

Dr. Babasaheb Ambedkar Open University

Term End Examination July – 2026

Course: BCAR / DCAR

Subject Name: Data Structure Using C

Subject Code: BCAR-201 / DCAR-201

Date: 06-07-2026

Time: 03:00pm to 5:15pm

Total Marks: 70

Section A

Answer the following (Attempt any three)

30 Marks

1. What is a Sparse Matrix? Explain how a sparse matrix can be efficiently represented in memory using a 3-column format with a suitable example.
2. Discuss the Singly Linked List data structure. Write the step-by-step algorithm to insert a new node at the beginning of a Singly Linked List.
3. Define a Binary Tree. Explain the three standard tree traversal techniques (Inorder, Preorder, and Postorder) with an illustrative example.
4. Describe the Quick Sort algorithm. Trace the Quick Sort technique to sort the following array of elements in ascending order: [25, 10, 50, 32, 12].
5. What is Hashing? Explain the concept of collision in hashing and discuss any two popular collision resolution techniques in detail.

Section B

Answer the following (Attempt any four)

Marks 20

1. Differentiate between Primitive Data Types and Abstract Data Types (ADT) with relevant examples.
2. Explain Row Major and Column Major ordering for memory allocation in a Two-Dimensional Array.
3. Define a Stack. Explain the basic Push and Pop operations along with their overflow and underflow conditions.
4. What is a Circular Queue? Discuss how it overcomes the disadvantage of a standard Linear Queue.
5. Explain the concept of a Graph. Differentiate between an Adjacency Matrix and an Adjacency List representation.
6. Define Sorting. Differentiate between Internal Sorting and External Sorting methods with examples.

Section C

Part – A (Multiple Choice Questions)

10 Marks

1. Which of the following is a non-linear data structure?
A. Array
B. Stack
C. Tree
D. Queue
2. In a 2D array, if elements are stored row by row, the address calculation style is known as:
A. Row Major Order
B. Column Major Order
C. Matrix Order
D. Index Order
3. Which data structure works on the Last-In-First-Out (LIFO) principle?
A. Queue
B. Stack
C. Linked List
D. Array
4. The process of inserting an element into a stack is called:
A. Pop
B. Enqueue
C. Push
D. Dequeue
5. In a queue, insertion is done at which end?
A. Front end
B. Rear end
C. Middle
D. Top
6. A binary tree node can have a maximum of how many children?
A. 1
B. 2
C. 3
D. Any number
7. In which tree traversal technique is the root node visited first?

- | | |
|-------------|----------------|
| A. Inorder | B. Postorder |
| C. Preorder | D. Level-order |
8. Which searching algorithm requires the list to be already sorted?
- | | |
|------------------|----------------------|
| A. Linear Search | B. Sequential Search |
| C. Binary Search | D. Bubble Search |
9. What is the worst-case time complexity of the Bubble Sort algorithm?
- | | |
|------------------|----------------|
| A. $O(n)$ | B. $O(\log n)$ |
| C. $O(n \log n)$ | D. $O(n^2)$ |
10. A collection of fields that represents a single entity in a file structure is called a:
- | | |
|-----------|--------------|
| A. Record | B. Byte |
| C. Bit | D. Attribute |

Part - B (Do as Directed)

Marks 10

1. Define the term 'Data Structure' in one line.
2. State whether True or False: An array is a collection of elements having different data types. (True / False)
3. Fill in the blank: A sparse matrix contains a large number of _____ elements.
4. What is the main benefit of a Doubly Linked List over a Singly Linked List?
5. State whether True or False: Pop operation on an empty stack result in an Underflow condition. (True / False)
6. Fill in the blank: The operation used to insert an item into a queue is called _____.
7. Define a 'Leaf Node' in a tree structure in one line.
8. State whether True or False: A graph can contain cycles, whereas a tree cannot. (True / False)
9. Fill in the blank: The time complexity of a Binary Search in the best case is _____.
10. Which index file structure uses a key and a pointer to locate records directly?