PAPER ID-311146

Roll No: | | | | | | | | | | | | |

B.TECH.
(SEM III) THEORY EXAMINATION 2020-21
DATA STRUCTURES

Time: 3 Hours ***Total Marks: 70***

Note: **1.** Attempt all Sections. If require any missing data; then choose suitably.
2. Any special paper specific instruction.

SECTION A

1. Attempt *all* questions in brief. 2 x 7 = 14

a. Define Complete Binary Tree, Strictly binary tree and Extended binary tree.
b. How can you represent a sparse matrix in memory?
c. Define transitive closure of a graph.
d. Explain objective of Tower of Hanoi problem.
e. Differentiate between Linear Search and Binary Search.
f. Differentiate between Circular Queue and Priority Queue.
g. Explain Merits and demerits of an array.

SECTION B

2. Attempt any *three* of the following: 7 x 3 = 21

a. Compare Linked List with Array. Write an Algorithm to search an element in a linked list containing elements in ascending order.
b. State the Steps required to convert the following expression from infix to postfix notation using stack:
$$A/B - C * (D/E * (F - G) + H/J) + K * L$$
c. Define Binary Tree. In order and preorder traversal of a tree are given below:
In-order: H D I B J E K A F C G
Preorder: A B D H I E J K C F G
Construct the Binary Tree and Determine the Post-order traversal of the Tree.
d. Explain Depth First Search Traversal in Graph with the help of an example.
e. Illustrate the operation of Merge sort on the array, A= (10, 5, 18, 35, 44, 29, 8)

SECTION C

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

(a) Define Time and Space Complexity of an algorithm? Explain the role of Asymptotic notations in determining complexity of Algorithm.
(b) Explain how two dimensional arrays can be used to represent matrices.

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

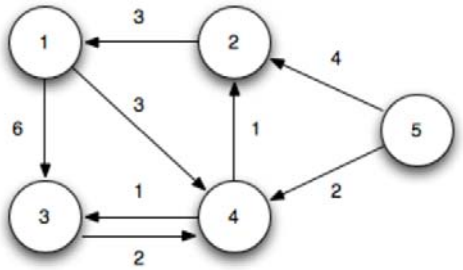
(a) Write a program for Tower of Hanoi problem with 'n' number of disks. Show all steps used in solving Tower of Hanoi for 3 disks.

(b) What is circular queue? Explain different operations that can be performed on circular queue.

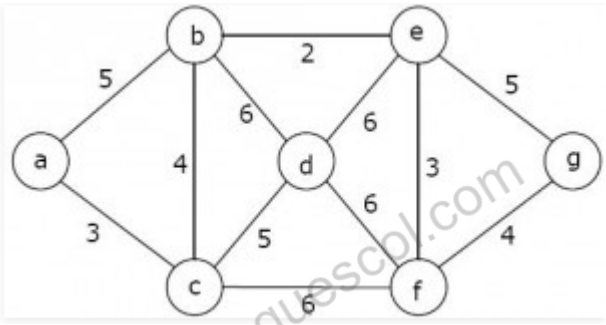
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5. Attempt any *one* part of the following: 7 x 1 = 7

(a) Find the Shortest path distance from source vertex '5' to all vertices in the following graph. Also draw the shortest path tree.



(b) Find minimum spanning Tree in following graph using Prim's Algorithm by considering vertex 'a' as root/source vertex:



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

(a) Explain all Steps used to build Huffman Tree where following characters are given with their frequencies:
a:5, b:9, c:12, d:13, e:16, f:45

(b) Define Threaded Binary trees. Explain how Threaded Binary trees can be traversed.

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

(a) Define AVL Tree. Insert 14, 17, 11, 7, 53, 4, 13 into an empty AVL tree

(b) Construct a B Tree of order 4 using following elements:
K, U, W, C, M, P, Y, A, E, Q, X, D, H, V, F, J, I, B, S, T

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