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## B. TECH.

## (SEM III) THEORY EXAMINATION 2019-20 <br> 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.
$2 \times 10=20$

| 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 <br> complete binary tree. | 2 | CO5 |
| j. | Explain threaded binary tree. | 2 | CO5 |

## SECTION B

2. Attempt any three of the following:
$3 \times 10=30$

| Qno. | Question ${ }^{3}$ | 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: $\mathrm{A}+(\mathrm{B} * \mathrm{C}-(\mathrm{D} / \mathrm{E} \uparrow \mathrm{~F}) * \mathrm{G}) * \mathrm{H}$ | 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:
$1 \times 10=10$

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

4. Attempt any one part of the following: $\quad 1 \times 10=10$

| Qno. | Question | Marks | CO |
| :--- | :--- | :--- | :--- |
| a. | (i) Differentiate between iteration and recursion. <br> (ii) Write the recursive solution for Tower of Hanoi problem. | 10 | CO 2 |
| b. | Discuss array and linked representation of queue data structure. What is <br> dequeue? | 10 | CO 2 |
| $\mathbf{5 .}$ | Attempt any one part of the following: | $\mathbf{1 \times 1 0}=\mathbf{1 0}$ |  |


| Qno. | Question | Marks | CO |
| :--- | :--- | :--- | :--- |
| a. | Why is quick sort named as quick? Show the steps of quick sort on the <br> 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 <br> collision resolution technique in hashing. | 10 | CO3 |
| $\mathbf{6}$ 6. | Attempt any one part of the following: | $\mathbf{1 \times 1 0}=\mathbf{1 0}$ |  |


| Qno. | Question |  | Marks | CO |
| :--- | :--- | :--- | :--- | :--- |
| a. | Explain warshall's algorithm with the help of an example. | $10{ }^{\circ}$ | CO 4 |  |
| b. | Describe the Dijkstra algorithm to find the shortest path. Find the <br> shortest path in the following graph with vertex ' S " as source vertex. | 10 | CO |  |


| Qno. | Question | Marks | CO |
| :--- | :--- | :--- | :---: |
| a. | Can you find a unique tree when any tyo traversals are given? Using the <br> following traversals construct the corresponding binary tree: <br> INORDER: H K D B I L E AFC M J G <br> PREORDER: A B D H K E IL 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 <br> (letters) arrive in the sequence as follows: <br> ag fbkdhmjes irxclntup | 10 | CO5 |

