DATA STRUCTURES (CS3C01) (3:0:0)

Sub code : CS3C01 **CIE : 50% Marks**
Hrs/week : 03 **SEE : 50% Marks**
SEE Hrs : 03 Hours **Max. Marks: 100**
Prerequisite : C Programming

Course Outcomes:

On Successful completion of the course, the students will be able to:

1. Explain basic concepts of pointers and data structures.
2. Implement the basic operations of linked lists.
3. Implement stack and queue data structures, use them in practical applications.
4. Demonstrate the operations and applications of binary trees.
5. Illustrate different sorting and searching methods.

UNIT 1:

Pointers and Structures: Pointers, Structures: Introduction, Nested Structures, Arrays of Structures, Structures and Functions, Self-Referential Structures,

Introduction to Data Structures: Basic terminology, classification of data structures, operations on data structures, abstract data type.

SLE: Algorithms, Different approaches to designing an algorithm **6 Hours**

UNIT 2: Linked Lists: Introduction, singly linked lists, circular linked lists, doubly linked lists, circular doubly linked lists.

SLE: Header linked list **8 Hours**

UNIT 3:

Stacks: Introduction, Array Representation of Stacks, Operations on a Stack, Linked Representation of Stacks, Operations on a Linked Stack, Applications of Stacks: Reversing a list, Parentheses checker, Conversion of an infix expression into a postfix expression, Evaluation of a postfix expression,**Recursion**.

Queues: Introduction, Array Representation of Queues, Linked Representation of Queues, Types of Queues: Circular Queue, Deque.

SLE: Priority Queues **9 Hours**

UNIT 4:

Trees: Introduction, Types of Trees, Traversing A Binary Tree, Applications of Trees, Binary Search Trees, Operations on Binary Search Trees, Threaded Binary Trees: One-way Threading.

SLE: AVL Trees **8 Hours**

UNIT 5:

Searching & Sorting: Sorting: Introduction to Sorting, Radix Sort, Heap Sort, Shell Sort, Tree Sort.

Searching: Binary Search, Interpolation Search, Hashing and Collision: Introduction, Hash Tables, Hash Functions, Collisions, Different Hash Functions.

SLE: Jump Search. **8 Hours**

TEXT BOOK:

1. Reema Thareja, **"Data Structures using C"**, 2nd Edition, 2018, Oxford University Press.

REFERENCE BOOKS:

1. Aaron M Tenenbaum, Yedidyah Langsam and Moshe J Augenstein, **"Data Structures using C"**, 2009, Pearson education, low price edition.
2. Richar F Gilberg and Behronz A Forouzan, **"Data Structures, A Pseudocode Approach with C"**, Thomson, 2005.
3. **Fundamentals of Data Structures in C,** Horowitz, Sahni, Anderson-Freed, 2nd Edition, Universities Press 2007

RECOMMENDED MOOCs :

1. Programming & Data structures: http://nptel.ac.in/courses/106106130/
2. Programming, Data structures and Algorithms: http://nptel.ac.in/courses/106106133/