

Assignment - 1.

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1) Given Data about Chemicals

Chemicals #	Liquid Prod. (x)	Dry Prod. (y)	Demand
A	5	1	10
B	2	2	12
C	1	4	12
Cost	₹3	₹2	

Objective function:

$$\text{Min } z = 3x + 2y.$$

Constraints:

$$5x + y = 10$$

$$2x + 2y = 12 \Rightarrow x + y = 6$$

$$x + 4y = 12.$$

$$x, y \geq 0.$$

Solutions found with graphical method \Rightarrow

$$A(1, 5), B(4, 2)$$

$$C(0, 10), D(12, 0).$$

Values of objective function

$$A \Rightarrow 3(1) + 2(5) = 13. \text{ (min) .}$$

$$B \Rightarrow 3(4) + 2(2) = 16$$

$$C \Rightarrow 3(0) + 2(10) = 20$$

$$D \Rightarrow 3(12) + 2(0) = 36$$

\therefore The number of cartons to be purchased for the liquid solution and the dry powder is 1, 5 cartons respectively.

2) Let,

the no. of H_1 hat produced = x .

the no. of H_2 hat produced = y .

then,

Objective function:

$$\text{Max } z = 8x + 5y.$$

Constraints:

$$2x + y \leq 500, \text{ (Production limit)}$$

$$x \leq 150 \text{ (Sale limit).}$$

$$y \leq 250$$

$$x \geq 0, y \geq 0 \text{ (non-zero number manufactured.)}$$

By Graphical method, the solution points are

$$O(0, 0), A(150, 200), C(125, 250),$$

$$D(0, 250), E(150, 0).$$

Values of Objective function:

$$O \Rightarrow z = 0.$$

$$A \Rightarrow z = 8(150) + 5(200) = 2200$$

$$C \Rightarrow z = 8(125) + 5(250) = \underline{2250} \text{ (Max)}$$

$$D \Rightarrow z = 8(0) + 5(250) = 1250$$

$$E \Rightarrow z = 8(150) + 5(0) = 1200$$

\therefore The optimal amount of H_1 and H_2 to be produced for maximum profit are 125 and 250 respectively.