



SWARNANDHRA

COLLEGE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS)

Accredited by National Board of Accreditation, AICTE, New Delhi, Accredited by NAAC with "A" Grade – 3.32 CGPA, Recognized under 2(f) & 12(B) of UGC Act 1956, Approved by AICTE, New Delhi, Permanent Affiliation to JNTUK, Kakinada Seetharampuram, W.G.DT., Narsapur-534280, (Andhra Pradesh)

DEPARTMENT OF INFORMATION TECHNOLOGY

TEACHING PLAN

Course Code	Course Title	Semester	Branch	Contact Periods /Week	Academic Year	Date of commencement of Semester
23CS3T02	Advanced Data Structures and Algorithm Analysis	III	CSE-DS	6	2025-26	14-07-2025

COURSE OUTCOMES

1	Illustrate the performance of an algorithm using asymptotic notation. (K2)
2	Analyze time efficiency of algorithms using Divide and Conquer Strategy. (K4)
3	Apply Greedy and Dynamic programming techniques to solve efficient solutions for optimization problem. (K3)
4	Identify the problems suitable for back tracking, branch and bound solutions. (K3)
5	Analyze the complexity classes NP-Hard and NP-Complete and solve related decision problems. (K4)

problems. (K4)						
UNIT	Out Comes / Bloom's Level	Topics No.	Topics/ Activity	Text Book/ Reference	Contact Hour	Delivery Method
I	CO – 1	1.1	Introduction to Algorithm and properties	T1,T2	1	Chalk & Board
		1.2	Introduction to Algorithm Analysis	T1,T2	1	
		1.3	Space Complexity analysis	T1,T2	1	
		1.4	Time Complexity analysis	T1,T2	1	
		1.5	Asymptotic Notations	T1,T2	1	
		1.6	AVL Trees – Properties and examples	T1,T2	1	Power point presentation
		1.7	AVL Trees – Rotations with examples	T1,T2	1	Assignment
		1.8	Creation and Insertion operations	T1,T2	1	Test
		1.9	Deletion operation and Applications	T1,T2	1	
		1.10	B-Trees – Properties, Examples for Creation	T1,T2	1	
		1.11	Insertion operation	T1,T2	1	
		1.12	Deletion operation and Applications	T1,T2	1	
Total					12	
II	CO – 2	2.1	Heap Trees (Priority Queues)	T1,R1	1	



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		2.2	Min and Max Heaps, Operations	T1,R1	1	Chalk & Board
		2.3	Min and Max Heaps, Operations	T2,R2	1	
		2.4	Operations and Applications	T2,R2	1	
		2.5	Applications	T2,R2	1	
		2.6	Graphs – Terminology and Representations	T2,R2	1	
		2.7	Basic Search and Traversals	T2,R2	1	Power point presentation
		2.8	Basic Search and Traversals	T2,R2	1	Assignment
		2.9	BFS, DFS Explanation	T2,R2	1	
		2.10	Connected Components	T2,R2	1	
		2.11	Biconnected Components	T2,R2	1	Test
		Total				
III	CO – 3	3.1	Divide and Conquer: The General Method	T1,T2	1	Chalk & Board
		3.2	Quick Sort methodology with example	T1,T2	1	
		3.3	Quick Sort algorithm analysis	T1,T2	1	
		3.4	Merge Sort methodology with example	T1,T2	1	
		3.5	Merge Sort algorithm analysis	T1,T2	1	
		3.6	Strassen's matrix multiplication	T1,T2	1	Power point presentation
		3.7	Strassen's matrix multiplication	T1,T2	1	
		3.8	Strassen's matrix multiplication	T1,T2	1	Assignment
		3.9	Greedy Method: General Method	T1,T2	1	
		3.10	Job Sequencing with deadlines	T1,T2	1	
		3.11	Knapsack Problem- General Methodology	T1,T2	1	Test
		3.12	Examples for Knapsack Problem	T1,T2	1	
		3.13	Minimum cost spanning trees – Prim's algorithm	T1,T2	1	
		3.14	Minimum cost spanning trees – Kruskal's algorithm	T1,T2	1	
		3.15	Single Source Shortest Paths	T1,T2	1	
Total					15	
IV	CO – 4	4.1	Dynamic Programming: General Method	T1,T2	1	Chalk & Board
		4.2	All pairs shortest paths	T1,T2	1	
		4.3	Single Source Shortest Paths– General Weights (Bellman Ford	T1,T2	1	Power point



