20. If the distance between the foci of a hyperbola is 16 and its eccentricity is √2, then obtain the equation of the hyperbola.

Solution:

We know that equation of Hyperbola

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

Also we have foci = (±a e, 0)

Given distance between foci is 2ae = 16

e = √2

2 × a × √2 = 16

$a = \frac{16}{2 \times \sqrt{2}} = \frac{8}{\sqrt{2}} = 4\sqrt{2}$

∵ $b^2 = a^2 (e^2 - 1)$

$b^2 = (4\sqrt{2})^2((\sqrt{2})^2 - 1)$

$= 32(2 - 1) = 32$

∴ Equation is $\frac{x^2}{32} - \frac{y^2}{32} = 1$