Printed Pages: 02 **Sub Code: RCS405**

Paper Id: 110435 **Roll No.**

B. TECH
(SEMESTER IV) THEORY EXAMINATION 2017-18
DATA STRUCTURE

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. The initial configuration of a queue is p, q, r, s ('p' is in the front end). To get the configuration s, r, q, p, how many minimum dequeues and enqueues are required?
b. Write the structure of binary search tree, threaded binary tree.
c. Define activity network with suitable example.
d. Calculate the minimum number of nodes in AVL tree with height 8.
e. Write a C program to multiply two integer number using recursion
f. What do you mean by priority queue?
g. Explain Transitive Closure.

SECTION B

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

a. An array DSUC[50][60] is stored in row major order with each element occupies 2 bytes of memory, and the address of DSUC[12][34] is stored at the location 1000. Find the address of CS[34][56]. Assume array index starting with '1'

b Write short notes on following:
(i) Activity network
(ii) Garbage collection and compaction

c. Define stack with suitable example. Write a program to reverse a string using Stack. Choose a C data structure for such a stack and design push and pop functions for it.

d. Translate the infix string (a+b^c^d)*(e+f/d) to reverse polish notation using stack.

e. Explain any three commonly used hash function with the suitable example?
A hash function H defined as H(key) =key%7, with linear probing, is used to insert the key 37,38,72,48,98,11,56 into a table indexed from 0 to 6.
what will be the location of key 11? Justify your answer,
also count the total number of collision in this probing.

SECTION C

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

a. What are the advantages of linked list over arrays? Implement Doubly Circular linked list and insert an element at given position in this linked list.

b. Assume that the operators +, -, × are left associative and ^ is right associative.

The order of precedence (from highest to lowest) is ^, x , +, -.
Then find the postfix expression corresponding to the infix
Expression a + b × c - d ^ e ^ f

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

a. Draw the Huffman tree for the following symbols (each of 7 bits) whose frequency Of occurrence of a message is stated along with the symbols below:

M1: 0.45 M2:0.02 M3: 0.24 M4: 0.18 M5: 0.11

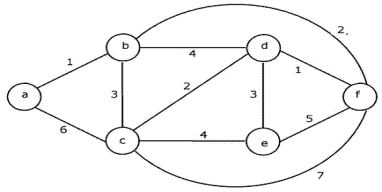
decode the following message
10110011011111001100101111101101100.
and what is the average number of bits required per message.

b. Write algorithm for Floyd warshall algorithm also explains with a suitable example.

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

a. Write C function for following in Binary Tree
(i) Count the number of total nodes.
(ii) Height of Binary Tree.

b. Write Prim's algorithms and Find the Minimum Spanning tree for following graph



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

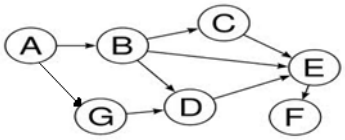
a. Construct a binary tree for the following preorder and inorder traversals. Explain with a neat diagram:

Preorder: ABDIEHJCFKLGM
Inorder: DIBHJEAFLKCGM

b. Explain Binary Search algorithm and it time complexity? Implement the binary search in C language.

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

a. Discuss what type of data structure used in DFS. Write an algorithm for DFS, Traverse the given graph starting from node A using DFS



b. Construct an expression tree for the expression $(-b + \sqrt{(b^2 - 4ac)}) / 2a$. Give pre-order, in-order and post-order traversals of the expression tree so formed