SEMESTER - III

Branch: BCA	Semester-III
Subject Code: 3101	Lecture: 04 Credit: 04
Course Opted	Core Course - 7
Subject Title	DATA STRUCTURES

Course objectives:

- To impart basic concepts of data structures and algorithms
- To learn fundamental concepts about arrays, linked list, stack, queue, trees and graphs
- To understand concepts about searching and sorting techniques.
- To gain knowledge about writing algorithm and step by step approach in solving problems with the help of fundamental data structures.
- To find complexity of various algorithmic methods.

Course Outcomes:

- Understand basic data structures such as array, linked list, stack, queue, binary tree and graph along with algorithms.
- Ability to analyze algorithm and algorithm correctness.
- Apply searching and sorting techniques.

Modules	Sr. No.	Topic and Details	No. of Lectures Assigned	Marks Weightage %
UNIT -I	1	**Introduction:** Definition of Data Structures, Data Types vs. Data Structures, Classification of Data Structures, Description of various data structures, Arrays, Lists, Stacks, Queues, Trees and Graphs, Operations performed on Data Structures	4	8
	2	**Arrays:** One dimensional array, its Initialization, Implementation of One dimensional array in memory, Insertion, deletion of an element from one dimensional array, Traversing of an array	4	8
UNIT-II	3	**Linked Lists:** Introduction, Key terms, Advantages & disadvantages, Linear linked lists ( ) - Types (Singly, Doubly, Circular) Operations (Inserting, Deleting nodes)	6	12
	4	**Stack:** Introduction, Stack implementation, Operations on stack (Push Pop), Implementation of stack using pointer, Applications of stack, Infix prefix, postfix notations, Algorithms for converting from one form to another, Recursion	6	12
	5	**Queue:** Introduction and Queue implementation, Operations on queue (Insertion & deletion), Limitations of simple queue, Circular queue, Double ended queue (dequeue), Application queue & its types	6	12
UNIT-III	6	**Trees:** Introduction, terminology, Binary tree,, Strictly Binary tree, Complete Binary tree, Binary tree representation as Array and Linked lists, Traversal	6	12

		(Inorder, Preorder, Postorder), Binary Search Tree, Threaded Binary Tree		
	7	**Graphs:** Introduction, terminology, Graph representation, Applications of graph, Graph traversal (BFS, DFS, Shortest path), Spanning tree, Minimum spanning tree	6	12
UNIT-IV	8	**Sorting:** Bubble Sort , Selection Sort , Quick Sort, Heap Sort, Insertion Sort. **Searching & Hashing:** Searching - Sequential search, Binary Search Hash Function, Hashing Techniques, Collision Resolution	6	12
	9	**Algorithms Complexity:** Performance Analysis, Time –Space Trade off, Big O, Omega and Theta Notation, Analysis of all Sorting Techniques. **Recurrences:** The substitution method, Recursion tree method, Master method	6	12
Total			50	100

Text Book:

1. S.Sawhney & E. Horowitz, “Fundamentals of Data Structure”, Computer Science Press, 1987

References:

1. Trembley&Sorrenson, “ Data Structure”, 2005
2. Lipschuiz, “Data structures” , (Schaum’s Outline Series Mcgraw Hill Publication)
3. Ellis Horowitz and SartajSawhney, “Fundamentals of Computer Algorithms”
4. Aho, Hopcroft and Ullman, “Data Structures and Algorithms”
5. AbhayAbhyankar, “Data Structures and Files”
6. G.S. Baluja, “Data Structures Through C”
7. Mary E. S. Loomis, “Data Management and File Structures”, Prentice Hall, 2nd ed. edition (January 1989)
8. Classical Data Structures : D. Samanta, PHI, New Delhi