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Section: A

Dept: B.SCC Engineering

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Subject: D.E

Given Data

→ Pakistan, Egyption & American

Cotton Ratio \Rightarrow

A B C

1 : 2 : 1

2 : 1 : 1

2 : 0 : 2

A, B & C (cost \Rightarrow 40, 50 & 60 Rs. respectively)

We write the given data
in a system of linear equation

$$\left\{ \begin{array}{l} a + 2b + c = 40 \\ 2a + b + c = 50 \\ 2a + 2c = 60 \end{array} \right\} \quad \text{or} \quad \left\{ \begin{array}{l} x + 2y + z = 40 \\ 2x + y + z = 50 \\ 2x + 2z = 60 \end{array} \right\}$$

Now we use Gauss Jordan-Elimination
method to find value of x, y & z

Where x, y, z are the cost of
a kg of each country.

(2)

$$x + 2y + z = 40$$

$$2x + y + z = 50$$

$$2x + 2z = 60$$

Augmented matrix of the given system:

$$\left[\begin{array}{cccc|c} 1 & 2 & 1 & 1 & 40 \\ 2 & 1 & 1 & 1 & 50 \\ 2 & 0 & 2 & 1 & 60 \end{array} \right]$$

$$\left[\begin{array}{cccc|c} 1 & 2 & 1 & 1 & 40 \\ 0 & -3 & -1 & 1 & -30 \\ 0 & -4 & 0 & 1 & -20 \end{array} \right] \begin{array}{l} R_2 - 2R_1 \\ R_3 - 2R_1 \end{array}$$

$$\left[\begin{array}{cccc|c} 1 & 2 & 1 & 1 & 40 \\ 0 & 1 & \frac{1}{3} & 1 & 10 \\ 0 & -4 & 0 & 1 & -20 \end{array} \right] \frac{1}{3}R_2$$

$$\left[\begin{array}{cccc|c} 1 & 2 & 1 & 1 & 40 \\ 0 & 1 & \frac{1}{3} & 1 & 10 \\ 0 & 0 & \frac{4}{3} & 1 & 20 \end{array} \right] R_3 + 4R_2$$

5

$$\left[\begin{array}{cccc|c} 1 & 2 & 1 & 1 & 40 \\ 0 & 1 & \frac{1}{3} & 1 & 10 \\ 0 & 0 & 1 & 1 & 15 \end{array} \right] \xrightarrow{\frac{3}{4}R_3}$$

Here we find $x=15$

The value of $y=5$

$$\left\{ \begin{array}{l} x=15 \\ y=5 \\ z=5 \end{array} \right.$$

$$\left[\begin{array}{cccc|c} 1 & 2 & 0 & 1 & 25 \\ 0 & 1 & 0 & 1 & 5 \\ 0 & 0 & 1 & 1 & 15 \end{array} \right] \begin{array}{l} R_1 - R_3 \\ R_2 - \frac{1}{3}R_3 \end{array}$$

$$\left[\begin{array}{ccc|c} 1 & 0 & 0 & 12.5 \\ 0 & 1 & 0 & 5 \\ 0 & 0 & 1 & 15 \end{array} \right] \xrightarrow{R_1 - 2R_3}$$