4.4.2

AI25BTECH11006 - Nikhila

September 13, 2025

Question

If the equation of a line is

$$x = ay + b, \quad z = cy + d,$$

then find its parametric form.

Solution

The given equations are

$$x = ay + b, \quad z = cy + d.$$

Let us choose the parameter as

$$y = t, \quad t \in \mathbb{R}.$$

Solution

Substituting $y = t$, we get:

$$x = at + b, \quad y = t, \quad z = ct + d.$$

Solution

Thus, the parametric equations of the line are:

$$x = at + b, \quad y = t, \quad z = ct + d.$$

The parametric vector form of the line is:

$$\vec{r}(t) = \begin{pmatrix} b \\ 0 \\ d \end{pmatrix} + t \begin{pmatrix} a \\ 1 \\ c \end{pmatrix}.$$