

Enrolment No./Seat No.:

GUJARAT TECHNOLOGICAL UNIVERSITY
M.SC INTEGRATED - SEMESTER - II EXAMINATION - SUMMER 2025

Subject Code: 1320503

Date: 26-05-2025

Subject Name: Data structure

Time:10:30 AM TO 01:00 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) What is a Data Structure? Explain the types of Data Structures.	03
(b) Differentiate between LIFO and FIFO data structures with suitable examples.	04
(c) What do you mean by the time complexity of an algorithm? Write an algorithm to perform binary search operation on an array.	07
Q.2 (a) Explain the advantages of a circular queue over a simple queue.	03
(b) Write an algorithm to concatenate string1 and string2, and store the result in string3.	04
(c) Write a C program to compare two strings and check whether they are equal or not.	07
OR	
(c) Write a C program to count the number of nodes in a singly linked list.	07
Q.3 (a) What is a stack overflow condition? How to check stack overflow condition in algorithm?	03
(b) Explain the formula for finding address of an element in 1-d and 2-d array with the help of example.	04
(c) Is a stack a linear or non-linear data structure? Write a program to perform push and pop operations on a stack using an array.	07
OR	
(a) What is dynamic memory allocation in Data Structures? Explain how it helps in managing memory efficiently.	03
(b) Write a C program to copy one string into another string.	04
(c) What is a queue? Write an algorithm for insertion and deletion operations on a queue.	07
Q.4 (a) Explain the types and structure of all types of linked lists along with their advantages and disadvantages.	03

- (b) What do you mean by collision in hashing? Explain the linear probing collision resolution technique with an example. **04**
- (c) Write algorithms to insert and delete a node at the beginning of a singly linked list. **07**

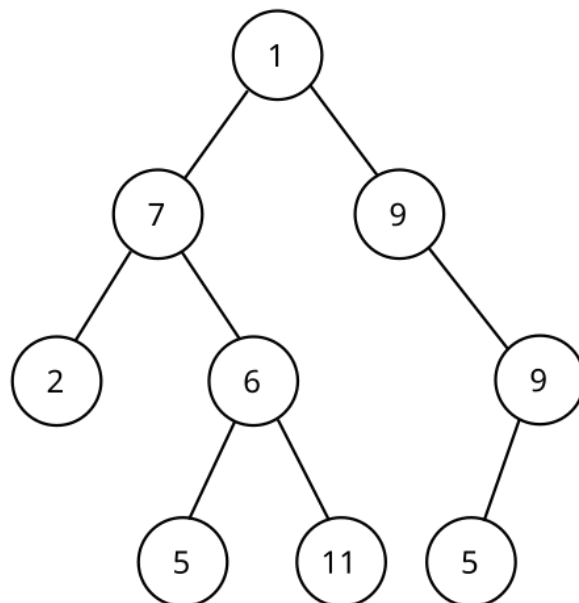
OR

- (a) How do you delete a node from a Binary Search Tree (BST) if the node has two children? Explain with a simple example. **03**
- (b) What is hashing? Explain any three hashing techniques with proper examples. **04**
- (c) Write algorithms to insert and delete a node at the beginning of a doubly linked list. **07**
- Q.5 (a)** Construct a Binary Search Tree (BST) for the following sequence. **03**
50, 30, 70, 20, 40, 60, 80, 10, 25, 35, 45, 55, 65, 75, 90
- (b) Answer the following in short: **04**
- Which node has its outdegree as zero in a tree?
 - If two trees have the same structure but different contents, are they called similar binary trees or copies of binary trees?
 - What do you mean by a forest tree?
 - True or False: In a binary tree, every node must have two children.

- (c) Write an algorithm for merge sort to sort an array. **07**

OR

- (a) Find the Inorder, Preorder, and Postorder traversals for the binary tree given below: **03**



(b) Answer the following in short.

04

- i. How many passes does Bubble Sort require to sort 'n' elements?
- ii. Which sorting algorithm is considered the best and why?
- iii. What do you mean by a pivot element?
- iv. To sort an array that contains only numbers, how many pockets/
bins are required in Radix Sort?

(c) Write an algorithm for Quick sort to sort an array.

07
