

Semester Scheme B.Tech. (CSE) 1st TO 8th SEMESTER 2023-24 ONWARDS

Course Name	: Design and Analysis of Algorithms
Course Code	: CSN 4001
Credits	: 4
L T P	: 3 0 2

Course Objectives:	
Students should be able -	
<ul style="list-style-type: none"> To analyze various algorithms mainly for time and space complexity To develop algorithm for solving various computational problems by applying various algorithm design strategies To understand the effect of choice of data structures on the complexity of algorithm To understand about P, NP, NP-H and NP-C class problems 	

Total No. of Lectures – 42

Lecture wise breakup	No. of Lectures
Unit 1 Review: Notion of Algorithms, Pseudocode, Time and Space Complexity of Algorithms, Analysis of recursive and non-recursive algorithms	5
Unit 2 Brute Force: Selection sort, Bubble sort, Insertion Sort, Sequential searching (Linear Search), Brute force string matching	5
Unit 3 Divide and Conquer: General method, Merge sort, Quick Sort, Binary Search, Strassen's matrix multiplication	5
Unit 4 Greedy Approach: General method, Fractional Knapsack problem, Minimum cost spanning tree: Prim's and Kruskal's algorithm, Single Source Shortest Path problem	5
Unit 5 Dynamic Programming: General method, Principle of optimality, Multi-stage graph problem, All pair shortest path problem, 0/1 Knapsack problem, Traveling salesperson problem	7
Unit 6 Backtracking: General method, N-Queen problem, 0/1 Knapsack problem	5
Unit 7 Branch and Bound: General method, 0/1 Knapsack problem, Traveling sales person problem	5
Unit 8 Lower Bound Theory and Complexity Classes: Lower bounds, Decision trees, P, NP and NP Complete problems	5

List of Experiments:	No. of Turns
1. Write programs implementing Brute Force algorithms	2
2. Write programs implementing Divide and Conquer algorithms	3
3. Write programs implementing Greedy algorithms	2
4. Write programs implementing Dynamic Programming	3
5. Write programs implementing Backtracking	2
6. Write programs implementing Branch and Bound	2

Course Outcomes: At the end of the course, students will be able to
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1.	Demonstrate the ability to select the best data structure for designing an algorithm to solve a given problem
2.	Demonstrate the ability to compare algorithms with respect to time and space complexity
3.	Develop algorithms to solve various computational problems
4.	Analyze and compare various possible solutions to any given problem

Text Book:		
Sr. No.	Name of Book/ Authors/ Publisher	Year of Publication / Reprint
1.	Algorithm Design by Jon Kleinberg and Eva Tardos, Pearson Education	1st Edition, 2014

Reference Books:		
Sr. No.	Name of Book/ Authors/ Publisher	Year of Publication / Reprint
1.	Fundamentals of Algorithms by Horowitz E, Sahani S and Rajasekaran S., University Press	2008
2.	Introduction to Algorithms by Cormen, Leiserson, Rivest, Stein, PHI.	3 rd edition, 2012
3.	An Introduction to Analysis of Algorithms by R. Sedgewick, Pearson Education	1 st edition, 1996

Equivalent MOOCs courses		
Sr. No.	Course Links	Offered by
1.	https://onlinecourses.swayam2.ac.in/cec20_cs03/preview	Swayam
2.	https://www.edx.org/learn/algorithms/stanford-university-algorithms-design-and-analysis-part-1 https://www.edx.org/learn/algorithms/stanford-university-algorithms-design-and-analysis-part-2	edX

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	-	-	-	-	-	-	-	-	-	1	1	-
CO2	1	3	1	-	-	-	-	-	-	-	-	-	2	-	-
CO3	3	1	3	1	-	-	-	-	-	-	-	1	1	1	-
CO4	-	1	3	2	1	-	-	-	-	-	-	2	2	2	-

1-Low, 2-Medium, 3-High

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