



ALGORITHM DESIGN AND ANALYSIS SYLLABUS

B. Tech. III Year II Sem

Course Code	Category	Hours/ Week			Credits	Maximum Marks		
		L	T	P		CIE	SEE	TOTAL
23CY603	Professional core	3	0	0	3	40	60	100
Contact Classes:48	Tutorial Classes:16	Practical Classes: Nil			Total Classes:64			

Prerequisites: Programming for problem solving and Data Structures

Course Objectives:

- Introduces the notations for analysis of the performance of algorithms.
- Describes major algorithmic techniques (divide-and-conquer, backtracking, dynamic programming, greedy, branch and bound methods) and mention problems for which each technique is appropriate;
- Describe how to evaluate and compare different algorithms using worst, average, and best-case analysis.
- Explains the difference between tractable and intractable problems, and introduces the problems that are P, NP and NP complete.

Course Outcomes:

- Analyze the performance of algorithms
- Choose appropriate data structures and algorithm design methods for a specified application
- Understand the choice of data structures and the algorithm design methods

UNIT-I

Introduction: Algorithm, Performance Analysis-Space complexity, Time complexity, Asymptotic Notations- Big oh notation, Omega notation, Theta notation and little oh notation.

Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Strassen's matrix multiplication.

UNIT- II

Disjoint Sets: Disjoint set operations, union and find algorithms, Priority Queue- Heaps, Heap sort **Back tracking:** General method, applications, n-queen's problem, sum of subsets problem, graph Coloring, Hamiltonian cycles.

UNIT- III

Dynamic Programming: General method, applications-Optimal binary search tree, 0/1 knapsack problem, All pairs shortest path problem, Traveling sales person problem, Reliability design.

UNIT-IV

Greedy method: General method, applications- Job sequencing with deadlines, knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

Basic Traversal and Search Techniques: Techniques for Binary Trees, Techniques for Graphs, Connected components, Bi connected components.

UNIT-V

Branch and Bound: General method, applications - Travelling sales person problem, 0/1 knapsack problem - LC Branch and Bound solution, FIFO Branch and Bound solution.

NP-Hard and NP-Complete problems: Basic concepts, non-deterministic algorithms, NP- Hard and NP-Complete classes, Cook's theorem.

TEXTBOOK:

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharan, University Press.

REFERENCEBOOKS:

1. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education.
2. Introduction to Algorithms, second edition, T.H.Cormen, C.E.Leiserson, R. L.Rivest, and C. Stein, PHI Pvt. Ltd./ Pearson Education.
3. Algorithm Design: Foundations, Analysis and Internet Examples, M.T.Goodrich and R.Tamassia, John Wiley and sons.

