DATA STRUCTURES WITH C

Course code: 18IS3DCDSA
Credits: 04
L: P: T: S: 4:0:0: 0 **CIE Marks: 50**
Exam Hours:03 **SEE Marks: 50**
Total Hours: 50

Course objectives:

1. Explain fundamentals of data structures and their applications essential for programming / problem solving
2. Analyze Linear Data Structures: Stack, Queues, Lists
3. Analyze Non-Linear Data Structures: Trees, Graphs
4. Assess appropriate data structure during program development / problem solving

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

CO1	Acquire knowledge of - Various types of data structures, operations and algorithms. - Sorting and searching operations.
CO2	Ability to analyze time and space efficiency of algorithms
CO3	Ability to apply various data structures and its properties to illustrate storage of data efficiently.
CO4	Analyze the performance of - Stack, Queue, Lists, Trees, Graphs, Searching and Sorting Techniques.
CO5	Implement all the applications of Data structures in a high-level language.
CO6	Design and apply appropriate data structures for solving computing problems.

Mapping of Course outcomes to Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	-	-	-	-	-	-	-	-	2	2	2	-
CO2	3	2	2	-	-	-	-	-	-	-	-	2	2	2	-
CO3	3	2	2	-	-	-	-	-	-	-	-	2	2	2	-
CO4	3	2	2	-	-	-	-	-	-	-	-	2	2	2	-
CO5	3	2	2	-	-	-	-	-	-	-	-	2	2	2	-
CO6	3	2	2	-	-	-	-	-	-	-	-	2	2	2	-

Unit	Contents of the Unit	Hours	COs
1.	**BASIC CONCEPTS:** Structure & Union, Introduction to Data Structure and its classification, the need for Data structure, Algorithm specification, performance analysis & measurements, Polynomials and Sparse Matrices.	10	CO1 & CO2

2.	**STACKS AND QUEUES:** Introduction to Stacks, Stacks Using Dynamic Arrays, Evaluation of Expressions, Introduction to Queues, Types of Queue: Ordinary queue, Circular Queues & Double ended queue, Application of stacks and Queues.	**10**	**CO3& CO4**
3.	**LINKED LISTS:** Definition of Linked lists and Chains, Representing Chains in C, Types of Linked List: Singly Linked List, Circular Singly Linked List, Doubly Linked Lists & Circular doubly linked list, Application of Linked List.	**10**	**CO3 & CO4**
4.	**TREES & GRAPH:** Introduction to Binary Search Trees (BST), Properties of Binary Tree, Operation on BST, Traversals in Binary Trees, Heaps, Selection Trees, Forests tree, Counting Binary Trees.	**10**	**CO4& CO6**
5.	**EFFICIENT BINARY SEARCH TREES:** Optimal Binary Search Trees, AVL Trees, Properties of AVL tree, Construction of AVL tree, Red-Black Trees, Properties of red black tree, Construction of red black tree.	**10**	**CO5 & CO6**

Self-study component:

Note: 1.Questions for CIE and SEE not to be set from self-study component.

2. Assignment Questions should be from self-study component only.

UNIT 1: Dynamic Memory Allocation
UNIT 2: Multiple Stacks and Queues
UNIT 3: Operation on Linked list using Stacks, Queues, Polynomials
UNIT 4: Introduction to Graph, properties of graph, Representation of graph in memory
UNIT 5: Splay Trees

TEXT BOOK:

1. Horowitz, Sahni, Anderson-Freed: Fundamentals of Data Structures in C, 2nd Edition, Universities Press, 2007.

REFERENCE BOOKS:

1 Yedidyah, Augenstein, Tannenbaum: Data Structures Using C and C++, 2nd Edition, Pearson Education, 2003.
2 Richard F. Gilberg and Behrouz A. Forouzan: Data Structures A Pseudocode Approach with C, Cengage Learning, 2005.
3 A.M Padma Reddy," Approach of Data Structures", Person Publication, 5th Edition, 2015
4 Reema Theraja " Data Structure using C. 1st Edition , 2014