

4.6.7

EE25BTECH11019 - Darji Vivek M.

Question:

Find the equation of the line which passes through the point $(3, 4, 5)$ and is parallel to the vector $2\mathbf{i} + \mathbf{j} - 3\mathbf{k}$.

(12, 2018)

Solution:

Matrix Method:

Let the point be

$$\mathbf{A} = \begin{pmatrix} 3 \\ 4 \\ 5 \end{pmatrix}, \quad (1)$$

and the direction vector be

$$\mathbf{d} = \begin{pmatrix} 2 \\ 1 \\ -3 \end{pmatrix}. \quad (2)$$

The general form of a line is

$$\mathbf{r} = \mathbf{A} + \lambda \mathbf{d}. \quad (3)$$

Substituting values,

$$\mathbf{r} = \begin{pmatrix} 3 \\ 4 \\ 5 \end{pmatrix} + \lambda \begin{pmatrix} 2 \\ 1 \\ -3 \end{pmatrix}. \quad (4)$$

$$\mathbf{r} = \begin{pmatrix} 3 + 2\lambda \\ 4 + \lambda \\ 5 - 3\lambda \end{pmatrix} \quad (5)$$

Equation of line in symmetric form

$$\frac{x-3}{2} = \frac{y-4}{1} = \frac{z-5}{-3}. \quad (6)$$

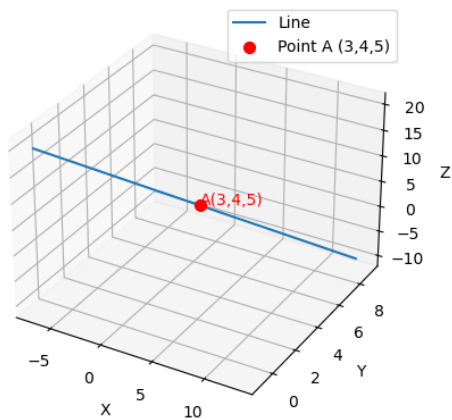


Fig. 0.1: Line through **A** parallel to **d**