

Roll No.

23068

**M. Tech. 1st Sem. (Computer. Sc.
Engg.) Examination–May, 2015**

ANALYSIS AND DESIGN OF ALGORITHMS

Paper : MTCE-605-A

Time : 3 hours

Max. 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 the examination.

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

1. (a) What is divide and conquer paradigm ?

Explain various methods of recurrence used to solve divide and conquer. (10)

(b) Solve the following relation by recurrence tree method. (10)

$$T(n) = T(n/3) + T(n/2) + \lg n$$

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(1)

[Turn Over

2. (a) Write and explain Kruskal's algorithm with the help of example. (10)
- (b) Write short notes on the following : 10
- (i) Strongly connected component
 - (ii) Minimum spanning tree
3. Give a recursive algorithm for matrix chain multiplication using dynamic programming. Find an optimal parenthesization of a matrix chain product whose sequence of dimension is $\langle 30, 35, 15, 5, 10, 20, 25 \rangle$ (20)
4. (a) Consider the 0/1 knapsack instance :
number of objects $n = 3$ with
corresponding weight and profit as
- $W_1 = (2, 3, 4)$
- $P_1 = (1, 2, 5)$

The knapsack capacity $m = 6$. Find the solution using dynamic programming.

(8)

(b) What is 4-Queen problem ? How can it be solved using backtracking ? Explain with the help of tree organization of solution space. (12)

5. (a) Differentiate the following: (10)

(i) Differentiate fractional and 0/1 knapsack problem.

(ii) NP hard and NP complete problem

(b) State and prove Cook's theorem. (10)

6. (a) Explain polynomial time approximation scheme. (10)

(b) Write and explain Rabin-Karp string matching algorithm. (10)

7. (a) Explain LC branch and bound techniques. (10)
- (b) Define Red-Black tree. Explain the concept of rotation in Red-Black. (10)
8. Describe the following : (20)
- (i) Amortized Time Analysis
 - (ii) Dynamic Equivalence Relation
 - (iii) PRAM Model
 - (iv) Clique Decision Problem
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