# 221 Assignment (Greedy + DP)

## Question : 1 Mark(10+5)

A team of two infamous thieves, Denver and Nairobi, planned to rob the famous Louvre Museum. Before the scene, they both agreed on the fact that none of them will break any item as all the items in the Louvre are too precious, and taking a fraction of any item won't sell in the black market. If it fits in the bag as a whole, they will take it, otherwise, leave it as it is.

Both of them arrived at the Louvre with an empty knapsack weighing a total of 8 kg. Despite the fact that both thieves are experts in their fields, they take slightly different approaches. Denver believes he will use a Dynamic Programming Approach to rob the items in the most efficient manner possible. Nairobi, on the other hand, believes that if she chooses a Greedy Approach, she will make the most money.

The objects in the Louvre Museum are listed below.

| **Objects** | **Jewelry** | **Sculpture** | **Painting** | **Book** | **Mummy** |
|---|---|---|---|---|---|
| **Profit ($)** | 5 | 9 | 5 | 4 | 6 |
| **Weight (Kg)** | 3 | 5 | 4 | 1 | 12 |

i) **Calculate** the maximum profit Denver can make using his strategy. What items did he pick up? **Show** how Denver used the DP table to select these objects. You may use arrows and circles to point to the chosen cells.
ii) Does Nairobi's belief remain valid after the robbery? **Prove** it.

## Question : 2 Mark(5+5)

You are given the following table containing symbols and their frequencies:

| **Symbol** | A | B | C | D | # |
|---|---|---|---|---|---|
| **Frequency** | 35 | 15 | 25 | 10 | 20 |

i) **Build** the Huffman code tree and find the codewords for each character.
ii) **Decode** 100010111001010 using the Huffman code that you generated.