

CS-506: ANALYSIS AND DESIGN OF ALGORITHM

Teaching and Examination Scheme:

| Teaching Scheme | | | Credits | Marks | | | Duration of End Semester Examination |
|-----------------|---|-----|---------|-----------|--------------------|-------|--------------------------------------|
| L | T | P/D | | Sessional | End Semester Exams | Total | |
| 3 | 1 | 0 | 4 | 40 | 60 | 100 | 3Hrs |

COURSE OBJECTIVE:

The course should enable students to introduce the basic concepts of algorithms, mathematical aspects and analysis of algorithms, sorting and searching of algorithms and various algorithms design methods.

COURSE CONTENT:

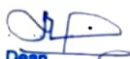
| UNIT | CONTENT | No. of Hrs. |
|------|---|-------------|
| I | Basics of algorithms: Algorithms and characteristics, algorithm design paradigms, fundamentals of algorithmic problem solving, fundamental data structures. Analysis of algorithms: The efficient algorithm-average, worst and best case analysis, asymptotic notations and its properties, amortized analysis, recurrences: substitution method, recursion tree method and master's method. | 10 |
| II | Divide and conquer: Binary search, Strassen's matrix multiplication, closest-pair and convex-hull problems. Sorting Algorithm: Counting sort, radix sort. Dynamic Programming: Overview, difference between dynamic programming and divide and conquer, multistage graphs, optimal binary search trees, knapsack problem, fast fourier transform. | 10 |
| III | Greedy Method: Traveling salesman problem, job sequencing with deadlines, minimum spanning trees (Prim's and Kruskal's algorithms). Single source Shortest path: Bellman ford algorithm, single source shortest path in directed acyclic graph. Approximation Algorithms: Vertex cover problem, set covering problem, the subset sum problem. | 10 |
| IV | Flow networks: Ford-Fulkerson, maximum bipartite matching, sorting networks, cryptographic, computations, multicast routing, BIN packing. Computational Complexity: Polynomial time vs non-polynomial time complexity, polynomial reduction, NP-hard and NP-complete problems, Cook's theorem (without proof). | 9 |

Text Books:

1. T.cormen, C. Lieserson. R. Rivest and C. Stein, "*Introduction to Algorithms*", Prentice-Hall/India.
2. Ellis Horowitz, Sartaz Sahni and Rajasekharan, "*Fundamentals of Computer Algorithms*", Galgotia publications pvt. Ltd.

Reference Books:

1. Sara Basse, A.V.Gelder, "*Computer Algorithms*", Addison Wesley.
2. Michal T. Goodrich, "*Algorithm Design*", Wiley India Publication.
3. Aho, ullman, and Hopcroft, "*Design and Analysis of Algorithms*", Pearson education.



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