

Total No. of Questions : 10]

SEAT No. :

P2433

[4758]-605

[Total No. of Pages : 4

T.E. (Information Technology)

DESIGN AND ANALYSIS OF ALGORITHMS

(2012 Pattern) (Semester - II) (end - Sem.) (314449)

Time : 2½ Hours]

[Max. Marks :70

Instructions to the candidates:

- 1) *Answers 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) 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 find factorial using recursion. Find the time complexity. **[5]**

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

$$N=8$$

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

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

$$M=110$$

P.T.O.

- Q3) a)** Write Kruskal's algorithm to find minimum spanning tree. [5]
- b) Write Floyd's algorithm for all pairs shortest path and find time complexity. [5]

OR

- Q4) a)** Solve the following job sequencing problem using greedy algorithm. [5]

$N(\text{Number of jobs}) = 4$

Profits associated with jobs $(P_1, P_2, P_3, P_4) = (100, 10, 15, 27)$. Deadline associated with jobs $(d_1, d_2, d_3, d_4) = (2, 1, 2, 1)$.

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

- Q5) a)** Write recursive backtracking algorithm for sum of subset problem. [8]

- b) Write an algorithm for 0/1 knapsack problem using backtracking method. [8]

OR

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

- b) Write short note on: [8]

- i) State space tree
- ii) Live node
- iii) Expanding node (E-node)
- iv) Bounding function

Q7) a) Explain the term:

[10]

- i) Least cost branch and bound.
- ii) Compare backtracking and branch and bound method.

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 first in first out branch and bound (FIFOBB) 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]**

Cost Matrix =

∞	20	30	10	11
15	∞	16	4	2
3	5	∞	2	4
19	6	18	∞	3
16	4	7	16	∞

- Q9)** a) Prove that Clique problem is NP complete. [8]
- b) Explain how parallel computations are possible using complete binary tree. [8]

OR

- Q10)**a) Specify one example of NP-hard problem. Also mention that why it is NP hard. [8]
- b) Explain in detail models for parallel computing. [8]

EEE