

Course/ Batch: BTech/ SCSET
Course Code: CSET244
Semester: Even
Session: 2024-2025

Course Type: Core
Course Name: Design and Analysis of Algorithms

Tutorial Assignment: Week 10

Tutorial title: Dynamic Programming

CO Mapping

Question no	CO1	CO2	CO3
Q1	✓	✓	
Q2	✓	✓	
Q3	✓	✓	
Q4	✓	✓	
Q5	✓	✓	

Q1. Find the optimal solution for 0/1 knapsack problem

$(w_1, w_2, w_3) = (2, 3, 3)$

$(p_1, p_2, p_3) = (1, 2, 4)$ and $W = 6$

Q2. Consider the weights and values of items listed below. Note that there is only one unit of each item.

Item No.	Weight	Value (in Rupees)
1	10	60
2	7	28
3	4	20
4	2	24

The task is to pick up a subset of these items such that their total weight is no more than 11 Kgs and their value is maximized. Moreover, no item may be split. The total value of the items picked by an optimal algorithm is denoted by V_{opt} . A greedy algorithm sorts the item by their value to weight ratios in descending order and packs them greedily, starting from the first item in the ordered list. The total value of the item picked by the greedy algorithm is denoted by V_{greedy} . Find the value of $V_{\text{opt}} - V_{\text{greedy}}$.

Q3. Determine the length of Longest Common Subsequence of $\langle 1,0,0,1,0,1,0,1 \rangle$ and $\langle 0,1,0,1,1,0,1,1,0 \rangle$ and state the subsequences.

Q4. Consider two strings $A = \langle q p q r r \rangle$ and $B = \langle p q p r q r p \rangle$. Let X be the length of the LCS between A and B and Y be the number of longest common subsequences between A and B , then find the value of $X + 10Y$