Name of the Program:	BTECH CSE - AIML	Semester: 5	Level: UG
Course Name:	Data Structures and Algorithms Laboratory	Course Code/ Course Type	UBTML202/PCC
Course Pattern:	2025	Version	1.0

Assessment Scheme					Teaching Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
-	1	-	1	2	25	-	25

Pre-Requisite:

1. Basic knowledge of Programming in C and C++

Course Objectives (CO):	**The objectives of Data Structures and Algorithms Laboratory are:** 1. To introduce fundamental problem-solving approaches and concepts of data structures and algorithm analysis. 2. To provide in-depth knowledge of linked list structures and their operations for dynamic memory management. 3. To develop understanding of stack and queue abstract data types along with their applications in expression handling and scheduling. 4. To enable learners to analyze and apply basic searching and sorting techniques along with their performance comparisons. 5. To impart knowledge about hierarchical and network data structures like trees and graphs, and explore their real-world applications.
Course Learning Outcomes (CLO):	**Students would be able to:** 1. Explain data structure types and analyze the efficiency of algorithms using time and space complexity metrics. 2. Demonstrate operations such as insertion, deletion, and traversal on different types of linked lists. 3. Apply stack and queue operations to solve computational problems like expression evaluation and process scheduling. 4. Compare various searching and sorting algorithms and analyze their performance in different scenarios. 5. Construct tree and graph-based solutions using traversal techniques and shortest path algorithms.

Practical Plan:

Practical Number	Practical Title	Week Number	Details	CLO	Hours
1	Time Complexity and Frequency Count	1	Write a C++ program to find the sum of elements in an array. Analyze its time complexity using frequency count.	CLO1	2
2	Best-case, worst-case, and average-case scenarios	2	Write a C++ program to perform linear search on an array. Identify and display best-case, worst-case, and average-case scenarios.	CLO2	2
3	Stack Application	5	Write a C++ program to implement a Stack using an array and apply it to convert an infix expression to postfix.	CLO3	2

4	Circular Queue	6	Write a C++ program to implement a Queue using arrays and demonstrate circular queue functionality.	CLO4	4
5	Single Linked List	3	Write a C++ program to implement a Singly Linked List with insertion, deletion, and traversal operations.	CLO2	2
6	Doubly Linked List	4	Write a C++ program to implement a Doubly Linked List and perform all basic operations.	CLO3	2
7	Bubble Sort and Insertion Sort	7	Write a C++ program to implement and analyze Bubble Sort and Insertion Sort.	CLO4	4
8	Binary Search and Quick Sort	8	Write a C++ program to perform Binary Search and Quick Sort, analyzing best, worst, and average case complexity.	CLO5	4
9	Binary Search Tree (BST)	9	Write a C++ program to implement a Binary Search Tree (BST) with operations: insertion, search, deletion, level-wise display.	CLO5	4
10	BFS and DFS	10	Write a C++ program to perform Breadth First Search (BFS) and Depth First Search (DFS) on a graph using adjacency list.	CLO5	4
Total Hours					**30**

Learning Resources:

Text Books:

1. JHerbert Schildt, "C++: The Complete Reference", McGraw Hill Education, 2003.
2. John R. Hubbard, "Data Structures with C++", Schaum's Outlines, Tata McGraw Hill Education, 2000.

Reference Books:

1. Michael T. Goodrich, Roberto Tamassia, and David Mount, 'Data Structures and Algorithms in C++', Wiley India Pvt. Ltd., 2004.
2. Seymour Lipschutz, "Data Structures", Schaum's Outlines, Tata McGraw Hill Education, 2006

Online Resources/E-learning Resources:

1. https://nptel.ac.in/courses/106102064 Data Structures and Algorithms, IIT Delhi Prof. Naveen Garg Date of Reference 18-4-2024
2. https://nptel.ac.in/courses/106103069 Date of Reference 18-4-2024