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 STRUCTURES

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

I-B.Tech., II-Semester

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Course Objectives:

- Understand the significance of 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 the 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 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.

UNIT I (9Hours)

Introduction to Data Structures: Definition and importance of data structures, Abstract data types (ADTs) and their implementation, Overview of time and space complexity. Searching Techniques: Linear & Binary Search, Sorting Techniques: Bubble sort, Selection sort, Insertion Sort

UNIT II (11Hours)

Linked Lists: Singly linked lists, representation and operations, Comparing arrays and linked lists, doubly linked lists, representation and operations. Comparing single link list and double linked lists, Circular linked lists, Applications of linked lists.

UNIT III (14Hours)

Stacks: Introduction to stacks: properties and operations, implementing stacks using arrays and linked lists, expression & types, Applications of stacks in converting expression, expression evaluation, backtracking, reversing list.

Queues: Introduction to queues: properties and operations, implementing queues using arrays and linked lists, Applications of queues in CPU scheduling FCFS & SJF.

UNIT IV (12Hours)

Hashing: Brief introduction to hashing and hash functions, Collision resolution techniques: chaining and open addressing.

Trees: Introduction to Trees, Tree terminology, representation, types of trees Binary Search Tree – Insertion, Deletion & Traversals.

UNIT V (14Hours)

Graph: Introduction, terminology, representation, types of graphs, applications of graph

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.

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Correlation of COs with POs & PSOs:

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	2	3	3	2	-	-	-	-	-	-	-	2	2	2	-
CO-2	2	3	3	2	-	-	-	-	-	-	-	2	2	2	-
CO-3	2	3	3	2	-	-	-	-	-	-	-	2	2	2	-
CO-4	2	3	3	2	-	-	-	-	-	-	-	2	2	2	-
CO-5	2	3	3	2	-	-	-	-	-	-	-	2	2	2	-