C. U. SHAH UNIVERSITY – WADHWAN CITY

FACULTY OF TECHNOLOGY AND ENGINEERING
DEPARTMENT OF INFORMATION TECHNOLOGY
B. TECH. SEMESTER: - V

Subject Name: Design and Analysis of Algorithms (DAA)
Subject Code: 4TE05DAA1

Teaching & Evaluation Scheme: -

Subject Code	Subject Name	Teaching Scheme (Hours)				Credits	Evaluation Scheme							Total
		Th	Tu	Pr	Total		Theory				Practical (Marks)			
							Sessional Exam		University Exam		Internal		University	
							Marks	Hours	Marks	Hours	Pr/ Viva	TW	Pr	
4TE05DAA1	Design and Analysis of Algorithms (DAA)	3	0	2	5	4	30	1.5	70	3.0	-	20	30	150

Objectives:

- To study paradigms and approaches used to analyze and design algorithms and to appreciate the impact of algorithm design in practice.
- It also ensures that how the worst-case time complexity of an algorithm is defined, how asymptotic notation is used to provide a rough classification of algorithms, how a number of algorithms for fundamental problems in computer science and engineering work and compare with one another, and how there are still some problems for which it is unknown whether there exist efficient algorithms, and how to design efficient algorithms.

Prerequisites:

- Knowledge of basic Data Structure and programming language

Course outline:

Sr. No.	Course Contents	Total Hrs.
1	**Basics of Algorithms and Analysis of Algorithm:** Algorithm and its properties, Mathematics for Algorithm, Time and Space Complexity, Average and worst case analysis, Asymptotic Notation, Analyzing control statement, Amortized analysis. Solving Recurrences using Substitution method, Tree method and Master theorem.	10
2	**Divide and Conquer Algorithm:** Introduction, Problem Solving using divide and conquer algorithm - Binary Search, Sorting (Merge Sort, Quick Sort), Matrix Multiplication, Exponential problem.	08
3	**Greedy Algorithm:** General Characteristics of greedy algorithms, Elements of	08

	Greedy Strategy Problem solving using Greedy Algorithm - Activity selection problem, Minimum Spanning trees, Graphs: Shortest paths problem, The Knapsack Problem, Job Scheduling Problem.	
5	**Dynamic Programming:** Introduction, The Principle of Optimality, Memoization, Problem Solving using Dynamic Programming – Calculating the Binomial Coefficient, Making Change Problem, Knapsack problem, Graph: All Pair Shortest path problem, Matrix chain multiplication problem, Longest Common Subsequence problem.	**08**
6.	**Backtracking** – The Knapsack Problem, The Eight queens problem	**04**
7.	**String Matching:** Introduction, The naive string matching algorithm, The Rabin-Karp algorithm, KMP algorithm.	**04**
8.	**Introduction to NP-Completeness:** The class P and NP, Polynomial reduction, NP Completeness Problem, NP-Hard Problems.	**03**
	Total	**45**

Learning Outcomes:

After successful completion of the course, student will be able to

- Identify the appropriate data structure and algorithm design method for the given application
- Evaluate various techniques for searching, sorting and recurrence analyze and design efficient algorithms
- Calculate and conclude the associated algorithms' operations and complexity

Books Recommended:

1. Introduction to Algorithms,3rd Edition, **Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein**, MIT Press (2009).
2. Fundamental of Algorithms,1st Edition, **Gills Brassard, Paul Bratley**, PHI (2009).
3. Design and Analysis of Algorithms,1st Edition, **Dave and Dave**, Pearson (2008).
4. Algorithm Design: Foundation, Analysis and Internet Examples, 2nd Edition **, Goodrich, Tamassia**, Wiley India (2006).
5. Introduction to Design and Analysis of Algorithms,3rd Edition, **Anany Levitin**, Pearson (2012).