58. The distance between the foci of a hyperbola is 16 and its eccentricity is $\sqrt{2}$. Its equation is

(a) $x^2 - y^2 = 32$

(b) $\frac{x^2}{4} - \frac{y^2}{9} = 1$

(c) $2x - 3y^2 = 7$

(d) None of these

Ans:

We know that distance between the foci $= 2ae$

$\therefore 2ae = 16 \Rightarrow ae = 8$

Given that $e = \sqrt{2}$

$\therefore \sqrt{2}a = 8 \Rightarrow a = 4\sqrt{2}$

Now $b^2 = a^2\left(e^2 - 1\right)$

$\Rightarrow b^2 = 32\,(2 - 1) \Rightarrow b^2 = 32$

So, the equation of the hyperbola is

$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1 \Rightarrow \frac{x^2}{32} - \frac{y^2}{32} = 1$

$\Rightarrow x^2 - y^2 = 32$

Hence, the correct option is (a).