

**II/IV B. TECH. SECOND SEMESTER
DESIGN AND ANALYSIS OF ALGORITHMS (Required)**

Course Code : CS 4T2**Credits: 3****Lecture: 3 periods/ week****Internal assessment: 30 Marks****Tutorial: 1period/week****Semester end examination: 70 Marks**

Prerequisites: Program Design

Course Objectives:

Upon completion of this course, students will be able to do the following:

1. Analyze the asymptotic performance of algorithms.
2. Ability to analyze asymptotic runtime complexity of algorithms including formulating recurrence relations.
3. Ability to understand and design algorithms using greedy strategy, divide and conquer approach, dynamic programming, Demonstrate a familiarity with major algorithms and data structures.

Course Outcomes:

At the end of this course student will:

CO1) Understand the basic notation for analyzing the performance of the algorithms.

CO2) Use divide-and-conquer techniques for solving suitable problems

CO3) Use greedy approach to solve an appropriate problem for optimal solution.

CO4) Apply dynamic programming approach to solve suitable problems

CO5) Understand the limitations of algorithm power and study how to cope with the limitations of algorithm power for various problems

Syllabus:**UNIT 1**

Introduction: Notion of an Algorithm–Fundamentals of Algorithmic Problem Solving – Fundamentals of the Analysis of Algorithm Efficiency – Analysis Framework –Asymptotic Notations and Basic efficiency classes.

UNIT 2

Divide and Conquer Method: General Method, Applications: Binary search, Quick sort, Merge sort and Analysis of divide and conquer runtime recurrence relations.

UNIT 3

Greedy Method: General method, Applications: Minimum cost spanning tree (prim's and kruskal's algorithm), Dijkstra's algorithm.

UNIT 4

Dynamic programming: General Method, Applications: Floyd's algorithm, Optimal Binary Search Tree, 0/1 knapsack problem

UNIT 5

Back tracking: General Method, Applications: Sum of Subsets, Hamiltonian Cycles.

Branch and bound: The Method – Assignment problem, Travelling Salesman Problem - Introduction to NP-Hard and NP-Complete Problems.

Learning Resource

Text Books

1. Introduction to the Design & Analysis of Algorithms, Anany Levitin, 2nd Edition, Pearson Education 2007.

References

1. "Introduction to Algorithms", 3rd Ed., T. H. Cormen, C. E. Leiserson, R. L. Rivest, Clifford Stein, PHI.
2. "Computer Algorithms", Ellis Horowitz and Sartaj Sahni, Silicon press, 2008.