C 58315 (Pages : 2)

Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION
JUNE 2009

Computer Science and Engineering

CS 2K 601—DESIGN AND ANALYSIS OF ALGORITHMS

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

1. (a) Explain two methods of solving recurrence relations.
   (b) Explain the worst-case time complexity analysis of quick sort.
   (c) Bring out the significance of dynamic programming with matrix chain multiplication.
   (d) Illustrate Prim's algorithm for finding minimum spanning tree with an example.
   (e) Give a verification algorithm for vertex cover problem.
   (f) Present an approximation strategy briefly for travelling sales person problem.
   (g) Illustrate probabilistic primality testing.
   (h) Discuss Pollard's the heuristic.

(8 × 5 = 40 marks)

2. (a) (i) Define $O-, \Omega-, \theta-$ notations. Give appropriate examples. (8 marks)
   (ii) Explain potential method with suitable example in amortized analysis. (7 marks)

Or

   (b) (i) What is heap ? Give an example. Explain heap sort for the set S = {4, 5, 6, 7, 1, 2, 3, 8, 9, 10}. (8 marks)
   (ii) Explain recursion-tree method for analysing time complexities, with a suitable example. (7 marks)

3. (a) (i) Explain the strategy that takes linear time for finding k-th smallest element in a given set. (8 marks)
   (ii) What are matroids ? Give the theoretical background for greedy approach. (7 marks)
   (b) (i) Explain Huffman's method for finding prefix-free codes for characters. (8 marks)
   (ii) Explain the basic principles of dynamic programming and its advantage over recursive technique. (7 marks)

4. (a) (i) Prove that subset sum problem is NP-hard. (8 marks)
   (ii) Give a verification algorithm for subset sum problem. (7 marks)

Or

Turn over

(b) (i) State Cook's theorem. Show that satisfiability problem is reducible to Travelling salesman problem. (8 marks)

(ii) Discuss various complexity classes with appropriate examples. (7 marks)

5. (a) (i) Show how matrix multiplication can be verified with probabilistic approach. (7 marks)

(ii) Present a randomized algorithm for sorting. (8 marks)

Or

(b) (i) Explain integer factorization. (7 marks)

(ii) Discuss Miller-Rabin test. (8 marks)

(4 × 15 = 60 marks)