

DATA STRUCTURES

(Common to CSE, IT, ECE & EEE)

Course Code : 13CT1106

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Course Educational Objectives:

Student will be able to

- ❖ Analyze algorithms.
- ❖ Develop software applications which are efficient in terms of space time complexity.
- ❖ Choose suitable Data Structures for different real world applications.
- ❖ Apply best algorithm to sort set of elements.
- ❖ Employ a structured methodology while providing a software solution to an engineering problem.

Course Outcomes:

At the end of the course student will be able to

- ❖ Get knowledge on how to develop algorithms, operations on queues and stacks.
- ❖ Work on different searching methods and graphs.
- ❖ Get knowledge on trees and binary trees.
- ❖ Work on different sorting methods.
- ❖ Get knowledge on different types of linked operations.

UNIT-I

(12 Lectures)

ANALYSIS OF ALGORITHMS:

Efficiency of algorithms, apriori analysis, asymptotic notations, time complexity of an algorithm using O notation, polynomial Vs exponential algorithms, average, best and worst case complexities, analyzing recursive programs.

STACKS: Introduction, stack operations, applications.

QUEUES: Introduction, Operations on queues, circular queues, other types of queues, applications.

UNIT-II

(12 Lectures)

LINKED LISTS:

Introduction, Singly linked lists, circularly linked lists, doubly linked lists, multiply linked lists, applications.

LINKED STACKS AND LINKED QUEUES:

Introduction, operations on linked stacks and linked queues, dynamic memory management and linked stacks, implementation of linked representations, applications.

UNIT-III

(12 Lectures)

SEARCHING:

Introduction, linear search, transpose sequential search, interpolation search, binary search, Fibonacci search.

INTERNAL SORTING:

Introduction, bubble sort, insertion sort, selection sort, merge sort, quick sort.

UNIT-IV

(12 Lectures)

TREES AND BINARY TREES:

Introduction, Trees: definition and basic terminologies, representation of trees, binary trees: basic terminologies and types, representation of binary trees, binary tree traversals, threaded binary trees, applications.

BINARY SEARCH TREES AND AVL TREES:

Introduction, binary search trees: definition and operations, AVL Trees: definition and operations, applications.

UNIT-V

(12 Lectures)

GRAPHS:

Introduction, definitions and basic terminologies, representations of graphs, graph traversals and applications.

TEXT BOOKS:

1. G A V PAI, *Data Structures and Algorithms, Concepts, Techniques and Applications*, Volume 1, 1st Edition, Tata McGraw-Hill, 2008.
2. Richard F. Gilberg & Behrouz A. Forouzan, *Data Structures, A Pseudo code Approach with C*, 2nd Edition, Cengage Learning India Edition, 2007.

REFERENCES:

1. Langsam, M. J. Augenstein, A. M. Tanenbaum, *Data structures using C and C++*, 2nd Edition, PHI Education, 2008.
2. Sartaj Sahni, Ellis Horowitz, *Fundamentals of Data Structures in C*, 2nd Edition, Orient blackswan, 2010.

WEB REFERENCES:

<http://nptel.iitm.ac.in/video.php?subjectId=106105085>

