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QUIZ 1

SUBMITTED TO :—

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Q A yarn merchant sell ..... cotton of Each country

SOLUTION :-

$x = A$, $y = B$, z

Let x, y & z be the cost/kg of Polister, Egyptian & American cotton

$$\frac{1}{4}x + \frac{2}{4}y + \frac{1}{4}z = 40 \quad \text{--- (1)}$$

Ratio = 4

$$\frac{2}{4}x + \frac{1}{4}y + \frac{1}{4}z = 50 \quad \text{--- (2)}$$

$$\frac{2}{4}x + \frac{2}{4}z = 60 \quad \text{--- (3)}$$

x-ing 4 both sides on eq (1) & (2) & (3), we get

(1) $\Rightarrow x + 2y + z = 160$

(2) $\Rightarrow 2x + y + z = 200$

(3) $\Rightarrow 2x + 0y + z = 120$

Now we use these equation in matrix

$$\begin{bmatrix} 1 & 2 & 1 \\ 2 & 1 & 1 \\ 2 & 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 160 \\ 200 \\ 120 \end{bmatrix}$$

Date:

$$A_1 = \begin{bmatrix} 1 & 2 & 1 \\ 2 & 1 & 1 \\ 2 & 0 & 1 \end{bmatrix} \quad x = \begin{bmatrix} x \\ y \\ z \end{bmatrix} \quad B_1 = \begin{bmatrix} 160 \\ 200 \\ 120 \end{bmatrix}$$

$\Rightarrow A_1 \times B_1$

Now using cramer's rule

$$A_1 x = \begin{bmatrix} 160 & 2 & 1 \\ 200 & 1 & 1 \\ 120 & 0 & 1 \end{bmatrix}$$

we just replace B_1 in first column of A_1

$$|A_1 x| = 160 \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix} - 2 \begin{bmatrix} 200 & 1 \\ 120 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} 200 & 1 \\ 120 & 0 \end{bmatrix}$$

$$= 160\,(1-0) - 2\,(200 - 120) + 1\,(0 - 120)$$

$$= 160 - 2(80) - 120 = 160 - 160 - 120$$

$$|A_1 x| = 120$$

$$\frac{|A_1 x|}{|A_1|} \rightarrow (4)$$

Now find $|A_1|$

$$|A_1| = \begin{bmatrix} 1 & 2 & 1 \\ 2 & 1 & 1 \\ 1 & 0 & 1 \end{bmatrix} = 1\,(1-0) - 2\,(2-1) + 1\,(0-1$$

$$= 1 - 2 - 1 = -2$$

Date:

Now

$$④ \Rightarrow x = \frac{|A_1x|}{|A_1|} = \frac{-120}{-2} = 60$$

$$x = A = 60$$

also

$$y = \frac{|A_1y|}{|A_1|} \Rightarrow ⑤$$

$$|A_1y| = 1(200-120) - 160(2-1) + 1(240-200)$$

$$= 80 - 160 - 40$$

$$|A_1y| = -40$$

$$⑤ \Rightarrow y = \frac{|A_1y|}{|A_1|} = \frac{-40}{-2} = 20$$

$$y = B = 20$$

again

$$z = \frac{|A_1z|}{|A_1|} \longrightarrow ⑥$$

$$A_1z = \begin{bmatrix} 1 & 2 & 160 \\ 2 & 1 & 200 \\ 1 & 0 & 120 \end{bmatrix}$$

$$|A_1z| = 1(120-0) - 2(240-200) - 160(0+0)$$

$$= 120 - 80 - 160$$

$$= 120$$

$$⑥ \Rightarrow z = \frac{|A_1z|}{|A_1|} = \frac{-120}{-2} = 60$$

Date:

$z = c = 60$

Hence $(x, y, z) = (60, 20, 60)$

or

$(A, B, C) = (60, 20, 60)$

It's means that

Pakistin blend cost/kg of cotton = 60.

Egyptian blend cost/kg of cotton = 20.

American blend cost/kg of cotton = 60