

2C8123

Roll No. 22CPGXX713

Total No. of Pages: 2

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MCA II - Sem. (Main / Back) Exam., - 2023

MCA – 203 Data Structures

Time: 3 Hours

Maximum Marks: 70

Instructions to Candidates:

Attempt all ten questions from Part A. All five questions from Part B and three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination.  
(Mentioned in form No. 205)

1. NIL

2. NIL

**PART – A**

[10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

- Q.1 Write an algorithm to convert Infix expression into Postfix expression.
- Q.2 What is data structure? Explain various types of data structure.
- Q.3 Give algorithm to sort a list using bubble sort.
- Q.4 Differentiate between stack and queue data structures.
- Q.5 Differentiate between linear and non-linear data structures.
- Q.6 Give the features of Abstract Data Type (ADT).
- Q.7 Convert the following infix expression into postfix form  
 $(A+B)*(C+D)*E^F$ .

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- Q.8 Write the prefix and postfix form for:  $A+B*(C-D)/(E-F)$ .  
 Q.9 Write an algorithm for in-order traversal of a binary tree.  
 Q.10 Write short notes on threaded binary tree.

[5×4=20]

### **PART – B**

**(Analytical/Problem solving questions)**

**Attempt all five questions**

- Q.1 What is minimum spanning tree? Write algorithm to find the minimum spanning tree.  
 Q.2 What is stack? Why it is known as LIFO? Write algorithm of PUSH and POP operation on stack.  
 Q.3 Write and explain algorithm to insert element at the beginning of singly linked list.  
 Q.4 What is tree traversal? Explain the in-order, pre-order and post-order traversal.  
 Q.5 Write an algorithm for the depth first search of a graph. State its advantages and disadvantages.

[3×10=30]

### **PART – C**

**(Descriptive/Analytical/Problem Solving/Design Questions)**

**Attempt any three questions**

- Q.1 Explain the implementation of circular queue using array. How an "empty queue" is distinguished from a "full queue"? Write necessary functions to perform all valid operations on circular queue.  
 Q.2 Explain heap sort. Construct heap sort for the initial key set 42, 23, 74, 11, 65, 58, 94, 36, 99, 87.  
 Q.3 Write an algorithm for binary search and discuss its speed compared with linear search.  
 Q.4 Discuss the difference between a general tree and a binary tree. What is a complete binary tree? Give an algorithm for deleting a value X from a given binary tree.  
 Q.5 Explain the Kruskal's algorithm to find minimal spanning tree for a graph.

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