III Year I Semester	**L**	**T**	**P**	**C**
Code: 20CS57B2	**3**	**0**	**0**	**3**

DATA STRUCTURES AND ALGORITHMS (Minors)

Course Objectives:
1. To introduce data abstraction and data representation in memory
2. To describe, design and use of elementary data structures such as stack, queue, linked list, tree and graph
3. To discuss decomposition of complex programming problems into manageable sub problems
4. To introduce algorithms and their complexity

Course Outcomes:-
1. To understand the fundamental concepts of data structures.
2. To distinguish the different data structures.
3. To implement the data structures
4. To understand the algorithm concepts in data structures.
5. To implement the various algorithms.

UNIT-1:
Introduction to Data Structures & Algorithms: Data types, Data structure and Abstract date type, Dynamic memory allocation in C, Introduction to Algorithms, Asymptotic notations and common functions.

UNIT-2:
Stack AND Queue: Basic Concept of Stack, Stack as an ADT, Stack Operations, Stack Applications, Conversion from infix to postfix/prefix expression, Evaluation of postfix/ prefix Expressions. Basic Concept of Queue, Queue as an ADT, Primitive Operations in Queue, Linear Queue, Circular Queue, Priority Queue, Queue Applications.

UNIT-3:
Recursion: Principle of Recursion, Comparison between Recursion and Iteration, Tail Recursion, Factorial, Fibonacci Sequence, GCD, Tower of Hanoi(TOH), Applications and Efficiency of Recursion.
Lists: Basic Concept, List and ADT, Array Implementation of Lists, Linked List, Types of Linked List: Singly Linked List, Doubly Linked List, Circular Linked List., Basic operations in Linked List: Node Creation, Node Insertion and Deletion from, Beginning, End and Specified Position, Stack and Queue as Linked List.

UNIT-4:
Searching and Hashing: Introduction to Searching, Search Algorithms: Sequential Search, Binary Search, Efficiency of Search Algorithms, Hashing : Hash Function and Hash Tables, Collision Resolution Techniques.

UNIT-5:

Trees and Graphs: Concept and Definitions, Basic Operations in Binary Tree, Tree Height, Level and Depth, Binary Search Tree, Insertion, Deletion, Traversals, Search in BST, AVL tree and Balancing algorithm, Applications of Trees, Definition and Representation of Graphs, Graph Traversal, Minimum Spanning Trees, Kruskal and Prims Algorithm,Shortest Path Algorithms: Dijksrtra Algorithm.

Text Books:
1. Data Structures Using C. 2nd Edition. Reema Thareja, Oxford.
2. Data Structures and algorithm analysis in C, 2nded, Mark Allen Weiss.

Reference Books:
1. Fundamentals of Data Structures in C, 2nd Edition, Horowitz, Sahni, Universities Press.
2. Data Structures: A Pseudo Code Approach, 2/e, Richard F.Gilberg, Behrouz A. Forouzon, Cengage.
3. Data Structures with C, Seymour Lipschutz TMH