

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

Time: 3 Hours

Total Marks: 70

Note 1. Attempt sections in sequence in any order that you deem suitable.

SECTION A

1. Attempt 4 questions 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) Derive the index formula for 2-Dimension 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 ith 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 elements 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.

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