

**Learning Outcomes:**

On successful completion of this course, students will be able to:

- Differentiate between the types of Data Structures.
- Select an appropriate data structure for solving typical computing problems.
- Apply sorting and searching algorithms to the small and large data sets.

**Syllabus:**

Unit No	Topics
1	<b>Introduction to Data Structure:</b> Data Management concepts, Data types – primitive and non-primitive, Types of Data Structures- Linear & Non Linear Data Structures.
2	<b>Linear Data Structure:</b> Stack: Concepts and representation, Operations, Applications. Polish Expression, Reverse Polish Expression And Their Compilation, Recursion, Tower of Hanoi.  Queue: Concept and Representation, Operations, Types viz. simple, circular, priority, double ended. Applications of queue.  Linked List: Concept and Representation. Operations: Insertion at beginning, at the end and at any point, Deletion at the beginning, at the end and at any point.  Types of Linked lists: Singly Linked List, Doubly Linked list, Circular linked list, Linked implementation of Queue. Applications and Advantages of Linked Lists.
3	<b>Nonlinear Data Structure:</b> Tree : Definitions and Concepts, Representation of binary tree, Binary tree traversal (In order, post order, preorder), Threaded binary tree, Binary search trees, Conversion of General Trees To Binary Trees, Applications Of Trees- Some balanced tree mechanism, eg. AVL trees, 2-3 trees, Height Balanced, Weight Balance.
4	<b>Graph:</b> Basic Concept of Graph Theory and its Properties, Matrix Representation Of Graphs, Elementary Graph operations, Breadth First Search, Depth First Search, Spanning Trees, Shortest path, Minimal spanning tree.
5	<b>Sorting &amp; Searching:</b> Performance Analysis and Management - Time and space analysis of algorithms – Average, best and worst case analysis.  Sorting – Bubble Sort, Selection Sort, Quick Sort, Merge Sort, Insertion sort, Heap sort.  Searching – Sequential Search and Binary Search
6	<b>Hashing:</b> Symbol Table, Hashing fun, Collision Resolution – Techniques.

**Reference Books:**

1. Data Structures using C & C++ -By Ten Baum Publisher – Prentice-Hall International.
2. Fundamentals of Computer Algorithms by Horowitz, Sahni, Galgotia Pub. 2001 ed.
3. Fundamentals of Data Structures in C++-By Sartaj Sahani.
4. Data Structures: A Pseudo-code approach with C -By Gilberg & Forouzan  
Publisher- Thomson Learning.
5. An Introduction to Data Structures with Applications. by Jean-Paul Tremblay  
& Paul G. Sorenson Publisher-Tata McGraw Hill