



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 ARTIFICIAL INTELLIGENCE & DATA SCIENCE

TEACHING PLAN

Course Code	Course Title	Semester/ Regulation	Branch	Contact Periods /Week	Academic Year	Date of commencement of Semester	
23CS3T02	Advanced Data Structures and Algorithms	III / R-23	AI&DS	5	2024-25	30-07-2024	
Pre-requisites:			Data Structures				
COURSE OUTCOMES						Knowledge Levels	
CO1	Discover the performance of an algorithm using asymptotic notation.					K2	
CO2	Understand basic graph concepts and analyze their connected components.					K3	
CO3	Use divide and conquer strategies, greedy methods to solve optimization problems.					K3	
CO4	Understand Dynamic Programming, Backtracking to solve complex problems like shortest paths and Travelling Salesperson problems.					K2	
CO5	Learn Branch and Bound techniques and understand NP Hard, NP Complete problems.					K2	
Unit	Out Comes / Bloom's Level	Topic s No.	Topics/Activity		Text Book / Reference	Contact Hour	Delivery Method
UNIT- I							
I	CO1: Discover the performance of an algorithm using asymptotic notation. (K2)	1.1	Introduction to Algorithm Analysis		T1,R1	1	Chalk & Talk, PPT
		1.2	Space and Time Complexity analysis		T1,R1	1	
		1.3	Asymptotic Notations		T1,R1	2	
		1.4	Introduction to AVL Tree		T1,R1	1	
		1.4.1	AVL Tree Creation, Insertion operations		T1,R1	3	
		1.4.2	Deletion operation in AVL Tree		T1,R1	2	
		1.4.3	AVL Tree Applications		T1,R1	1	
		1.5	Introduction to B-Tree		T1,R1	1	
		1.5.1	B-tree Creation, Insertion operations		T1,R1	2	
		1.5.2	Deletion operation in B Tree		T1,R1	2	
		1.5.3	B Tree Applications		T1,R1	1	
				Revision of Unit - I			
Total						18	



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UNIT- II: Heap Trees, Graphs						
II	CO2: Understand basic graph concepts and analyze their connected components.(K3)	2.1	Introduction to Heap Trees (Priority Queues)	T1,R2,R3	1	Chalk & Talk, PPT
		2.1.1	Min Heap & Max Heap	T1,R2,R3	2	
		2.1.2	Heap Tree operations	T1,R2,R3	3	
		2.1.3	Heap Tree Applications	T1,R2,R3	2	
		2.2	Introduction to Graphs	T1,R2,R3	1	
		2.2.1	Terminology	T1,R2,R3	1	
		2.2.2	Graph Representations	T1,R2,R3	1	
		2.2.3	Basic Search and Traversals	T1,R2,R3	3	
		2.2.4	Connected Components	T1,R2,R3	1	
		2.2.5	Biconnected Components	T1,R2,R3	1	
		2.2.6	Applications of Graphs	T1,R2,R3	1	
		Revision of Unit - II				
Total				18		
UNIT- III: Divide and Conquer, Greedy Method						
III	CO3: Use divide and conquer strategies, greedy methods to solve optimization problems.(K3)	3.1	Introduction to Divide and Conquer	T2	1	Chalk & Talk, PPT
		3.1.1	The General Method	T2,R3,R4,R5	1	
		3.1.2	Quick Sort	T2,R3,R4,R5	1	
		3.1.3	Merge Sort	T2,R3,R4,R5	1	
		3.1.4	Strassen's matrix multiplication	T2,R3,R4,R5	2	
		3.2	Introduction to Greedy method	T2	1	
		3.2.1	General Method	T2,R3,R4,R5	1	
		3.2.2	Job Sequencing with deadlines	T2,R3,R4,R5	1	
		3.2.3	Knapsack Problem	T2,R3,R4,R5	1	
		3.2.4	Minimum cost spanning trees	T2,R3,R4,R5	2	
		3.2.5	Single Source Shortest Paths	T2,R3,R4,R5	1	
		Revision of Unit - III				
Total				14		
UNIT- IV: Dynamic Programming, Backtracking						
IV	compt ex probl ems like	4.1	Introduction to Dynamic Programming	T2	1	Chalk & Talk,
		4.1.1	General Method	T2,R6	1	



