

C. U. SHAH UNIVERSITY

Summer Examination-2022

Subject Name: Design and Analysis of Algorithms

Subject Code: 4TE05DAA1

Branch: B.Tech (CE)

Semester: 5

Date: 26/04/2022

Time: 11:00 To 02:00

Marks: 70

Instructions:

- (1) Use of Programmable calculator & any other electronic instrument is prohibited.
- (2) Instructions written on main answer book are strictly to be obeyed.
- (3) Draw neat diagrams and figures (if necessary) at right places.
- (4) Assume suitable data if needed.

- Q-1 Attempt the following questions: (14)**
- a) Define space and time complexity of algorithm. (01)
 - b) Write the complexity of insertion sort and binary search. (01)
 - c) Explain transitive relation. (01)
 - d) Define: Minimum Spanning Tree (01)
 - e) Define: Breadth First Search (01)
 - f) Define: Directed acyclic graph. (01)
 - g) When is a problem said to be NP? (01)
 - h) Arrange following rate of growth in increasing order: (01)
 $2N, n \log n, n^2, 1, n, \log n, n!, n^3$
 - i) Define big Theta (Θ) notation. (01)
 - j) What is the difference between recursion and iteration? (01)
 - k) What are the advantages of an algorithm? (01)
 - l) Which condition needs to be fulfilled for binary search? (01)
 - m) Name any two graph algorithm. (01)
 - n) What is the time complexity to insert an element in unsorted array? (01)

Attempt any four questions from Q-2 to Q-8

- Q-2 Attempt all questions**
- (a) What is Asymptotic notation? Explain upper bound notation, lower bound notation and tight bound notation. (7)
 - (b) Solve following recurrences. (7)
 1. $T(n) = T(n/3) + T(2n/3) + O(n)$
 2. $T(n) = 2T(n/2) + n$

- Q-3 Attempt all questions**
- (a) Differentiate: Divide and conquer strategy, Greedy algorithms and dynamic programming strategy (7)



- (b) Solve the following 0/1 knapsack problem with knapsack capacity=8. (7)
 $I = (I_1, I_2, I_3, I_4)$
 $V = (15, 10, 9, 5)$
 $W = (1, 5, 3, 4)$
- Q-4 Attempt all questions**
- (a) Analyze Divide and conquer algorithm. Write its algorithm and derive its complexity. (7)
 (b) Explain Dijkstra's shortest path algorithm. (7)
- Q-5 Attempt all questions**
- (a) Find Longest Common Subsequence of given two strings using Dynamic programming strategy. $S_1 = zxcvcvbcv$ $S_2 = zxcxvbn$ (7)
 (b) Explain prim's minimum spanning tree algorithm with an example. (7)
- Q-6 Attempt all questions**
- (a) Solve the following matrix chain multiplication problem in optimal way. (7)
 $M_1: 5 \times 4, M_2: 4 \times 6, M_3: 6 \times 2, M_4: 2 \times 7$
 (b) Explain N-Queen problem with an example of 8-queens problem. Give at least four possible solutions of 8-queens problem. (7)
- Q-7 Attempt all questions**
- (a) Explain Naive String matching algorithm. (7)
 (b) Explain kruskal's algorithm with example. (7)
- Q-8 Attempt all questions**
- (a) Explain NP hard type and NP complete type of problems. (7)
 (b) What is relation? Explain types of relation with example. (7)

