DATA STRUCTURES AND ALGORITHMS LAB

Course Code: CS-2001L **Credit Hours:** 1

Introduction

This course aims at developing the basic understanding and practice of basic data structures using C++.

Learning Outcomes

- Understand basic data structures such as arrays, linked lists, hash table, stacks and queues.
- Solve problems involving trees and graphs.
- Apply algorithms for solving problems like sorting, searching, insertion and deletion of data and relating it to the concepts discussed in theory.

Text and Reference Books

- Data Structures and Algorithm in C++ by Adam Drozdek (latest edition)

Assessments

Assessment Tools	Percentage
Lab Tasks & Assignments	20%
Quizzes (4-5)	10%
Mid Exam	20%
Project	20%
Final Exam	30%
Total	***100%***

Lesson Plan

Week No	Topics
1	Introduction to Data Structures and Algorithms, Learning about Arrays and implementation of Static and Dynamic Arrays
2	Learning about implementation of following search algorithms: Linear Search and Binary Search
3	Learning about implementation of following sorting algorithm: Bubble Sort, Selection Sort and Insertion Sort
4	Learning string operations
5	Understand and implement the concepts of singly linked list in C++ using the below operations: Insert, Delete and Traverse
6	Understand and implement the concepts of doubly linked list and Circular linked list in C++ using the below operations: Insert, Delete and Traverse
7	Learning about pushing and popping an element on a stack using linked list and arrays, use of stack in infix, postfix and prefix expressions, implementation of C++ templates
8	Learning about Queue Operations, implementing Queue using linked list and arrays.

9	Learning about implementation of following concepts: General Tree, Binary Tree, Traversing Binary Trees and General Trees (In order, Pre order, Post order, level order), Huffman Coding Algorithm
10	Learning about implementation of following concepts of Binary Search Tree and traversal, Search, Insertion, Deletion, Pre-Order traversal, In-Order traversal, Post-Order traversal.
11	Learning about implementation of following concepts of Heaps and Heap Sort Algorithm, Insertion and Deletion
12	Learning about concepts and implementation of: Graphs, Adjacency matrix and adjacency list, Breadth First Search and Depth First Search Algorithm
13	Learning about implementation of following concepts of hashing and collision resolution techniques: Basics of hash table, Hash functions and Collision resolution techniques
14	Project Presentations
15	Final Exam