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

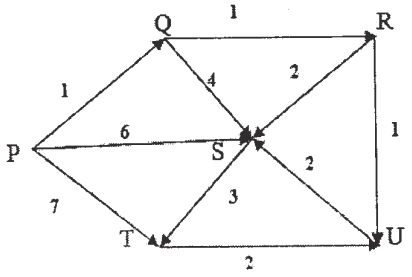
ii) Subset paradigm and ordering paradigm

b) Write Warshall's algorithm for finding transitive closure and find its time complexity. **[5]**

P.T.O.

OR

Q4) a) Apply Dijkstraw'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.

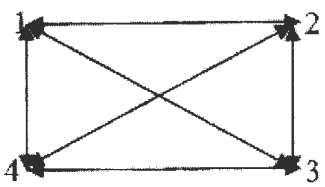
iv) Bounding function.

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]**