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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)

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

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 <30, 35, 15, 5, 10, 20, 25> (20)

4. (a) Consider the 0/1 kanpsack 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
