

[5353] - 598

**T.E. (Information Technology) (Semester - II)****DESIGN AND ANALYSIS OF ALGORITHMS****(2015 Pattern)****Time : 2½ Hours]****[Max. Marks : 70****Instructions to the candidates:**

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume suitable data if necessary.

- Q1)** a) Write an algorithm to solve 8 queen's problem using Brute force method. [5]
- b) Let  $n = 3$  and  $(11, 12, 13) = (5, 10, 3)$  find the optimal ordering on tapes using Greedy method. [5]

OR

- Q2)** a) Prove by mathematical induction that for each positive number  $n$   $1+2+3+\dots+n=n(n+1)/2$ . [5]
- b) Write an algorithm for finding the maximum and minimum element using divide and conquer and verify its complexity. [5]
- Q3)** a) Find the solution of following travelling salesman problem using dynamic programming. [8]

cost matrix =

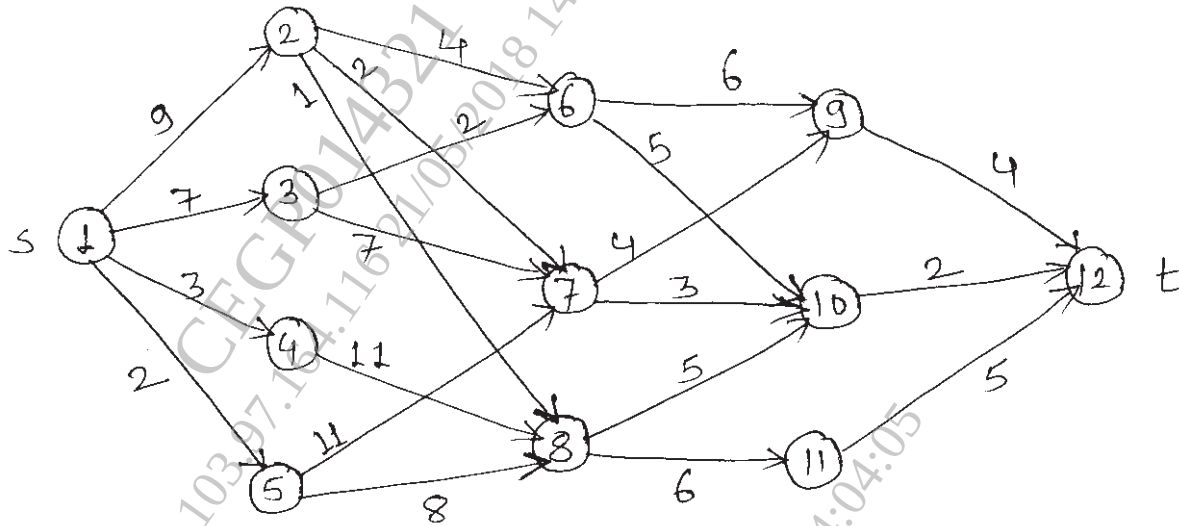
|   | 1 | 2  | 3  | 4  |
|---|---|----|----|----|
| 1 | 0 | 10 | 15 | 20 |
| 2 | 5 | 0  | 9  | 10 |
| 3 | 6 | 13 | 0  | 12 |
| 4 | 8 | 8  | 9  | 0  |

- b) Define greedy method. [2]

**P.T.O.**

OR

**Q4)** Find the minimum cost path from source (s) to sink (t) of the following multistage graph. [10]



- Q5)** a) Write a recursive and Iterative algorithm of backtracking method. [8]  
 b) Let  $W = \{5, 10, 12, 13, 15, 18\}$  and  $M = 30$ . Find all possible subsets of  $W$  that sum to  $M$ . Draw the portion of state space tree. [8]

OR

- Q6)** a) Write an algorithm for backtracking solution to the 0/1 knapsack problem. [8]  
 b) Explain the following terms : [8]  
 i) State space tree.  
 ii) Live node.  
 iii) E-node.  
 iv) Dead node.

- Q7)** a) Solve the following instance of 0/1 knapsack problem by LC branch and bound approach [10]  
 $N = 4$ ,  $(p_1, p_2, p_3, p_4) = (10, 10, 12, 18)$   
 $(w_1, w_2, w_3, w_4) = (2, 4, 6, 9)$  and  $M = 15$   
 b) Write an algorithm for FIFO branch and bound. [8]

OR

- Q8) a)** What is travelling salesman problem? Find the solution of the following travelling salesman problem using branch and bound method. [12]

cost matrix = 
$$\begin{bmatrix} \infty & 4 & 2 \\ 3 & \infty & 4 \\ 1 & 8 & \infty \end{bmatrix}$$

- b) Explain the following terms: [6]
- i) Branch and bound.
  - ii) LC search.
  - iii) Bounding Function.

- Q9) a)** What is Nondeterministic algorithm? Write the Nondeterministic algorithm for sorting the element of an array. [8]
- b) Explain complexity classes P and NP. And differentiate between NP complete and NP Hard. [8]

OR

- Q10) a)** Prove that Clique Decision problem is NP complete. [8]
- b) Explain the Flynn's classification for Parallel Computing. [8]



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