

Cluster Innovation Centre, University of Delhi, Delhi-110007

Examination : End Semester Examination – May/June 2021
Name of the Course : B.Tech (Information Technology and Mathematical Innovations)
Name of the Paper : Linear Construction of Actions: Engineering through Linear Programming and Game Theory
Paper Code : 911610
Semester : VI
Duration : 3 Hours
Maximum Marks : 75

Instructions:

This question paper contains five questions, out of which any four are to be attempted. Each question carries equal marks.

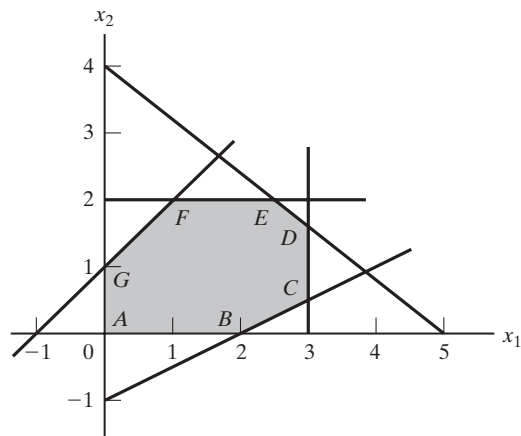
1. A Company produces two products A and B. The sales volume for A is at least 80% of the total sale of both A and B. However, the company cannot sell more than 100 units of A per day. Both products use one raw material, of which the maximum daily availability is 240lb. The usage rates of the raw material are 2lb per unit of A and 4lb per unit of B. The profit units for A and B are \$20 and \$50, respectively. Determine the optimal product mix for the company.

2. JoShop uses lathes and drill presses to produce two types of machine parts, PP1 and PP2. The table below summarizes the pertinent data.

Machine	Machine time in minutes per unit of		
	PP1	PP2	Capacity (min.)
Lathes	1	5	5
Drill Presses	3	2	12
Unit revenue (\$)	6	5	

For the parts that are not produced by the present optimum solution, determine the rate of deterioration in the optimum revenue per unit increase of each of these products.

3. Consider the two-dimensional solution space in figure



Determine the entering variable, the corresponding ratios of the feasibility condition, and the change in the value of z , assuming that the starting iteration occurs at point A and that the objective function is given as

$$\text{Maximize } z = x_1 + 4x_2$$

4. Show how the M-method will indicate that the following problem has no feasible solution

$$\begin{aligned} &\text{maximize}(z) = 2x_1 + 5x_2 \\ &\text{subject to} \\ &\quad 3x_1 + 2x_2 \geq 6 \\ &\quad 2x_1 + x_2 \leq 2 \\ &\quad x_1, x_2 \geq 0 \end{aligned}$$

5. In a game given below, the payoff is for player A . This game has a pure strategy solution. Determine the strategies that define the saddle point and the value of the game.

	B_1	B_2	B_3	B_4
A_1	9	6	2	8
A_2	8	9	4	5
A_3	7	5	2	5