

Modern Education Society's
Wadia College of Engineering, Pune

NAME OF STUDENT:	CLASS:
SEMESTER/YEAR:	ROLL NO:
DATE OF PERFORMANCE:	DATE OF SUBMISSION:
EXAMINED BY:	EXPERIMENT NO: LP-III(DAA)-03

TITLE: Knapsack Problem

AIM: Write a program to solve a fractional Knapsack problem using a greedy method.

OBJECTIVES:

- 1) Learn how to implement algorithms that follow greedy strategy.
- 2) Analyze performance of an algorithm

PER-REQUISITES:

1. Knowledge of Fractional Knapsack problem using a greedy method.

THEORY:

Given the weights and values of **N** items, put these items in a knapsack of capacity **W** to get the maximum total value in the knapsack. In **Fractional Knapsack**, we can break items for maximizing the total value of the knapsack

Note: In the 0-1 Knapsack problem, we are not allowed to break items. We either take the whole item or don't take it.

Greedy approach for fractional knapsack problem:

An efficient solution is to use the Greedy approach. The basic idea of the greedy approach is to calculate the ratio value/weight for each item and sort the item on the basis of this ratio. Then take the item with the highest ratio and add them until we can't add the next item as a whole and at the end add the next item as much as we can. Which will always be the optimal solution to this problem.

ALGORITHM:-

Steps to solve the problem using the above approach:

- 1) Calculate the ratio(value/weight) for each item.
- 2) Sort all the items in decreasing order of the ratio.
- 3) Initialize res =0, curr_cap = given_cap.
- 4) Do the following for every item "i" in the sorted order:
 - If the weight of the current item is less than or equal to the remaining capacity then add the value of that item into the result

- else add the current item as much as we can and break out of the loop

5)Return res

CONCLUSION:-Implemented fractional knapsack using a greedy strategy successfully.

QUESTIONS FOR REVIEW:

- 1) Write realistic applications of this experiment in brief (at least two applications).?
- 2) Explain Kanpsack with example using greedy approach?

Item	Weight	Value
1	5	30
2	10	40
3	15	45
4	22	77
5	25	90

- 3)Analyse time complexity of knapsack ?