

Total No. of Questions : 12]

SEAT No. :

P1449

[4759]-205

[Total No. of Pages : 3

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 $\{k_1, k_2, k_3, k_4\} = \{\text{do, if, int, while}\}$.

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]

EEE