Total No. of Questions : 12]

SEAT No. :

P2082

[Total No. of Pages : 3

B.E. (Semester - I)

COMPUTER ENGINEERING

Design and Analysis of Algorithms

(2008 Pattern)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) *Attempt three questions from section - I and three questions from Section - II.*
2) *Answer of Section - I and Section - II should be written on separate answer book.*
3) *Figures to the right indicate full marks.*
4) *Draw neat diagram where ever necessary.*
5) *Make suitable assumptions where ever necessary.*

SECTION - I

Q1) a) Write the recurrence relation for binary search and solve it. **[6]**

b) Explain the Greedy Prim's minimum spanning tree algorithm. **[4]**

c) Write control abstraction for divide and conquer algorithmic strategy. Also write recurrence relation for the same. **[5]**

d) Define asymptotic notations. Explain their significance in analyzing algorithms. **[3]**

OR

Q2) a) Write an algorithm for quick sort. State its time complexity. **[6]**

b) Solve the following instance of "job sequencing with deadlines" problem : **[4]**

n = 7, profits (p1, p2, p3, ...,p7) = (3, 5, 20, 18, 1, 6, 30) and deadlines (d1, d2, ..., d7) = (1, 3, 4, 3, 2, 1, 2)

c) Obtain a set of optimal Huffman codes for the messages (M1, M2, ... M6) with relative frequencies (q1, q2, ... q6) = (2, 3, 5, 7, 9, 13). Draw the decode tree for this set of codes. **[8]**

P.T.O.

Q3) a) Let n = 3 and {k1, k2, k3} = {do, if, while} **[9]**

Let p (1:3) = {0.5, 0.1, 0.05}

Let q (0:3} = {0.15, 0.1, 0.05, 0.05}

Compute & construct OBST for above values.

b) State multistage graph problem and explain how it can be solved using forward approach. **[7]**

OR

Q4) a) Explain 0/1 Knapsack using dynamic programming with an example. **[8]**

b) Define the Traveling Salesperson Problem. Solve the TSP problem using Dynamic programming where the edge lengths are given as : **[8]**

0	9	8	8
12	0	13	6
10	9	0	5
20	15	10	0

Q5) a) What are implicit and explicit constraints with respect to backtracking? **[8]**

b) Write the control abstraction for LC-Search. Explain how Travelling Salesperson problem is solved using LCBB. **[8]**

OR

Q6) a) Write recursive algorithm on Graph Coloring using Backtracking Strategy. Determine the time complexity of the same. **[8]**

b) Write an iterative algorithm to solve n queen's problem using backtracking methods. What is the time complexity of this algorithm? **[8]**

SECTION - II

Q7) a) Prove that vertex cover problem is NP complete. **[9]**

b) Show that the sum of subsets problem is NP-Hard, given that Exact cover problem is NP-Hard. **[9]**

OR

Q8) a) What is meant by a problem "reducing to" another problem? Prove that the clique decision problem reduces to node cover decision problem. **[8]**

b) Explain NP-Hard scheduling problem with example. Also comment on the time complexity. **[10]**

Q9) a) Write an algorithm for Odd-Even merge. Determine its time complexity. **[8]**

b) Consider the following expression : **[8]**

((7 – (21 / 3)) * 3) + ((9 * (10 – 8)) + 6) Explain how it can be evaluated parallely.

OR

Q10) a) Explain how graph problems can be solved using parallel processors. **[8]**

b) Explain in detail parallel MERGE sorting. **[8]**

Q11) a) Explain Deadlock detection and avoidance algorithm. **[8]**

b) What is meant by heuristic algorithms? Discuss any one heuristic search algorithm. **[8]**

OR

Q12) a) Explain convex hull algorithm. Comment on the time complexity. **[8]**

b) Explain resource allocation algorithm for deadlock avoidance. **[8]**