C. U. SHAH UNIVERSITY – WADHWAN CITY

FACULTY OF TECHNOLOGY AND ENGINEERING
DEPARTMENT OF COMPUTER ENGINEERING
B. TECH. SEMESTER: - III

SUBJECT NAME: Data and File Structure (DFS)   **SUBJECT CODE: 4TE03DFS1**

Teaching & Evaluation Scheme: -

Subject Code	Subject Name	Teaching Scheme (Hours)				Credits	Evaluation Scheme							Total
							Theory				Practical (Marks)			
		Th	Tu	Pr	Total		Sessional Exam		University Exam		Internal		University	
							Marks	Hours	Marks	Hours	Pr/Viva	TW	Pr	
4TE03DFS1	Data and File Structure (DFS)	4	0	2	6	5	30	1.5	70	3.0	30	20	-	**150**

Objectives: - Main objective of this course is
- To develop proficiency in the specification, representation, and implementation of Data Types and Data Structures.
- To be able to carry out the Analysis of various Algorithms for mainly Time and Space Complexity.
- To get a good understanding of applications of Data Structures.
- To develop a base for advanced computer science study.

Prerequisites: -
- Any Programming language skill like in C,C++, Basics of Mathematics

Course outline: -

Sr. No.	Course Contents	Total Hours
1	**Introduction to Data Structures:** - Data Structure concepts - Data types – primitive and non-primitive - Basics of algorithm and performance analysis and measurement (Time and space analysis of algorithms-Average, best and worst case analysis) - Concept of iteration and recursion (Types of iteration and recursion) - Types of Data Structures- Linear & Non Linear Data Structures.	03
2	**Sorting and Searching:** - Sorting: Selection Sort, Bubble Sort, Insertion Sort, Merge Sort, Quick Sort, Shell	04

		Sort	
		• Searching: Sequential Search, Binary Search.	
3	**Linear Data Structure:**	• Array: Representation of arrays, Types of array, Dynamic array creation, Applications of arrays	15
		• Stack: Definitions & Concepts, Operations on Stacks, Applications of Stack, Polish Expression, Reverse Polish Expression and their compilation, Evaluation of Expression.	
		• Queue: Definitions & Concepts, Operations on Queue, Types, and Applications of Queue	
		• Linked List: Definitions & Concepts, Types of linked list, and Applications of each linked list type, Linked implementation of Stack, and Queue	
4	**Non Linear Data Structures:**	• Tree: Definitions and Concepts, Representation of binary tree, Binary tree traversal (In-order, Post-order, Pre-order), Threaded binary tree, Binary search Trees, Conversion of General Trees to Binary Trees, Applications of Trees.	24
		• Types of Tree: Binary Search Tree (BST), AVL Tree, B Tree, B+ Tree: Insert, Delete and traversal operation of each tree.	
		• Graph: Definition and concept of graph, Different types of graph, Representation of graph in computer memory, BFS and DFS strategy, minimum spanning tree (Prim's and Kruskal's algorithm), concept of Shortest path.	
5	**Hashing:**	• Hashing: The symbol table, Hashing Functions, Collision-Resolution Techniques	02
6	**File Structure:**	• Concepts of fields, records and files, Sequential, Indexed and Relative /Random File Organization, Indexing structure for index files.	03
7	**Advanced Topic in Data Structure:**	• Augmented Data Structure, Data Structure for disjoint sets.	04
		• Computational Geometry: Introduction, Strength and limitation, polygons, types of polygons, convex hulls, graham's scan algorithm, Jarvis march algorithm.	

Learning Outcomes: - After studying this course students would be able
- To decide the appropriate data type and data structure for a given problem.
- To select the best algorithm to solve a problem by considering various problem characteristics, such as the data size, the type of operations, etc.
- To apply various operations on Queues, Stacks, Linked Lists, Trees, Graphs, Sorting, Searching, Hash tables and also use these data structures properly.
- To use various searching and sorting operations.
- To analyze algorithms for time and space complexity.

Books Recommended: -
1. An Introduction to Data Structures with Applications**,** by **Jean-Paul Tremblay & Paul G. Sorenson**, Tata McGraw Hill, 2nd Edition.
2. "Data Structures using C & C++", By **Ten Baum**, Prenctice-Hall International, 2nd Edition.

3. "Fundamentals of Computer Algorithms**"**, **Horowitz, Sahni**, computer science press, 2001.
4. "Data Structures: A Pseudo-code approach with C", **Gilberg & Forouzan**, Thomson Learning, 2nd Edition, 2005.
5. "Algorithm Design and analysis", **Udit agarwal**, Dhanpat rai & Co.