

[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]

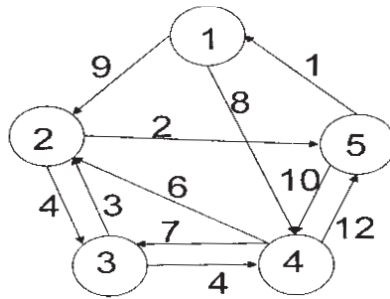
- b) Consider 0/1 Knapsack instance n = 4 with capacity 10 kg. such that [8]

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]

