

University of Mumbai			
Class: S.E.	Branch: Computer Engineering	Semester: IV	
Subject : Analysis of algorithm & design (Abbreviated as AOAD)			
Periods per Week (each 60 min.)	Lecture	04	
	Practical	02	
	Tutorial	--	
		Hours	Marks
Evaluation System	Theory	03	100
	Practical & Oral	02	25
	Oral	---	---
	Term Work	---	25
	Total	05	150

Pre-requisites: Students should be familiar with data structure concepts, discrete structure and programming language such as C++ or JAVA

Module	Contents	Hours
1	Introduction to Analysis of algorithm: <ul style="list-style-type: none"> • Design and analysis fundamentals • Performance analysis, space and time complexity • Growth of a function-Big-Oh, Omega, theta notation • Mathematical background for algorithm analysis • Randomized and recursive algorithm 	05
2	Divide and Conquer: <ul style="list-style-type: none"> • General method, Binary search, finding the min and max. • Quick sort, performance measurement • Randomized version of quick sort and analysis • Partitioned algorithm selection sort, radix sort, efficiency consideration • Strassen's matrix multiplication 	08
3	Greedy Method : <ul style="list-style-type: none"> • General method • Knapsack problem • Minimum cost spanning tree-kruskal and primal algo, performance analysis • Single source shortest path • Job sequencing with deadlines • Optimal storage on tapes 	08

4	Dynamic Programming: <ul style="list-style-type: none"> • The general method • Multistage graphs, all pair shortest paths, single source shortest paths • Optimal BST .01 knapsack • TSP, flow shop scheduling 	07
5	Backtracking : <ul style="list-style-type: none"> • The general method • 8 queen problem, sum of subsets • Graph coloring, hamtonian cycles • Knapsack Problem 	07
6	Branch and Bound: <ul style="list-style-type: none"> • The method, LC search • 15 puzzle: An example • Bounding and FIFO branch and bound • LC branch and Bound • 0/1 Knapsack problem • TP efficiency considerations 	07
7	Internet Algorithm : <ul style="list-style-type: none"> • String and pattern matching algorithm • Trees • Text Compression • Text similarity testing 	06

TERM WORK:

Term work should consist of graded answer papers of the test and 12 implementations using c++/JAVA. Students are expected to calculate complexities of all methods. Each student is to appear for at least 1 written test during the term. Each implementation must consist of problem statement, Brief theory, complexity calculation and conclusion.

Topics For Implementation:

1. Implementation based on divide and conquer method
2. Implementation on greedy approach
3. Implementation on dynamic programming
4. Implementation of backtracking methods
5. Implementation of Branch and bound concept
6. Implementation of internet algorithm

TEXT BOOKS:

1. Ellis Horowitz, Sarataj Sahni, S.Rajsekarán,” Fundamentals of computer algorithm”, University Press
2. Anany V. Levintin “Introduction to design and analysis of algorithms”, Pearson Education publication, 2nd Edition
3. T.H.Cormen ,C.E.Leiserson,R.L.Rivest and C.Stein,” Introduction to algorithms”,2nd Edition ,MIT press/McGraw Hill,2001
4. Michael Googrich & Roberto Tamassia,” Algorithm Design Foundation, analysis and Internet examples”,2nd Edition,Wiley Student Edition.

REFERENCE BOOKS:

1. S.Baase, S and A Van Gelder,”Computer algorithms:Introduction to design and analysis”,3rd Edition, Addison Wesley,2000
2. Keneneth berman,Jerome Paul,” Algorithm: Sequential, parallel and distributed”Cengage Learning .
3. Mark Allen Weiss,”Data Structure & algorithm Analysis in c++”,3rd Edition, Pearson Education