Design and Analysis of Algorithms

Course Code	19CS3404	Year	II	Semester	II
Course Category	Program Core	Branch	CSE	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Discrete mathematics, Data Structure
Continuous Internal Evaluation :	30	Semester End Evaluation:	70	Total Marks:	100

Course Outcomes		
Upon successful completion of the course, the student will be able to:		
CO1	Understand the fundamental concepts of algorithm analysis and design techniques.	L2
CO2	Apply various algorithm design techniques for solving problems	L3
CO3	Analyze the performance of different algorithms in divide and conquer.	L4
CO4	Analyze the feasible solutions to find optimal one for the given problem.	L4

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													
CO2	3													
CO3		3												
CO4		3							3	3				

	Course Content	
UNIT-1	**Introduction**: Notion of Algorithm, Fundamentals of Algorithmic Problem Solving. **Fundamentals of the Analysis of Algorithm Efficiency:** Analysis framework and Asymptotic Notations and Basic Efficiency Classes. Introduction to Brute Force Technique, Exhaustive Search.	**CO1, CO2**
UNIT-2	**Divide and Conquer:** Introduction, Merge sort, Quick sort, Binary Search, Finding Maximum and Minimum, Strassen's Matrix Multiplication.	**CO1, CO2, CO3**
UNIT-3	**The Greedy Method:** Introduction, Huffman Trees and codes, Minimum Coin Change problem, Knapsack problem, Job sequencing with deadlines, Minimum Cost Spanning Trees, Single Source Shortest paths.	**CO1, CO2, CO4**
UNIT-4	**Dynamic Programming**: Introduction, 0/1 Knapsack problem, All pairs shortest paths, Optimal Binary search trees, Travelling salesman problem.	**CO1, CO2**
UNIT-5	**Back Tracking:** Introduction, n-Queens problem, Sum of subsets, Hamiltonian cycle. **Branch and Bound:** Introduction, Assignment problem, Travelling Salesman problem. **Introduction to Complexity classes**: P and NP Problems, NP-Complete Problems.	**CO1, CO2**
	Learning Resources	
Text Books	1.Introduction to the Design & Analysis of Algorithms, Anany Levitin, Third Edition, 2011, Pearson Education. 2.Data Structures and Algorithm Analysis in C, Mark Allen Weiss, 2002, Pearson. 3.Algorithm Design Techniques, NarasimhaKarumanchi, CareerMonk Publications, 2018.	
Reference Books	1. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, Third Edition, 2012, MIT Press. 2. Fundamentals of computer algorithms, Ellis Horowitz, SartajSahni, S. Rajasekharan, Second Edition, 2008, Universities Press.	
e-Resources & other digital material	**1.** https://nptel.ac.in/courses/106/106/106106131/ **2.** https://www.cmi.ac.in/~madhavan/ **3.** https://www.coursera.org/lecture/analysis-of-algorithms/resources-jMWPy **4.** https://www.geeksforgeeks.org/fundamentals-of-algorithms/	