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		Algorithm)			presentation Assignment Test		
4.4	Optimal Binary Search Trees	T1,T2	1				
4.5	Optimal Binary Search Trees	T1,T2	1				
4.6	0/1 Knapsack problem	T1,T2	1				
4.7	String Editing	T1,T2	1				
4.8	Travelling Salesperson problem		1				
4.9	Backtracking: General Method	T1,T2	1				
4.10	8-Queens Problem constraints	T1,T2	1				
4.11	State space tree for 8-Queens Problem	T1,T2	1				
4.12	Sum of Subsets problem	T1,T2	1				
4.13	Graph Coloring	T1,T2	1				
4.14	0/1 Knapsack Problem	T1,T2	1				
		T1,T2	1				
V	CO – 5	5.1	Branch and Bound:The General Method	Total	14	Chalk & Board Power point presentation Assignment Test	
		5.2	0/1 Knapsack Problem	T1,R1	1		
		5.3	0/1 Knapsack Problem	T1,R1	1		
		5.4	Travelling Salesperson problem LC Branch and Bound solution	T1,R1	1		
		5.5	Travelling Salesperson problem LC Branch and Bound solution	T1,R1	1		
		5.6	Travelling Salesperson problem LC Branch and Bound solution	T1,R1	1		
		5.7	Travelling Salesperson problem LC Branch and Bound solution	T1,R1	1		
		5.8	NP Hard and NP Complete Problems	T1,R1	1		
		5.9	Basic Concepts of NP Hard and NP Complete Problems	T1,R1	1		
		5.10	Cook's theorem	T1,R1	1		
		5.11	NP Hard Graph Problems	T1,R1	1		
		5.12	Clique Decision Problem (CDP)	T1,R1	1		
		5.13	Chromatic Number Decision Problem (CNDP)	T1,R1	1		
		5.14	Traveling Salesperson Decision Problem (TSP)	T1,R1	1		
				Total	14		
		CUMULATIVE PROPOSED PERIODS					66



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Text Books:

S. No	AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION
1	Horowitz, Ellis, Sahni, Sartaj, Mehta, Dinesh, Fundamentals of Data Structures in C++, 2 nd Edition Universities Press, 2006.
2	Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, Computer Algorithms in C++, 2 nd Edition University Press, 2008.

Reference Books:

S.No	AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION
1	Robert Kruse, Data Structures and program design in C, Pearson Education Asia, 2006.
2	Trembley & Sorenson, An introduction to Data Structures with applications, McGraw Hill, 2017
3	Donald E. Knuth, Addison, The Art of Computer Programming, Vol.1: Fundamental Algorithms, Wesley, 2005
4	Lingnam, Augenstein & Tanenbaum, Data Structures using C & C++, Pearson, 2019.
5	N. Worth, Algorithms + Data Structures + Programs, PHI
6	Horowitz Sahni & Mehta, Fundamentals of Data Structures in C++, Galgotia Pub.
7	Thomas Standish, Data structures in Java, Pearson Education Asia, 1997.

Web Details

http://www.tutorialspoint.com/data_structures/index.asp

<http://geogebra.org/m/Algorithms.html>

Abdul Bari, Introduction to Algorithms (youtube.com)

	Name	Signature with Date
Faculty	Dr. V. Suman	
Module Coordinator	Dr. Ch. Rama Krishna Rao	
Programme Coordinator	Dr. B. V. V. Prasad	


Principal