Q. P. Code: 20937

(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**

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

Q 2 **Attempt *any three* of the following:** **15**

a. Explain the structure of single linked list.
b. Explain algorithmically the traversal of single linked list.
c. Write an algorithm for reversing the single linked list.
d. Explain the structure of double linked list.
e. Explain in brief the working mechanism of circular linked list.
f. Explain how polynomials are presented using linked list.

Q 3 **Attempt *any three* of the following:** **15**

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

Q 4 **Attempt *any three* of the following:** **15**

a. Write an algorithm for Bubble sort.
b. Explain the difference between binary search and sequential search.
c. What is heap? Explain the concept of minimum heap.
d. 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.

Q 5 **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: