

Total No. of Questions : 10]

SEAT No. :

P1361

[Total No. of Pages : 3

[4858] - 1110

T.E. (Information Technology)

DESIGN AND ANALYSIS OF ALGORITHMS

(2012 Pattern) (Semester - II) (Theory) (End Sem.)

Time : 3 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) Solve following recurrence relation : **[5]**

$$T(n) = T(n/2) + 1$$

$$T(1) = 1$$

b) Analyze merge sort and find time complexity of merge sort. **[5]**

OR

Q2) a) Write an algorithm to solve “Tower of Hanoi” problem. **[5]**

b) Consider following instance for simple knapsack problem. Find the solution using greedy method. **[5]**

$$N = 8$$

$$P = \{ 11, 21, 31, 33, 43, 53, 55, 65 \}$$

$$W = \{ 1, 11, 21, 23, 33, 43, 45, 55 \}$$

$$M = 110$$

Q3) a) Write Prim’s algorithm to find minimum spanning tree. **[5]**

b) What is Principle of optimality? Differentiate between greedy and dynamic method. **[5]**

P.T.O.

OR

- Q4)** a) Write Dijkstra's algorithm to find all pairs shortest path. [5]
b) Write short note on : Proof by counterexample. [5]

- Q5)** a) Write an algorithm to find hamiltonian path using backtracking method. [8]

- b) Differentiate between backtracking and branch and bound. Draw state space tree for given sum of subset problem : [8]

Set of elements = {3, 5, 6, 7} and d = 15

OR

- Q6)** a) What is backtracking? Write general recursive algorithm for backtracking. [8]

- b) Discuss and analyze problem of graph coloring using backtracking with the help of example. [8]

- Q7)** a) Describe in brief the general strategy used in branch and bound method. Write general algorithm for Branch and Bound Method. [10]

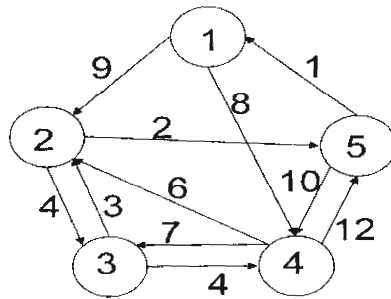
- b) Consider 0/1 Knapsack instance n = 4 with capacity 10 kg. such that [8]

Item	Profit (in Rs.)	Weight (in Kg)
1	40	4
2	42	7
3	20	5
4	12	3

Find maximum profit using Least Cost branch and bound (LCBB) method. Use fixed size formation for state space tree.

OR

- Q8)** What is travelling salesman problem? Find the solution of following travelling salesman problem using branch and bound method. [18]



- Q9)** a) Prove that vertex cover problem is NP complete. [8]
b) Explain in detail models for parallel computing. [8]

OR

- Q10)** a) Explain : NP-Hard, NP-Complete, Decision Problem and Polynomial Time Algorithm. [8]
b) Write an algorithm for pointer doubling problem. What is the time complexity of this algorithm? [8]

