

RAGHU ENGINEERING COLLEGE

(Autonomous)

proved by AICTE, New Delhi, Accredited by NBA (ECE, EEE, MECH, CSE), NAAC with 'A+' grade & Permanently Affiliated to JNTUGV)

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II Year – I Semester Course Code: 2302501

DATA STRUCTURES	L	Т	Р	С
(SKILL ENHANCEMENT COURSE)	0	1	2	2

Course Objectives:

The main objectives of the course is to

- Understand the significance of linear data structures and non-linear data structures in problem-solving
- Create and manage arrays, files, and linked lists to efficiently organize and manipulate data, emphasizing memory efficiency.
- Implement and apply stacks, queues to manage program flow and solve problems

Course Outcomes:

CO1	Explain the role of linear and non-linear data structures in organizing and accessing data efficiently	L2
CO2	Design, implement, apply arrays for static data storage and linked lists for dynamic data storage, demonstrating understanding of memory allocation.	L6
CO3	Develop programs using stacks, queues to handle recursive algorithms and solve related problems	L3

Exercise 1-Single Dimensional Array

- 1. Write a program to find the second largest element of an array
- 2. Write a program to merge two 1D arrays into a single array.
- 3. Write a program to find the sum and average of elements in a 1D array.

Exercise 2-Multi Dimensional Array

- 1. Write a program that takes a matrix as input and returns its transpose.
- 2. Write a program that calculates the sum of the primary and secondary diagonal elements of a square matrix.
- **3.** Write a program to read two-dimensional array marks which stores marks of 5 students in 3 subjects. Write a program to display the highest marks in each subject.

Exercise 3-Files

- 1. Write a program to create a text file and write a string entered by the user into the file.
- 2. Write a program that searches for a character in a text file and prints its occurrences along with the line number.
- 3. Write a program that reads a file and counts the number of words, characters, and lines in it.

Exercise 4-Structures

1. Write a program to define a structure named Student with members name, roll number, and marks. Initialize and display the details of a student.



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- 2. Write a program where a 'Student' structure is passed to a function to calculate the average marks and return it.
- **3.** Write a program to define a structure Employee with members like name, age, and another structure Address (containing city, state, zip_code). Initialize and display the details of an employee.

Exercise 5-Unions

- 1. Write a program to define a union Data with members int_val (integer), float_val (float), and char_val (character). Initialize each member and display their values, observing how union members share memory.
- 2. Create a program to define a union that can hold an integer and a float. Assign an integer value, print it, then assign a float value and print it, observing the changes.
- **3.** Write a program that defines a union with a character array (string) and an integer. Assign values to both and display them, noting how the memory overlap affects the output.

Exercise 6-Searching

- 1. Write a program to implement the Linear Search Technique
- 2. Write a program to implement the Binary Search Technique

Exercise 7-Sorting

- 1. Write a program to implement Bubble sort
- 2. Write a program to implement Selection Sort
- 3. Write a program to implement Insertion Sort

Exercise 8-Single Linked Lists

- 1. Implement a singly linked list and perform insertion and deletion operations.
- 2. Develop a program to reverse a linked list iteratively.

Exercise 9-Double and Circular Linked Lists

- 1. Implement a doubly linked list and perform insertion, deletion, and traversal
- 2. Implement a circular linked list and perform insertion, deletion, and traversal.

Exercise 10-Stacks

- 1. Implement Stack operations using arrays or linked lists.
- 2. Implement a program to check for balanced parentheses using a stack

Exercise 11-Queues

- 1. Implement Queue operations using arrays or linked lists.
- 2. Implement a queue to perform comparison and check for symmetry of a string



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Exercise 12-Trees & Graphs

- 1. Implement a program to construct BST using Linked List.
- 2. Implement a program to traversing of BST.
- **3.** Write a program to represent a simple undirected graph using an adjacency matrix and print the matrix.

Text Books:

- 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

	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

CO PO Mapping: