Sub Code:KCS301

Paper Id: 110321 Roll No:

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.

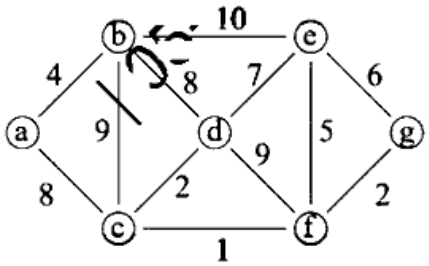
SECTION A

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 ↑ 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

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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

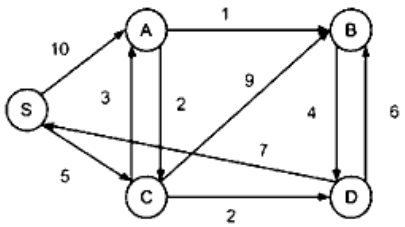
4. Attempt any *one* part of the following: 1 x 10 = 10

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 I 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: https://www.aktuonline.com a g f b k d h m j e s i r x c l n t u p	10	CO5