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Question # 01:-

A company produces 08 products
 P_1 , P_2 and P_3 ... Time required

Solution :-

Producing	Progress	Finishing
P_1	12	03
P_2	06	08
P_3	08	06
Company capacity	3000	1500

Now convert into Linear programme.

$$12x_1 + 6x_2 + 8x_3 \leq 3000$$

$$3x_1 + 3x_2 + 6x_3 \leq 1500$$

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

Now Find x_1 intercept

Put $x_2 = 0$ and $x_3 = 0$

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

Put $x_2 = 0$ and $x_3 = 0$

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

$$12x_1 + 0 + 0 = 3000$$

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

$$x_1 = 250$$

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

Now for x_2 intercept put $x_1 = 0$

$$\text{and } x_3 = 0$$

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

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

$$0 + 6x_2 + 0 = 3000$$

$$6x_2 = 3000$$

dividing by 6.

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

$$x_2 = 500$$

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

Now for x_3 intercept

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

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

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

$$0 + 0 + 8x_3 = 3000$$

$$8x_3 = 3000$$

dividing by 8.

$$\frac{8x_3}{8} = \frac{3000 + 500}{8} = \frac{3500}{8} = 375$$

$$x_3 = 375$$

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

that is all points put in equation (Z) to find the maximum point value.

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

$$Z = 1000(250) + 800(0) + 400(0)$$

$$Z = 2,500,000 + 0 + 0$$

$$Z = 2,500,000$$

NOW put another intercept

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

$$Z = 1000(0) + 800(500) + 400(0)$$

$$Z = 0 + 400,000 + 0$$

$$Z = 400,000$$

NOW PUT 3rd intercept.

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

$$Z = 1000(0) + 800(0) + 400(375)$$

$$Z = 0 + 0 + 150,000$$

$$Z = 1,50,000$$

$$Z = 1000(500) + 0 + 0 = 500,000 \checkmark$$

$$Z = 0 + 800(187.5) + 0 = 150,000$$

$$Z = 0 + 0 + 400(250) = 100,000$$

NOW maxi points is

$$P_4(500, 0) = 500,000$$

Q2:- A manufacture produces two types of products A and B. the plant has production capacity of 500 hours a month:-

Type of P	Number Sold/mm	Net profit
A	150	
B	200	

the MD of the company has set following goals which are arranged in order of priority.

$P_1 \Rightarrow$ No under utilization of plant production

$P_2 \Rightarrow$ Sell maximum possible number ...?

$P_3 \Rightarrow$ minimize overtime operation of the plant.

Solution:-

Suppose

x_1 and x_2 be the number of production of A and B, since allowed

$d_1 =$ under utilization of product

capacity variable.

Since goal is the maximization of sales hence positive deviation will not appear in constraints related with sales so.

$$\text{and } x_1 + d_2 = 150$$

$$x_2 + d_3 = 200$$

→ d_2 = under achievement of sales goals product A.

→ d_3 → d_3 underachievement of sales goals for product B.

Now the goal programming mathematical model can be.

minimise

$$z = p_1 d_1 + p_2 d_3 + p_3 d_1$$

Subjected to constraints

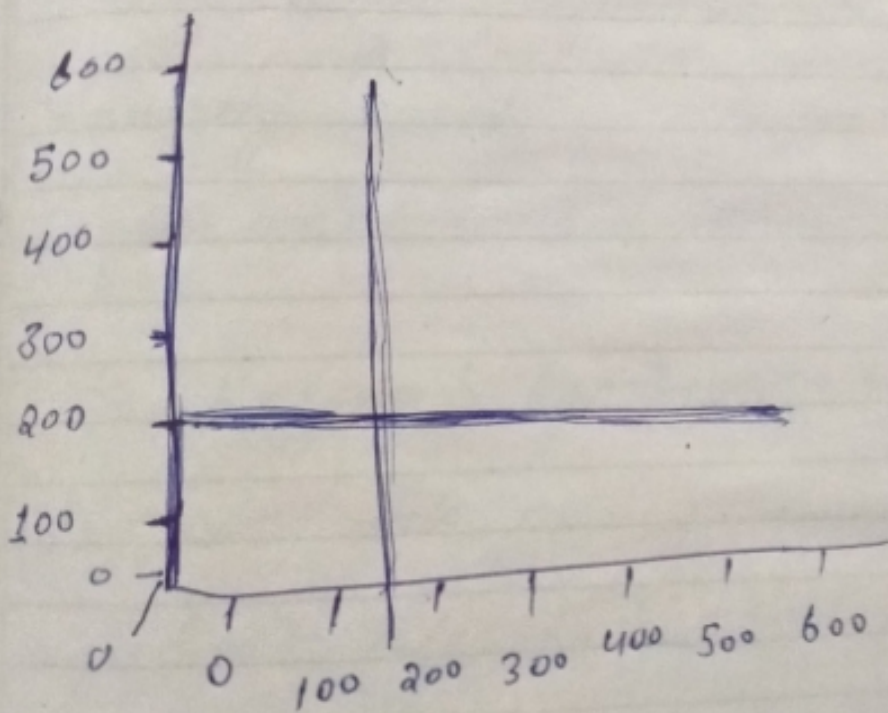
$$x_1 + x_2 + d_1 - d_1 = 500$$

$$x_1 + d_1 = 150$$

$$x_2 + d_2 = 200$$

$$\text{and } x_1, x_2, d_1, d_2, d_3, d_4 \geq 0$$

All the goal constraints can be plotted on the graph.



(ANSWER)
Product A as for product B, because the net profit from the sale of product A is twice the amount from that of product B.