Total No. of Questions :12]

SEAT No. :

P1799

[Total No. of Pages :3

[4859]-202
B.E (Computer Engg.)
DESIGN & ANALYSIS OF ALGORITHMS
(2008 Course) (410441) (Semester - I)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Prove by contradiction: There exist two irrational numbers x and y such that x^y is rational. **[8]**

b) Write an algorithm for Merge Sort. State its time complexity. **[6]**

c) Explain the Greedy Kruskal's minimum spanning tree. **[4]**

OR

Q2) a) Consider the following instances of knapsack problem. n=3, m=20, $(p_1, p_2, p_3) = (25, 14, 15)$ and $(w_1, w_2, w_3) = (18, 15, 10)$. Find the feasible solutions using greedy method. **[8]**

b) Explain a control abstraction for divide and conquer strategy. Write the recurrence relation for quick sort. **[6]**

c) Explain the different ways of measuring the running time of an algorithm. **[4]**

Q3) a) With respect to dynamic programming explain the following: **[8]**

i) Principle of Optimality

ii) Optimal substructure

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

OR

P.T.O.

Q4) a) Explain Travelling Salesperson problem using dynamic programming with example. Specify its complexity. **[8]**

b) Let n=3 and (k_1, k_2, k_3) = {do, if, while} **[8]**

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

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

Compute and construct OBST for above values.

Q5) a) Write an algorithm to solve 8-Queens problem using backtracking method. **[8]**

b) Explain the difference between FIFO and LC branch-and-bound solution to 0/1 knapsack. **[8]**

OR

Q6) a) Write recursive backtracking schema for m coloring of the graph. Determine the time complexity of the same. **[8]**

b) Explain how branch and bound method can be used to solve travelling salesperson problem. **[8]**

SECTION - II

Q7) a) Explain how Directed Hamiltonian Cycle (DHC) reduces to travelling salesperson decision problem (TSP). **[6]**

b) Show that the job sequencing with deadlines problem is NP-hard. **[8]**

c) What are non-deterministic problems? Explain classes NP-hard and NP-complete. **[4]**

OR

Q8) a) Show that partition reduces to minimum finish time preemptive job shop schedule. **[6]**

b) Explain NP-Hard scheduling problem with example. **[6]**

c) State and explain Cook's Theorem. **[6]**

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

b) Explain how graph problems can be solved on parallel processors. **[8]**

OR

Q10)a) Write and explain pointer doubling algorithm with suitable example. **[8]**

b) How merge sort algorithm can be implemented on multiprocessors? Explain it with an example. **[8]**

Q11)a) Explain the sequential and parallel technique for solving the convex Hull problem? **[8]**

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

OR

Q12)a) Explain resource allocation algorithm with deadlock avoidance. **[8]**

b) Explain Huffman coding algorithm with example. **[8]**

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