

## 4.12.8

AI25BTECH11003 - Bhavesh Gaikwad

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# Question

Distance of the point  $(\alpha, \beta, \gamma)$  from y-axis is

- a)  $\beta$
- b)  $|\beta|$
- c)  $|\beta + \gamma|$
- d)  $\sqrt{\alpha^2 + \gamma^2}$

# Theoretical Solution

$$\text{Let } \mathbf{A} = \begin{pmatrix} \alpha \\ \beta \\ \gamma \end{pmatrix}$$

$$\text{Equation of y-axis: } \mathbf{r} = \mathbf{e}_2 \text{ OR } \mathbf{r} = \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix} \quad (1)$$

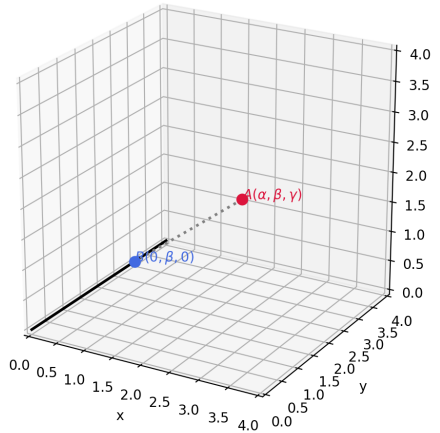
Let the distance of Point A from the y-axis be 'd'.

$$\text{Distance formula from a line of a point} = \frac{\|\mathbf{AP} \times \mathbf{v}\|}{\|\mathbf{v}\|} \quad (2)$$

$$d = \text{Distance formula from y-axis of a point} = \frac{\|\mathbf{A} \times \mathbf{e}_2\|}{\|\mathbf{e}_2\|} = \sqrt{\alpha^2 + \gamma^2} \quad (3)$$

$$\therefore d = \sqrt{\alpha^2 + \gamma^2} \quad (4)$$

Therefore, Option D is Correct.



**Figure:** Point **B** is a point on the y-axis which is nearest to point **A**