

Roll No.

23068

**M. Tech. 1st Semester (Computer Engg.)
Examination – January, 2012**

ANALYSIS & DESIGN OF ALGORITHMS

Paper : MTCE - 605 - A

Time : Three hours] [Maximum Marks : 100

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt any *five* questions. All questions carry equal marks

1. (a) What do you mean by an asymptotic notation? Write and explain different types of asymptotic notations with suitable examples.
- (b) What is a recurrence relation? Solve the following relation by recursive method :

$$T(n) = \begin{cases} c_1 & \text{if } n = 1 \\ 2T(n/2) + c_2n & \text{if } n > 1 \end{cases}$$



2. (a) What are the various Sorting Algorithms ? Compare and contrast explaining which is the best practical choice. 10
- (b) Define a Red-Black tree. Explain the concept of rotations in a Red-Black tree. 10
3. (a) What is a minimum spanning tree ? Which approach of algorithms is used to generate a minimum spanning tree ? Discuss Prim's algorithm for generating a minimum spanning tree. 10
- (b) How does amortized analysis contribute to the analysis of algorithms ? Explain the technique of aggregate method of amortized analysis. 10
4. (a) Differentiate between Greedy and Dynamic approaches of solving algorithms. Hence differentiate Fractional and 0-1 Knapsack problem. 10
- (b) Explain Strassen's matrix multiplication. 10
5. (a) Explain the problem of solving optimal binary search trees using dynamic programming. 10
- (b) Find the solution for the following Fractional Knapsack problem using Greedy method : 10

$$n = 3, m = 50$$

$$W_i = (10, 20, 30)$$

$$P_i = (60, 100, 120)$$

6. Suggest the solutions to the following problems using backtracking :
- (a) 8-queen.
 - (b) Graph-Coloring.
7. (a) State and prove Cook's theorem.
- (b) Explain LC branch and bound technique.
8. (a) Use depth first search to help design algorithms to divide an undirected graph into connected components.
- (b) Write short notes on any two :
- (i) NP hard and NP complete problems.
 - (ii) Approximation algorithms.
 - (iii) Clique Decision problem.