

Prasad V. Potluri Siddhartha Institute of Technology:: Vijayawada.

Department of Computer Science and Engineering

I/II M.Tech. (CSE) - (First Semester)

17CSCS1T1

DATA STRUCTURES and ALGORITHMS

Credits: 4

Lecture: 4 Periods/week

Internal Assessment: 40 Marks
Semester end examination: 60 Marks

Course Description

This course covers some of the general-purpose data structures and algorithms, and software development. It is aimed at helping to understand the reasons for choosing structures or algorithms. Topics covered include managing complexity & analysis, lists, stacks, queues, trees, heaps, hash tables maps, and graphs.

Course Outcomes:

At the end of this course students will be able to:

- CO1:** Analyse the concepts of algorithm evaluation & Implement linear data structures.
- CO2:** Implement various Hashing Techniques & Dictionaries.
- CO3:** Implement basic operations on binary trees.
- CO4:** Solve Problems on Graph traversal techniques and their applications.

Unit-1

Algorithms, Performance analysis - time complexity and space complexity, Asymptotic Notation - Big Oh, Omega and Theta notations, Complexity Analysis Examples.

Introduction to Data Structures, Singly Linked Lists, Doubly Linked Lists, Circular Lists- Algorithms. Linked Stacks and Linked Queues.

Unit-2

Dictionaries: Definition, Dictionary Abstract Data Type, Implementation of Dictionaries.

Hashing: Review of Hashing, Hash Function, Collision Resolution Techniques in Hashing, Separate Chaining, Open Addressing, Linear Probing, Quadratic Probing, Double Hashing, Rehashing, Extendible Hashing.

Unit-3

Introduction to Trees, Implementation of Trees, Binary Trees, Tree Traversals with an Application, Binary Search Trees (BSTs), AVL Trees, B-trees.

Unit-4

Graph Algorithms: Graphs and their Representations, Graph Traversal Techniques, Applications of Graphs: Minimum Spanning Trees (MST), Prim's and Kruskal's algorithms for MST, Dijkstra's Shortest Path Routing.

TEXT BOOKS:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, Introduction to Algorithms, Second Edition, PHI, 2009.
2. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, Third Edition, Pearson Education, 2006
3. GAV Pai, Data Structures and Algorithms: Concepts, Techniques and Applications, Tata McGraw-Hill Education Pvt. Ltd., 2015

REFERENCE BOOKS:

1. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, Fundamentals of Computer Algorithms, Second Edition, Universities Press, 2011.
2. Michael T. Goodrich and Roberto Tamassia, Algorithm Design: Foundations, Analysis and Internet Examples, Second Edition, Wiley-India, 2006.