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

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

$\Rightarrow 2(x_1^2+y_1^2)\pm 2(x_1^2+y_1^2)\pm(x_1^2-y_1^2)=1 \Rightarrow 2x_1^2=1$ 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'

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

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 ΔOAB 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 $G(x_1, y_1)$

$\left(\frac{a}{3},\frac{b}{3}\right)=(x_1y_1) \Rightarrow a=3x_1; b=3y_1$

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

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