



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
23IT3T02	Advanced Data Structures and Algorithm Analysis	III	IT	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)

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	T2	1	Chalk & Board Power point presentation Assignment Test
		1.2	Introduction to Algorithm Analysis	T2	1	
		1.3	Space Complexity analysis	T2	1	
		1.4	Time Complexity analysis	T2	1	
		1.5	Asymptotic Notations	T2	1	
		1.6	AVL Trees – Properties and examples	T2	1	
		1.7	AVL Trees – Rotations with examples	T2,T1	1	
		1.8	Creation and Insertion operations	T2,T1	1	
		1.9	Deletion operation and Applications	T2,T1	1	
		1.10	B-Trees – Properties, Examples for Creation	T2,T1	1	
		1.11	Insertion operation	T2,T1	1	
		1.12	Deletion operation and Applications	T2,T1	1	
	Content beyond syllabus	1.13	Introduction to Red Black trees	T2	1	
Total					13	



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II	CO – 2	2.1	Heap Trees (Priority Queues)	T1	1	Chalk & Board
		2.2	Min and Max Heaps, Operations	T1	1	
		2.3	Operations and Applications	T1	1	
		2.4	Graphs – Terminology and Representations	T1	1	
		2.5	Basic Search and Traversals	T1	1	
		2.6	Connected Components and Biconnected Components	T1	1	Power point presentation
		2.7	Applications of Graphs	T1	1	
		2.8	Divide and Conquer: The General Method	T1	1	Assignment
		2.9	Quick Sort methodology with example	T1	1	
		2.10	Quick Sort algorithm analysis	T1	1	Test
		2.11	Merge Sort methodology with example	T1,R1	1	
		2.12	Merge Sort algorithm analysis	T1,R1	1	
		2.13	Strassen's matrix multiplication	T1,R1	1	
		2.14	Convex Hull	T1,R1	1	
	Content beyond syllabus	2.15	Binary Search algorithm analysis	R1	1	
Total					15	
III	CO – 3	3.1	Greedy Method: General Method	T1,T2	1	Chalk & Board
		3.2	Job Sequencing with deadlines	T1,T2	1	
		3.3	Knapsack Problem- General Methodology	T1,T2	1	
		3.4	Examples for Knapsack Problem	T1,T2	1	
		3.5	Minimum cost spanning trees – Prim's algorithm	T1,T2	1	
		3.6	Minimum cost spanning trees – Kruskal's algorithm	T1,T2	1	Power point presentation
		3.7	Single Source Shortest Paths	T1,T2	1	
		3.8	Dynamic Programming: General Method	T1,T2	1	Assignment
		3.9	All pairs shortest paths	T1,T2	1	
		3.10	Single Source Shortest Paths– General Weights (Bellman Ford Algorithm)	T1,T2	1	Test
		3.11	Optimal Binary Search Trees	T1,T2	1	
		3.12	Optimal Binary Search Trees	T1,T2	1	



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		3.13	0/1 Knapsack problem	T1,T2	1	
		3.14	String Editing	T1,T2	1	
		3.15	Travelling Salesperson problem	T1,T2	1	
		3.16	Travelling Salesperson problem	T1,T2	1	
Total					16	
IV	CO – 4	4.1	Backtracking: General Method	T1	1	Chalk & Board
		4.2	8-Queens Problem constraints	T1	1	
		4.3	State space tree for 8-Queens Problem	T1	1	
		4.4	Sum of Subsets problem	T1	1	
		4.5	Graph Coloring	T1	1	Power point presentation
		4.6	0/1 Knapsack Problem	T1	1	
		4.7	Branch and Bound: The General Method	T1	1	Assignment
		4.8	0/1 Knapsack Problem - LCBB	T1	1	
		4.9	0/1 Knapsack Problem - LCBB	T1	1	Test
		4.10	0/1 Knapsack Problem - FIFOBB	T1	1	
		4.11	Travelling Salesperson problem	T1	1	
				4.12	Travelling Salesperson problem	T1
Content beyond syllabus		4.13	Hamiltonian Cycles	T1	1	
Total					13	
V	CO – 5	5.1	NP Hard and NP Complete Problems	T1,R1	1	Chalk & Board
		5.2	Basic Concepts of NP Hard and NP Complete Problems	T1,R1	1	
		5.3	Cook’s theorem	T1,R1	1	
		5.4	NP Hard Graph Problems	T1,R1	1	
		5.5	Clique Decision Problem (CDP)	T1,R1	1	Power point presentation
		5.6	Chromatic Number Decision Problem (CNDP)	T1,R1	1	
		5.7	Traveling Salesperson Decision Problem (TSP)	T1,R1	1	Assignment
		5.8	NP Hard Scheduling Problems	T1,R1	1	
		5.9	Scheduling Identical Processors	T1,R1	1	Test
		5.10	Job Shop Scheduling	T1,R1	1	
		Total				
CUMULATIVE PROPOSED PERIODS					67	



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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, 2016.
2	Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, Computer Algorithms in C++, 2 nd Edition University Press, 2018.

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. 2016.
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, 2002.
4	Langsam, Augenstein & Tanenbaum, Data Structures using C & C++: Pearson, 2005.
5	N.Wirth, Algorithms + Data Structures & Programs:, PHI, 2006.
6	Horowitz Sahni & Mehta, Fundamentals of Data Structures in C++: Galgottia Pub, 2002.
7	Thomas Standish, Data structures in Java, Pearson Education Asia, 2007.

Web Details:

1	https://www.tutorialspoint.com/advanced_data_structures/index.asp
2	http://peterindia.net/Algorithms.html
3	Abdul Bari, Introduction to Algorithms (youtube.com)

	Name	Signature with Date
i. Faculty	Mr. Ch Rama Krishna Raju	 11/12/21
ii. Module Coordinator	Mr. Ch Rama Krishna Raju	 11/12/21
iii. Programme Coordinator	Dr. RVVSV Prasad	 11/12/21


Principal