

Total No. of Questions : 12]

SEAT No. :

P1435

[Total No. of Pages : 3

[4858] - 210

T.E. (IT) (Semester - II)

DESIGN AND ANALYSIS OF ALGORITHMS

(2008 Pattern)

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) Explain O , θ and Ω notations. Give examples. [8]

b) Explain any two proof techniques with suitable examples. [8]

OR

Q2) a) What is the framework for analysis of algorithms? Discuss all the components. [8]

b) Explain amortized analysis. [8]

Q3) Use of divide and conquer technique for multiplication of large integers, reduces time complexity of algorithms. Two n -digit numbers require 3 multiplications of $n/2$ numbers. Thus $M(n) = 3 M(n/2)$ for $n > 1$ and $M(1) = 1$. Solve this recurrence and find the time complexity for this recurrence. [16]

OR

Q4) a) Construct Huffman tree using greedy strategy. [8]

character	A	B	C	D	-
probability	0.35	0.1	0.2	0.2	0.15

b) Explain closest pair problem. How can it be solved using divide and conquer strategy. [8]

P.T.O.

- Q5)** a) What is Dynamic programming? Is this the optimization technique? Give reasons. What are its drawbacks? [9]
- b) Compare dynamic programming and divide and conquer. What are the advantages and disadvantages of both techniques. [9]

OR

- Q6)** a) Explain knapsack problem. State its recurrence relation. What is the strategy of solving knapsack problem using Dynamic Programming paradigm? [9]
- b) Compare matrix generation for Warshall's algorithm and Floyd's algorithm with suitable examples. [9]

SECTION - II

- Q7)** a) Explain the following terms : [8]
Live nodes, expanding nodes, bounding function and solution space.
- b) Consider $S=\{5,10,12,13,15,18\}$ and sum of subsets=30. Find different subsets. [8]

OR

- Q8)** a) Explain 4-queens problem using backtracking. State the constraints for placement of queens on 4x4 chessboard. [8]
- b) Write GraphColoring algorithm. State time complexity. [8]

- Q9)** a) Explain the terms : [9]
Branch and Bound, LC, LIFO and Bounding function. How are LIFO and LC techniques different?
- b) Explain dynamic reduction for TSP. [9]

OR

- Q10)** a) Explain FIFO Branch and bound with suitable example. [9]
- b) Explain the terms: state space, live node, static trees and dynamic trees. [9]

- Q11)** a) Write non-deterministic algorithm for sorting elements of an array.
Write its complexity. [8]
- b) What is a halting problem? Is this NP-Complete or NP-Hard? [8]

OR

- Q12)** a) Write non-deterministic algorithm for searching an element of an array.
Write its complexity. [8]
- b) Explain Cook's theorem. [8]

