

# **MID TERM ASSIGNMENT SPRING 2020**

**NAME: FAIZULLAH KHAN**

**ID: 14840**

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**SECTION: B**

**PAPER: OPERATION**

**RESEARCH**

**SUBMITTED TO: SAIFULLAH JAN SIR**

Q1 A company produces 05 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 correct into linear program

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

$$3x_1 + 8x_2 + 6x_3 \leq 1500$$

maximum

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

Now find  $x_1$  intercept.

$$\text{put } x_2 = 0 \text{ and } x_3 = 0$$

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

$$\text{put } x_2 = 0 \text{ and } x_3 = 0$$

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

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

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

$$x_1 = 250$$

$P_1 (250, 0, 0)$

Now for  $x_2$  intercept put  $x_1 = 0$  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

put  $x_1 = 0$  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

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

$$x_3 = 375$$

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

that is all points put in equation (2) to find the maximum point value.

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

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

$$Z = 2,50,000 + 0 + 0$$

$$Z = 2,50,000$$

Now put another intercept.

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

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

$$Z = 0 + 40,0000 + 0$$

$$Z = 4,00,000$$

Now put 3rd intercept.

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

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

$$Z = 0 + 0 + 1,50,000$$

$$Z = 1,50,000$$

$$Z = 1000(500) + 0 + 0 = 5,00,000$$

$$Z = 0 + 800(187.5) + 0 = 1,50,000$$

$$Z = 0 + 0 + 400(350) = 1,40,000$$

Now maximum point is

$$P_x(50000) = \underline{5,00,000}$$

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Q2

The MD of the company has the following goals which are arranged in order of priority?

- \*  $P_1$  No under utilization of plant production capacity.
- \*  $P_2$  sells maximum possible number of products A and B the MD has twice as much desire to sell product "A" as for product "B" because the net profit from the sale of products "A" as for the amounts.

### Solution:

\* We are formulating the above as general programming problem and solving it.

\* goal is the maximization of sales

Then  $x_1 + \bar{z}_2 = 150$

and

$$x_2 + \bar{z}_2 = 200$$

Subjected to constraints

$$x_1 + x_2 + d_1 - d_2 = 500$$

$$x_1 + d_2 = 150$$

$$x_2 + d_3 = 200$$

and

$$x_1, x_2, d_1, d_2, d_3 \geq 0$$

