

Total No. of Questions :12]

SEAT No. :

P1799**[4859]-202**

[Total No. of Pages :3

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 $(k_1, k_2, k_3) = \{\text{do, if, while}\}$ [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]
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b) Explain Huffman coding algorithm with example. [8]

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