Printed Pages: 02 **Sub Code: RCS305**

Paper Id: | 1 | 1 | 0 | 3 | 0 | 3 | **Roll No.** | | | | | | | | | | |

B. TECH.
(SEM III) THEORY EXAMINATION 2018-19
DATA STRUCTURES

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

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

SECTION A

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

a. How the graph can be represented in memory? Explain with suitable example.

b. Write the syntax to check whether a given circular queue is full or empty?

c. Draw a binary Tree for the expression: A * B - (C + D) * (P /Q)

d. Differentiate between overflow and underflow condition in a linked list.

e. What do you understand by stable and in place sorting?

f. Number of nodes in a complete tree is 100000. Find its depth.

g. What is Recursion? Give disadvantages of recursion.

SECTION B

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

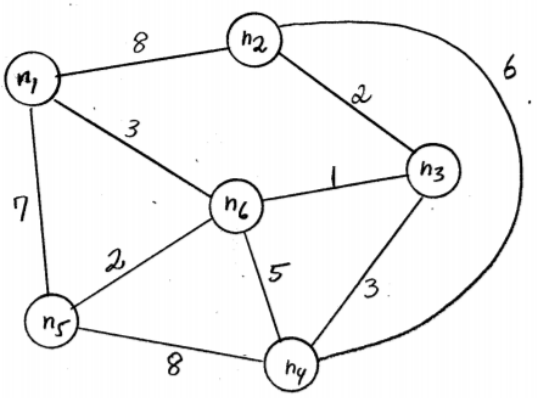
a. What do you understand by time and space trade off? Define the various asymptotic notations. Derive the O-notation for linear search.

b. Consider the following infix expression and convert into reverse polish notation using stack. A + (B * C – (D / E ^ F) * H)

c. Explain Huffman algorithm. Construct Huffman tree for MAHARASHTRA with its optimal code.

d. What is a height balanced Tree? Why height balancing of Tree is required? Create an AVL Tree for the following elements: a, z, b, y, c, x, d, w, e, v, f

e. Write the Floyd Warshall algorithm to compute the all pair shortest path. Apply the algorithm on following graph:



SECTION C

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

(a) Write a program in c to delete a specific element in single linked list. Double linked list takes more space than single linked list for storing one extra address. Under what condition, could a double linked list more beneficial than single linked list.

(b) Suppose multidimensional arrays P and Q are declared as P (-2: 2, 2: 22) and Q (1: 8, -5: 5, -10: 5) stored in column major order

(i) Find the length of each dimension of P and Q

(ii) The number of elements in P and Q

(iii) Assuming Base address (Q) = 400, W=4, Find the effective indices E1, E2, E3 and address of the element Q [3, 3, 3].

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

(a) Explain Tower of Hanoi problem and write a recursive algorithm to solve it.

(b) Explain how a circular queue can be implemented using arrays. Write all functions for circular queue operations.

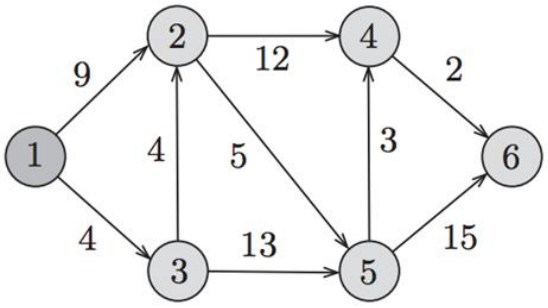
5. Attempt any *one* part of the following: 7 x 1 = 7

(a) Write the algorithm for deletion of an element in binary search tree.

(b) Construct the binary tree for the following.
In-order: Q, B, K, C, F, A, G, P, E, D, H, R
Preorder: G, B, Q, A, C, K, F, P, D, E, R, H
Find the Post Order of the Tree

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

(a) By considering vertex '1' as source vertex, Find the shortest paths to all other vertices in the following graph using Dijkstra's algorithms. Show all the steps.



(b) Explain in detail about the graph traversal techniques with suitable examples.

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

(a) Write algorithm for Quick sort. Trace your algorithm on the following data to sort the list: 2, 13, 4, 21, 7, 56, 51, 85, 59, 1, 9, 10. How the choice of pivot element effects the efficiency of algorithm.

(b) Construct a B-tree of order 5 created by inserting the following elements
3, 14, 7, 1, 8, 5, 11, 17, 13, 6, 23, 12, 20, 26, 4, 16, 18, 24, 25, 19
Also delete elements 6, 23 and 3 from the constructed tree.