NAME :- MARVIN PATEL
ER NO :- 22162101013
BATCH:- 51
SUB :- AAD
PRACTICAL- 9

A thief is robbing a store and can carry a maximal weight of W into his knapsack. There
are n items available in the store and weight of i th item is wi and its profit is pi. What
items should the thief take?
In this context, the items should be selected in such a way that the thief will carry those
items for which he will gain maximum profit. Hence, the objective of the thief is to maximize the profit.
Implement Program for fractional knapsack using Greedy design technique.
Note: First solve the example:
W=60

Item	A	B	C	D
Profit	280	100	120	120
Weight	40	10	20	24

Sample Input:-
p=[280,100,120,120]
w=[40,10,20,24]
W=60
Sample Output:-
Profit [100, 280, 120, 120]
Weight [10, 40, 20, 24]
Ratio [10.0, 7.0, 6.0, 5.0]
[1, 1, 0.5, 0]
Total profit : 440.0

NAME :- MARVIN PATEL
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BATCH:- 51
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PRACTICAL- 9
Code:-

```
from flask import Flask, render_template, request

app = Flask(__name__)

# Class to represent each item with profit, weight, and
profit-to-weight ratio
class Item:
    def __init__(self, profit, weight):
        self.profit = profit
        self.weight = weight
        self.ratio = profit / weight

# Function to solve the fractional knapsack problem
using the greedy algorithm
def fractional_knapsack(profits, weights, W):
    # Create a list of items
    items = [Item(profits[i], weights[i]) for i in
range(len(profits))]

    # Sort items based on profit-to-weight ratio in
descending order
    items.sort(key=lambda x: x.ratio, reverse=True)

    total_profit = 0.0
    fractions = [0] * len(profits)

    for i in range(len(items)):
```

NAME :- MARVIN PATEL
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PRACTICAL- 9

```
        if items[i].weight <= W:
            # Take the whole item
            fractions[i] = 1
            total_profit += items[i].profit
            W -= items[i].weight
        else:
            # Take fraction of the item
            fractions[i] = W / items[i].weight
            total_profit += items[i].profit *
fractions[i]
            break

    return total_profit, fractions, items

@app.route('/')
def index():
    return render_template('index.html')

@app.route('/calculate', methods=['POST'])
def calculate():
    # Get user input from form
    profits = list(map(int,
request.form['profits'].strip().split(',')))
    weights = list(map(int,
request.form['weights'].strip().split(',')))
    W = int(request.form['capacity'])

    # Solve the knapsack problem
```

NAME :- MARVIN PATEL
ER NO :- 22162101013
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SUB :- AAD
PRACTICAL- 9

```
    total_profit, fractions, items =
fractional_knapsack(profits, weights, W)

    # Prepare data for display
    sorted_profits = [item.profit for item in items]
    sorted_weights = [item.weight for item in items]
    sorted_ratios = [item.ratio for item in items]

    return render_template(
        'index.html',
        total_profit=total_profit,
        fractions=fractions,
        sorted_profits=sorted_profits,
        sorted_weights=sorted_weights,
        sorted_ratios=sorted_ratios
    )

if __name__ == '__main__':
    app.run(debug=True)
```

Index.html

```
<!DOCTYPE html>
<html>
<head>
    <title>Fractional Knapsack Problem</title>
    <style>
```

NAME :- MARVIN PATEL
ER NO :- 22162101013
BATCH:- 51
SUB :- AAD
PRACTICAL- 9

```
        body {
            font-family: Arial, sans-serif;
            background-color: #f4f4f4;
            color: #333;
            text-align: center;
            padding: 20px;
        }
        h1 {
            color: #005f73;
        }
        form {
            margin-bottom: 20px;
        }
        input[type="text"], input[type="number"] {
            padding: 10px;
            width: 60%;
            margin-bottom: 10px;
            border: 1px solid #ccc;
            border-radius: 5px;
        }
        input[type="submit"] {
            padding: 10px 20px;
            background-color: #005f73;
            color: #fff;
            border: none;
            border-radius: 5px;
            cursor: pointer;
        }
```

NAME :- MARVIN PATEL
ER NO :- 22162101013
BATCH:- 51
SUB :- AAD
PRACTICAL- 9

```
        input[type="submit"]:hover {
            background-color: #0a9396;
        }
        .result {
            margin-top: 20px;
            padding: 10px;
            background-color: #e9f5f2;
            border: 1px solid #005f73;
            display: inline-block;
        }
        table {
            width: 60%;
            margin: 20px auto;
            border-collapse: collapse;
        }
        table, th, td {
            border: 1px solid #005f73;
        }
        th, td {
            padding: 10px;
            text-align: center;
        }
        th {
            background-color: #94d2bd;
        }
        td {
            background-color: #e9f5f2;
        }
```

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PRACTICAL- 9

```
    </style>
</head>
<body>
    <h1>Fractional Knapsack Problem</h1>
    <form action="/calculate" method="post">
        <input type="text" name="profits"
placeholder="Enter profits (comma-separated)"
required><br>
        <input type="text" name="weights"
placeholder="Enter weights (comma-separated)"
required><br>
        <input type="number" name="capacity"
placeholder="Enter knapsack capacity" required><br>
        <input type="submit" value="Calculate">
    </form>

    {% if total_profit is not none %}
    <div class="result">
        <h2>Results</h2>
        <p><strong>Total Profit:</strong> {{
total_profit }}</p>
        <table>
            <tr>
                <th>Profit</th>
                <th>Weight</th>
                <th>Ratio</th>
                <th>Fraction Taken</th>
            </tr>
```

NAME :- MARVIN PATEL
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PRACTICAL- 9

```
            {% for i in range(sorted_profits|length)
%}
            <tr>
                <td>{{ sorted_profits[i] }}</td>
                <td>{{ sorted_weights[i] }}</td>
                <td>{{ sorted_ratios[i] | round(2)
}}</td>
                <td>{{ fractions[i] }}</td>
            </tr>
            {% endfor %}
        </table>
    </div>
    {% endif %}
</body>
</html>
```

OUTPUT:-

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PRACTICAL- 9