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		4.1.2	All pairs shortest paths	T2,R6	1	Chalk ,talk
		4.1.3	Single Source Shortest Paths– General Weights (Bellman Ford Algorithm)	T2,R6	2	Chalk ,talk
		4.1.4	Optimal Binary Search Trees	T2,R6	1	Chalk ,talk
		4.1.5	0/1 Knapsack	T2,R6	2	Chalk ,talk
		4.1.6	String Editing	T2,R6	1	Chalk ,talk
		4.1.7	Travelling Salesperson problem	T2,R6	2	Chalk ,talk,ppt
		4.2.1	General Method	T2,R6	1	Chalk ,talk
		4.2.2	8-Queens Problem	T2,R6	1	Chalk ,talk
		4.2.3	Sum of Subsets problem	T2,R6	1	Chalk ,talk
		4.2.4	Graph Coloring	T2,R6	1	Chalk ,talk
		4.2.5	0/1 Knapsack Problem	T2,R6	1	Chalk ,talk
		Revision of Unit - IV			1	Chalk ,talk, ppt
Total					16	
UNIT- V: Branch and Bound, NP Hard and NP Complete Problems						
V	CO5: Learn Brach and Bound techniques and understand NP Hard, NP Complete problems.(K2)	5.1.1	The General Method	T2, R7	1	Chalk ,talk
		5.1.2	0/1 Knapsack Problem	T2, R7	1	Chalk ,talk
		5.1.3	Travelling Salesperson problem.	T2, R7	2	Chalk ,talk,ppt
		5.2.1	Basic Concepts	T2, R7	1	Chalk ,talk
		5.2.2	Cook's theorem	T2, R7	1	Chalk ,talk
		5.2.3	NP Hard Graph Problems: Clique Decision Problem (CDP)	T2, R7	1	Chalk ,talk
		5.2.4	Chromatic Number Decision Problem (CNDP)	T2, R7	1	Chalk ,talk
		5.2.5	Traveling Salesperson Decision Problem (TSP)	T2, R7	1	Chalk ,talk
		Revision of Unit - V			1	Chalk ,talk, ppt
Total					10	
CUMULATIVE PROPOSED PERIODS					67	




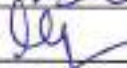
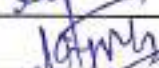

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Text Books:	
S.No.	AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION
1	Horowitz, Ellis; Sahni, Sartaj; Mehta, Dinesh, Fundamentals of Data Structures in C++, 2nd Edition Universities Press, 2006.
2	Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, Computer Algorithms/C++ 2nd Edition University Press, 2019.
Reference Books:	
S.No.	AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION
1	Robert Kruse, Data Structures and program design in C, 2 nd Edition, Pearson Education Asia 2006.
2	Trembley & Sorenson, An introduction to Data Structures with applications, McGrawHill, 2017.
3	Donald E Knuth, The Art of Computer Programming, Vol.1: Fundamental Algorithms, Addison-Wesley, 1997.
4	Langsam, Augenstein & Tanenbaum, Data Structures using C & C++, Pearson, 1995.
5	N.Wirth, Algorithms + Data Structures & Programs, 1 st edition, PHI, 2009.
6	Horowitz Sahni & Mehta, Fundamentals of Data Structures in C++: Galgottia Pub, 2008.
7	Thomas Standish, Data structures in Java:, 4 th edition, Pearson Education Asia, 2021.
Web References	
1	https://www.tutorialspoint.com/advanced_data_structures/index.asp
2	http://peterindia.net/Algorithms.html
3	Introduction to Algorithms (youtube.com)
4	https://www.swarnandhra.ac.in/dsv
5	bit.ly/BRK_DSV

	Name	Signature with Date
i. Faculty 1	Mr. V.Subrahmanyam	
ii. Course Coordinator	Dr. G.Sudhakar	
iii. Module Coordinator	Mr. K.Jai Prakash	
iv. Programme Coordinator	Dr. B.Ramakrishna	


Principal