DATA STRUCTURE

Paper Code	**CEN-301**
Course Credits	**4**
Lectures / week	**3**
Tutorial / week	**1**
Course Description	**UNIT – I**

UNIT – I

Definition of Data Structure, Types & characteristics of Data structures, Abstract Data Type (ADT), Algorithms: Algorithm Concepts, Definition of Algorithm, Objectives of algorithms, Quality of an algorithm Space complexity and Time complexity of algorithm. Characteristics of an array, Definition of an Array, Implementation of 1-D arrays, Row and Column Major Implementations of 2-D, 3-D and n-D arrays.

Advanced concept of Pointers in C, Dynamic allocation of Memory

UNIT- II

Stack as a ADT, operations on stack, Stack implementation using array and linked list, Applications of Stack: Polish and reverse Polish notations, Recursion, Garbage collection. Queue as ADT, Operations on queue, and Types of queues: Linear Queue, Circular Queue, Priority Queue, and Double Ended Queue, Application of Queue.

UNIT- III

Concept of a Linked List, Linear Single and Double link lists, Circular Single and Double link List, Generalized Linked List, Header Linked list, Applications of Link List.

UNIT- IV

Concepts of a Tree, Tree as ADT, Definitions of n-ary, binary trees, Strictly Binary Tree, Complete Binary Tree, Weight of a tree, Level of a node, Height/Depth of a Tree. Operations on tree, Tree Search Algorithms, Binary Search Tree, Tree traversal Algorithms, AVL Trees, Threaded binary trees, Left Threaded and Right Threaded binary search trees, Heap Tree, Expression tree, Huffman Tree.

Graph: Different terminology associated with Graphs, Types of graphs – directed/undirected, connected/disconnected, cyclic/acyclic, Representation of graphs: Adjacency matrix, linked list. Graph Traversal – BFS, DPF, Graph algorithm-Warshall's, Djikastra's, Minimum Spanning Tree – Prim's and Kruskal's Algorithm.

UNIT – V

Bubble Sort, Sequential Sort, Shell Sort, Selection Sort, Insertion Sort, Merge Sort, Quick Sort, Heap Sort, Topology sort. Searching Algorithm- Linear Search and Binary Search

References / Text Books:	• Seymour Lipschutz, TMH, Scaumn Series. • Fundamentals of Data Structure inC by Horowitz, Sahni and Anderson-Freed, University Press, Second Edition. • Data Structure and Algorithm – John Beidler, Springer
Computer Usage / Software Requires:	Practical implementation can be done on any C Compiler like gcc or Dev C++ with problems on Stack, Queue, Tree and Graph.