



B.C.A. (Honours) & B.C.A. (Honours with Research)
(Semester - 1 and Semester - 2)
Saurashtra University
To be effective from June – 2023

CS-08: DATA STRUCTURE USING C LANGUAGE		
Objectives: <ul style="list-style-type: none"> To provide the knowledge of basic data structures and their implementations. To understand importance of data structures in context of writing efficient programs. To develop skills to apply appropriate data structures in problem solving 		
Prerequisites: <ul style="list-style-type: none"> Computer Programming Knowledge Fundamental knowledge of C Programming 		
Sr. No.	Topic	Detail
1	Algorithm Analysis	<ul style="list-style-type: none"> The analysis of algorithm. Time and space complexities. Asymptotic notation. Classes of algorithm. Big-Oh Notation Big-Omega Notation
	File Handling	<ul style="list-style-type: none"> Concept of data files File handling Use of file handling functions fopen, fclose, fprintf, fscanf, getw, putw, fseek, ftell, rewind, freopen, remove, rename, feof, ferror I/O operations Command line arguments
2	Sorting and Searching	<ul style="list-style-type: none"> Bubble sorting Insertion sorting Quick sorting Bucket sorting Merge sorting Selection sorting Shell sorting Basic searching technique: Index searching, Sequential searching, Binary searching
3	Introduction To data Structure	Primitive and simple structures Linear and nonlinear structures file organization.
	Elementary Data Structure	<ul style="list-style-type: none"> Stack <ul style="list-style-type: none"> Definition Operations on stack



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		<ul style="list-style-type: none">○ Implementation of stacks using arrays<ul style="list-style-type: none">▪ Function to insert an element into the stack▪ Function to delete an element from the stack▪ Function to display the items○ Recursion and stacks○ Evaluation of expressions using stacks<ul style="list-style-type: none">▪ Postfix expressions▪ Prefix expression• Queue<ul style="list-style-type: none">○ Introduction○ Array implementation of queues○ Function to insert an element into the queue○ Function to delete an element from the queue• Circular queue<ul style="list-style-type: none">○ Function to insert an element into the queue○ Function for deletion from circular queue○ Circular queue with array implementation• Deques• Priority queues
4	Linked List & Implementation	<ul style="list-style-type: none">• Applications of the linked lists• Types of Linked Lists<ul style="list-style-type: none">○ Singly Linked List○ Doubly linked list○ Header Linked List○ Circular Linked List• Implementation using Singly Linked List, Doubly Linked List and Circular Singly Linked List<ul style="list-style-type: none">○ Insertion of a node at the beginning○ Insertion of a node at the end○ Insertion of a node after a specified node○ Traversing the entire linked list○ Deletion of a node from linked list○ Updating of a specific node• Implementation of merging of two Singly Linked List• Implementation of reversing of Singly Linked List
5	Tree	<ul style="list-style-type: none">• Objectives• Properties of a tree• Binary trees<ul style="list-style-type: none">○ Properties of binary trees○ Implementation○ Traversals of a binary tree



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		<ul style="list-style-type: none">▪ In order traversal▪ Post order traversal▪ Preorder traversal• Binary search trees (bst)<ul style="list-style-type: none">○ Insertion in bst○ Deletion of a node○ Search for a key in bst• Height balanced tree• B-tree Algorithm<ul style="list-style-type: none">○ Insertion, Deletion
	Graph	<ul style="list-style-type: none">• Adjacency matrix and adjacency lists• Graph traversal<ul style="list-style-type: none">○ Depth First Search (DFS)○ Implementation○ Breadth First Search (BFS)○ Implementation• Shortest path problem• Minimal spanning tree

Seminar - 5 Lectures

Expert Talk - 5 Lectures

Test - 5 Lectures

Total Lectures 60 + 15 = 75

Reference Books:

1. Data Structure through C/C++ Author : Tennaunbuam.
2. Let us C Author : Kanitkar.
3. Pointer in C Author : Kanitkar.
4. Data and File Structure Author : Trembley & Sorrenson.

Course Outcome:

- Able to Understand basic data structures and their implementations.
- Able to Understand importance of data structures in context of writing efficient programs.
- Able to Develop skills to apply appropriate data structures in problem solving
- Able to Explore tree and graph data structure

Additional Topics to be taught during the semester – 2 (Not to be asked in examination):

- Case studies of data structure