

**SES's L.S. RAHEJA COLLEGE OF ARTS AND COMMERCE
(AUTONOMOUS)**



BOARD OF STUDIES: Information Technology and Data Science

Programme: B.Sc. (Artificial Intelligence & Data Science)

Semester: II

Nomenclature of the Course: Data Structures & Algorithms

NEP Vertical: Major

Credit: 02

Total Marks: 50

Academic Year: 2026–27

(As per Choice Based Credit System under NEP 2020)



Unit-wise Detailed Syllabus

Unit	Detailed Contents	Andragogy	Hours
Unit I: Algorithmic Foundations & Linear Data Structures	1. Algorithm Fundamentals • Introduction to Algorithms • Characteristics of a Good Algorithm • Writing Algorithms & Flowcharts 2. Complexity Analysis • Time and Space Complexity • Best, Average, Worst Case • Asymptotic Notations – Big O (Basic Concept) 3. Arrays • Representation and Operations (Insertion, Deletion, Traversal) 4. Stack • Basic Operations – Push, Pop, Traverse • Applications – Parenthesis Checking • Infix to Postfix Conversion (Algorithm only) 5. Queue • Basic Operations • Types of Queue – Linear Queue, Circular Queue, Priority Queue (Theory only)	Algorithm tracing, Dry runs, Complexity comparison tables, Expression conversion exercises	15
Unit II: Non-Linear Data Structures & Searching/Sorting	1. Searching Techniques • Linear Search • Binary Search • Complexity Comparison 2. Sorting Techniques • Bubble Sort • Selection Sort • Time Complexity Analysis 3. Linked List (Introductory) • Concept and Representation • Basic Traversal (No detailed types) 4. Trees • Basic Terminology • Binary Tree Concept • Binary Search Tree (Insertion, Traversal – Conceptual) 5. Graphs • Basic Terminology • Graph Representation (Adjacency Matrix & List – Conceptual) • Basic Graph Traversal – BFS and DFS (Concept Only)	Diagram-based explanation, Tree construction exercises, Comparison tables, Visual traversal demonstrations	15

Learning Objectives

1. To understand algorithm design and complexity analysis.
2. To apply operations on basic linear data structures.
3. To analyze searching and sorting algorithms.
4. To understand fundamental tree and graph concepts.
5. To compare data structures based on efficiency and application.

Course Outcomes (CO)

CO No.	Course Outcome	Bloom's Level	PSO Mapped
CO1	Explain algorithm design principles and complexity concepts	Understand (L2)	
CO2	Apply operations on arrays, stack and queue	Apply (L3)	
CO3	Analyze efficiency of searching and sorting techniques	Analyze (L4)	
CO4	Explain tree and graph representations and traversals	Understand (L2), Analyze (L4)	
CO5	Compare linear and non-linear data structures	Analyze (L4)	

Suggested Readings

Sr. No.	Title	Author
1	Data Structures and Algorithms in Python	Goodrich et al.
2	Fundamentals of Data Structures	Horowitz & Sahni
3	Introduction to Algorithms	Cormen et al.
4	Data Structures Using C	Reema Thareja

QUESTION PAPER PATTERN

(A) FOR CONTINUOUS EVALUATION

Particulars	Marks
Class Test	10
Assignment / Programming Task	10
Total	20

B) FOR SEMESTER END EXAMINATION

Maximum Marks: 30

Duration: 1 Hour

Question No.	Description	Total Marks
Q1	Attempt Unit I	
	A – Remembering	15
	B – Applying	
	C – Analysing	
OR		
	P – Remembering	15
	Q – Applying	
	R – Analysing	
Q2	Attempt Unit II	
	A – Understanding	15
	B – Applying	
	C – Evaluating/Analysing	
OR		
	P – Remembering	15
	Q – Understanding	
	R – Evaluating/Analysing	