MSDS - Optimization

Module 1	
Sr. No.	**Questions**
1	Imagine you are a logistics manager. Based on the warehouse problem, how would you decide the optimal location of a warehouse to ensure minimal transportation costs, considering several demand points like cities or retail outlets?
2	For a multinational company trying to assign its managers to various global projects, describe how the assignment problem could be formulated considering constraints like language proficiency and past project experience.
3	A backpacker is preparing for a trek and must select gears to carry. Using the knapsack problem framework, how would they ensure maximum utility from the items without surpassing the backpack's weight limit?
4	In an organization trying to streamline its operations, how would you represent constraints such as employees not working more than 8 hours a day or machinery not operating beyond its capacity in an optimization problem?
5	Considering the concept of linear programming, explain a scenario where a juice manufacturer has to determine the best blend of different fruits to meet a specific taste profile, keeping in mind the cost and availability of each fruit.
6	Detail how the simplex method can be employed by a toy manufacturer trying to determine the optimal mix of different toy products to produce, considering factors like production time, resource availability, and potential profit.
7	In a large-scale operation with thousands of variables, what potential challenges could arise when using the simplex method, and how could alternative methods like the barrier method or interior point methods be more effective?
8	How does the revised simplex method, which uses matrix factorization techniques, prove advantageous in situations where only a few decision variables change in a given problem?
9	Imagine a city's transportation department trying to optimize traffic flow. How would network analysis be applied to determine optimal traffic signal timings at intersections to minimize overall city congestion?
10	In a transportation company's scenario, explain the importance of the "shortest path" concept in network analysis to ensure timely delivery of packages through the most efficient route.