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Printed Pages: 02 **Sub Code: RCA202**

Paper Id: | 2 | 1 | 4 | 2 | 2 | 2 | **Roll No.** | | | | | | | | | | |

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 x 7 = 14

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

SECTION B

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

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

SECTION C

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

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

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

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

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

(a) What is tree data structure? Explain different ways to traverse a Tree.
(b) Define AVL tree. Explain the different types of rotation done in AVL tree.

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

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