GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. SEMESTER : VIII

INFORMATION TECHNOLOGY

Subject Name: **DESIGN AND ANALYSIS OF ALGORITHM**

Sr. No.	Course Contents	Total Hrs
1.	**Basics of Algorithms and Mathematics:** What is an algorithm?, Mathematics for Algorithmic Sets, Functions and Relations, Vectors and Matrices, Linear Inequalities and Linear Equations.	**04**
2.	**Analysis of Algorithm:** The efficient algorithm, Average and worst case analysis, Elementary operation, Asymptotic Notation, Analyzing control statement, Amortized analysis, Sorting Algorithm, Binary Tree Search.	**08**
3.	**Divide and Conquer Algorithm:** Introduction, Multiplying large Integers Problem, Problem Solving using divide and conquer algorithm - Binary Search, Sorting (Merge Sort, Quick Sort), Matrix Multiplication, Exponential.	**08**
4.	**Greedy Algorithm:** General Characteristics of greedy algorithms, Problem solving using Greedy Algorithm - Activity selection problem, Elements of Greedy Strategy, Minimum Spanning trees (Kruskal's algorithm, Prim's algorithm), Graphs: Shortest paths, The Knapsack Problem, Job Scheduling Problem	**10**
5.	**Dynamic Programming:** Introduction, The Principle of Optimality, Problem Solving using Dynamic Programming – Calculating the Binomial Coefficient, Making Change Problem, Assembly Line- Scheduling, Knapsack problem, Shortest path, Matrix chain multiplication, Longest Common Subsequence.	**10**
6.	**Exploring Graphs:** An introduction using graphs and games, Traversing Trees – Preconditioning, Depth First Search - Undirected Graph, Directed Graph, Breath First Search, Backtracking – The Knapsack Problem, The Eight queens problem, General Template.	**10**
7.	**String Matching:** Introduction, The naive string matching algorithm, The Rabin-Karp algorithm, String Matching with finite automata.	**06**
8.	**Introduction to NP-Completeness:** The class P and NP, Polynomial reduction, NP-Completeness Problem, NP-Hard Problems.	**04**

Text Books:

1. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, PHI.
2. Fundamental of Algorithms by Gills Brassard, Paul Bratley, PHI.

Reference Books:

1. Design and Analysis of Algorithms, Dave and Dave, Pearson.
2. Algorithm Design: Foundation, Analysis and Internet Examples, GoodRich, Tamassia, Wiley India
3. Introduction to Design and Analysis of Algorithms, Anany Levitin, Pearson.