DATA STRUCTURES (THEORY)

Pre-requisite: Object Oriented Programming

Credit Hours 03
Contact Hours 48

TEXT BOOKS

- Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", 4th Edition, 2014, Pearson. ISBN: 978-0-13-284737-7

REFERENCE BOOKS

- VARSHA H. PATIL, "Data Structures Using C++", 1st Edition, 2012, Oxford University Press. ISBN: 0-19-806623-6.
- Robert L. Kruse, Alexander J. Ryba, "Data Structures and Program Design in C++", 2000, Prentice Hall. ISBN 0-13-087697-6.
- D. S. MALIK, "Data Structures Using C++", 2nd Edition, 2010, Course Technology, ISBN: 978-0-324-78201-1.

COURSE OBJECTIVES

The objective of this course is to enable students to understand common data structures and their implement in C++. The course will cover well-known data structures such as dynamic arrays, linked lists, stacks, queues, tree, heap.

S. No.	CLO/ PLO Mapping	Domain	PLO
1.	**Learn** fundamental data structures and their implementation C++.	C1	01
2.	**Identify** and **apply** appropriate data structures and algorithms to a particular situation.	C2	02
3.	Student confidently can **design** and implement new structures after studying this subject.	C2	03

COURSE CONTENTS

Introduction to the course and course objectives

- Introduction, course objectives and its importance.

Linear data structures

- Stack, array based stack. prefix, infix and postfix expressions, infix to postfix conversion.
- Queue, array based queue , circular queue, applications of queue.
- Linked list, insertion deletion and search operations, linked stack, linked queue, applications of linked list.

Recursion

- Linear recursion, binary recursion, multiple recursion.

Non Linear Data Structures

- Binary Trees, pre-order, in-order, post-order traversal.
- Binary Search Trees, search insert and delete operations, non-recursive pre-order, in-order, post-order traversal using stack.
- AVL Trees, insertion, tree rotation and deletion operation.
- B-Trees, searching, traversing, insertion and deletion operation.

Graphs

- Adjacency matrices, adjacency lists, depth first traversal, breadth first traversal, minimal spanning tree.

Tables and Hashing

- Index function and index table, hash tables, hash function, collision resolving techniques.

Heaps

- implementation of heap using complete binary tree, Priority queue implementation using heap, heap sort.

Searching

- Linear search, binary search.

Sorting

- Merge sort, quick sort.