Class Test-02

Time: 40 minutes | Set-01 | Full Marks:15 (3×5)

A thief breaks into a store that contains the following items. Each item has a weight and a value. The thief can carry at most 20 kg in his knapsack. He can take fractions of items.

Item	Weight (kg)	Value ($)
A	5	30
B	10	50
C	15	60
D	7	70
E	8	40

1. Calculate the value-to-weight ratio for each item. Rank the items in descending order based on this ratio. (Marks: 02)
2. Based on the greedy approach, determine which items (whole or fractional) the thief should pick to maximize total value within the 20 kg limit. If the knapsack's weight limit is reduced to 10 kg, what would be the new optimal selection and total value**?** (Marks: 04)
3. Compute the maximum total value the thief can obtain. Show how much weight is taken from each item and the corresponding value. (Marks: 03)
4. Write a program to implement your answer for question no. 03 (Marks: 06)

Class Test-02

Time: 40 minutes | Set-02 | Full Marks:15 (3×5)

You are given a set of activities with their start and finish times. Only one activity can be performed at a time. Your goal is to select the maximum number of non-overlapping activities using the Activity Selection Algorithm (greedy approach).

Activity	Start Time	Finish Time
A	1	4
B	3	5
C	0	6
D	5	7
E	8	9
F	5	9
G	6	10

1. Using the greedy strategy, select the maximum number of non-overlapping activities. Show the step-by-step decision-making process that leads to the final selection. (Marks: 05)

2. List the selected activities. Which activity is chosen first and why? If Activity D's finish time is changed to 8, how does this affect the selected set of activities? List the new optimal selection. (Marks: 05)

3. Write a program to implement your answer for question no. 01 (Marks: 05)

Class Test-02

Time: 40 minutes | Set-03 | Full Marks:15 (3×5)

A partial DNA sequence was recovered from a piece of clothing found at a park, believed to belong to a missing child. Two families have come forward, each providing the DNA sequence of their missing child.

Scene DNA	*AGTCG*
Child 1 DNA	*ATGCG*
Child 2 DNA	*ATAGC*

1. By calculating the LCS lengths, design a solution to identify the child whose DNA best matches the scene DNA, and justify your conclusion. (Marks: 06)
2. Write a program to print the length of the LCS you computed in question no. 01 (Marks: 04)
3. Write a program to print the LCS you computed in question no. 01 (Marks: 05)