

ADVANCED DATA STRUCTURES & ALGORITHM ANALYSIS

Course Code:	23CS3301	Year:	II	Semester:	I
Course Category:	Professional Core Course	Branch:	CSE	Course Type:	Theory
Credits:	3	L-T-P:	3-0-0	Prerequisites:	Data Structures through C / Object Oriented Programming
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

SYLLABUS CONTENTS

Unit No.	SYLLABUS CONTENTS	Mapped CO
I	Introduction: Algorithm Analysis, Space and Time Complexity analysis, Asymptotic Notations. AVL Trees – Creation, Insertion, Deletion operations and Applications B-Trees – Creation, Insertion, Deletion operations and Applications	CO1, CO3
II	Heap Trees (Priority Queues) – Min and Max Heaps, Operations and Applications Graphs – Terminology, Representations, Basic Search and Traversals, Sets and Disjoint set Union, applications	CO1, CO3
III	Divide and Conquer: The General Method, Max-Min, Quick Sort, Merge Sort, 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), Optimal Binary Search Trees, 0/1 Knapsack, String Editing, Travelling Salesperson problem.	CO1, CO2, CO3, CO4
V	Backtracking: General Method, n-Queens Problem, Sum of Subsets problem, Graph Coloring, Branch and Bound: The General Method, 0/1 Knapsack Problem, Travelling Salesperson problem.	CO1, CO2, CO3, CO4

	Introduction to Complexity classes: P and NP Problems, NP-Complete Problems.	
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Learning Resources

Text Books

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| <ol style="list-style-type: none"> 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, |
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References Text Book

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| <ol style="list-style-type: none"> 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 |
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e-Resources and other Digital Material

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| <ol style="list-style-type: none"> 1. https://www.tutorialspoint.com/advanced_data_structures/index.asp 2. http://peterindia.net/Algorithms.html 3. Abdul Bari, Introduction to Algorithms (youtube.com) |
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