GL BAJAJ Institute of Management & Research Greater Noida
FIND YOUR SPARK

Roll No……

Plot No. 2, Knowledge Park-III, Greater Noida (U.P.) –201306

POST GRADUATE DIPLOMA IN MANAGEMENT (2025-26)

MID TERM EXAMINATION (TERM -III)

Subject Name: **Decision Science** Time: **01.00 hrs**

Sub. Code: **PG35** Max Marks: **20**

Note: All questions are compulsory.

Section -A

Read the following case study and answer the following questions: 10×2 = 20 Marks

Q-1 Case Study: Optimization of Production for a Small Manufacturing Firm

A small manufacturing firm specializes in the production of two products: Product A and Product B. Both products require processing time on two machines, M1 and M2. Product A requires 2 hours on Machine M1 and 1 hour on Machine M2, while Product B requires 1 hour on Machine M1 and 2 hours on Machine M2. The profit per unit of Product A is $40, whereas Product B generates a profit of $30 per unit. However, the manufacturing process is constrained by the availability of machine hours. The factory operates with a weekly limit of 100 hours on Machine M1 and 80 hours on Machine M2. Given these constraints, the company seeks to determine the optimal number of units of each product to produce in order to maximize total profit.

Based on the above information the given LPP is:

$$Z = 40x + 30y$$

Subject to constraints,

$$2x + y \leq 100$$
$$x + 2y \leq 80$$
$$x, y \geq 0$$

a. Write the importance of slack variable in the above problem.
b. Plot the constraints on a graph (with the decision variables on the axes) and identify the feasible region.
c. Determine the corner points of the feasible region.
d. Evaluate the objective function at each corner point to determine the maximum profit.

Q-2 Case Study: Ice Cream Vendor's Inventory Decision Under Uncertainty

Rahul runs a small ice cream stall near a park. Every day, he purchases ice cream cones at Rs 15 per unit and sells them for Rs 30 per unit, making a profit of Rs 15 per cone sold. However, since ice cream melts, any unsold cones at the end of the day go to waste, leading to a loss of Rs 15 per unsold cone. Rahul has observed that daily demand fluctuates between 40 and 60 cones, but he must decide the number of cones to purchase in the morning before knowing the exact demand. The possible action and uncertain demand are as follows

a) Possible Action
   Order 40 cones Order 50 cones Order 60 cones
b) Uncertain Demand
   Demand = 40 cones Demand = 50 cones Demand = 60 cones

Pay-off Profit Table

Demand / Order	Demand = 40 cones	Demand = 50 cones	Demand = 60 cones
Order = 40 cones	600	600	600
Order = 50 cones	450	750	750
Order = 60 cones	300	600	900

Using **decision criteria** such as **Maximax, Maximin, Minimax and Laplace**, Rahul can determine the best purchasing strategy under demand uncertainty.