MSDS - Optimization

Sr. No.	Questions
Module 3	
1	Given the unpredictable nature of renewable energy sources, detail how an energy provider might employ the dual simplex method to balance power supply from wind, solar, and traditional sources, ensuring grid stability and cost-effectiveness.
2	In a smart city initiative, how might urban planners use network analysis to optimize traffic light patterns, considering real-time traffic data, peak hours, and event-based congestion to ensure smoother commutes?
3	Examine a scenario where a space agency, working on satellite launches, applies the knapsack problem to decide on the instruments to be onboarded, ensuring maximum scientific output while adhering to weight and power constraints.
4	Given a multinational with operations in various countries, explore how they might reformulate the warehouse problem to decide on optimal inventory levels across regions, factoring in customs regulations, local demand, and import/export tariffs.
5	Dive deep into the complexities a global music festival organizer might face in the assignment problem, deciding which artists perform at which venues and times, ensuring crowd balance, artist preferences, and logistical constraints.
6	For a logistics company employing drones for delivery, explain how they might use linear programming to determine optimal flight paths, considering battery life, no-fly zones, and dynamic weather conditions.
7	Considering a complex transportation network with trains, buses, and trams, elucidate how city officials might apply network analysis to ensure synchronized timings, minimizing wait times and optimizing intermodal transfers for commuters.
8	Examine a scenario where a multinational has to decide on hosting data centers globally. Using the warehouse problem framework, how would they factor in considerations like data regulations, latency requirements, and energy costs?
9	In the hyper-competitive world of online streaming, explore how a platform like Netflix might employ the knapsack problem to curate content bundles for different regions, ensuring viewer engagement while adhering to licensing budgets.
10	Given an international sports league, detail how the assignment problem would dictate the season's match schedules, considering team preferences, venue availabilities, and broadcast timings.