DATA STRUCTURES

Contact Hours/ Week	: 4 + 1 (Lecture + Tutorial)	Credits :	4.5
Total Lecture Hours	: 52	CIE Marks:	50
Total Tutorial Hours	: 13	SEE Marks	50
Sub. Code	: 3CCI02		

UNIT–I

STRUCTURES AND UNIONS: Defining the structures, Declaring structure variables, Accessing structure members, Structure initialization, copying and comparing structure variables, operations on individual members, array of structures, unions, size of structures, bit fields, Dynamic Memory Allocation Functions.

File management in C: Defining and opening a file, closing a file, input/output operations on files, error handling during I/O operations, random access to files, command line arguments.

10+02 Hrs

UNIT-II

The Stack: Definition and Examples, representing Stacks in C, Example: Infix, Postfix, and Prefix.

Recursion: Recursive Definition and Processes, Recursion in C, Writing recursive programs: The Towers of Hanoi Problem, Efficiency of Recursion.

Queues and Lists: The Queue and Its Sequential Representation: C implementation of Queues, Insertion, Deletion and Display operations, Types of Queues (Linear, Circular, Priority and Double Ended Queues). **11+3 Hrs**

UNIT-III

Queues and Lists Continued

Linked lists: Inserting and removing nodes from a list, linked implementation of stacks, get node and free node operations, linked implementation of queues, examples of list operation, list implementation of priority queues, header nodes.

Lists in C: allocating and freeing dynamic variables, linked lists using dynamic variables, queues as lists in C, examples of list operations in C, non-integer and non-homogeneous lists, implementing header nodes. **12+3 Hrs**

UNIT-IV

Other List Structures: Circular lists, stack as a Circular list, queue as a Circular list, primitive operations on circular lists, the Josephus problem, header nodes, Doubly linked lists, Primitive operations on Doubly linked list. **09+2 Hrs**

UNIT-V

Trees: Operations on Binary Trees, Applications of Binary Trees, Binary Tree Representations: Node representation of Binary Trees, Internal and External Nodes, Implicit array representation of Binary Trees, Binary Tree Traversals in C, Threaded Binary Trees.

Trees and Their applications: C Representations of Trees, Tree Traversals, General Expressions as Trees, Evaluating an Expression Tree, Constructing a Tree. **10+3 Hrs**

TEXT BOOKS:

1	E. Balagurusamy	Programming in ANSI C , 4th Edition, Tata McGraw-Hill Publications
2	Yedidyah Langsam, Moshe J. Augenstein, Aaron M. Tenenbaum	Data structures using C and C++,PHI/Pearson, 2nd Edition .(Chapter 2, 3.1, 3.2, 3.3(only the Towers of Hanoi Problem), 3.5. 4.1(excluding Queue as an ADT), 4.2, 4.3(except array implementation of list, Limitations of array implementation, comparing dynamic and array implementations of list), 4.5(except addition of long positive integers using circular and doubly linked list), 5.1, 5.2(except choosing Binary Tree Representation, Traversal using a Father field, Heterogeneous Binary Trees), and 5.5)

REFERENCE BOOK:

Jean- Paul Tremblay Paul G. Sorenson	An Introduction To Data Structures With Applications, 2nd edition, McGraw-Hill International Editions

LEARNING OUTCOMES:

Upon successful completion of the course the student will be able to:

CO1: Apply advanced C programming techniques like pointers, dynamic memory allocation, structures to developing solutions for particular problems;

CO2:Design and implement abstract data types such as linked list, stack, queue and tree by using C as the programming language using static or dynamic implementations techniques.

CO3: Decide, Design and Develop a solution for a given problem by Selecting an appropriate data structure for a given open end problem.

CO4: Implement and submit comprehensive and continuous assignment modules on societal problems as a team event (PO: 11(L) and PO: 12(L))

CO5: Do a Survey on the complex implementation challenges related to the data structures in real world scenario.