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[Roll No.]

**MCS-405/DCA-105/
MIT(CS)-401**

(MSCIT/DCA/MSCCS)

IIInd/IVth Semester

Examination Dec., 2023

**DATA STRUCTURE AND PROGRAM
METHDOLOGY/DATA STRUCTURE**

Time : 2 Hours]

[Max. Marks : 70

Note :- This paper is of Seventy (70) marks divided into two (02) Sections 'A' and 'B'. Attempt the questions contained in these Sections according to the detailed instructions given there in. *Candidates should limit their answers to the questions on the given answer sheet. No additional (B) answer sheet will be issued.*

Section-A

Long Answer Type Questions 2×19=38

Note :- Section 'A' contains Five (05) Long-answer type questions of Nineteen (19) marks each. Learners are required to answer any *two* (02) questions only.

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(1)

P.T.O.

1. Define data structure and its type. What are queues ? Explain various operations on queue. Write algorithm for each.
2. What is asymptotic notation ? Define Big Theta and BigOh asymptotic notation ?
3. What are Binary trees ? Explain in brief about various binary tree traversal techniques. A Binary Tree has 9 nodes :

In-order : E A C K F H D B G

Pre-order : F A E K C D H G B

Draw the tree T and write its post-order traversal.

4. Given the following List :

82 292 235 195 96 198 19 119

Apply the merge sort and radix sorting technique to sort the list Also compare the time complexity of both sorting techniques.

5. Define Singly Link List. Explain the traversal and searching in singly link list.

Section-B

Short Answer Type Questions 4×8=32

Note :- Section 'B' contains Eight (08) Short-answer type questions of Eight (08) marks each. Learners are required to answer any *four* (04) questions only.

1. What is Queue ? What are its properties ? What are the applications of queue ?
2. Explain the steps involved in insertion and deletion into a singly and doubly linked list.
3. What is AVL Tree ? Construct AVL tree for the following data :

21, 26, 30, 9, 4, 14, 28, 18, 15, 10, 2, 3, 7

4. Discuss Algorithm of Binary Search with examples, complexity and limitations.
5. Transform the following expression into postfix and pre-fix expressions showing each step of conversion properly.

$$((A+B)*C-(D-E))/(F+G)$$

6. Discuss the Konigsberg bridge problem. What was the conclusion of the Konigsberg bridge problem ?

7. What do you mean by program testing and verification ?
Explain in brief different testing methods.
8. What is minimum spanning tree ? Explain with a suitable example,
