

# LOCUS

## PREVIOUS EAMET BITS

1. If the sum of the distance of a point P from two perpendicular lines in a planes is 1, then the locus of P is a [EAMCET 2008]

1) rhombus                      2) circle                      3) straight line                      4) pair of straight lines

Ans: 1

- Sol. Let  $P(x_1, y_1)$  be a point such that the sum of the distances of P from two perpendicular lines

$$x + y = 0, x - y = 0 \text{ is } 1. \text{ Then } \left| \frac{x_1 + y_1}{\sqrt{2}} \right| + \left| \frac{x_1 - y_1}{\sqrt{2}} \right| = 1$$

$$\Rightarrow \pm(x_1 + y_1) \pm (x_1 - y_1) = \sqrt{2} \Rightarrow (x_1 + y_1)^2 + (x_1 - y_1)^2 \pm 2(x_1 + y_1)(x_1 - y_1) = 2$$

$$\Rightarrow 2(x_1^2 + y_1^2) \pm 2(x_1^2 + y_1^2) \pm (x_1^2 - y_1^2) = 1 \Rightarrow 2x_1^2 = 1 \text{ or } 2y_1^2 = 1$$

$\therefore$  The locus of P is  $(2x^2 - 1)(2y^2 - 1) = 0$  which represents a rhombus.

2. If a point P moves such that its distances from the point A(1, 1) and the line  $x + y + 2 = 0$  are equal then the locus of P is [EAMCET 2005]

1) a straight line      2) a pair of straight lines      3) a parabola      4) an ellipse

Ans: 3

- Sol.  $PA^2 = PM^2$

$$(x-1)^2 + (y-1)^2 = \frac{(x+y+2)^2}{2}$$

$$x^2 + y^2 - 8x - 8y - xy = 0$$

3. If a point  $(x, y) = (\tan\theta + \sin\theta, \tan\theta - \sin\theta)$ , then the locus of  $(x, y)$  is [EAMCET 2002]

1)  $(x^2y)^{2/3} + (xy^2)^{2/3} = 1$                       2)  $x^2 - y^2 = 4xy$

3)  $x^2 - y^2 = 12xy$                       4)  $(x^2 - y^2)^2 = 16xy$

Ans: 4

- Sol.  $x = \tan\theta + \sin\theta$       Eliminating 'θ'

$$y = \tan\theta - \sin\theta \quad (x^2 - y^2)^2 = 16xy$$

4. A straight rod of length 9 units slides with its ends A, B always on the x and y axes respectively. Then the locus of the centroid of  $\Delta OAB$  is [EAMCET 2000]

1)  $x^2 + y^2 = 3$       2)  $x^2 + y^2 = 9$       3)  $x^2 + y^2 = 1$       4)  $x^2 + y^2 = 81$

Ans: 2

- Sol. Let  $A(a, 0)B(0, b)$  and  $G(x_1, y_1)$

$$\left( \frac{a}{3}, \frac{b}{3} \right) = (x_1, y_1) \Rightarrow a = 3x_1; b = 3y_1$$

$$a^2 + b^2 = 81 \Rightarrow x^2 + y^2 = 9$$

