

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-III(NEW) EXAMINATION – SUMMER 2023****Subject Code:3130702****Date:26-07-2023****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. Simple and non-programmable scientific calculators are allowed.

- Q.1** (a) What is DS? Explain data structure and its types. **03**
 (b) Explain Tower of Hanoi with example. **04**
 (c) Write algorithms to insert, and delete elements in queue **07**
- Q.2** (a) Construct Binary Tree where the preorder traversal is 1,2,4,5,3,6,8,9,7 & postorder is 4,5,2,8,9,6,7,3,1. **03**
 (b) Construct an AVL Tree by inserting numbers from 1 to 8. **04**
 (c) What is stack? Explain operations on stack in detail. **07**
- OR**
- (c) Explain tree traversal in detail with example. **07**
- Q.3** (a) Explain 2-3 Tree in brief. **03**
 (b) Explain any three hashing techniques with example. **04**
 (c) What is problem with simple queue? Explain its solution with example and algorithms. **07**
- OR**
- Q.3** (a) Explain binary search technique. **03**
 (b) Explain fastest sorting technique with example. **04**
 (c) What is collision? Explain collision resolution techniques with example. **07**
- Q.4** (a) List all asymptotic notations and explain any one of it. **03**
 (b) List and explain linked list applications. **04**
 (c) What is doubly linked list? Write Algorithm for insertion and deletion in doubly linked list. **07**
- OR**
- Q.4** (a) What is file? Explain types of files. **03**
 (b) Convert the following infix expressions to their prefix. **04**
 ($A^B * C - D + E / F / (G + H)$)
 (c) Explain Prim's & Kruskal's algorithm with suitable example **07**
- Q.5** (a) Explain malloc and free functions in 'C'. **03**
 (b) Define the following: 1. Sibling 2. Forest 3. Complete Binary Tree 4. Complete Graph **04**
 (c) Explain following: (i) Recursion (ii) Nonprimitive data structures (iii) Hashing (iv) Non-linear data structures (v) sparse matrix (vi) Priority queue (vii) Collision **07**
- OR**
- Q.5** (a) What is time complexity? Explain with example. **03**
 (b) Explain Binary Search with example. **04**
 (c) Write and explain algorithm for insertion in Singly Linked List **07**