

Total No. of Questions: 6

Seat No.:

**BACHELOR OF TECHNOLOGY (CBCS - 2023)**  
**B. Tech. Sem-III Computer Science & Engineering AI & ML : WINTER: 2025**  
**SUBJECT: DATA STRUCTURE**

Day : Thursday  
Date : 11/12/2025

**W-29209-2025**

Time : 10:00 AM-01:00 PM  
Max. Marks : 60

NB :

1. Assume suitable data, if necessary.
2. Draw neat labelled diagrams WHEREVER necessary.
3. Figures to the right indicate FULL marks for the question.
4. All questions are COMPULSORY.

Q. 1 Explain the process of infix to postfix conversion using stack. Demonstrate the conversion of the expression  $A + B * (C - D)$  step-by-step. (10)

**OR**

Q. 1 Describe the types of data structures with suitable examples. Explain in detail the operations performed on data structures. (10)

Q. 2 Explain the different types of queues: Linear Queue, Circular Queue, Priority Queue, and Double Ended Queue (Deque). Highlight their differences with suitable examples. (10)

**OR**

Q. 2 Explain the concept and operations of Double Ended Queue (Deque). Differentiate between Input-restricted and Output-restricted Deques. (10)

Q. 3 List an algorithm to perform the following operations in a doubly linked list. (10)

i. Insert a node at the end of the list.

ii. Delete the last node in the list.

**OR**

Q. 3 Explain what a circular linked list is and how it works. (10)

Q. 4 Describe the three common binary tree traversal methods and provide the traversal order for the following tree: (10)

```
A
 / \
B   C
 / \ \
D  E F
```

OR

Q. 4 Explain AVL trees and describe the need for rotations. Give an example of a Left Rotation. (10)

Q. 5 Explain Depth First Search (DFS) and Breadth First Search (BFS) algorithms with their working and applications. Use the following graph for illustration: (10)

Vertices: {A, B, C, D, E}

Edges: {A-B, A-C, B-D, C-D, D-E}

OR

Q. 5 What is Topological Sorting? Explain the algorithm to perform topological sorting on a Directed Acyclic Graph (DAG). (10)

Q. 6 Given a hash table of size 10, insert the keys 12, 22, 32, 43, 55 using linear probing. Show the final hash table. Assume hash function  $h(\text{key}) = \text{key} \% 10$ . (10)

OR

Q. 6 What is searching? Explain Binary search algorithm with given example. (10)  
Consider an array [5, 7, 12, 19, 24, 31, 45], perform binary search to find the key 19 and show the steps involved.

\*\*\*\*\*