

PC-CS201A	Data Structure and Algorithms						
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	0	0	3.0	75	25	100	3 Hour
<b>Purpose</b>	To introduce the principles and paradigms of Data Structures for design and implement the software systems logically and physically.						
<b>Course Outcomes (CO)</b>							
<b>CO 1</b>	To introduce the basic concepts of Data structure , basic data types ,searching and sorting based on array data types.						
<b>CO 2</b>	To introduce the structured data types like Stacks and Queue and its basic operations's implementation.						
<b>CO 3</b>	To introduce dynamic implementation of linked list.						
<b>CO 4</b>	To introduce the concepts of Tree and graph and implementation of traversal algorithms.						

### Unit-1

**Introduction to Data Structures**, Data Types, Built in and User Defined Data Structures, Applications of Data Structure, Algorithm Analysis, Worst, Best and Average Case Analysis, Notations of Space and Time Complexity, Basics of Recursion.

**Arrays**, One Dimensional Arrays, Two Dimensional Arrays and Multi-Dimensional Arrays, Sparse Matrices, Searching from array using Linear and Binary Searching Algorithm, Sorting of array using Selection, Insertion, Bubble, Radix Algorithm

### Unit-2

**Stacks**: Definition, Implementation of Stacks and Its Operations, Evaluation of Infix, prefix and Postfix Expression, Inter-conversion of Infix, Prefix and Post-Fix Expression, Implementation of Merge Sort and Quick Sort Algorithm.

**Queues**: Definition, Sequential Implementation of Linear Queues and Its Operations, Circular Queue and Its Implementation, Priority Queues and Its Implementation, Applications of queues.

### Unit-3

**Linked Lists**: Need of Dynamic Data Structures, Single Link List and Its Dynamic Implementation, Traversing, Insertion, Deletion Operations on Single Link Lists. Comparison between Static and Dynamic, Implementation of Linked List.

Circular Link Lists and Doubly Link List, Dynamic Implementation of Primitive Operations on Doubly Linked Lists and Circular Link List. Dynamic Implementation of Stacks and Queues.

### Unit-4

**Trees**: Definition, Basic Terminology, Binary Tree, External and Internal Nodes, Static and Dynamic Implementation of a Binary Tree, Primitive Operations on Binary Trees, Binary Tree Traversals: Pre-Order, In-Order and Post-Order Traversals. Representation of Infix, Post-Fix and Prefix Expressions using Trees.

Introduction to Binary Search Trees: B+ trees, AVL Trees, Threaded Binary trees, Balanced Multi-way search trees, Implementation of Heap Sort Algorithm.

**Graphs**: Basic Terminology, Definition of Undirected and Directed Graphs, Memory Representation of Graphs, Minimum-Spanning Trees, Warshal Algorithm, Graph Traversals Algorithms: Breadth First and Depth First.

### Suggested Books:

- Theory and Problems of Data Structures by Jr. Seymour Lipschetz, Schaum's outline, TMH.
- Data Structures and Algorithms by PAI, TMH.
- Fundamentals of Data structures by Ellis Horowitz and Sartaj Sahni, Pub, 1983, AW.
- Data Structures and Algorithms by A.V. Aho, J.E. Hopcroft and T.D. Ullman, Original edition, Addison-Wesley, 1999, Low Priced Edition.
- Data Structures and Program Design in C by Robert Kruse, PHI,
- Shukla, Data Structures using C++, Wiley India
- Introduction to Computers Science -An Algorithms Approach, Jean Paul Tremblay, Richard B. Bunt, 2002, T.M.H.
- Data Structure and the Standard Template library – Willam J. Collins, 2003, T.M.H.