:**

15

- What is stack? Write an algorithm for PUSH operation.
- Write the steps for converting infix to postfix. And Convert the following expression into postfix form:  $a*b+c+d/(e+f)$
- Explain the working mechanism of Circular queue.
- Write an algorithm for Deque.
- Explain the concept of recursion with suitable example.
- What is Queue? Explain the operations of queue with suitable example.

Q 4 **Attempt any three of the following:**

15

- Write an algorithm for Bubble sort.
- Explain the difference between binary search and sequential search.
- What is heap? Explain the concept of minimum heap.
- Sort the following elements using Insertion sort.

22,43,12,55,67,71,5,89,47,50

[TURN OVER]

- e. What is binary tree? Construct the binary tree for the following: 21,18,7,9,11,8,19,14,13,6
- f. Explain inorder and preorder traversal of the tree.

Q5 **Attempt any three of the following:**

15

- a. What is Hashing? Explain Linear Probing with suitable example.
- b. What is collision? Explain how it is resolve.
- c. What is Graph? Explain directed and undirected graph.
- d. Explain in brief about spanning tree with suitable example.
- e. Give the outline of Kruskal's algorithm.
- f. What is Adjacency Matrix? Generate adjacency matrix for the following undirected graph:

