

**B. TECH.**  
**(SEM III) THEORY EXAMINATION 2019-20**  
**DATA STRUCTURES**

Time: 3 Hours

Total Marks: 100

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

**SECTION A**

1. Attempt all questions in brief.

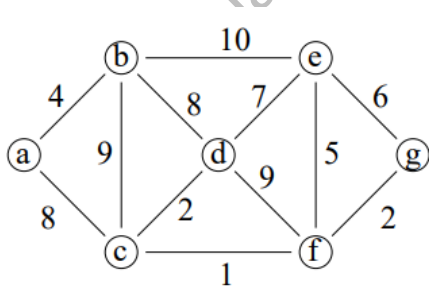
2 x 10 = 20

| Qno. | Question  | Marks | CO  |
|------|---|-------|-----|
| a.   | How can you represent a sparse matrix in memory?  | 2     | CO1 |
| b.   | List the various operations on linked list.   | 2     | CO1 |
| c.   | Give some applications of stack.  | 2     | CO2 |
| d.   | Explain Tail recursion.   | 2     | CO2 |
| e.   | Define priority queue. Given one application of priority queue.                               | 2     | CO3 |
| f.   | How does bubble sort work? Explain.   | 2     | CO3 |
| g.   | What is Minimum cost spanning tree? Give its applications.                                    | 2     | CO4 |
| h.   | Compare adjacency matrix and adjacency list representations of graph.                         | 2     | CO4 |
| i.   | Define extended binary tree, full binary tree, strictly binary tree and complete binary tree. | 2     | CO5 |
| j.   | Explain threaded binary tree.   | 2     | CO5 |

**SECTION B**

2. Attempt any three of the following:

3 x 10 = 30

| Qno. | Question  | Marks | CO  |
|------|---|-------|-----|
| a.   | What are the merits and demerits of array? Given two arrays of integers in ascending order, develop an algorithm to merge these arrays to form a third array sorted in ascending order.                       | 10    | CO1 |
| b.   | Write algorithm for Push and Pop operations in stack. Transform the following expression into its equivalent postfix expression using stack:<br>$A + (B * C - (D / E \uparrow F) * G) * H$                    | 10    | CO2 |
| c.   | How binary search is different from linear search? Apply binary search to find item 40 in the sorted array: 11, 22, 30, 33, 40, 44, 55, 60, 66, 77, 80, 88, 99. Also discuss the complexity of binary search. | 10    | CO3 |
| d.   | Find the minimum spanning tree in the following graph using Kruskal's algorithm:<br>                                       | 10    | CO4 |
| e.   | What is the difference between a binary search tree (BST) and heap? For a given sequence of numbers, construct a heap and a BST.<br>34, 23, 67, 45, 12, 54, 87, 43, 98, 75, 84, 93, 31                        | 10    | CO5 |

**SECTION C****3. Attempt any one part of the following:****1 x 10 = 10**

| Qno. | Question  | Marks | CO  |
|------|---|-------|-----|
| a.   | What is doubly linked list? What are its applications? Explain how an element can be deleted from doubly linked list using C program. | 10    | CO1 |
| b.   | Define the following terms in brief:<br>(i) Time complexity (iii) Space complexity<br>(ii) Asymptotic Notation (iv) Big O Notation    | 10    | CO1 |

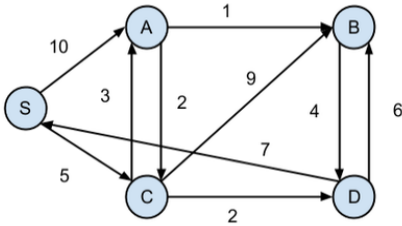
**4. Attempt any one part of the following:****1 x 10 = 10**

| Qno. | Question  | Marks | CO  |
|------|---|-------|-----|
| a.   | (i) Differentiate between iteration and recursion.<br>(ii) Write the recursive solution for Tower of Hanoi problem. | 10    | CO2 |
| b.   | Discuss array and linked representation of queue data structure. What is dequeue?                                   | 10    | CO2 |

**5. Attempt any one part of the following:****1 x 10 = 10**

| Qno. | Question   | Marks | CO  |
|------|--|-------|-----|
| a.   | Why is quick sort named as quick? Show the steps of quick sort on the following set of elements: 25, 57, 48, 37, 12, 92, 86, 33<br>Assume the first element of the list to be the pivot element. | 10    | CO3 |
| b.   | What is hashing? Give the characteristics of hash function. Explain collision resolution technique in hashing.   | 10    | CO3 |

**6. Attempt any one part of the following:****1 x 10 = 10**

| Qno. | Question  | Marks | CO  |
|------|---|-------|-----|
| a.   | Explain warshall's algorithm with the help of an example.   | 10    | CO4 |
| b.   | Describe the Dijkstra algorithm to find the shortest path. Find the shortest path in the following graph with vertex 'S' as source vertex.<br> | 10    | CO4 |

**7. Attempt any one part of the following:****1 x 10 = 10**

| Qno. | Question   | Marks | CO  |
|------|--|-------|-----|
| a.   | Can you find a unique tree when any two traversals are given? Using the following traversals construct the corresponding binary tree:<br>INORDER: H K D B I L E A F C M J G<br>PREORDER: A B D H K E I L C F G J M<br>Also find the Post Order traversal of obtained tree. | 10    | CO5 |
| b.   | What is a B-Tree? Generate a B-Tree of order 4 with the alphabets (letters) arrive in the sequence as follows:<br>a g f b k d h m j e s i r x c l n t u p  | 10    | CO5 |