Course Code				**23BCMAP231**			
Title of the Course				**DATA STRUCTURE LAB**			
Offered to: (Programme)				**BCA Hons**			
L	**0**	**T**	**0**	**P**	**2**	**C**	**1**
Year of Introduction:	**2024-25**			**Semester:**			**3**
Course Category:	**Major Practical**			**Course Relates to:**	**GLOBAL / NATIONAL / REGIONAL / LOCAL**		
Year of Revision:				**Percentage:**			
Type of the Course:				**Skill Development**			
Crosscutting Issues of the Course :							
Pre-requisites, if any				Basic knowledge of programming concepts Familiarity with the C programming language is recommended.			

Course Description:

The objective of course is to provide students with practical experience in using data structures. Students will learn to perform data manipulation and retrieval, implement advanced techniques in real life applicatons.

Course Aims and Objectives:

S.NO	COURSE OBJECTIVES
1	Students will learn to implement fundamental data structures such as arrays, linked lists, stacks, queues, and hash tables.
2	Students will explore and implement more complex data structures including trees and graphs.
3	Students will analyse the time and space complexity of different data structures and their operations.
4	Students will apply data structures to solve practical problems, enhancing their problem-solving and programming skills.
5	Students will improve their proficiency in programming languages commonly used for data structures, such as C++, Java, or Python.

Course Outcomes

At the end of the course, the student will be able to…

CO NO	COURSE OUTCOME	BTL	PO	PSO
CO1	Implement and manipulate basic and advanced data structures.	K2	1,2, 7	2
CO2	Analyze the performance of data structures and algorithms.	K3	1,2,7	2
CO3	Apply data structures to solve practical computing problems.	K3	1,2,7	2
CO4	Develop efficient and optimized code for various data structure operations.	K3	1,2,7	2
CO5	Demonstrate proficiency in a programming language used for data structure implementation.	K3	1,2,7	2

For BTL: K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create

CO-PO MATRIX									
CO NO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	2	2					3		2
CO2	3	3					2		3
CO3	3	2					3		2
CO4	3	3					3		3
CO5	3	3					3		3

Use the codes 3, 2, 1 for High, Moderate and Low correlation Between CO-PO-PSO respectively

Course Structure

This lab list covers the key areas of a Data structures lab course, providing hands-on practice with various data structures, enabling students to implement and manipulate these structures to solve real-world problems efficiently. Through a series of programming exercises and projects, students will develop practical skills in designing, analysing, and optimizing data structures.

Unit 1: Basic Concepts: (6Hrs)

Lab 1:

1. **Time Complexity calculation on Linear & Binary Search**

Exercise 1:

Linear and binary search :

Objective: Learn to calculate time complexity on linear search binary search

Tasks:

Write a program to calculate time complexity for

- **Linear Search**
- **Binary Search**

Lab 2:

2. **Time Complexity calculation on Bubble Sort**

Bubble Sort

Objective: Learn to calculate time complexity on Bubble sort

Tasks:

Write a program to calculate time complexity for Bubble Sort

Unit 2: Linear Data Structures

Lab 3:

1. **Single Linked Lists**

Representation of Single Linked Lists

1. **Objective: To understand the concept and types of linked lists better**
2. **Tasks:**

Write Program to implement Single Linked List with insertion, deletion and traversal operations

Lab 4:

2. **Double Linked Lists**

Representation of Double Linked Lists

1. **Objective: To understand the concept and types of linked lists better**
2. **Tasks:**

Write Program to implement Double Linked List with insertion, deletion and traversal operations

Lab 4:

3. **Circular Linked Lists**

Representation of Circular Linked Lists

1. **Objective: To understand the concept and types of linked lists better**
2. **Tasks:**
3. Write Program to implement Circular Linked List with insertion, deletion and traversal operations

Unit 3: Stacks

Lab 5: Stack Operations

Implementing stacks in linked Lists and arrays

1. **Objective:** Understanding to implement stacks in linked lists and arrays

Lab 6:

Write Programs to implement the Stack operations using an array .

Write Programs to implement the Stack operations using Linked List.

Write Programs to implement the Queue operations using an array.

Write Programs to implement the Queue operations using Linked List.

Unit 4:

Searching

1. **Quick Sort**

Lab 7:

Objective: Implementation of Sorting Algorithms

1. **Tasks:**

a.) Write a program for implementation of the following Sorting Algorithms

i)Bubble Sort ii) Insertion Sort iii)Quick Sort

b.) Write a program for implementation of Selection Sort

Unit 5: Binary Search Trees (6Hrs)

Lab 8:

Creation of binary trees and tree traversals

1. **Binary Trees:**

Objective: Understanding **Creation of binary trees and tree traversals**

Write a program for Binary Search Tree Traversals

References:

1. "Data Structures through C", Yashavant Kanetkar, BPB Publications
2. Rajesh K. Shukla, "Data Structure Using C and C++" Wiley Dreamtech Publication.
3. Lipschutz, "Data Structures" Schaum's Outline Series, Tata Mcgraw-hill Education (India)Pvt. Ltd .
4. Michael T. Goodrich, Roberto Tamassia, David M. Mount "Data Structures and Algorithms in C++", Wiley India.

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23BCMAP231: DATA STRUCTURES LAB

Offered to: B. C. A Hons **Semester: III**
Max. Marks : 50 (CIA: 15 + SEE: 35) **Hrs/Week: 2**

Model Paper : Practicals

Time: 3 Hrs. **Max. Marks: 35**

Section – A

1. Experiment-1 15 M

2. Experiment-2 10 M

Section – B

Viva Voce 10 M

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