[Total No. of Questions - 9] [Total No. of Printed Pages - 2]

MAY-24-1047

MCA-6201 (Data Structure Using C)

MCA-2nd CBCS/NEP

Time : 3 Hours **Max. Marks : 60**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note: Attempt five questions in all, selecting one question each from Section A, B, C and D. Section E is compulsory.

Section-A

1. What are data structures and why do we need them? Explain about different types of data structures in detail. (12)

2. What is Time and Space Complexity? Write an algorithm for Binary Search and discuss about its time and space complexity. (12)

Section-B

3. What is a Linked List and why do you require it when you already have arrays? Is a linked list linear or non-linear data structure? How can a queue be implemented with the help of a linked list? (12)

4. What is an AVL Tree? Why do we need it when we have Binary Search Trees? Construct an AVL tree by inserting numbers from 1 to 8 one by one in sequence. (12)

Section C

5. Define Graph. How can a graph be represented in memory? Consider a connected undirected graph with at least four nodes where one of the nodes is having degree of three. Represent the graph with the help of adjacency matrix. (12)

6. Discuss about various asymptotic notations like Big-O, Omega and Theta in detail. (12)

Section D

7. Write an algorithm for Insertion Sort and discuss its time complexity. Perform your algorithm on the following array

   20, 60, 40, 30, 10, 70, 80, 50 (12)

8. Write an algorithm for Quick Sort. Discuss about the worst and best cases for Quick sort and their complexities in each case. (12)

Section E

9. Write short note on following (any six) (6×2=12)

   I. What are abstract data types?

   II. Concatenation of two arrays.

   III. Dynamic Memory allocation.

   IV. Doubly Linked List.

   V. Circular Queue.

   VI. Is binary search always better than the linear search? Why?

   VII. Traversing of a graph.