

Total No. of Questions : 12]

SEAT No. :

P811

[Total No. of Pages : 3

[4659] - 224

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

*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) Solve the recurrence relation

$$T(n) = T(n-1) + T(n-3) - T(n-4), n \geq 4 \text{ subject to } T(n) = n \text{ for } 0 \leq n \leq 3. \quad [8]$$

- b) Write an algorithm for insertion sort. State its time complexity. [6]
- c) Explain with example the notations Big - O and Omega. [4]

OR

**Q2)** a) Write Prim's algorithm for minimum spanning tree. Analyze the algorithm for time complexity [8]

- b) Explain Divide and conquer strategy with example of Binary search. [6]
- c) Show that the following equality is correct  $5n^2 - 6n = \theta(n^2)$  [4]

**Q3)** a) Let  $n = 4$  and  $(a_1, a_2, a_3, a_4) = (\text{do}, \text{if}, \text{int}, \text{while})$ , let  $p(1:4) = (3, 3, 1, 1)$  and  $q(0:4) = (2, 3, 1, 1)$ , construct OBST using dynamic programming. [8]

- b) What is dynamic programming? Define principle of optimality and explain it for 0/1 Knapsack. [8]

**P.T.O.**

OR

- Q4)** a) State multistage graphs problem and explain how it can be solved using backward approach. [8]  
b) Find optimal solution for 0/1 Knapsack problem using Dynamic programming  
 $n = 3, (W_1, W_2, W_3) = (1,2,3) (P_1, P_2, P_3) = (1,2,4)$  and  $m = 6$ . [8]

- Q5)** a) Write an algorithm to solve 8-Queens problem using back tracking. [8]  
b) Explain the steps of solving Travelling salesMan problem using Branch and Bound. [8]

OR

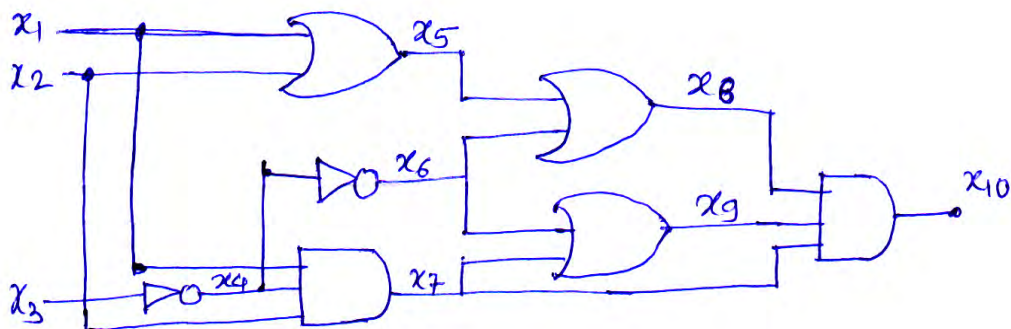
- Q6)** a) Explain Graph coloring problem with respect to backtracking. [8]  
b) What is Branch and Bound method? Explain FIFO Branch and Bound algorithm. [8]

**SECTION - II**

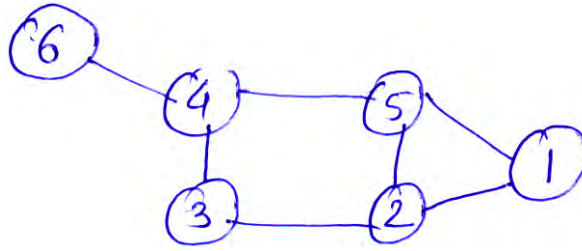
- Q7)** a) Write Cook's algorithm in pseudo C and find out its time complexity. State the significance of this algorithm. [8]  
b) Consider scheduling problem where six jobs have a profit of (10, 34, 67, 45, 23, 99) and corresponding deadlines (2, 3, 1, 4, 5, 3). Obtain optimum schedule. What is time complexity of your algorithm? [8]

OR

- Q8)** a) Reduce the following circuit satisfiability to formula satisfiability. [6]



- b) Define a Clique problem. Find out all possible Cliques for following graph. Does it contains a Clique of maximum size? [6]



- c) Explain in brief AND / OR Graph decision problem [4]

- Q9)** a) Explain pointer doubling algorithm with suitable example. [8]  
 b) How Quick sort can be implemented on multiprocessor system? Explain it with suitable Example. [8]

OR

- Q10)** a) State and explain different parallel computational models. [8]  
 b) Write an algorithm for odd-even merge sort & Illustrate it with following set of numbers. 2, 4, 3, 5, 6, 1, 7, 8. [8]

- Q11)** a) Write an algorithm to implement Hoffman coding algorithm. [6]  
 b) What do you mean by Heuristic search algorithm?  
 Explain it in brief with suitable example. [8]

- c) State and explain Resource allocation algorithm [4]

OR

- Q12)** a) State and explain Image edge detection algorithm. [8]  
 b) What is meaning of deadlock detection and deadlock avoidance ? what are the necessary conditions for deadlock to occur? [6]  
 c) Explain convex Hulls problem. [4]

