TEACHING PLAN

Course Code	Course Title	Semester	Branch/ Sec	Contact Periods /Week	Academic Year	Date of commencement of Semester
PE	ADVANCED DATA STRUCTURES & ALGORITHMS	III	CSE-A,B,C,D,E	5	2024-25	30-7-2024

COURSE OUTCOMES

1	Discover the performance of an algorithm using asymptotic notation. (K2)
2	Apply advanced data structures such as priority queues, Heaps. (K3)
3	Understand greedy and, divide and conquer programming techniques to solve efficient solutions for optimization problems. (K3)
4	Illustrate and derive dynamic-programming paradigm and apply when an algorithmic design Situation calls for it.(K3)
5	Understand the complexity classes NP-Hard and NP-Complete and solve related decision problems. (K2)

UNIT	CO	Topics No.	Topics/Activity	Text Book / Reference	Contact Hour	Delivery method
I	Discover the performance of an algorithm using asymptotic notation. (K2)	1.1	Introduction to Algorithm Analysis	T1	1	Chalk and Talk
		1.2	Space and Time Complexity analysis	T1	2	PPT
		1.3	Asymptotic Notations	T1	1	Chalk and Talk
		1.4	Recursive functions	T1	2	PPT
		1.5	AVL Trees – Creation, Insertion operations	T1	1	PPT
		1.6	AVL Trees – Deletion operation and Applications	T1	2	PPT
		1.7	B Trees – Creation, Insertion operations	T1	1	Chalk and Talk
		1.8	B Trees – Deletion operation and Applications	T1	2	PPT
		1.9	B+ Trees – Creation, Insertion operations	T1	1	Chalk and Talk
		1.10	B+ Trees – Deletion operation and Applications	T1	2	PPT

				Total	15	
II	Apply advanced data structures such as priority queues, Heaps. (K3)	2.1	Heap Trees (Priority Queues) – Min Heaps	T1	2	Chalk and Talk
		2.2	Heap Trees (Priority Queues) – Max Heaps	T1	2	PPT
		2.3	Heap Trees Operations	T1	1	PPT
		2.4	Heap Trees Applications	T1	1	PPT
		2.5	Graphs – Terminology, Representations	T1	1	Chalk and Talk
		2.6	Basic Search and Traversals	T1	2	PPT
		2.7	Connected Components	T1	1	PPT
		2.8	Biconnected Components	T1	1	Chalk and Talk
		2.9	Applications	T1	1	Chalk and Talk
				Total	12	
III	Understand greedy and, divide and conquer programming techniques to solve efficient solutions for optimization problems. (K3)	3.1	Divide and Conquer: The General Method	T2	2	Chalk and Talk
		3.2	Quick Sort	T2	1	PPT
		3.3	Merge Sort	T2	1	**Colloborative Learning**
		3.4	Heap Sort	T2	1	Chalk and Talk
		3.5	Strassen's matrix multiplication.	T2	1	PPT
		3.6	Greedy Method: General Method	T2	2	PPT
		3.7	Job Sequencing with deadlines	T2	1	PPT
		3.8	Knapsack Problem	T2	1	Chalk and Talk
		3.9	Minimum cost spanning trees	T2	1	PPT
		3.10	Single Source Shortest Paths	T2	1	PPT
				Total	12	
IV	Illustrate and derive dynamic-programming paradigm and apply when an algorithmic design Situation calls for it.(K3)	4.1	Dynamic Programming: General Method	T2	1	PPT
		4.2	All pairs shortest paths	T2	1	**Quiz**
		4.3	Single Source Shortest Paths– General Weights (Bellman Ford Algorithm)	T2	2	Chalk and Talk
		4.4	Optimal Binary Search Trees	T2	1	PPT
		4.5	0/1 Knapsack	T2	1	PPT
		4.6	String Editing	T2	1	PPT
		4.7	Backtracking: General Method	T2	1	Chalk and Talk

		4.8	8-Queens Problem	T2	2	Chalk and Talk
		4.9	Sum of Subsets problem	T2	1	PPT
		4.10	Graph Coloring	T2	2	PPT
		4.11	0/1 Knapsack Problem	T2	2	Chalk and Talk
				Total	15	
V	Understand the complexity classes NP-Hard and NP-Complete and solve related decision problems. (K2)	5.1	Branch and Bound: The General Method	T1	2	PPT
		5.2	0/1 Knapsack Problem	T1&T2	2	**Flipped learning**
		5.3	Travelling Salesperson problem	T1	2	PPT
		5.4	NP Hard and NP Complete Problems: Basic Concepts	T1&T2	2	Chalk and Talk
		5.5	Cook's theorem NP Hard Graph Problems: Clique Decision Problem (CDP)	T1&T2	2	PPT
		5.6	Chromatic Number Decision Problem (CNDP)	T1	2	PPT
		5.7	Traveling Salesperson	T1	2	Chalk and Talk
	Content Beyond Syllabus		Multi-way search trees / Floyd-Warshall's Algorithm	T1,R1	2	PPT
				Total	16	
				CUMULATIVE PROPOSED PERIODS	70	

Text Books:

S. No.	AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION
1	Fundamentals of Data Structures in C++, Horowitz, Ellis; Sahni, Sartaj; Mehta, Dinesh 2nd Edition Universities Press, 2018
2	Computer Algorithms/C++ Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran 2nd Edition University Press, 2019

Reference Books:

S. No.	AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION
1	Data Structures and program design in C, Robert Kruse, Pearson Education Asia, 2006
2	An introduction to Data Structures with applications, Trembley & Sorenson, McGraw Hill, 2017

3	The Art of Computer Programming, Vol.1: Fundamental Algorithms, Donald E Knuth, Addison-Wesley, 1997
4	Data Structures using C & C++: Langsam, Augenstein & Tanenbaum, Pearson, 1995
5	Algorithms + Data Structures & Programs:, N.Wirth, PHI
6	Fundamentals of Data Structures in C++: Horowitz Sahni & Mehta, Galgottia Pub.
7	Data structures in Java: , Thomas Standish, Pearson Education Asia
Web Details	
1	http://peterindia.net/Algorithms.html
2	https://www.swarnandhra.ac.in/dsv
Video Links	
1	https://www.tutorialspoint.com/advanced_data_structures/index.asp
2	Abdul Bari, 1. Introduction to Algorithms (youtube.com)
3	bit.ly/BRK_DSV

		Name	Signature with Date
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ii.	Faculty II	Mr. S Raja	
iii.	Faculty III	Mr. B. S. Varaprasad	
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PRINCIPAL