Total No. of Questions : 12]

SEAT No. :

P1449

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[4759]-205

B.E. (Computer Engineering)

DESIGN & ANALYSIS OF ALGORITHMS

(2008 Course) (Semester - I) (410441)

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

Instructions to the candidates:

1) ***Answer three questions from section- I and three questions from section -II.***
2) ***Answers 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 Prim's minimum spanning tree algorithm. Also explain it with suitable example. **[10]**

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

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

OR

Q2) a) Write an algorithm for Knapsack greedy problem.

Find an optimal solution for following knapsack problem:

n=4, M=70, w= {10, 20, 30, 40}, P = {20, 30, 40, 50} **[10]**

b) Write an algorithm for merge sort. State its time complexity by solving recurrence equation of merge sort. **[8]**

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

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

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

Compute & construct OBST for above values. **[8]**

P.T.O.

b) 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]**

OR

Q4) a) Explain multistage graph problem with forward approach 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	10	15	20
5	0	9	10
6	13	0	12
8	8	9	0

Q5) a) Explain in detail backtracking strategy and give control abstraction for the same. **[8]**

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

OR

Q6) a) Write an algorithm on Hamiltonian cycles using Backtracking Strategy. **[8]**

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

SECTION - II

Q7) a) State and explain in detail Cook's theorem. **[10]**

b) Describe with example following class:

i) P ii) NP **[8]**

OR

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

b) Explain NP hard code generation problem. **[8]**

Q9) a) Explain in detail with example Logarithmic time merging algorithm. **[8]**

b) Explain with example parallel evaluation of expression. **[8]**

OR

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

b) State and explain pointer doubling problem with algorithm, what is the time complexity of this algorithm. **[8]**

Q11)a) Explain Resource - Allocation algorithm with deadlock avoidance. **[8]**

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

OR

Q12)a) Explain Image edge detection algorithm. **[8]**

b) Explain how Huffman's technique is used for data coding. **[8]**

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