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**MCA (DUAL DEGREE)**

**(SEM-II) THEORY EXAMINATION 2018-19**

**DATA STRUCTURE 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. Define the Basic Data Structure operations.
b. When recursion is suitable for a given problem? Give example.
c. Write some real-life examples of Stack and Queue data structure.
d. Why analysis is important for different algorithms?
e. Write the time complexities of Bubble Sort, Quick Sort.
f. What do you mean by Traversal of a Tree?
g. Define the B-Tree with basic properties.
h. Write the different ways of storing Graphs in computer memory.
i. What are the basic properties of Binary Search Tree?
j. In a binary tree who we can find the successor of a given node?

**SECTION B**

**2. Attempt any *three* of the following: 10x3=30**

a. Define the STACK data structure. Write an algorithm to PUSH and POP operation.
b. Write a procedure SORT, which sorts a linked list without changing any value in information field of the node.
c. Define the two-way linked list. Discuss the advantages of two-way linked list over the one-way linked list in case of deleting a node whose location LOC is given.
d. Write an Algorithm to convert the Infix Expression to Postfix Expression.
e. Write a program in 'C' to find the Greatest Common Divisor of given two nos.

**SECTION C**

**3. Attempt any *one* part of the following: 10x1=10**

a. What is a Hash function? Also discuss a collision resolution strategy in hashing with suitable example.

b. Write a program in C to delete duplicate value from a given array.

**4. Attempt any *one* part of the following: 10x1=10**

a. Draw binary tree of the following expression:

(i) (A+B)*(C+D)

(ii) (A+B+C)*(D+E+F)

b. Define queue. Write a program in C to insert an element in an already existing queue. Make suitable assumptions yourself.

**5. Attempt any *one* part of the following: 10x1=10**

a. Write procedure of operations:

(i) B-Tree Search

(ii) B-Tree Insert

b. Write a program in C which sorts a list of n items using insertion sort method. Illustrate your algorithm with an example.

**6. Attempt any *one* part of the following: 10x1=10**

a. Illustrate the execution of HEAP-SORT on the array.

A = <6,14,3,25,2,10,20,7,6>

b. Write quick sort algorithm. Explain your algorithm taking suitable example. Analyze its running time.

**7. Attempt any *one* part of the following: 10x1=10**

a. Write short notes on the following:

(i) AVL Tree

(ii) Big-Oh Notation

b. Explain $B^+$ tree index files and B tree index files in detail.