**ALGORITHMS AND DATA STRUCTURES**

**UNIT I:** An Introduction to data structure: Introduction, Definition, Classification of data structure, Concept of data, Data types, Abstract data Types (ADT), Features of structured program. Introduction to algorithms: Definition and Characteristics of an Algorithm, Apriori analysis, Time and space complexity, Average , Best and Worst case complexities, Big „O‟ Notations, Asymptotic notations, Top-Down and bottom-up programming techniques, Recursion, Divide and conquer strategy. ( e.g. Quick sort, Tower of Hanoi).

**UNIT II:** Stacks and Queue: Definition and Terminology, Concept of stack, Stack implementation, Operation on stack, Algorithms for push and pop, Implementing stack using pointers, Application of stacks, Evaluation of polish notation, multiple stack. Queue: Queue as ADT Implementation of queue, Operation on queue, Limitations, Circular queue, Double ended queue (dequeue), Priority queue, Application of queues, multiple queues.

**UNIT III:** Linked List : Introduction, Linked list, Representation of linear linked list, Operation on linked list, Types of linked list, Singly linked list, Circular linked list, Doubly linked list, Circular doubly linked list, Application: Addition of Two polynomials, Generalized linked list, Sparse matrix.

**UNIT IV:** Tree: Introduction to Non Linear Data Structures, Binary tree Concept and terminology, Representation of binary trees, Algorithm for tree traversals (recursive and non recursive). Conversion of general tree to binary tree (Implementation not expected). Binary search trees, Extended binary tree, Threaded binary tree. Height balanced and weight balanced binary trees, B-Tree, B+ Tree, AVL tree, Multiway tree, 2-3 Tree.

**UNIT V:** Graphs: Concepts and terminology, Representation of graphs using adjacency matrix, adjacency list, Depth First search and Breadth First Search Algorithms, Spanning trees, Minimal cost spanning tree and Shortest path algorithm ( Single Source-all pairs).

**UNIT VI:** Searching and sorting Techniques: Importance of searching. Sequential, Binary, Sorting : Bubble sort, selection sort, quick sort, Merge sort, heap sort, Shell sort, Analysis of these algorithms in worst and average cases. Hashing techniques and collision handing mechanism.   
**Text Books:** 1. Data Structures with C by SEYMOUR LIPSCHUTZ [TMH]. 2. Data Structure using C by ISRD Group [TMH]. 3. Data Structure through C by G. S. BALUJA [Dhanpat Rai & co.]. 4. Introduction to Data Structure in C by Ashok N. Kamthane [Pearson]. 5. Data structures using C and C++ by Tenenbaum [Pearson]. 6. Data structures Pseudocode with C by Gilberg/Foruzen, Cengage Learning