P2957

[5354]-171

B.E. (Computer Engineering)
DESIGN & 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 sheets.*
3) *Figures to the right indicate full marks.*
4) *Draw neat diagram wherever necessary.*
5) *Make suitable assumptions wherever necessary.*

SECTION - I

Q1) a) Give Greedy Kruskal's minimum spanning tree algorithm. Also explain it with suitable example. **[10]**

b) Write control abstraction for divide and conquer algorithmic strategy. Also write recurrence relation for the same and solve it. **[8]**

OR

Q2) a) Write an algorithm for quick sort. State its time complexity by solving recurrence equation. **[10]**

b) Solve following recurrence: **[8]**

$t(n) - 2\,t(n-1) = 3^n$

Q3) a) Let n = 4 and (k1, k2, k3, k4} = {do, if, int, while}. **[8]**

Let p(1:4) = {3,3, 1, l}

Let q(0:4} = {2,3, 1,1, l}

Compute & construct OBST for above values

b) State multistage graph problem and explain how it can be solved using forward approach. **[8]**

OR

Q4) a) State and explain the principle of dynamic programming. Name the elements of dynamic programming and give the difference between dynamic programming and Greedy method. **[8]**

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

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

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

b) Write an algorithm on Hamiltonian cycles using Backtracking Strategy.**[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. **[10]**

b) Describe with example following class: **[8]**

   i) P

   ii) NP

OR

Q8) a) Prove that CNF-SAT is polynomially transformable to DHC, hence DHC is NP-complete. **[10]**

b) Explain NP – Hard scheduling problem with example. Also comment on the time complexity. **[8]**

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

b) Explain in detail with example Logarithmic time merging algorithm. **[8]**

OR

*Q10)*a) Explain All pairs shortest paths. Also give parallel shortest paths algorithm. **[8]**

b) Explain in detail sorting and convex Hull algorithm. **[8]**

*Q11)*a) Explain Image edge detection 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]**

⊖⊖⊖