

PRASAD V POTLURI SIDDHATHA INSTITUTE OF TECHNOLOGY
(AUTONOMOUS)
INFORMATION TECHNOLOGY
ADVANCED DATA STRUCTURES & ALGORITHMS

Course Code:	23IT3301	Year:	II	Semester:	I
Course Category:	Professional Core Course	Branch:	IT	Course Type:	Theory
Credits:	3	L-T-P:	3-0-0	Prerequisites:	Data Structures
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

COURSE OUTCOMES

Upon successful completion of the course, Student will be able to

CO1	Understand the fundamental concepts of algorithm analysis and design techniques.	L2
CO2	Apply various algorithm design techniques for solving problems	L3
CO3	Apply the concepts of Trees and Graphs for solving problems effectively.	L3
CO4	Analyze the given scenario and choose appropriate algorithm design for solving problems.	L4

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations
(3:High, 2: Medium, 1:Low)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3											3	3	3
CO2	3								3	3		3	3	3
CO3	3								3	3		3	3	3
CO4		3							3	3		3	3	3

Unit No.	SYLLABUS CONTENTS	Mapped CO
I	Introduction: Algorithm Analysis, Space and Time Complexity analysis, Asymptotic Notations. AVL Trees – Creation, Insertion, Deletion operations. B-Trees – Creation, Insertion, Deletion operations.	CO1, CO3
II	Heap Trees (Priority Queues) – Min and Max Heaps, Operations and Heap Sort . Graphs – Terminology, Representations, Basic Search and Traversals, topological sort.	CO1, CO3
III	Divide and Conquer: The General Method, Max-Min, Quick Sort, Merge Sort, and Strassen's matrix multiplication. Greedy Method: General Method, Job Sequencing with deadlines, Knapsack Problem, Minimum cost spanning trees, Single Source Shortest Paths.	CO1, CO2, CO3, CO4
IV	Dynamic Programming: General Method, All pairs shortest paths, Single Source Shortest Paths– General Weights (Bellman Ford Algorithm), 0/1 Knapsack, Travelling Salesperson problem, Optimal Binary Search Trees.	CO1, CO2, CO3, CO4
V	Backtracking: General Method, n-Queens Problem, Sum of Subsets problem, Graph Colouring. Branch and Bound: The General Method, Assignment problem, Travelling Salesperson problem. Introduction to Complexity classes: P and NP Problems, NP-Complete Problems.	CO1, CO2, CO3, CO4

Learning Resources

Text Books

1. Fundamentals of Data Structures in C++, Horowitz, Ellis; Sahni, Sartaj; Mehta, Dinesh, 2nd Edition Universities Press
2. Computer Algorithms in C++, Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, 2nd Edition University Press
3. Fundamentals of Computer Algorithms, Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, 2nd Edition, Universities Press,

References Text Book

1. Data Structures and program design in C, Robert Kruse, Pearson Education Asia
2. An introduction to Data Structures with applications, Trembley & Sorenson, McGraw Hill
3. The Art of Computer Programming, Vol.1: Fundamental Algorithms, Donald E Knuth, Addison-Wesley, 1997.
4. Data Structures using C & C++: Langsam, Augenstein & Tanenbaum, Pearson, 1995
5. Fundamentals of Data Structures in C++: Horowitz Sahni & Mehta, Galgottia Pub.
6. Data structures in Java:, Thomas Standish, Pearson Education Asia

e-Resources and other Digital Material

1. https://www.tutorialspoint.com/advanced_data_structures/index.asp
2. <http://peterindia.net/Algorithms.html>
3. Abdul Bari, [Introduction to Algorithms \(youtube.com\)](#)
4. Striver www.takeyouforward.org