**Bangladesh Army University of Engineering & Technology (BAUET)**



**Department of Computer Science and Engineering (CSE)**

**2nd Year 2nd Semester Sessional Class, Fall-2024**

**Course Code: CSE-2211**

**Course Title: Data Structures and Algorithms-II**

Problem Statement:

A greedy algorithm is an approach for solving a problem by selecting the best option available at the moment. In greedy algorithm approach, decisions are made from the given solution domain. As being greedy, the closest solution that seems to provide an optimum solution is chosen. There are many examples of greedy approach. Some of Travelling Salesman Problem, Prim's Minimal Spanning Tree Algorithm, Kruskal's Minimal Spanning Tree Algorithm, Graph - Map Coloring, Knapsack Problem, Job Scheduling Problem, Dijkstra's Minimal Spanning Tree Algorithm etc. The knapsack problem is in combinatorial optimization problem. It appears as a sub problem in many, more complex mathematical models of real-world problems. One general approach to difficult problems is to identify the most restrictive constraint, ignore the others, solve a knapsack problem, and somehow adjust the solution to satisfy the ignored constraints. Suppose 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 *ith* 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. Based on the nature of the items, Knapsack problems are categorized as Fractional Knapsack and 0/1 Knapsack.

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| Q1. | Organize all the steps of fractional knapsack problem of greedy approach. |
| Q2. | Consider the following table:  Item Weight Value  1 5 30  2 3 40  3 6 45  4 8 77  5 7 90  Choose the optimal solution for the fractional knapsack problem making use of greedy approach. For the capacity of the knapsack consider your last two digits of ID%10  If ID%10 =0 then consider the capacity of knapsack is 4. |
| Q3. | Analyze the complexity of fractional knapsack problem |