FRACTIONAL KNAPSACK USING PYTHON.

Weights = [2, 3, 4, 5]
Values = [10, 20, 30, 40]
Capacity = 10

Step 1 : Create a 2d array of (weights, value) in a list.

l = [(2, 10), (3, 20), (4, 30), (5, 40)]

weight — value

Step 2 : Take ratio of either value/weight or weight/value and store them in a list.

if you are going for value/weight it will affect further steps accordingly,

$X[i] = \frac{\text{value}}{\text{weight}}$ $\frac{20}{10} = 5.0$

X = [5.0, 6.67, 7.5, 8]

Step 3 : To map the ratios in descending order with respective weights and values, first intialize a variable with range of weights.

a = 4 → [2, 3, 4, 5]
0 1 2 3
4

a = [0, 1, 2, 3]

Step 4 : Map ratio in descending order using index

a = [3, 2, 1, 0]

a = [3, 2, 1, 0]
8 7.5 6.67 5

Step 5 : Check whether the capacity at index [i] is greater then provided capacity. If true then add the value of weight to maximum_value, to be remove the weight from capacity which is equal to the value of weight added. i.e.

3 → Weight = 5, value = 40.
→ Capacity (10) > Weight (5):
∴ maximum_value = 40
∴ Capacity = capacity (10) - weight (5)
Capacity = 5

2 → Weight = 4, value = 30
→ Capacity (5) > weight (4)
∴ maximum_value = 40 + 30 = 70
∴ Capacity = capacity (5) - weight (4)
Capacity = 1

Step 6: Now if capacity is less than the weight in index (i) then add product of capacity and ratio of value/weight at index [i] i.e to utilize total capacity provided.

1 → Weight = 3 value = 20
→ Capacity (1) < weight (3)
∴ maximum_value = capacity (1) × ratio of v/w at index [i] (6.67)
= 70 + 6.67 = 76.67