Paper Code : DAA:604
Paper Name : DESIGN AND ANALYSIS OF ALGORITHMS

Teaching Hours (Per Week)		**Examination Scheme**		
TH. (hours)	Pr. (hours)	Internal	External	Total
		Th. (marks)	Th. (marks)	100 (marks)
4		30	70	

Lectures = 68 Hours

"In order to design good algorithm, we must first agree the criteria for measuring algorithms. The emphasis in this course will be on design of efficient algorithm, hence we will measure algorithms in terms of the amount of the computational resources that algorithm requires."

Detailed Syllabus

UNIT I

Introduction **10 Hours**

What is an Algorithm?, Fundamentals of Algorithmic Problem Solving, Important Problem Types, Fundamental Data Structures.

Fundamentals of the Analysis of Algorithm Efficiency

Analysis Framework, Asymptotic Notations and Basic Efficiency Classes.

UNIT II

Brute Force and Exhaustive Search **24 Hours**

Selection Sort and Bubble Sort, Sequential Search and Brute-Force String Matching, Exhaustive Search, Depth First Search, Breadth First Search.

Divide and Conquer

Mergesort, Quicksort, Binary Search, Binary tree traversals and related properties.

Decrease and Conquer

Insertion Sort, , Topological Sorting.

Transform and Conquer

Balanced Search Trees, Heaps and Heapsort.

UNIT III

Dynamic Programming 8 **Hours**

The Knapsack Problem and Memory Functions, Optimal Binary search tree.

UNIT IV

Greedy Technique **6 Hours**

Prim's Algorithm, Kruskal's Algorithm.

UNIT V **20 Hours**

Limitations of Algorithm Power

Lower-Bound Arguments, Decision Trees, P, NP and NP-Complete Problems.

Coping with the Limitation of Algorithm Power

Backtracking (definition only), Branch-and-Bound : Knapsack Problem, Traveling Salesman Problem

RECOMMENDED BOOKS

Main Book:

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

Reference Book:

1. **Introduction to Algorithms**, Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein, 2ndEdition, PHI, 2006.
2. **Computer Algorithms** by Horowitz E., Sahni S., Rajasekaran S., Galgotia Publications, 2001.
3. **Introduction to the Design and Analysis of Algorithms A Strategic Approach,** R.C.T. Lee, S.S. Tseng, R.C. Chang & Y.T.Tsai, TMH, 2005.
4. **Analysis and Design of Algorithm,** A.A.Puntambekar
5. **The Design and Analysis of Algorithm,** Dexter C, Kozen
6. **Algorithms Design Techniques and Analysis**, M.H.Alsuwaiyel
7. **The Design and Analysis of Algorithms 1974**, AV Aho, JE Hopcroft and JD Ullman, Addison-Wesley Publishing Company