

Hyperbola - Class XI

Past Year JEE Questions

Questions

Question: 01

The locus of the point of intersection of the lines, $\sqrt{2}x - y + 4\sqrt{2}k = 0$ and $\sqrt{2}kx + ky - 4\sqrt{2} = 0$ (k is any non-zero real parameter), is :

- A. an ellipse whose eccentricity is $\frac{1}{\sqrt{3}}$.
- B. an ellipse with length of its major axis $8\sqrt{2}$.
- C. a hyperbola whose eccentricity is $\sqrt{3}$.
- D. a hyperbola with length of its transverse axis $8\sqrt{2}$.

Solutions

Solution: 01

Explanation

Here, lines are :

$$\sqrt{2}x - y + 4\sqrt{2}k = 0$$

$$\Rightarrow \sqrt{2}x + 4\sqrt{2}k = y \quad \dots (i)$$

$$\text{and } \sqrt{2}kx + ky - 4\sqrt{2} = 0 \quad \dots (ii)$$

Put the value of y from (i) in (ii) we get;

$$\Rightarrow 2\sqrt{2}kx + 4\sqrt{2}(k^2 - 1) = 0$$

$$\Rightarrow x = \frac{2(1-k^2)}{k}, y = \frac{2\sqrt{2}(1+k^2)}{k}$$

$$\therefore \left(\frac{y}{4\sqrt{2}}\right)^2 - \left(\frac{x}{4}\right)^2 = 1$$

\therefore length of transverse axis

$$2a = 2 \times 4\sqrt{2} = 8\sqrt{2}$$

Hence, the locus is a hyperbola with length of its transverse axis equal to $8\sqrt{2}$