Pimpri Chinchwad Education Trust's

Pimpri Chinchwad College of Engineering

An Autonomous Institute

(Affiliated to Savitribai Phule Pune University)

List of Assignment

Subject: Data Structures Laboratory **AY 2025-2026** **Semester: I**

SY - Div A **Batch : A1**

Sr. No	Topic	Problem Statement
1	Insertion sort	A manufacturing plant collects temperature readings from sensors every second. For analysis, the system needs to sort recent temperature readings to detect anomalies.Write a program for above scenario. Hint: Implement Insertion Sort to sort a stream of sensor temperature data (integers or floats) collected over a period. The sorting algorithm should be efficient enough to run in near real-time on large batches of data.
2	Quick sort	You work for an online retail company that manages thousands of product listings every day. The system needs to display product prices in ascending order quickly when customers filter by price, to help them find affordable options easily. Write a program for above scenario.
3	Merge sort	A travel booking website shows available flights sorted by ticket price so users can choose the cheapest options first. Write a program for above scenario. Hint: Given an array of flight prices, implement Merge Sort to sort the prices in ascending order. Handle large data sets with many duplicate prices and analyze Merge Sort's performance on such inputs.
4	Linked List	Design a music playlist system using a linked list where: ● Songs can be added to the beginning/end ● Songs can be deleted ● Next and previous songs can be navigated
5	Linked List	Write a program to perform Polynomial Addition using Linked Lists ● Each term is a node (with coefficient and power). ● Add two polynomials represented by linked lists.

6	Linked list	File navigation system Create a file navigation system that stimulate forward and backward navigation similar to file explorers or web browsers Key operations to be perform: Navigate to a new folder(add node),go back(move left in DLL),go forward(move right),display current path.
7	Linked list	Circular order history Create a order history system where the orders are stored in a circular DLL structure allowing navigation from the latest back to earliest and vice versa. Key operations: Add orders,traverse forward and backward,edit the orders.
8	Stack	Write a program to reverse the words in a sentence using a stack. Example: Input: I love coding Output: coding love I
9	Stack	Develop a Book Return Cart in Library :A book return cart receives returned books and stacks them. When reshelving, books are taken from the top.
10	Queue	Develop a task scheduler for smart devices (e.g., lights, AC, alarms) using circular queue. Tasks are scheduled in time slots and repeated in a cyclic order.
11	Queue	Design a hospital patient queue management system where patients are added with their details (name, age, symptoms). Doctors serve patients in the order they arrive (FIFO). Emergency patients can be inserted at the front.
12	Hashing	Consider an employee database of N employees considering emp Id and name as data members. Make use of a hash table implementation to quickly look up the employer's id number. Implement above scenario using hashing and linear probing.
13	Additional Practice Assignment	"Browser History Management" You are tasked with implementing a simplified browser history management system. This system should allow users to navigate between previously visited pages, and also add new pages to their history. The system needs to efficiently handle both "back" and "forward" navigation, as well as adding new pages, while maintaining a limited history size.

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List of Assignment

Subject: Data Structures Laboratory **AY 2025-2026** **Semester: I**

SY - Div A **Batch : A2**

Sr. No	Topic	Problem Statement
1	Insertion sort	An education platform needs to rank students based on their exam scores to publish results and generate merit lists. Write a program for above scenario. Hint: Given a list of student scores, use Quick Sort to sort them in descending order. Handle cases where many students have the same score and analyze how this affects the performance of Quick Sort.
2	Quick sort	A warehouse management system wants to sort inventory items by stock quantity to prioritize restocking.Write a program for above scenario. Hint: Given an unsorted list of inventory quantities, implement Quick Sort to sort items by stock quantity in ascending order. Discuss how the presence of many duplicate quantities affects Quick Sort's efficiency.
3	Merge sort	A banking app needs to display a user's transaction history sorted by transaction amount to quickly identify large deposits or withdrawals. Write a program for above scenario. Hint: Given a list of transaction amounts (positive and negative), implement Quick Sort to sort transactions in ascending order of amount. The solution should efficiently handle thousands of transactions.

4	Linked List	Design a music playlist system using a linked list where: ● Songs can be added to the beginning/end ● Songs can be deleted ● Next and previous songs can be navigated
5	Linked List	Write a program to perform Polynomial Addition using Linked Lists ● Each term is a node (with coefficient and power). ● Add two polynomials represented by linked lists.
6	Linked List	Circular Traffic Simulation: Model vehicle moving around the circular track.Using Circular linked list where each vehicle is node and movement is simulated in cycle.
7	Linked List	Text Editor: Implement the text editor where each operation (insert,delete,modify) is stored in DLL . Use the backward traversal for undo and forward traversal for redo.
8	Stack	Write a program for Mathematical Expression Evaluation in Calculator: Implement a calculator that supports evaluation of complex arithmetic expressions using stacks for operands and operators.
9	Stack	Write a program to check whether a string is a palindrome using stack operations.
10	Queue	Simulate a ticketing system where customers raise support tickets and are added to a queue. The support team dequeues and resolves tickets. Allow urgent issues to be placed at the front.Write a program for above scenario.
11	Queue	Design a simplified railway reservation system where users can book, cancel, and view tickets. Use an array to store booking details and a queue to manage the waiting list.
12	Hashing	Write a C++ Program to insert elements in Hash Table using Separate Chaining.
13	Additional Practice Assignment	"Browser History Management" You are tasked with implementing a simplified browser history management system. This system should allow users to navigate between previously visited pages, and also add new pages to their history. The system needs to

		efficiently handle both "back" and "forward" navigation, as well as adding new pages, while maintaining a limited history size.

