# GUJARAT TECHNOLOGICAL UNIVERSITY

Diploma in Computer Engineering

Semester: 3

**Subject Code**
**Subject Name** DATA STRUCTURE MANAGEMENT

| Sr. No. | Course content |
|---|---|
| 1. | **Introduction to Data Structures :**<br>1.1 Introduction<br>1.2 Data and Information<br>1.3 Overview of Data structures<br>1.4 Types of data structures<br>1.5 Primitive and Non Primitive data structures and Operations<br>1.6 Algorithms |
| 2. | **Data Structures : Aray**<br>2.1 Introduction<br>2.2 Characteristic of Array<br>2.3 One Dimensional Array<br>2.4 Operation with Array<br>2.5 Two Dimensional Arrays<br>2.6 Three or Multi Dimensional Arrays<br>2.7 Strings<br>2.8 Array of Structures<br>2.9 Drawbacks of linear arrays<br>2.10 Row Major Arrays<br>2.11 Column Major Arrays<br>2.12 Pointer and Arrays<br>2.13 Pointers and Two Dimensional Arrays<br>2.14 Array of Pointers<br>2.15 Pointers and Strings |
| 3. | **Stacks and Queues :**<br>3.1 What is a Stack?<br>3.2 Operations on Stack (PUSH & POP).<br>3.3 Implementation of a Stack.<br>3.4 Representation of Arithmetic Expressions<br>3.5 Infix, Prefix and Postfix Notations<br>3.6 Evaluation of Postfix Expression<br>3.7 Conversion of Expression from infix to postfix<br>3.8 What is Queue?<br>3.9 Implementation of the Queues (Simple and Circular).<br>3.10 Disadvantages of simple queue<br>3.11 Priority Queues. |

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| **4.** | **Linked Lists :**<br>4.1 Pointers and Linked allocation.<br>4.2 Linked lists & Sequential list.<br>4.3 Difference between Linked & sequential List.<br>4.4 Operations on linear lists using singly linked & doubly linked storage structure.<br>4.4.1 Insertion node at start, at end, at given position<br>4.4.2 Deletion of node at any position<br>4.5 Circular linked list.<br>4.6 Application of linked lists. |
| **5.** | **Searching and Sorting :**<br>5.1 Various sorting techniques.<br>Selection sort - bubble sort- Quick sort<br>Merge sorting - Tree sort - Shell sort - Radix sort.<br>5.2 Sequential searching.<br>5.3 Binary searching.<br>5.4 Hash tables - methods.<br>5.5 Hashing functions.<br>5.6 Collision resolution techniques. |
| **6.** | **Trees :**<br>6.1 Definitions and Concepts.<br>6.2 Binary trees.<br>6.3 Operations on binary trees.<br>6.4 Binary tree and tree traversal algorithms.<br>6.5 Operations on binary trees.<br>6.6 List representation of Tree. |
| **7.** | **Strings :**<br>7.1 Strings and their representations.<br>7.2 String Conversion.<br>7.3 String manipulation., String arrays |

## Laboratory Experience :

1. Develop a program to insert, delete, edit element in array
2. Write simple programs using pointers and arrays
3. Write simple programs using array of pointer
4. Develop an algorithm for push and pop stack operations and implement using array data structure and pointer.
5. Develop an algorithm for insert and delete operations of queue and implement using array and pointer data structures.
6. Develop algorithms for following ordered singly linked list operations:
   - addition into the list
   - deletion from the list
   - searching into the list
   - displarity the list

Write a complete menu driven program for the above operations and test it.

7. Develop algorithms for following binary tree operations
   - addition new nodes into the tree
   - deletion nodes from the tree
   - searching a node into the tree
   - display current nodes of the tree

   Write complete menu driven program for the above operations and test it
8. Develop algorithm for sequential search, write program for the same and test it.
9. Develop algorithm for binary search write program for the same and test it.
10. Develop algorithms for following sorting methods, write programs for each and test it.
    - Bubble sort.
    - Insertion sort.
    - Selection sort
    - Shell sort
    - Merge sort
    - quick sort
    - radix sort
11. Develop algorithms for following string operations and implement them
    - Finding length of a given string
    - copying a string into another string
    - concatenating two strings.
    - String comparison finding a substring into a string.

## Reference Books:


1. Introduction to Data structures, Author : Ashok N. Kamthane, Pub. Pearson Ed. in C
2. Introduction to Data- Structure with applications , Author : Tremblay & Sorenson, Pub. : MGH
3. Introduction to Data structure, Author : Bhagat Singh & Thomas Naps, Pub. : TMH
4. Data Structures and Program Design, Author : Robert Kruse, Pub. : PHI
5. Data Structure using PASCAL, Author : Aaron M. Tenenbaum & Moshe J. Augenstein, Pub. : EEE,PHI