

III B.Tech – I Semester
(17CS502) DESIGN AND ANALYSIS OF ALGORITHMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	3

Pre-Requisites: Discrete Structures, Data Structures

Course Objectives:

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

- Analyze the asymptotic performance of algorithms.
- Write rigorous correctness proofs for algorithms.
- Demonstrate a familiarity with major algorithms and data structures.
- Apply important algorithmic design paradigms and methods of analysis.
- Synthesize efficient algorithms in common engineering design situations

UNIT-I:

Introduction: Examples and motivation, Asymptotic complexity: informal concepts, formal notation, examples

Searching and Sorting: binary search, insertion sort, selection sort, merge sort, quick sort, stability and other issues.

UNIT-II:

Graphs: Motivation, Directed acyclic graphs, Graph exploration: BFS, DFS, applications.

UNIT-III:

Search Trees: Introduction, Traversals, insertions, deletions, Balancing, Priority queues, heaps

UNIT-IV:

Greedy : Interval scheduling, Minimum cost spanning trees: Prim's algorithm, Kruskal's Algorithm, Shortest paths: unweighted and weighted, Single source shortest paths: Dijkstra, Huffman coding.

UNIT-V:

Dynamic Programming: weighted interval scheduling, memorization, 0/1 knapsack, Travelling Salesman Problem, matrix chain multiplication, shortest paths: Bellman Ford, Floyd, Warshall.

UNIT-VI:

Backtracking: The General Method, The 8-Queens Problem, Sum of Subsets, Graph Coloring , Hamiltonian Cycles.

Course Outcomes:

1	Apply searching and sorting techniques to solve various problems.	L3
2	Apply the concepts of graph theory.	L3
3	Apply the concepts of trees in various applications.	L3
4	Analyze minimum cost spanning tree, shortest path problems.	L4
5	Apply dynamic programming technique to various problems.	L3
6	Apply backtracking technique to various problems.	L3

Correlation of COs with POs & PSOs:

	PO- 1	PO- 2	PO- 3	PO- 4	PO- 5	PO- 6	PO- 7	PO- 8	PO- 9	PO- 10	PO- 11	PO- 12	PSO- 1	PSO- 2	PSO- 3
CO-1	2	2	2	1	1	-	-	-	-	-	-	-	3	-	-
CO-2	3	3	2	2	2	-	-	-	-	-	-	-	3	-	-
CO-3	3	3	3	3	3	-	-	-	-	-	-	-	3	-	-
CO-4	3	3	3	3	3	-	-	-	-	-	-	-	3	-	-
CO-5	3	3	3	3	3	-	-	-	-	-	-	-	3	-	-
CO-6	3	3	3	3	3	-	-	-	-	-	-	-	3	-	-

Text Books:

1. Fundamentals of computer algorithms E. Horowitz S. Sahni, University Press
2. Introduction to Algorithms Thomas H. Cormen, PHI Learning

Reference Books

1. The Design and Analysis of Computer Algorithms, Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman
2. Algorithm Design, Jon Kleinberg, Pearson.