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MCA (SEM II) THEORY EXAMINATION 2017-18 **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.

 $2 \times 7 = 14$

- What are the data structures used to perform recursion? a.
- State the difference between stacks and linked lists? b.
- Translate the following infix expression into its equivalent postfix expression c. by showing all steps (A-B)/((D+E)*F)
- Define the terms binary tree, complete binary tree and threaded binary tree? d.
- What is a heap? How does heap sort work? e.
- f. Write Short Note on Indexing and Hashing in file structures?
- Write a program for insertion sorting. Analyze its running time? g.

SECTION B

2. Attempt any three of the following:

 $7 \times 3 = 21$

- Write an algorithm to convert in the infix expression to postfix a. Expression?
- Write a program of binary search. Analyze its running time.? b.
- Write a C program to perform Merge sort and analyze time complexity of the c. algorithm?
- Is it possible to implement a queue with the help of two Stacks? Explain. d.
- Define a B tree. Construct a B tree of order 3 by inserting following keys in the e. order shown into an empty B tree.

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SECTION C

3. Attempt any one part of the following:

 $7 \times 1 = 7$

- Define Sparse Matrices? How Sparse Matrices can be represented?
- Explain recursion. Write a recursive algorithm to calculate the factorial of a (b) number. Also calculate the time complexity of this routine.

4. Attempt any one part of the following:

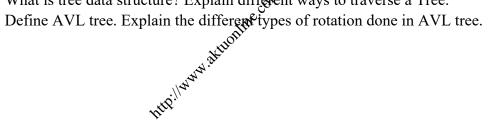
 $7 \times 1 = 7$

- What is a circular queue? Write the implementation of circular queues using (a) arrays and also write the methods to perform insertion, deletion and display on
- Explain various garbage collection and compacting techniques. (b)

5. Attempt any one part of the following:

 $7 \times 1 = 7$

- What is tree data structure? Explain different ways to traverse a Tree. (a)
- (b)



6. Attempt any *one* part of the following:

 $7 \times 1 = 7$

- (a) Define Searching. What do you mean by Linear Search and Binary Search explain it with its complexity?
- (b) Write Short Note on (1) Heap Sort & (2) Bubble Sort along with their comparison and analysis?

7. Attempt any *one* part of the following:

 $7 \times 1 = 7$

- (a) What are the different ways the graph is represented in computer memory? Explain with suitable example.
- (b) Explain the minimum spanning tree algorithms with an example.