D- (2)

(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 M**

a) What is an Algorithm? Explain properties of an algorithm.
b) What is data structure? Explain primitive and non-primitive data structure.
c) What is time and space complexity? Explain Big O and Big Theta notation.
d) Write an algorithm for merging two arrays.
e) Discus memory representation of one dimensional array.
f) What is bubble sort? Sort the following data items using bubble sort method.
14, 32, 26, 34, 10

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

a) What is linked list? Write and explain an algorithm to insert an element at the beginning of the singly linked list.
b) What is circular linked list? How to traverse a circular linked list?
c) What is header linked list? Explain different categories of header linked list.
d) Write algorithm to subtract two polynomials.
e) Write an algorithm for reversing the single linked list
f) Write an algorithm to copy one linked list into another linked list

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

a) What is stack? Write an algorithm for PUSH operation.
b) What is Queue? Explain the operations of queue with suitable example.
c) Write and explain syntax verification algorithm.
d) Explain with example priority queue.
e) Write an algorithm to insert and delete a node from a circular queue.
f) Convert the following expressions in postfix and prefix notations.
(i) Iin= (x – y) x ((z + v) / f)
(ii) Iin= (x * y) + (z + ((a + b - c) * d)) – I * (j / k)

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

a) Write an algorithm for Bubble sort.
b) Sort the following elements using merge sort. 23 56 13 34 78 62 98 53 49 82
c) Draw the binary tree whose inorder and preorder traversals are:
In-order : g d b h e i a f c Pre-order : a b d g e h i c f
d) What is AVL tree? How balancing is done in AVL tree? Explain with example
e) What are 2-3 trees? How to delete a key value from 2-3 trees?

f) Sort the following data elements using heap sort algorithm.
22, 35, 17, 8, 13, 44, 5, 28

Q 5 Attempt any three of the following: **15 M**

a) What is Graph? Explain directed and undirected graph.
b) Give the outline of Kruskal's algorithm.
c) Explain with example Dijkstra shortest path algorithm
d) Explain Warshall's algorithm of finding path matrix of a graph.
e) Explain any two collision resolution techniques.
f) What is Adjacency Matrix? Generate adjacency matrix for the following undirected graph: