POSSESION OF MOBILES IN EXAM IS UFM PRACTICE.

Name _____ **Enrollment No.** 37

Jaypee Institute of Information Technology, Noida
Test-2 Examination, Even 2024
B. Tech. IV Semester/ VI Semester (Minor Specialization)

Course Name: Algorithms and Problem Solving **Max. Time: 1 Hour**
Course Code: 15B11CI411 **Max. Marks: 20**

CO1	Demonstrate a familiarity of complexity classes, the notion of algorithm, asymptotic analysis and problem solving approaches.
CO2	Apply a standard algorithm for solving fundamental problems such as sorting, searching, and graph based problems.
CO3	Analyze and identify an appropriate data structure and/or algorithm design strategy for a given problem.
CO4	Design an efficient algorithm to solve a given problem.

Q1. Given a sequence of matrices representing co-workers and their dimensions (3×5, 5×4, 4×6, 6×2, 2×5) representing their individual capabilities. The goal is to parenthesize the sequence of co-workers to enhance their collective productivity and effectiveness in the workplace. Find the optimal arrangement (show intermediate steps) to maximize the scalar multiplication.

[CO2(Apply): 5 Marks]

Q2. Construct a network on four vertices for which the Ford-Fulkerson algorithm may need more than a million iterations depending on the choice of augmenting paths. What are the comparative advantages and disadvantages of using Ford-Fulkerson algorithm and Edmonds-Karp algorithm in solving network flow problems particularly in terms of efficiency, implementation complexity, and applicability to various type of networks? **[CO3 (Analyze): 4 Marks]**

Q3. Given a row of n coins with positive values v(1), v(2),....v(n), where n is even, two players play a game alternatively. In each turn, a player select either the first or the last coin from the row, removes it permanently and receives the value of the coin. Let maxAmount(i, j) be the function that computes the maximum amount of money player 1 can definitely win if the coins remaining in the row are from index i to index j. The problem is to:

a) Formulate base step and recursive step of dynamic programming based solution.
b) Write dynamic programming based algorithm for the above problem.
c) Determine the maxAmount(1,n) for the given set of values: [7, 13, 8, 10, 12, 9]

[CO4 (Create): 6 Marks]

Q4. A message is made up entirely of characters from the set X= {P, Q, R, S, T}. The table of probabilities of each character is given below: A message of 100 characters over X is encoded using Huffman coding and Shannon-Fano coding. Compare both approaches in terms of bit requirement of the encoded message.

Character	Probability
P	0.22
Q	0.34
R	0.17
S	0.19
T	0.08
Total	1.00

[CO3 (Analyze): 5 Marks]