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List of Assignment

Subject: Data Structures Laboratory **AY 2025-2026** **Semester: I**

SY - Div A **Batch : A3**

Sr. No	Topic	Problem Statement
1	Insertion sort	An education platform needs to rank students based on their exam scores to publish results and generate merit lists.Write a program for above scenario. Hint: Given a list of student scores, use Quick Sort to sort them in descending order. Handle cases where many students have the same score and analyze how this affects the performance of Quick Sort.
2	Quick sort	A company HR system needs to sort employee records by salary to generate payroll reports and salary analytics. Write a program for above scenario.
3	Merge sort	A company wants to analyze sales data sorted by revenue generated per product to identify best sellers.Write a program for above scenario. Hint: Given an array of revenue figures per product, implement Merge Sort to sort the data in descending order. Measure the algorithm's performance for very large sales datasets.
4	Linked List	Write a program to perform Singly Linked List Operations Tasks:

		• Create a list • Insert at beginning/end/position • Delete from beginning/end/position • Search an element • Count nodes • Reverse the linked list
5	Linked List	Write a program to perform Polynomial Addition using Linked Lists • Each term is a node (with coefficient and power). • Add two polynomials represented by linked lists.
6	Linked List	Design a music playlist system using a doubly linked list where songs can be added to the beginning or end ,songs can be deleted from the music playlist.
7	Linked List	Implement a navigation system for a delivery service using circular linked list to represent a navigation system should support the following functionalities: 1.Add the route 2.Remove route 3.Display route
8	Stack	Write a program to build a calculator that evaluates postfix expressions using a stack. Input: 6 2 3 + - 3 8 2 / + * Output: Result of the expression
9	Stack	Write a program to sort a given stack in ascending order using only one additional stack.
10	Queue	Develop an application for Emergency Room Bed Allocation using Queue. Hint: Simulate bed allocation in an emergency room using an array. When no bed is free, patients are added to a waiting queue.
11	Queue	Write a program to check whether a string is a palindrome using Queue operations.
12	Hashing	Write a C++ Program to insert elements in Hash Table using Separate Chaining.

13	Additional Practice Assignment	"Browser History Management" You are tasked with implementing a simplified browser history management system. This system should allow users to navigate between previously visited pages, and also add new pages to their history. The system needs to efficiently handle both "back" and "forward" navigation, as well as adding new pages, while maintaining a limited history size.

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Subject: Data Structures Laboratory **AY 2025-2026** **Semester: I**

SY - Div A **Batch : A4**

Sr. No	Topic	Problem Statement
1	Insertion sort	An education platform needs to rank students based on their exam scores to publish results and generate merit lists.Write a program for above scenario. Hint: Given a list of student scores, use Quick Sort to sort them in descending order. Handle cases where many students have the same score and analyze how this affects the performance of Quick Sort.

2	Quick sort	An e-commerce platform wants to display customer orders sorted by order date to show the most recent orders first or oldest orders first.Write a program for above scenario using Quick sort.
3	Merge sort	A sports league website ranks teams based on points earned throughout the season. Write a program for above scenario using merge sort. Hint: Given an array of teams' points, implement Merge Sort to sort teams by their points in descending order. Handle ties in points by maintaining relative order (stable sort behavior discussion).
4	Linked List	Write a program to perform Polynomial Addition using Linked Lists ● Each term is a node (with coefficient and power). ● Add two polynomials represented by linked lists.
5	Linked List	Develop Train Compartment Management System using following information: ● Each train compartment is a node in a linked list. ● Create functions to: ● Add a new compartment at a specific position ● Remove a compartment ● Display the sequence of compartments
6	Linked List	Design a music playlist system using a linked list where: ● Songs can be added to the beginning/end ● Songs can be deleted ● Next and previous songs can be navigated
7	Linked List	Text Editor: Implement the text editor where each operation (insert,delete,modify) is stored in DLL . Use the backward traversal for undo and forward traversal for redo.
8	Stack	Write a program for expression evaluation, using a stack to perform the following operations: ● Convert infix to postfix expression ● Evaluate postfix expression
9	Stack	Write a program to Sort a stack using another stack. Sort a given stack in ascending order using only one additional stack.
10	Queue	Develop Bank Queue System. Hint:

		Simulate a bank queue system where: ● Customers arrive and join the queue ● Tell the expected waiting time ● Track total served customers
11	Queue	Write a program to perform following queue operations using Linked List : ● Enqueue, Dequeue ● Display queue ● Check overflow/underflow
12	Hashing	Write a C++ Program to insert elements in Hash Table using Separate Chaining
13	Additional Practice Assignment	"Browser History Management" You are tasked with implementing a simplified browser history management system. This system should allow users to navigate between previously visited pages, and also add new pages to their history. The system needs to efficiently handle both "back" and "forward" navigation, as well as adding new pages, while maintaining a limited history size.