

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: $A + (B * C - (D / E \uparrow F) * G) * H$ | 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: | 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. 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: (i) Time complexity (iii) Space complexity (ii) Asymptotic Notation (iv) Big O Notation | 10 | CO1 |

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

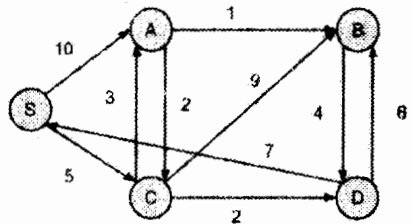
| Qno. | Question | Marks | CO |
|------|---------------------------------------------------------------------------------------------------------------------|-------|-----|
| a. | (i) Differentiate between iteration and recursion. (ii) Write the recursive solution for Tower of Hanoi problem. | 10 | 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 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. | 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: INORDER: H K D B I L E A F C M J G PREORDER: A B D H K E L L C F G J M 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: a g f b k d h m j e s i r x c l n t u p | 10 | CO5 |