

5.3.6

AI25BTECH11012 - GARIGE UNNATHI

Question:

If the pair of equations $3x - y + 8 = 0$ and $6x - ry + 16 = 0$ represents coincident lines, then the value of r is

Solution:

Let :

$$\mathbf{r}_1 = \begin{pmatrix} 3 & -1 \end{pmatrix} \mathbf{x} = -8 \quad (0.1)$$

$$\mathbf{r}_2 = \begin{pmatrix} 6 & -r \end{pmatrix} \mathbf{x} = -16 \quad (0.2)$$

For coincident lines:

$$\mathbf{r}_2 = \kappa \mathbf{r}_1 \quad (0.3)$$

Solving using above equation

$$\begin{pmatrix} 6 & -r \end{pmatrix} \mathbf{x} + 16 = \kappa \begin{pmatrix} 3 & -1 \end{pmatrix} \mathbf{x} + 8 \quad (0.4)$$

$$= \begin{pmatrix} 3\kappa & -1\kappa \end{pmatrix} \mathbf{x} + 8\kappa \quad (0.5)$$

By comparing we get :

$$\kappa = 2 \quad (0.6)$$

$$\begin{pmatrix} 6 & -r \end{pmatrix} \mathbf{x} + 16 = \begin{pmatrix} 6 & -2 \end{pmatrix} \mathbf{x} + 16 \quad (0.7)$$

since LHS should be equal to RHS :

$$r = 2 \quad (0.8)$$