SIXTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
CE602T	Design and Analysis of Algorithms	4	-	-	4	30	70	100

Course Objectives	Course Outcomes
This course is intended to provide • Analysis of asymptotic performance of algorithms. • Analysis of asymptotic runtime complexity of algorithms including formulating recurrence relations. • Understanding and way of designing of algorithms using greedy strategy, divide and conquer approach, dynamic programming.	Student will be able to: • Apply various methods to solve recurrence relations • Analyze worst-case running times of sorting algorithms using asymptotic notation. • Implement greedy, divide & conquer algorithms and solve recurrences describing the performance of each. • Understand dynamic-programming paradigm, analyze and implement dynamic programming algorithms • Describe the major graph algorithms. Interpret the concepts of model engineering problems. Interpret the concepts of tractable and intractable problems and the classes P, NP-Hard, and NP-Complete.

Unit I [10Hrs]

Mathematical foundation, Important summation, combinatorics and logarithmic formulas for algorithmic analysis, algorithmic design principles, Review of asymptotic notations & growth of functions, Analysis Framework – Asymptotic Notations and its properties – mathematical analysis for recursive and non-recursive algorithms, recurrences, solutions of recurrence relations using technique of recursion tree method, substitution method, and master method, solution for homogeneous and non homogeneous recurrence.

Unit II [8Hrs]

Amortized analysis and it's applications, analysis of sorting algorithms such as selection sort, insertion sort, bubble sort, heap sort, lower bound proof, elementary and advanced data structures like Fibonacci heap, disjoint set with operations on them and their time complexity, sorting networks.

Unit III [10Hrs]

Divide and conquer basic strategy, binary search, quick sort, merge sort. Greedy method - basic strategy, fractional knapsack problem, application to job sequencing with deadlines problem, Strassen's Matrix Multiplication, minimum cost spanning trees - Prim's algorithm and kruskal's algorithm, single source shortest path - Dijkstra's and Bellman Ford algorithm, closest-pair and convex – hull problems, Huffman Coding.

Unit IV [10Hrs]

Dynamic Programming basic strategy, multistage graphs, all pairs shortest path Floyd Warshall algorithm, single source shortest paths, 0/1 knapsack problem, optimal binary search trees, travelling salesman problem, matrix chain multiplication, longest common sub sequence problem.

Unit V [10Hrs]

Basic Traversal and Search Techniques, breadth first search and depth first search, connected components. Backtracking basic strategy, 8-Queen's problem, graph coloring, Hamiltonian Circuit Problem – Subset Sum Problem, randomized and approximate algorithms, NP-hard and NP-complete problems, basic concepts, non-deterministic algorithms, NP-hard and NP-complete, Cook's Theorem, decision and optimization problems, polynomial reduction.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Introduction to Algorithms	Cormen T.H		Prentice Hall of India
2	Foundations of Algorithms	S. R. Sathe		Penram International

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Computer Algorithms	Horowitz, Sahani, Rajsekharan		Galgotia Publications Pvt. Ltd
2	Fundamentals of Algorithms	Brassard, Bratley		Prentice Hall
3	Data Structures and Algorithms	Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman	Reprint 2006	Pearson Education

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