

[5058] - 170

T.E. (IT)

DESIGN AND ANALYSIS OF ALGORITHMS

(2008 Course) (314455) (Semester - II)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) Draw neat diagrams wherever necessary.*
- 2) Assume suitable data, if necessary.*
- 3) Figures to the right indicate full marks.*

SECTION - I

Q1) a) Name any three proof techniques. Discuss any one in detail. You may take an example. **[8]**

b) What is worst case time complexity of the following: **[8]**

$100n^2$, 2^n , $5.6n^3$, $7n!$, $1000n$, 519 , $n^2 \log n$, n^4 .

OR

Q2) a) Arrange the following in the ascending order according to their time complexity: **[8]**

$10n^5$, 3^n , n^3 , $n!$, $1000n$, 519 , $n^2 \log n$, 2^n .

b) Write an algorithm to search an element in an array of size n . Calculate complexity of this algorithm. **[8]**

Q3) a) What is divide and conquer strategy? Write general steps. **[8]**

b) Explain Prim's algorithm. Comment on its complexity. **[8]**

OR

Q4) a) What is greedy method? Write characteristics of greedy method. **[8]**

b) Write Kruskal's algorithm. Comment on its complexity. **[8]**

P.T.O.

Q5) a) What is Dynamic Programming technique? [9]

b) Explain with suitable example Warshall's algorithm. [9]

OR

Q6) a) Compare dynamic programming and divide and conquer. What are the advantages and disadvantages of both techniques. [9]

b) Explain knapsack problem. State its recurrence relation. [9]

SECTION - II

Q7) a) Explain the following terms: [8]

Live nodes, expanding nodes, bounding function and solution space.

b) Explain 4 queens problem using backtracking. [8]

OR

Q8) What is backtracking? What kind of problems does it solve? Solve the following knapsack problem using backtracking. [16]

i	p_i	w_i
1	24	15
2	15	10
3	25	18

For $n = 3$ and $m = 20$.

Q9) a) Explain the terms:

Branch and Bound, LC, LIFO and Bounding function. How are LIFO and LC techniques different? [9]

b) Differentiate between Backtracking and Branch and Bound. [9]

OR

Q10)a) Explain dynamic reduction technique for Travelling Sales Person. [9]

b) Explain the terms: state space, live node, static trees and dynamic trees.[9]

Q11)a) What is a deterministic and non-deterministic algorithm? Write a non - deterministic algorithm for searching an element. [8]

b) Prove that: A clique problem is NP-complete. [8]

OR

Q12)a) What is satisfiability problem? Explain DNF and CNF. [8]

b) Explain NP-Complete and NP-Hard. Give examples. Are all NP-Complete problems NP-Hard or vice versa? Justify. [8]

