

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**MCA INTEGRATED – SEMESTER III- EXAMINATION –SUMMER-2025**

**Subject Code: 4430602****Date: 17/06/2025****Subject Name: Data structures****Time:02:30 PM TO 05:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make Suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Use of simple calculators and non-programmable scientific calculators are permitted.

- Q.1 (a)** Do as Directed. **07**
1. Define Complete Binary tree.
  2. What is the prerequisite of binary search?
  3. Define Directed Graph.
  4. Write the best, average and worst case complexity for selection sort.
  5. Explain circular queue in short.
  6. Explain KWIC indexing in short.
  7. Enlist any three applications of Stack.
- (b)** Explain the classification of Data Structures in detail. **07**
- Q.2 (a)** Explain Queue data structure. Write and explain algorithms for insertion and deletion of an element in queue with example. **07**
- (b)** What is Sparse Matrices? Explain sequential representation of Sparse Matrices with example. **07**
- OR**
- (b)** What is binary tree traversal? Enlist and explain any two binary tree traversal methods with suitable example. **07**
- Q.3 (a)** Explain the node structure of Doubly linked list. Write and explain algorithm to insert node at last in doubly linked list. **07**
- (b)** Convert the following infix expression into postfix expression. **07**  
 $A-B/C*(D+E)^F$
- OR**
- Q.3 (a)** Write an algorithm to add two polynomials. **07**
- (b)** Explain cursor implementation of Linked list in detail. **07**
- Q.4 (a)** Explain the problem of Tower of Hanoi in detail with Example. **07**
- (b)** Define Graph and explain undirected, directed and weighted graph. Also explain different representations of graph. **07**
- OR**
- Q.4 (a)** Explain the algorithm of BFS with suitable example. **07**
- (b)** Explain Height-Balanced trees in detail. **07**
- Q.5 (a)** Explain Prim's Algorithm with example. **07**
- (b)** What is Hashing? Explain Any three hashing function with example. **07**
- OR**
- Q.5 (a)** Explain Dijkstra's algorithm with example. **07**
- (b)** Discuss Quick-sort algorithm with example. **07**