C 42751

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Name.....................................
Reg. No....................................

SEVENTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION MAY 2013

CS 04 704—DESIGN AND ANALYSIS OF ALGORITHMS

(2004 Admissions)

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all the questions.

I. (a) What is a recurrence relation ? Solve the following recurrence relation using substitution method.

$$T(n) = \begin{cases} 1 & n \le 4 \\ T(\sqrt{n}) + C & n > 4. \end{cases}$$

(b) Explain various asymptotic efficiency of an algorithm.

(c) What is backtracking ? Explain how it is used in solving 8 queen's problem.

(d) Discuss about 0/1 knapsack problem with the greedy algorithm to solve it.

(e) Prove that Hamiltonian cycle problem is NP-Complete.

(f) Discuss about subset-sum problem.

(g) Discuss any two random number generation methods.

(h) Write about universal hashing algorithm with example.

(8 × 5 = 40 marks)

Part B

II. (a) Explain in detail merge sorting method. Provide a complete analysis of merge sort.

Or

(b) Explain the amortized weight balanced trees with example.

III. (a) Write an algorithm that multiplies two $n \times n$ matrices using $O(n^3)$ operations. Determine the precise number of multiplications, additions and array element accesses.

Or

Turn over

(b) Apply Kruskal's and Prim's algorithm for the following graph and find the Minimum spanning tree.
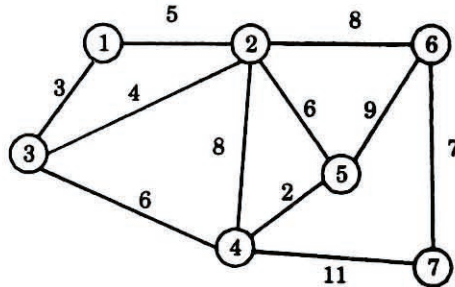
IV. (a) Given an undirected graph G(V, E) and an integer K, the goal is to determine whether G has a clique of size K and an independent set of size K. Show that this problem is NP-complete.

Or

(b) (i) Prove that vertex-cover problem is in NP.   (7½ marks)

(ii) Prove that if any NP complete problem belongs to class P, then P = NP.

(7½ marks)

V. (a) Explain the Miller Robin Test and Pollard's rho heuristic.

Or

(b) Explain the randomized solution for eight queen's problem.

[4 × 15 = 60 marks]