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operation Research

(2)

(01) A company produces 3 type of products $P_1, P_2,$ and P_3 .

Time required

Production Progress	Finishing	total	
P_1	12	03	1000
P_2	06	08	800
P_3	08	06	400
company capacity	3000	1500	

convert into linear prog

$$12x_1 + 6x_2 + 8x_3 \leq 3000 \quad \text{--- (I)}$$

$$3x_1 + 8x_2 + 6x_3 \leq 1500 \quad \text{--- (II)}$$

$$\text{Max } Z = 1000x_1 + 800x_2 + 400x_3$$

3

Now final x_1 inter to

put $x_2 = 0$ and $x_3 = 0$

$$12x_1 + 6x_2 + 8x_3 = 3000$$

put $x_2 = 0$ and

$$x_3 = 0$$

$$12x_1 + 6(0) + 8(0) = 3000$$

$$x_1 = \frac{3000}{12} = 250$$

$$= P_1 = (250, 0, 0)$$

Now for x_2 interese

put $x_1 = 0$ and $x_3 = 0$

$$12x_1 + 6x_2 + 8(0) = 3000$$

$$x_2 = \frac{3000}{6} = 500$$

(4)

$$P_2 = (0, 300, 0)$$

Now for x_3 put

$$x_1 = 0 \text{ and } x_2 = 0$$

$$12x_1 + 6x_2 + 8x_3 = 3000$$

$$12(0) + 6(0) + 8x_3 = 3000$$

$$12(0) + 6(0)$$

$$x_3 = \frac{3000}{8}$$

$$P_3 (0, 0, 375)$$

Now for x_3 intercept

$$\text{put } x_1 = 0 \text{ and } x_2 = 0$$

$$3x_1 + 8x_2 + 6x_3 = 1500$$

$$3(0) + 8(0) = 6x_3 = 1500$$

(4)

$$P_2 = (0, 500, 0)$$

Now for x_3 put

$$x_1 = 0 \text{ and } x_2 = 0$$

$$12x_1 + 6x_2 + 8x_3 = 3000$$

$$12(0) + 6(0) + 8x_3 = 3000$$

$$12(0) + 6(0)$$

$$x_3 = \frac{3000}{8}$$

$$P_3 (0, 0, 375)$$

Now for x_3 intercept

$$\text{put } x_1 = 0 \text{ and } x_2 = 0$$

$$3x_1 + 8x_2 + 6x_3 = 1500$$

$$3(0) + 8(0) = 6x_3 = 1500$$

(3)

$$x_3 = \frac{1500}{6} = 250$$

$$P_1 = (0, 0, 250)$$

Thus all points put
in eq (2) to find the
max value.

$$Z = 1000x_1 + 800x_2 + 400x_3$$

$$Z = 100 + 800(500) + 0 = 400000$$

$$Z = 1000(250) + 0 + 0 = 250000$$

$$Z = 0 + 0 + 400(375) = 150000$$

$$Z = 1000(500) + 0 + 0 = 500000 \checkmark$$

$$Z = 0 + 800(187.5) + 0 = 150000$$

$$Z = 0 + 0 + 1000(250) = 250000$$

(6)

So the max point is

$$P_4 (500, 0, 0) = 500000$$

$$Z = 500000 \text{ Ans}$$

(02) A manufacture produces two types of products

A and B

in the given table

Type of product	No sold in month	Net profit
A	150	
B	200	

(7)

* P₁ No under utilization of plant production capacity.

* P₂ Sells max possible no of products.

* P₃ Maximize over time of the plant.

* let x_1 and x_2 be the number of product A and B. Since.

$$x_1 + x_2 + z_1 - z_1^+ = 500$$

where

z_1^+ = under is utilization operation capacity

8

variable.

then

$$x_1 = z_1 = 150$$

and

$$x_2 + z_3 = 200$$

where z_2 under achievement of sale goals of product A.

z_3 under achievements of the sale goal of products 'B' minimize

$$x = p_1 d_1 + 2 p_2 d_2 + p_3 d_3 + p_3 d_1$$

(9)

Subj to constraints

$$x_1 + x_2 + d_1 - d_1 + = 500$$

$$x_1 + d_2 = 150$$

$$x_2 + d_3 = 200$$

and

$x_1, x_2, d_1, d_2, d_3, d_4$

