CS-08: DATA STRUCTURE USING C LANGUAGE

Objectives:

- 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:

- Computer Programming Knowledge
- Fundamental knowledge of C Programming

Sr. No.	Topic	Detail
1	**Algorithm Analysis**	• The analysis of algorithm. • Time and space complexities. • Asymptotic notation. • Classes of algorithm. • Big-Oh Notation • Big-Omega Notation
	File Handling	• 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**	• 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	• Stack o Definition o Operations on stack

		○ Implementation of stacks using arrays ▪ 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 ▪ Postfix expressions ▪ Prefix expression • Queue ○ Introduction ○ Array implementation of queues ○ Function to insert an element into the queue ○ Function to delete an element from the queue • Circular queue ○ 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**	• Applications of the linked lists • Types of Linked Lists ○ 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 ○ 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**	• Objectives • Properties of a tree • Binary trees ○ Properties of binary trees ○ Implementation ○ Traversals of a binary tree

		▪ In order traversal ▪ Post order traversal ▪ Preorder traversal • Binary search trees (bst) ○ Insertion in bst ○ Deletion of a node ○ Search for a key in bst • Height balanced tree • B-tree Algorithm ○ Insertion, Deletion
	Graph	• Adjacency matrix and adjacency lists • Graph traversal ○ 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