Design and Analysis of Algorithms

Course Code	20CS3403	**Year**	II	**Semester**	II
Course Category	PCC	**Branch**	CSE	**Course Type**	Theory
Credits	3	**L-T-P**	3-0-0	**Prerequisites**	Discrete Mathematical Structures and Data Structures
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 given problem using different algorithm techniques.	**L4**
CO4	Analyze the given problem and provide the feasible solution.	**L4**

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations

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

Syllabus		
Unit No	**Contents**	**Mapped CO**
I	**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, Amortized Analysis. Introduction to Brute Force Technique, Exhaustive Search.	**CO1,CO2,CO3**
II	**Divide and Conquer:** Introduction, Merge sort, Quick sort, Binary Search, Finding Maximum and Minimum, Strassen's Matrix Multiplication.	**CO1,CO2,CO3,CO4**
III	**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,CO3,CO4**
IV	**Dynamic Programming**: Introduction, 0/1 Knapsack problem, All pairs shortest paths, Optimal Binary search trees, Travelling salesman problem.	**CO1,CO2,CO3,CO4**
V	**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,CO3,CO4**

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, Narasimha Karumanchi, CareerMonk Publications, 2018.

References

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, Sartaj Sahni, S. Rajasekharan, Second Edition, 2008, Universities Press.

e-Resources and 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/