CS-506: ANALYSIS AND DESIGN OF ALGORITHM

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	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"***, Addision Wesley.
2. Michal T. Goodrich, ***"Ålgorithm Design"***, Wiley India Publication.
3. Aho, ullman, and Hopcroft, ***"Design and Analysis of Algorithms"***, Pearson education.