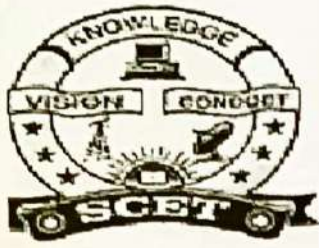# SWARNANDHRA
COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

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	2024-25	30-07-2024

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 and properties	T1,T2	1	Chalk & Board Power point presentation Assignment Test
		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	
		1.7	AVL Trees – Rotations with examples	T1,T2	1	
		1.8	Creation and Insertion operations	T1,T2	1	
		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	Chalk & Board
		2.2	Min and Max Heaps, Operations	T1,R1	1	
		2.3	Operations and Applications	T2,R2	1	
		2.4	Graphs – Terminology and Representations	T2,R2	1	

1

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		2.5	Basic Search and Traversals	T2,R2	1	
		2.6	Connected Components and Biconnected Components	T2,R2	1	Power point presentation
		2.7	Applications of Graphs	T2,R2	1	
		2.8	Divide and Conquer: The General Method	T1,T2	1	Assignment
		2.9	Quick Sort methodology with example	T1,T2	1	Test
		2.10	Quick Sort algorithm analysis	T1,T2	1	
		2.11	Merge Sort methodology with example	T1,T2	1	
		2.12	Merge Sort algorithm analysis	T1,T2	1	
		2.13	Strassen's matrix multiplication	T1,T2	1	
		2.14	Convex Hull	T1,T2	1	
			Total		**14**	
III	CO – 3	3.1	Greedy Method: General Method	T1,T2	1	
		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	Chalk & Board
		3.6	Minimum cost spanning trees – Kruskal's algorithm	T1,T2	1	
		3.7	Single Source Shortest Paths	T1,T2	1	Power point presentation
		3.8	Dynamic Programming: General Method	T1,T2	1	
		3.9	All pairs shortest paths	T1,T2	1	Assignment
		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	
		3.13	0/1 Knapsack problem	T1,T2	1	
		3.14	String Editing	T1,T2	1	
		3.15	Travelling Salesperson problem	T1,T2	1	
Content beyond syllabus		3.16	Reliability design problem using Dynamic Programming	T1,T2	1	
			Total		**16**	
IV	CO – 4	4.1	Backtracking: General Method	T1,T2	1	Chalk & Board
		4.2	8-Queens Problem constraints	T1,T2	1	
		4.3	State space tree for 8-Queens Problem	T1,T2	1	Power point presentation
		4.4	Sum of Subsets problem	T1,T2	1	

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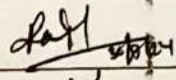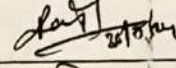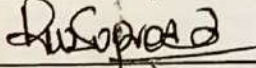Seetharampuram, W.G.DT., Narsapur-534280, (Andhra Pradesh)

		4.5	Graph Coloring	T1,T2	1	Assignment
		4.6	0/1 Knapsack Problem	T1,T2	1	
		4.7	Branch and Bound: The General Method	T1,T2	1	Test
		4.8	0/1 Knapsack Problem	T1,T2	1	
		4.9	0/1 Knapsack Problem	T1,T2	1	
		4.10	Travelling Salesperson problem LC Branch and Bound solution	T1,T2	1	
		4.11	Travelling Salesperson problem LC Branch and Bound solution	T1,T2	1	
		4.12	Travelling Salesperson problem FIFO Branch and Bound solution	T1,T2	1	
		4.13	Travelling Salesperson problem FIFO Branch and Bound solution	T1,T2	1	
Content beyond syllabus		4.14	Hamiltonian cycles	T1	1	
				Total	14	
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	Scheduling Identical Processors	T1,R1	1	
		5.11	Job Shop Scheduling	T1,R1	1	
				Total	11	
			CUMULATIVE PROPOSED PERIODS		67	

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++, 2nd Edition Universities Press, 2006.
2	Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, Computer Algorithms in C++, 2nd Edition University Press, 2008.

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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	Langsam, Augenstein &Tanenbaum, Data Structures using C & C++: Pearson, 2019.
5	N.Wirth, Algorithms + Data Structures & Programs:, PHI
6	Horowitz Sahni & Mehta, Fundamentals of Data Structures in C++: Galgottia Pub.
7	Thomas Standish, Data structures in Java, Pearson Education Asia, 1997.

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	
ii.	Module Coordinator	Mr. Ch Rama Krishna Raju	
iii.	Programme Coordinator	Dr. RVVSV Prasad	

Principal

4