G216100DS

(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 meant by complexity of an algorithm? Explain different types of complexities.
b) Write an algorithm to insert an element into the array and to delete an element from the array.
c) What are the advantages and limitations of an array?
d) Differentiate between linear search and binary search.
e) What is data structure? Explain different categories of data structure.
f) What is sparse matrix? Explain different ways of representing sparse matrix into memory.

Q 2 Attempt any three of the following: 15 M

a) Explain algorithmically the traversal of single linked list.
b) Explain the structure of single linked list.
c) Write and explain an algorithm to split a linked list into two linked lists.
d) Write and explain an algorithm to delete a node containing item from a doubly linked list.
e) What is the need of two way linked lists? Explain the structure of a node in a two way linked list.
f) Explain how to represent a sparse array using an array and a linked list with an example.

Q 3 Attempt any three of the following: 15 M

a) What is queue? How queue is represented in memory? Write and explain an algorithm to insert element into circular queue.
b) Write the steps for converting infix to postfix. And Convert the following expression into postfix form: a*b+c+d/(e+f)
c) Write an algorithm for Deque.
d) Explain the working mechanism of Circular queue.
e) What is recursion? What are disadvantages of recursion?
f) Define stack. Discuss the basic operations performed on the stack. Also explain overflow and underflow conditions of the stack.

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

a) What is heap? Explain the concept of minimum heap.
b) Explain the difference between binary search and sequential search.
c) Sort the following elements using Insertion sort. 22,43,12,55,67,71,5,89,47,50
d) What is binary tree? Construct the binary tree for the following:
21,18,7,9,11,8,19,14,13,6
e) Explain inorder and preorder traversal of the tree.
f) Reconstruct the binary tree whose in-order and pre-order traversals are:
In-order Traversal : g d b h e i a f c Pre-order Traversal: a b d g e h i c f

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

a) What is collision? Explain how it is resolve.
b) Explain in brief about spanning tree with suitable example.
c) Explain with example Dijkstra shortest path algorithm
d) What is Hashing? Explain Linear Probing with suitable example.
e) Define the following terms: Graph, Weighted graph, Multi graph, Directed graph and Hamiltonian path
f) Find the adjacency matrix and list representation of the following graph