Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY
Winter Examination-2018

Subject Name : Design and Analysis of Algorithms

Subject Code : 4TE05DAA1 **Branch: B.Tech (CE,IT)**

Semester : 5 **Date : 03/12/2018** **Time : 10:30 To 01:30** **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:**

(a) Define Algorithm. **(01)**
(b) Write best case and worst case time complexity of binary search. **(01)**
(c) Define Big-Omega asymptotic notation. **(01)**
(d) Define feasible solution. **(01)**
(e) State principle of optimality. **(01)**
(f) Define directed acyclic graph. **(01)**
(g) Write best case and worst case time complexity of merge sort. **(01)**
(h) Define memoization. **(01)**
(i) Differentiate: Longest common subsequence problem and longest common substring problem. **(01)**
(j) Define Minimum Spanning Tree. **(01)**
(k) List methods for solving recurrences. **(01)**
(l) Write best case and worst case time complexity of quick sort. **(01)**
(m) List algorithms for string matching. **(01)**
(n) Give the example that solved in polynomial time. **(01)**

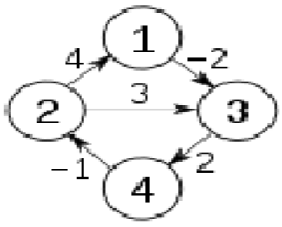
Attempt any four questions from Q-2 to Q-8

Q-2 **(a)** Explain key characteristics of an algorithm. **(03)**
(b) Prove or disprove that $f(n) = 1 + 2 + 3 + ... + n \in \Theta(n^2)$. **(04)**
(c) Why amortized analysis is required? Explain any two method of amortized analysis with suitable example. **(07)**

Q-3 **(a)** Differentiate: Divide & Conquer method and Dynamic Programming method. **(03)**
(b) Solve following recurrence using recursion tree: **(04)**
$T(n) = T(n/4) + T(n/2) + cn^2$
(c) Solve following knapsack problem using Greedy method: **(07)**
Number of items = 6. Max weight capacity, W = 16.
Weight = {6, 10, 3, 5, 1, 3} and Value = {6, 2, 1, 8, 3, 5}.

Q-4 **(a)** Solve following Making Change problem using Dynamic Programming: **(07)**
Amount = Rs. 7 and Denominations = Rs.1, Rs.2 and Rs.4

(b) Solve all pair shortest path problem for the following graph using Floyd-Warshall algorithm: **(07)**



Q-5 **(a)** Write an algorithm for Quick sort. Also analyze it in best case running time. **(07)**

(b) Explain Matrix Chain Multiplication with example. **(07)**

Q-6 **(a)** Find Longest Common Subsequence using Dynamic Programming technique for the following sequences: **(07)**

X = computer

Y = calculator

(b) Explain activity selection problem using greedy method with example. **(07)**

Q-7 **(a)** What is the basic idea behind Rabin – Karp algorithm? What is expected running time of this algorithm? Explain it with example. **(07)**

(b) What is the use of Kruskal's algorithm? Explain it with example. **(07)**

Q-8 **(a)** What is backtracking? Explain N-queen problem. Also give the solution for the 8-queen problem. **(07)**

(b) Explain the concept of P, NP, NP-complete and NP-Hard problems with appropriate examples. **(07)**