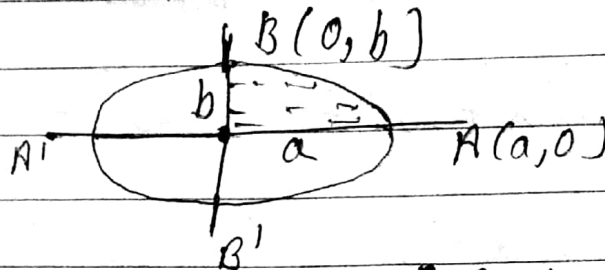


Section - 3

Ans 2 Find the area of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

we have $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$



Area of one quadrant = $\iint dx dy$

Whole area of ellipse = $4 \iint dx dy$

$$= 4 \int_0^a \int_0^{\frac{b}{a} \sqrt{a^2 - x^2}} dx dy$$

$$= 4 \int_0^a \left[y \right]_0^{\frac{b}{a} \sqrt{a^2 - x^2}} dx$$

$\left[\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1, y \neq \right]$
 $b \sqrt{1 - \frac{x^2}{a^2}}$

$$= \frac{4b}{a} \int_0^a \sqrt{a^2 - x^2} dx$$

$$= \frac{4b}{a} \left[\frac{x}{2} \sqrt{a^2 - x^2} + \frac{a^2}{2} \sin^{-1} \left(\frac{x}{a} \right) \right]_0^a$$

$$= \frac{4b}{a} \left[0 + \frac{a^2}{2} \times \frac{\pi}{2} - 0 \right]$$

$$= \frac{4b}{a} \times \frac{\pi a^2}{4} = \pi ab.$$