SEMESTER: II

Course Code:	Course Title: Data Structures Using C

Course Learning Objectives:
1.To impart the basic concepts of data structures and algorithms
2 To understand concepts about searching and sorting techniques
3 To Understand basic concepts about stacks, queues, lists, trees and graphs
4 To understanding about writing algorithms and systematic approach in solving problems with the help of fundamental data structures.

Course Outcomes: On successful completion of the course, the students shall be able to
1. Ability to analyze algorithms and algorithm correctness.
2.Ability to summarize searching and sorting techniques
3. Ability to describe stack, queue and linked list operation.
4. Ability to have knowledge of trees and graphs concepts.

Unit-I

Structure and union:
Structure definition, giving values to members, structure initialization, comparison of structure variables, arrays of structure, self-referential structures, union. Pointers: Understanding pointers, accessing the address of variables, Declaring and initializing pointers, accessing a variable through its Pointer. Dynamic memory allocation: Meaning of static and dynamic memory allocation. Memory allocation functions: malloc(), calloc(), free() and realloc(). Files: Introduction, definition, Basic file operations: Naming a file, opening a file, Reading data from file, writing data to a file and closing a file, Input/Output operations on files, Error Handling in files, Random Access to files.

Unit-II

Introduction to Data Structures, Stack and Queue

Definition, Applications, Classification of data structures: primitive and non-primitive, Operations on data structures Definition, Array Implementation of stack(using structure) and operations on stack, Applications of stacks, Infix, prefix and postfix notations, Conversion of an arithmetic expression from Infix to postfix. Queue and Recursion: Definition, Types of queue: Simple queue, circular queue, double ended queue, priority queue, Array Implementations of queue (using structure) and operations on all types of queues. Definition, Recursion in C, Writing Recursive programs – Binomial coefficient, Fibonacci, GCD, towers of Hanoi.

Unit-III

Linked list
Definition, components of linked list, Representation of linked list, Advantages and disadvantages of linked list, Types of linked list: singly linked list, doubly linked list, Circular list and circular doubly linked list, operations on all types of linked lists: Creation, insertion, deletion, search and display.

Unit-IV

Sorting and Trees
Sorting: insertion sort, bubble sort, radix sort, quick sort.
Tree: Definition, Binary tree, complete binary tree, Binary search tree, Tree terminology: root, Node, Degree of a node, ancestors of a node, Binary tree, Array representation of tree, Creation of Binary tree, Traversal of Binary tree: Preorder, In order and post order.

Text books:
1. Langsam, Augenstein and Tenenbaum, Data structures Using C and C++, Prentice Hall of India, 2nd Edition.
2. Kamthane :Introduction to Data structures in C Pearson Education.
3. Padma Reddy: Data structure Using C.

References:
1. Weiss Data structures and Algorithm Analysis in C II Edition , Pearson Education.
2. Lipschutz Schaum's outline series Data structures Tata MgGraw-Hill.

Course Code:	Course Title: Basic Skills with C Programming Lab

List of Assignments

1) Write a C Program to find the GCD using recursive function

2) Write a C Program to implement dynamic array, find the smallest and largest of the array.

3) Write a C Program to search an element using linear search technique.

4) Write a C Program to search an element using binary search technique.

5) Write a C Program to store the given list using selection sort technique.

6) Write a C Program to sort the given list using bubble sort technique.

7) Write a C Program to sort the given list using insertion sort technique.

8) Write a C Program to sort the given list using quick sort technique.

9) Write a C program to implement Stack.

10) Write a C program to implement tower of Hanoi problem

11) Write a C Write a program to implement simple queue.

12) Write a C program to implement linear linked list.

13) Write a C program to implement circular linked list

14) Write a C program to implement double liked list

15) Write a C program to demonstrate traversal of a tree.