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B.E. (Computer Engg.)
DESIGN AND ANALYSIS OF ALGORITHMS
(2008 Pattern) (Semester - I)

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

Instructions to the candidates :

1) Answer any 3 questions from each section.
2) Answers to the two sections should be written in separate books.
3) Neat diagrams must be drawn wherever necessary.
4) Black figures to the right indicate full marks.
5) Assume suitable data, if necessary.

SECTION - I

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

b) Prove by contradiction: There exist two irrational numbers x & y such that x^y is rational. **[8]**

OR

Q2) a) Let the number of jobs be 4, and the associated profits with these jobs be $P_1 = 100$, $P_2 = 10$, $P_3 = 15$, P4 = 27 respectively. The deadline for completion of these jobs $d_1 = 2$, $d_2 = 1$, $d_3 = 2$ and $d_4 = 1$ respectively for the four jobs. Find the feasible solutions and an optimal solution for these Job sequencing using Greedy approach. **[7]**

b) Write an algorithm to solve Optimal Merge Patterns problem. **[5]**

c) Write an algorithm for Quick Sort. State its time complexity. **[6]**

Q3) a) Solve the instance of 0/1 knapsack problem using dynamic programming : **[8]**

n = 4, m = 25

$(P_1, P_2, P_3, P_4) = (10, 12, 14, 16)$

$(W_1, W_2, W_3, W_4) = (9, 8, 12, 14)$

b) What is Travelling Salesperson problem? Explain how it is solved using dynamic programming. **[8]**

P.T.O.

Q4) a) State multistage graphs problem and explain how it can be solved using forward approach. **[8]**

b) Write an algorithm for finding optimal binary search tree using dynamic programming strategy. What is its computing time? **[8]**

Q5) a) Explain the algorithm for 0/1 knapsack problem using backtracking. **[8]**

b) Write the control abstraction for LC- search. **[6]**

c) Differentiate between "backtracking" and "branch and bound" strategies. **[2]**

OR

Q6) a) Write backtracking algorithm form coloring of the graph. Determine the time complexity of the same. **[8]**

b) Explain branch and bound algorithm for Hamiltonian Cycles problem.**[8]**

SECTION - II

Q7) a) Explain how Directed Hamiltonian Cycle (DHC) reduces to Travelling Salesperson decision Problem (TSP). **[7]**

b) Prove that the sum of subsets problem is NP-Hard, given that exact cover problem is NP-Hard. **[7]**

c) Explain non deterministic algorithms. **[4]**

OR

Q8) a) Prove that CNF- satisfiability reduces to clique decision problem. **[6]**

b) Explain any two NP-Hard graph problems. **[6]**

c) Explain Cook's Theorem. Explain P and NP. **[6]**

Q9) a) Write an algorithm for prefix computation. Determine its time complexity. **[8]**

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

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

b) Write the odd-even merge sort algorithm and explain it with an example.[8]

*Q11)*a) Explain how Huffman's technique is used for data coding. [8]

b) Explain Convex Hull, Quick Hull and techniques to solve them. [8]

*Q12)*a) Explain any two heuristic search algorithms. [8]

b) Explain any two image edge detection algorithms. [8]

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