

UNIT I **9**

Algorithm Analysis – Time Space Tradeoff – Asymptotic Notations – Conditional asymptotic notation – Removing condition from the conditional asymptotic notation - Properties of big-Oh notation – Recurrence equations – Solving recurrence equations – Analysis of linear search.

UNIT II **9**

Divide and Conquer: General Method – Binary Search – Finding Maximum and Minimum – Merge Sort – Greedy Algorithms: General Method – Container Loading – Knapsack Problem.

UNIT III **9**

Dynamic Programming: General Method – Multistage Graphs – All-Pair shortest paths – Optimal binary search trees – 0/1 Knapsack – Travelling salesperson problem .

UNIT IV **9**

Backtracking: General Method – 8 Queens Problem – sum of subsets – graph coloring – Hamiltonian problem - knapsack problems.

UNIT V **9**

Graph Traversals – Connected Components – Spanning Trees – Biconnected components – Branch and Bound: General Methods (FIFO & LC) – 0/1 Knapsack problem – Introduction to NP-Hard and NP-Completeness.

TUTORIAL = 15**Total = 60****TEXT BOOK:**

1. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, Computer Algorithms/ C++, Second Edition, Universities Press, 2007. (For Units II to V)
2. K.S. Easwarakumar, Object Oriented Data Structures using C++, Vikas Publishing House pvt. Ltd., 2000 (For Unit I)

REFERENCES:

1. T. H. Cormen, C. E. Leiserson, R.L.Rivest, and C. Stein, "Introduction to Algorithms", Second Edition, Prentice Hall of India Pvt. Ltd, 2003.
2. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "The Design and Analysis of Computer Algorithms", Pearson Education, 1999.

SUBJECT DESCRIPTION AND OBJECTIVES

DESCRIPTION

The emphasis of this course is on techniques for designing algorithms for various computer applications. In the process of learning and practicing methods of algorithm design, we will see many examples of important algorithms. We will also discuss techniques for implementing algorithms and improving program performance.

- Mathematical preliminaries, in particular, mathematical induction.
- Analysis of algorithms.
- Techniques for improving performance.

Basic Algorithms:

- Graph algorithms--shortest path problems, Optimal binary search trees etc.
- Various algorithms backtracking, dynamic programming, branch and bound, divide and conquer, greedy algorithms etc.
- Reductions and NP-Completeness.

OBJECTIVE:

On the completion of the course, students should be able to:

- ✓ To introduce basic concepts of algorithms
- ✓ To introduce mathematical aspects and analysis of algorithms
- ✓ To introduce sorting and searching algorithms
- ✓ To introduce various algorithmic techniques
- ✓ To introduce algorithm design methods

MICRO LESSON PLAN

HOURS	LECTURE TOPICS	READING
UNIT I		
1	Algorithm Analysis – Time Space Tradeoff	T2
2	Asymptotic Notations	T2
3	Conditional asymptotic notation	T2
4	Removing condition from the conditional asymptotic notation	T2
5	Properties of big-Oh notation	T2
6,7	Recurrence equations	T2
	Solving recurrence equations	T2
8,9	Analysis of linear search.(AV CLASS)	T2
10,11,12	Tutorial	T2
UNIT II		
13	Divide and Conquer: General Method	T1
14	Binary Search	T1
15	Finding Maximum and Minimum	T1
16,17	Merge Sort	T1
18	Greedy Algorithms: General Method	T1
19	Container Loading	T1
20,21	Knapsack Problem. (AV CLASS)	T1
22,23,24	Tutorial	T1
UNIT III		
25,26	Dynamic Programming: General Method	T1
27,28	Multistage Graphs (AV CLASS)	T1
29,30	All-Pair shortest paths	T1
31	Optimal binary search trees	T1
32	0/1 Knapsack	T1
33	Traveling salesperson problem	T1
34,35,36	Tutorial	T1

HOURS	LECTURE TOPICS	READING
UNIT IV		
37	Backtracking: General Method	T1
38,39	8 Queens problem(AV CLASS)	T1
40,41	sum of subsets	T1
42	graph coloring	T1
43,44	Hamiltonian problem	T1
45	knapsack problem	T1
46,47,48	Tutorial	T1
UNIT V		
49	Graph Traversals(AV CLASS)	AV CLASS
50	Connected Components	T1
51	Spanning Trees	T1
52	Biconnected components	T1
53	Branch and Bound: General Methods	T1
54	(FIFO & LC) Branch and Bound(AV CLASS)	T1
55	0/1 Knapsack problem	T1
56,57	Introduction to NP-Hard and NP-Completeness.	T1
58,59,60	Tutorial	T1

PREPARED BY

STAFF: Mr. A. PALANISAMY, Asst.Prof,

DEPT. OF COMPUTER SCIENCE AND ENGG.