Printed Pages: 02 **Sub Code: RCAI 402**

Paper Id: 294232 **Roll No.** | | | | | | | | | | |

MCA - INTEGRATED
(SEM IV) THEORY EXAMINATION 2018-19
DATA STRUCTURE USING C

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) Define the term 'Algorithm'. Give the essential properties of an algorithm.
(b) Define the types of queues.
(c) Discuss Linear and Nonlinear data structure with example.
(d) Explain parameter-passing technique used in C with example.
(e) Define Threaded Binary Tree with suitable example.
(f) Discuss the basic Data Structure operations.
(g) Define the properties of Binary Search Tree.

SECTION B

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

(a) What is Queue? Explain Priority Queue. Write uses of Queue.
(b) Drive the index formula for 2-Dimention array stored as row major order.
(c) Transform the following prefix expression to infix:
++A-*$BCD/+EF*GHI.
(d) What do you mean by pattern matching? Discuss any pattern matching algorithm with proper example.
(e) Write an algorithm which finds the transitive closure of a graph.

SECTION C

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

(a) Define the term data structure? List some linear and non-linear data structure stating the application area where they will be used.
(b) Write function in C, which deletes all occurrence of given character from a given string.

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

(a) How two-dimensional array are represented in memory? Also obtain the formula for calculating the address of any element stored in array, in case of column major order. (Make necessary assumptions yourself)
(b) Write a "C" program-using stack to check whether a string is palindrome or not. Do not define empty, push, and pop functions. (Note: Palindrome is a sequence of characters that read the same as backward and forward.)

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

(a) Let A[n] be an array of "n" numbers. Design a data structure and algorithm to perform any sequence of the following two operations: -

(i) Add (i,y) : add the value y to the i^{th} number in the array.

(ii) Partial-sum(i): returns the sum of the first "i" numbers in the array i.e.

$$\sum_{j=1}^{i} A[j].$$

(b) Write an algorithm for insertion and deletion of element s of a queue. Use a Boolean variable to distinguish between a queue being empty or full

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

(a) Use Quick sort algorithm to sort 36, 15, 40, 1, 60, 20, 55, 25, 50, and 20. Is it a stable sorting algorithm? Justify.

(b) Illustrate the creating of AVL trees of 7 nodes with key values 1, 2, 3, 4, 5, 6, 7.

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

(a) Differentiate Sequential file organization and Direct file organization.

(b) Define Hashing. Discuss various methods of collision resolution with suitable example.