GUJARAT UNIVERSITY

K. S. SCHOOL OF BUSINESS MANAGEMENT
[Five Years' (Full-time) Integrated Degree Course]

Semester-8 [M.Sc. (CA & IT)]

Subject Code: - KS_C_CC-486
Subject Name: - Design and Analysis of Algorithm
Course Credit: - 3

Objective:
The course introduces the basics of computational complexity analysis and various algorithm design paradigms. The goal is to provide students with solid foundations to deal with a wide variety of computational problems, and to provide a thorough knowledge of the most common algorithms and data structures. The student will:
- Learn & apply the algorithm analysis techniques.
- Become familiar with the different algorithm design techniques.
- To critically analyze the efficiency of alternative algorithmic solutions for the same problem
- Understand the limitations of Algorithm power

Prerequisites:
Basic knowledge of the following concepts is required:
- Any elementary Programming Language like C
- Data Structure
- Discrete Mathematics

Unit No.	Content	Weightage (%)
1	INTRODUCTION: Notion of an Algorithm – Performance of Programs: Space & Time Complexity; Classification of Algorithm, Fundamentals of the Analysis of Algorithms, Algorithm Efficiency: Best Case, Average Case & Worst Case; Analysis Framework – Asymptotic Notations & Analysis	20%
2	RECCURRENCES AND DIVIDE & CONQUER ALGORITHMS Recurrences: Introduction, Substitution Method, Recursion Tree, Master method Divide and conquer methodology: Introduction – Binary search – Quick sort – Heap & Heap Sort, Red-Black Trees: Properties, Rotation, Insertion, Deletion	20%
3	DYNAMIC PROGRAMMING ALGORITHM Introduction, Elements of Dynamic Programming, Binary Search Trees: Fundamental, Insertion & Deletion; Matrix -Chain Multiplication, Common sub-words & sub-sequences.	20%
4	GREEDY ALGORITHM Introduction, Activity-Selection problem, elements of greedy strategy, Huffman codes, Greedy Vs Dynamic Programming	20%

5	NP COMPLETENESS AND THE P & NP CLASSES
	    Introduction, Polynomial Time & Verification, NP-Completeness and Reducibility, NP Complete Problems: Vertex-Cover Problem, Travelling Salesman Problem
	STRING-MATCHING ALGORITHM
	    Introduction, The naive string-matching algorithm, The Rabin-Karp algorithm
		20%

Recommended Lecture Scheme: Approximately 40 to 45 hours in a semester

Recommended Practical Scheme: Not Applicable

Assignment: Minimum five assignments should be given.

Reference Books:
1. Fundamentals of Computer Algorithms, 2nd Edition, Ellis Horowitz, Sartaj Sahni and S. Rajasekharan, Universities Press.
2. Introduction to Algorithms by T.H. Cormen, C.E. Leiserson, R.L. Rivest, C. Stein, 3rd Edition
3. Introduction to Design and Analysis of Algorithms, Anany Levitin, Pearson
4. Design and Analysis of Algorithms, P. H. Dave, H. B. Dave, 2nd edition, Pearson Education