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	CS	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	

		2.2	Min and Max Heaps, Operations	T1,R1	1	Chalk & Board Power point presentation Assignment Test
		2.3	Operations and Applications	T2,R2	1	
		2.4	Graphs – Terminology and Representations	T2,R2	1	
		2.5	Basic Search and Traversals	T2,R2	1	
		2.6	Connected Components and Biconnected Components	T2,R2	1	
		2.7	Applications of Graphs	T2,R2	1	
		2.8	Divide and Conquer: The General Method	T1,T2	1	
		2.9	Quick Sort methodology with example	T1,T2	1	
		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	15	
III	CO – 3	3.1	Greedy Method: General Method	T1,T2	1	Chalk & Board Power point presentation Assignment Test
		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	
		3.7	Single Source Shortest Paths	T1,T2	1	
		3.8	Dynamic Programming: General Method	T1,T2	1	
		3.9	All pairs shortest paths	T1,T2	1	
		3.10	Single Source Shortest Paths– General Weights (Bellman Ford Algorithm)	T1,T2	1	
		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 Power point presentation Assignment Test
		4.2	8-Queens Problem constraints	T1,T2	1	
		4.3	State space tree for 8-Queens Problem	T1,T2	1	
		4.4	Sum of Subsets problem	T1,T2	1	
		4.5	Graph Coloring	T1,T2	1	
		4.6	0/1 Knapsack Problem	T1,T2	1	
		4.7	Branch and Bound: The General Method	T1,T2	1	
		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 Power point presentation Assignment Test
		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	
		5.6	Chromatic Number Decision Problem (CNDP)	T1,R1	1	
		5.7	Traveling Salesperson Decision Problem (TSP)	T1,R1	1	
		5.8	NP Hard Scheduling Problems	T1,R1	1	
		5.9	Scheduling Identical Processors	T1,R1	1	
		5.10	Scheduling Identical Processors	T1,R1	1	
		5.11	Job Shop Scheduling	T1,R1	1	
				Total	11	
				CUMULATIVE PROPOSED PERIODS	68	

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.

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++: Galgotia 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	Mrs. V.SIVANI	
ii.	Module Coordinator	Mr. Ch Rama Krishna Raju	
iii.	Programme Coordinator	Dr. RVVSV Prasad	

Principal