

4.5.11

EE25BTECH11009 - Anshu Kumar Ram

Question:

Find the cartesian equation of the line which passes through the point $(-2, 4, -5)$ and parallel to the line

$$\frac{x+3}{3} = \frac{y-4}{5} = \frac{z+8}{6} \quad (0.1)$$

Solution:

From the given line, the direction vector is

$$\mathbf{m} = \begin{pmatrix} 3 \\ 5 \\ 6 \end{pmatrix} \quad (0.2)$$

The required line passes through

$$\mathbf{A} = \begin{pmatrix} -2 \\ 4 \\ -5 \end{pmatrix} \quad (0.3)$$

So, the vector equation is

$$\mathbf{r} = \mathbf{A} + \lambda \mathbf{m}, \quad \lambda \in \mathbb{R} \quad (0.4)$$

In matrix form,

$$\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} -2 \\ 4 \\ -5 \end{pmatrix} + \lambda \begin{pmatrix} 3 \\ 5 \\ 6 \end{pmatrix} \quad (0.5)$$

Eliminating λ ,

$$\frac{x+2}{3} = \frac{y-4}{5} = \frac{z+5}{6} \quad (0.6)$$

Hence, the required cartesian equation of the line is

$$\boxed{\frac{x+2}{3} = \frac{y-4}{5} = \frac{z+5}{6}} \quad (0.7)$$

Line through A parallel to given line

