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SECTION:

"B"

SEMESTER:

4th

SUBJECT:

DIFFERENTIAL EQUATION

Solution;

Ratios

$$1:2:1$$

$$2:1:1$$

$$2:0:2$$

Cost of A, B, C (Per kg is 40, 50, 60)

$$A = \begin{array}{|c|c|} \hline P & E \\ \hline A & E \\ \hline \end{array} = 40 \rightarrow 1:2:1$$

$$B = \begin{array}{|c|c|} \hline P & P \\ \hline A & E \\ \hline \end{array} = 50 \quad 2:1:1$$

$$C = \begin{array}{|c|c|} \hline P & P \\ \hline A & A \\ \hline \end{array} = 60 \quad 2:0:2$$

x, y, z = Price of cotton

$$\frac{1}{4}x + \frac{2}{4}y + \frac{1}{4}z = 40$$

$$\frac{2}{4}x + \frac{1}{4}y + \frac{1}{4}z = 50$$

$$\frac{2}{4}x + \frac{2}{4}z + \frac{0}{4}y = 60$$

P.T.O

$$1x + 2y + 1z = 160$$

$$2x + 1y + 1z = 200$$

$$1x + 0y + 1z = 120$$

Now writings, the following in matrix form.

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

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

$$Ax = B$$

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

$$A_2 = \begin{bmatrix} 1 & 160 & 1 \\ 2 & 200 & 1 \\ 1 & 120 & 1 \end{bmatrix}$$

$$A_3 = \begin{bmatrix} 1 & 2 & 160 \\ 2 & 1 & 200 \\ 1 & 0 & 120 \end{bmatrix}$$

$$|A| = \begin{vmatrix} 1 & 2 & 1 \\ 2 & 1 & 1 \\ 1 & 0 & 1 \end{vmatrix}$$

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

$$|A_1| = 160(1 \times 1 - 0 \times 1) - 2(200 \times 1 + 120 \times 1)$$

$$|A_1| = -120$$

$$|A_2| = \begin{vmatrix} 1 & 160 & 1 \\ 2 & 200 & 1 \\ 1 & 120 & 1 \end{vmatrix}$$

$$|A_2| = 1(200 \times 1 - 120 \times 1) - 160(2 \times (-1 \times 1 + 1))$$
$$(2 \times 1 - 1 \times 200)$$

$$|A_2| = -40$$

150/-

$$|A_3| = \begin{bmatrix} 1 & 2 & 100 \\ 2 & 1 & 200 \\ 1 & 0 & 120 \end{bmatrix}$$

$$|A_3| = 1(1 \times 120) + (0 \times 200) - 2(2 \times 120 - 1 \times 200) + 100(2 \times 120 - 1)$$

$$|A_3| = -120$$

$$|A_1| = -2, \quad |A_2| = -120, \quad |A_3| = -40, \quad |A_3| = -120$$

CRAMER'S RULE:

$$x = \frac{|A_1|}{|A|}$$

$$x = \frac{-120}{-2}$$

$$x = 60$$

$$x = \frac{|A_2|}{|A|}$$

$$x = \frac{-40}{-2}$$

$$x = 20$$

$$x = \frac{|A_3|}{|A|}$$

$$x = \frac{-120}{-2}$$

$$x = 60$$

$$(x, y, z) = \boxed{60, 20, 60}$$