Printed Pages: 02 **Sub Code: NCS301**

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

B. Tech.
(SEM III) THEORY EXAMINATION 2018-19
DATA STRUCTURES USING C

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

a. Differentiate between overflow and underflow condition in a linked list.
b. Define connected graph and complete graph with example.
c. With the help of algorithm explain the binary search.
d. Write a program in C to compute the factorial of given number recursively.
e. Define Binary search tree. How it is different from binary tree?
f. How the graph can be represented in memory? Explain with suitable example.
g. Explain stable and in place sorting?
h. Write the syntax to check whether a given circular queue is full or empty?
i. Convert the following infix expression into postfix expression:
B-C/D+A*(F-G/H)
j. What are the advantages and disadvantages of array over linked list?

SECTION B

2. Attempt any *three* of the following: 10 x 3 = 30

a. Assume the declaration of multi-dimensional arrays A and B to be,
A (-2:2, 2:22) and B (1:8, -5:5, -10:5)
(i) Find the length of each dimension and number of elements in A and B.
(ii) Find the address of element B (2, 2, 3), assuming Base address of B = 400 and there are W=4 words per memory location.
b. Write a Program in C to implement all operations of a Stack using array.
c. Suppose the following list of letters is inserted in order into empty binary search tree: J, R, D, G, T, E, M, H, P, A, F, Q
(i) Construct the binary Search Tree
(ii) Find the in-order, Pre-order and Post-order Traversal of the BST created.
d. Explain Depth First Search Traversal in Graph with the help of an example.
e. Classify the Hashing Functions based on the various methods by which the key value is found. What are the types of Collision Resolution Techniques and the methods used in each of the type?

SECTION C

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

(a) Illustrate the operation of Quick sort on the array, A= (19, 4, 7, 24, 52, 56, 87)

(b) Discuss the advantages of using B-Tree. Insert the following Information 86, 23, 91, 4, 67, 18, 32, 54, 46, 96, 45 into an empty B-Tree with order 4.

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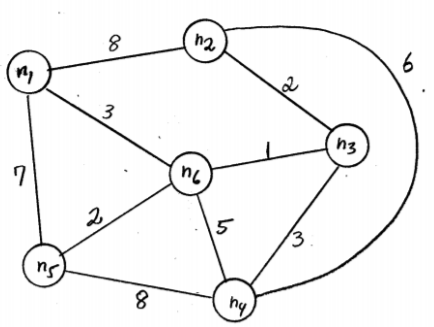
4. Attempt any *one* part of the following: 10 x 1 = 10

(a) Write a program in C for implementation of queue. Your program should at least contain ADD, CREATE, DELETE, FULL, EMPTY functions.

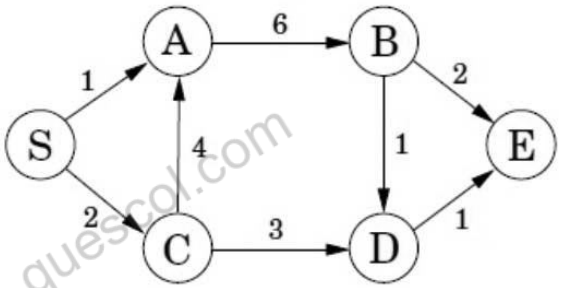
(b) Explain Tower of Hanoi problem and write a recursive algorithm to solve it.

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

(a) Define Floyd Warshall Algorithm for all pair shortest path and apply the same on following graph:



(b) Considering 'S' as source vertex, Apply the Dijkstra's shortest path algorithm on the following graph:



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

(a) Construct the binary tree using following in-order and post-order traversal.

In-order : DBMINEAFCJGK

Post-order : ABDEIMNCFGJK

(b) Differentiate between fixed length and variable length encoding. Draw the Huffman tree for the following symbols whose frequency of occurrence in message is stated along with symbol below

A:15, B:6, C:7, D:12, E:25, F:4, G:6, H:1, I:15

Decode the message: 1110100010111011

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

(a) Write a program to insert a new element in the given unsorted array at k^{th} position.

(b) Write a program to implement linear linked list, showing all the operations that can be performed on a linked list.

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