RAGHU ENGINEERING COLLEGE

(Autonomous)

(Approved by AICTE, New Delhi, Permanently Affiliated to JNTU-GV, Vizianagaram, Accredited by NBA & Accredited by NAAC with A+ grade)

DATA STRCTURES LAB

AR23- B.Tech (Common to CSE, IT & allied branches of Engineering)

I-B.Tech., II-Semester

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Course Objectives:

- Understand the significance of linear data structures in problem-solving and basic time/space complexity analysis.
- Create and manage linked lists to efficiently organize and manipulate data, emphasizing memory efficiency.
- Implement and apply stacks to manage program flow and solve problems involving expression evaluation and backtracking.
- Utilize queues to model real-world scenarios, such as process scheduling and explore basic concepts of hashing and apply it to solve problems
- Impart basic understanding of non-linear data structures such as trees and graphs.

Course Outcomes: At the end of the course, Student will be able to

CO1. Explain the role of linear data structures in organizing and accessing data efficiently in algorithms.

CO2. Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation.

CO3. Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems.

CO4. Apply queue-based algorithms for efficient task scheduling, design hash-based solutions for problems. And apply them appropriately to solve data management challenges.

CO5. Recognize the scenarios of non linier data structures like tree & graphs and applications

List of Experiments:

Exercise 1: Array Manipulation

i) Write a program to reverse an array.

ii) C Programs to implement the Searching Techniques – Linear & Binary Search

iii) C Programs to implement Sorting Techniques – Bubble, Selection and Insertion Sort

Exercise 2: Linked List Implementation

i) Implement a singly linked list and perform insertion and deletion operations.

ii) Develop a program to reverse a linked list iteratively.

iii) Solve problems involving linked list traversal and manipulation.

Exercise 3: Linked List Applications

i) Create a program to detect and remove duplicates from a linked list.
ii) Implement a linked list to represent polynomials and perform addition.
iii) Implement a double-ended queue (deque) with essential operations.

Exercise 4: Double Linked List Implementation

i) Implement a doubly linked list and perform various operations to understand its properties and applications.
ii) Implement a circular linked list and perform insertion, deletion, and traversal.

Exercise 5: Stack Operations

i) Implement a stack using arrays and linked lists.
ii) Write a program to evaluate a postfix expression using a stack.
iii) Implement a program to check for balanced parentheses using a stack.

Exercise 6: Queue Operations

i) Implement a queue using arrays and linked lists.
ii) Solve problems involving circular queues.
iii) Develop a program to simulate a FCFS CPU Scheduling

Exercise 7: Stack and Queue Applications

i) Use a stack to evaluate an infix expression and convert it to postfix.
ii) Create a program to determine whether a given string is a palindrome or not.
iii) Implement a stack or queue to perform comparison and check for symmetry

Exercise 8: Binary Search Tree

i) Implementing a BST using Linked List.
ii) Traversing of BST.

Exercise 9: Hashing

i) Implement a hash table with collision resolution techniques.

Textbooks:

1. Data Structures and algorithm analysis in C, Mark Allen Weiss, Pearson, 2nd Edition.
2. Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, Silicon Press, 2008

Reference Books:

1. Algorithms and Data Structures: The Basic Toolbox by Kurt Mehlhorn and Peter Sanders
2. C Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman, and John E. Hopcroft
3. Problem Solving with Algorithms and Data Structures" by Brad Miller and David Ranum

4. Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein
5. Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms by Robert Sedgewick.

CO PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	3	1	1	-	1	1	-	1
CO2	1	2	1	1	3	1	1	-	1	1	-	1
CO3	2	2	2	3	3	1	1	-	1	1	-	1
CO4	2	2	2	3	3	1	1	-	1	1	-	1
CO5	2	2	2	3	3	1	1	-	1	1	-	1