



C. U. SHAH UNIVERSITY – WADHWAN CITY

FACULTY OF TECHNOLOGY AND ENGINEERING DEPARTMENT OF INFORMATION TECHNOLOGY 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							
		Th	Tu	Pr	Total		Theory				Practical (Marks)			Total
							Sessional Exam		University Exam		Internal		University	
							Marks	Hours	Marks	Hours	Pr/Viva	TW	Pr	
4TE03DFS1	Data and File Structure	4	0	2	6	5	30	1.5	70	3.0	30	20	-	150

Objectives: -

- 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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • Sorting: Selection Sort, Bubble Sort, Insertion Sort, Merge Sort, Quick Sort, Shell 	04

	Sort <ul style="list-style-type: none"> Searching: Sequential Search, Binary Search. 	
3	Linear Data Structure: <ul style="list-style-type: none"> Array: Representation of arrays, Types of array, Dynamic array creation, Applications of arrays 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 	15
4	Non Linear Data Structures: <ul style="list-style-type: none"> 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. 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. 	24
5	Hashing: <ul style="list-style-type: none"> Hashing: The symbol table, Hashing Functions, Collision-Resolution Techniques 	02
6	File Structure: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> Augmented Data Structure, Data Structure for disjoint sets. Computational Geometry: Introduction, Strength and limitation, polygons, types of polygons, convex hulls, graham's scan algorithm, Jarvis march algorithm. 	04

Learning Outcomes: -

- Ability to decide the appropriate data type and data structure for a given problem.
- Ability to select the best algorithm to solve a problem by considering various problem characteristics, such as the data size, the type of operations, etc.
- The algorithms as referred above would include various operations on Queues, Stacks, Linked Lists, Trees, Graphs, Sorting, Searching, Hash tables.
- Ability to compare algorithms with respect to 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**, Prentice-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.