

Total No. of Questions : 10]

SEAT No. :

P2473

[Total No. of Pages : 3

[5253]-196

T.E. (Information Technology) (Semester - II)
DESIGN AND ANALYSIS OF ALGORITHMS
(2012 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 and 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)** Explain direct proof and proof by counter example techniques. **[4]**
- b)** Define following asymptotic notations: **[6]**
- i) Theta
 - ii) Little Oh
 - iii) Little Omega

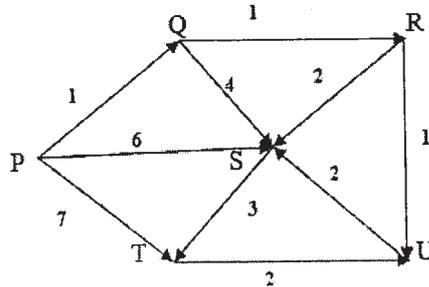
OR

- Q2) a)** Write an algorithm for binary search using recursion and find out its best case, average case & worst case time complexities. **[5]**
- b)** Consider 0/1 knapsack problem by: $N = 3$; $W = (4, 6, 8)$ and $P = (10, 12, 15)$. Using dynamic programming. Determine the optimal profit for the knapsack of capacity 10. **[5]**
- Q3) a)** Explain the following terms with reference to Greedy Technique. **[5]**
- i) Feasible solution and Optimal solution
 - ii) Subset paradigm and ordering paradigm
- b)** Write Warshall's algorithm for finding transitive closure and find its time complexity. **[5]**

P.T.O.

OR

- Q4) a)** Apply Dijkstra's algorithm for finding all shortest paths from a single source 'P' in a given graph. [5]



- b) Write a note on Masters theorem. [5]

- Q5) a)** State the principle of backtracking: Explain the constraints used in backtracking with an example. [8]

- b) Write an algorithm for Hamiltonian cycle problem using backtracking method. [8]

OR

- Q6) a)** What is m-colorability optimization problem? Explain with an example. [8]

- b) Find all possible solutions for 5- queens' problem using backtracking method. [8]

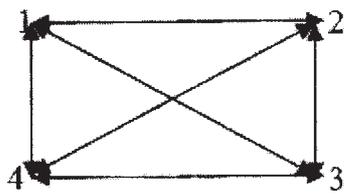
- Q7) a)** Explain the term : [10]

- i) Branch and Bound.
- ii) LC search.
- iii) FIFO branch & bound.
- iv) Bounding function.
- v) Difference in LIFOBB and LCBB.

- b) Write and explain the upper bound function for 0/1 Knapsack problem by branch and bound method. [8]

OR

Q8) What is travelling sales person problem? Find the solution of the following travelling sales person problem using Dynamic approach and Branch and Bound approach. **[18]**



$$\begin{pmatrix} 0 & 10 & 15 & 20 \\ 5 & 0 & 9 & 10 \\ 6 & 13 & 0 & 12 \\ 8 & 8 & 9 & 0 \end{pmatrix}$$

- Q9) a)** What do you mean by P, NP, NP-Hard and NP-Complete problems? Give an example of each category. **[8]**
- b) Explain the need and significance of parallel algorithms. **[8]**

OR

- Q10)a)** Explain the following : **[8]**
- i) Computational complexity.
 - ii) Decision problems.
 - iii) Deterministic and Non-deterministic classes.
 - iv) Complexity classes.
- b) Explain the possible parallel computations using complete binary tree. **[8]**

