

(3 Hours)

[Marks: 80]

- N.B.: 1) Question No. 1 is compulsory.  
2) Answer any three out of remaining questions.  
3) Assume suitable data if necessary.  
4) Figures to the right indicate full marks.

- Q1. (a) Explain data structures and Abstract Data Type. (5)  
(b) What is expression tree? Give examples. (5)  
(c) What is a Linked List? State the different types of Linked List. (5)  
(d) What are the different ways to represent Graph. (5)

- Q2. (a) Write an algorithm to implement queue using an array. (10)

- Q2. (b) Explain insertion sort with example by giving its algorithm and comment on its complexity. (10)

- Q3. (a) Write an algorithm to implement stack using array. (10)

- Q3. (b) What is Doubly Linked List? Write an algorithm to implement following operations on Doubly Linked List.

- a) Insertion (all cases)  
b) Traversal (Forward and Backward) (10)

- Q4. (a) Define Minimum Spanning Tree. Construct a minimum spanning tree shown in figure 1 using Kruskal's and Prim's Algorithm and find out the cost with all intermediate steps. (10)

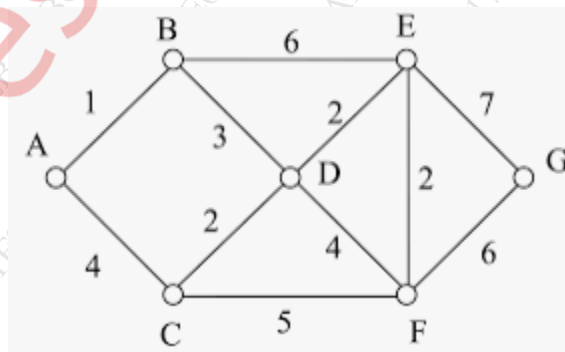


Figure 1

Q4. (b) Define AVL tree. Construct an AVL tree from the following data and mention the rotations in each step. (10)

40,30,20,25,21,50,60,70,65,22,18,15

Q5. (a) What is collision? List down the methods to resolve the collision. Consider a hash table of size 11. Using linear probing, insert keys 54, 26, 93, 17, 77, 60 and 31 into the table. (10)

Q5. (b) Write the algorithm for deletion of a node (all cases) in a Binary Search Tree. (10)

Q6. Write Short note on any **four**: (20)

- a) Breadth First Search
- b) Expression Tree
- c) Selection Sort
- d) Double Ended Queue (De-Queue)
- e) Binary Search

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