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**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 $H(\text{key}) = \text{key} \% 7$, 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 +, -, $\times$ are left associative and $\wedge$ is right associative.

The order of precedence (from highest to lowest) is $^$, $\times$, $+$, $-$.

Then find the postfix expression corresponding to the infix

Expression $a + b \times c - d \wedge e \wedge f$

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:

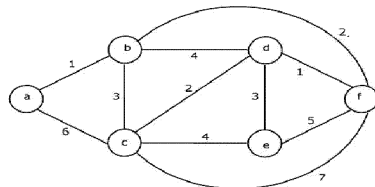
7 x 1 = 7

- 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

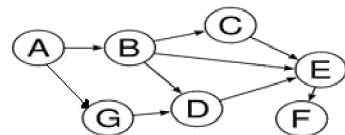
Inorder: DIBHJEAFLKCGM

- b. Explain Binary Search algorithm and its 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 is 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