MSDS - Optimization

Module 2	
Sr. No.	**Questions**
1	Considering the assignment problem, how might an international consulting firm optimally allocate its consultants to global projects, factoring in constraints like visa regulations, timezone differences, and area expertise?
2	Detail a scenario where a renewable energy firm uses linear programming to determine the optimal mix of solar, wind, and hydro sources to meet daily energy demands while considering unpredictable supply variables like weather.
3	For a shipping company with a fleet of ships of varied sizes and speeds, how would they use the simplex method to decide the best ship to deploy for specific cargo loads, ensuring timely delivery and minimal fuel consumption?
4	Elaborate on a scenario where an agricultural firm employs network analysis to determine the optimal distribution of water in a vast irrigation network, ensuring every crop segment receives adequate water, especially during droughts.
5	Given a tech firm developing multiple software products, how would they use the cutting-plane method in linear programming to decide the optimal allocation of developers, considering each developer's expertise and project urgency?
6	How might a pharmaceutical company employ the dual simplex method when formulating an optimization model to decide the production quantity for various drugs, factoring in constraints like raw material availability and regulatory caps?
7	Using the concept of shadow pricing, explain how a hospital might understand the value of adding an extra bed or hiring an additional nurse, especially in times of heightened demand like during an epidemic.
8	In a congested urban setting, how would city planners utilize network analysis to design an optimal public transport network, ensuring reduced commute times and enhanced connectivity between key points of interest?
9	Given the frequent fluctuation in raw material prices, how might a car manufacturer update its linear programming model to decide the optimal production mix of various car models, ensuring profitability?
10	Dive deep into the assignment problem for a research institution. How would they decide the optimal pairing of researchers to various projects, factoring in each researcher's expertise, project timelines, and expected outcomes?