Printed pages: 02 **Sub Code: RCA 202**

Paper Id: 214234 **Roll No:** | | | | | | | | | | |

MCA
(SEM II) THEORY EXAMINATION 2018-19
DATA STRUCTURES

Time: 3 Hours *Total Marks: 70*

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.
2. Any special paper specific instruction.

SECTION A

1. Attempt *all* questions in brief. **2 x 7 = 14**

a. What is a sparse matrix? Also give its important properties.
b. Discuss the differences between Array and lists.
c. Write two applications of Linked Lists.
d. Explain a method to store a graph in computer.
e. Explain Complete Binary Tree and Extended Binary Tree.
f. Differentiate between directed and Undirected graph.
g. Explain Garbage Collection with example.

SECTION B

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

a. What do you understand by complexity of an algorithm?Describe the different notations used to describe the asymptotic running time of an algorithm.
b. How a linked list can be used to represent a polynomial 5x3 +4x2 +3x+2? Give an algorithm to perform addition of two polynomials using linked list.
c. What is AVL tree? Explain the balancing methods of AVL trees with an example.
d. Compare Linear search and Binary search algorithms with examples with their complexities.
e. Describe the minimum cost spanning tree with suitable example.

SECTION C

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

(a) Define Stack. Convert the expression**infix to prefix** using stack: A*(B+D)/E-F*(G+H/K).
(b) What is the Tower of Hanoi problem? Explain the solutions of the Tower of Hanoi problem where the numbers of disks are 3 and numbers of pages are 3.

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

(a) Explain circular queue and Double ended queue with example.
(b) Give an algorithm to perform following operations in a singly linked list.
(i) Insert a new node after a given node.
(ii) Delete last node.

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

(a) How records are organized into blocks? Discuss any one method for the same with an example.

(b) What is threaded binary tree? Explain the operation of threaded binary tree.

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

(a) Write algorithm for Insertion sort. Also illustrate insertion sort with an example.

(b) Write an algorithm for heap sort technique. Illustrate with an example.

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

(a) Define hashing. What are the properties of a good hash function? With necessary examples explain four different hashing techniques.

(b) Write a note on the following: (i) B+ tree. (ii) Internal sorting.