# GUJARAT TECHNOLOGICAL UNIVERSITY
## M.SC(IT)- INTEGRATED – SEMESTER II- EXAMINATION –WINTER-2025

**Subject Code: 1320503**                                    **Date: 29/11/2025**
**Subject Name: Data structure**
**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.

|  |  |  | **Marks** |
|---|---|---|---|
| **Q.1** | **(a)** | Define "Data Structure". Why data structure plays an important role in success of a sowftware. | **03** |
|  | **(b)** | Differntiate "Linear Seach" and "Binary Search". | **04** |
|  | **(c)** | Write a program to convert a string entered by user into uppercase without using any library function. | **07** |
| **Q.2** | **(a)** | Define "Time" and "Space" complexity of algorithm. | **03** |
|  | **(b)** | Write applications of stack as a data structure in real world scenarios. | **04** |
|  | **(c)** | Write a menu driven C prgram to implement PUSH(), POP() and PRINT() for the "Stack" data structure. | **07** |
|  |  | **OR** |  |
|  | **(c)** | Write a menu driven C prgram to implement ENQUEUE(), DEQUEUE () and PRINT() for the "Queue" data structure. | **07** |
| **Q.3** | **(a)** | Compare stack and queue data strcutures. | **03** |
|  | **(b)** | Write a C program to print fibonanci series upto 'n' terms. | **04** |
|  | **(c)** | Write an algorithm to convert given infix expression to postfix. Explain steps to covert an infix expression 2 * (3 + 4) - 5  into postfix. | **07** |
|  |  | **OR** |  |
| **Q.3** | **(a)** | Compare simple vs circular queue. | **03** |
|  | **(b)** | What do you mean by recursion? Write a recursive program to find factorial of the given number. | **04** |
|  | **(c)** | Write an algorithm to convert given prefix expression to postfix. Explain steps to covert an infix expression + * 2 + 3 4 5 into postfix. | **07** |
| **Q.4** | **(a)** | What do you mean by "link list". Write application of it. | **03** |
|  | **(b)** | What do you mean by dynamic memory allocation. List syntax and application of following functions : malloc(), calloc() and dealloc(). | **04** |
|  | **(c)** | Write a menu based C pogram to insert a new node in "link list" 1) at the beginning of list 2) after a given node 3) at the end of a list. | **07** |
|  |  | **OR** |  |
| **Q.4** | **(a)** | Define doubly link list and list advantage of it. | **03** |
|  | **(b)** | What is Pointer? List advantage of it. | **04** |

**(c)** Write a menu based C pogram to insert a new node in "doubly link list" 1) at the beginning of list 2) after a given node 3) at the end of a list. **07**

**Q.5 (a)** Write in-oder traversal and post-order traversal for following tree. **03**
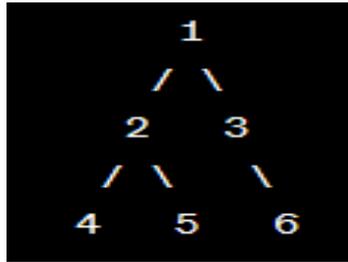


**(b)** Write an algoirhm for "merge sort". **04**

**(c)** Define following in terms of Tree **07**
    1) Depth of Tree
    2) Binay Search Tree
    3) Complete Binary Tree

**OR**

**Q.5 (a)** Define following in terms of Tree. **03**
    1) Leaf node
    2) In-degree of node in a tree
    3) Depth of a tree

**(b)** What do you mean by hashing? List and explain techniques to handle "hash collision". **04**

**(c)** Write an algorithm to insert a new node in binary tree. **07**

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