POLAR COORDINATES

PREVIOUS EAMCET BITS

1. The eccentricity of the conic $\frac{5}{r} = 2 + 3\cos\theta + 4\sin\theta$ is **[EAMCET 2009]**

   1) $\frac{1}{2}$ 2) 1 3) $\frac{3}{2}$ 4) $\frac{5}{2}$

   Ans: 4

Sol. $\frac{5}{2r} = 1 + \frac{5}{2}\cos(\theta + \alpha) \Rightarrow e = \frac{5}{2}$

2. The radius of the circle with the polar equation $r^2 - 8r\left(\sqrt{3}\cos\theta + \sin\theta\right) + 15 = 0$ is **[EAMCET 2008]**

   1) 8 2) 7 3) 6 4) 5

   Ans: 2

Sol. Given equation $r^2 - 8r\left(\sqrt{3}\cos\theta + \sin\theta\right) + 15 = 0$

$\Rightarrow r^2 - 2r(8)\left(\frac{\sqrt{3}}{2}\cos\theta + \frac{1}{2}\sin\theta\right) = -15$

$\therefore\ a^2 - c^2 = -15 \Rightarrow a^2 - 64 = -15 \Rightarrow a^2 = 49 \Rightarrow a = 7$

3. The area (in square units) of the triangle formed by the points with polar coordinates (1, 0), (2, π/3) and (3, 2π/3) **[EAMCET 2007]**

   1) $\frac{11\sqrt{3}}{4}$ 2) $\frac{5\sqrt{3}}{4}$ 3) $\frac{5}{4}$ 4) $\frac{11}{4}$

   Ans: 2

Sol. $\frac{1}{2}\left|\sum r_1 r_2 \sin(\theta_1 - \theta_2)\right| = \frac{5\sqrt{3}}{4}$

4. The polar equation of the circle with centre $\left(2, \frac{\pi}{2}\right)$ and radius 3 units is **[EAMCET 2006]**

   1) $r^2 + 4r\cos\theta = 5$ 2) $r^2 + 4r\sin\theta = 5$ 3) $r^2 - 4r\sin\theta = 5$ 4) $r^2 - 4r\cos\theta = 5$

   Ans: 3

Sol. Polar equation of circle with centre(c, α) and r is $r^2 + c^2 - 2rc\cos(\theta - \alpha) = a^2$

$c\left(2, \frac{\pi}{2}\right), a = 3$

$r^2 + 4 - 4r\cos\left(\theta - \frac{\pi}{2}\right) = 9$

$r^2 - 4r\sin\theta = 5$

5. The cartesian form of the polar equation $\theta = \tan^{-1} 2$ is **[EAMCET 2005]**

1) x = 2y 2) y = 2x 3) x = 4y 4) y = 4x

Ans: 2

Sol. $\theta = \tan^{-1} 2 \Rightarrow \tan\theta = 2 \Rightarrow \frac{y}{x} = 2 \Rightarrow y = 2x$

6. Which of the following equations gives a circle? **[EAMCET 2005]**

1) r = 2sinθ 2) $r^2\cos 2\theta = 1$ 3) $r(4\cos\theta + 5\sin\theta) = 3$ 4) $5 = r\left(1 + \sqrt{2}\cos\theta\right)$

Ans: 1

Sol. $r^2 = 2r\sin\theta$

$x^2 + y^2 = 2y$ which is a circle equation.

7. The polar equation $\cos\theta + 7\sin\theta = \frac{1}{r}$ represents a **[EAMCET 2004]**

1) Circle 2) Parabola 3) Straight line 4) Hyperbola

Ans: 3

Sol. ----

8. The centre of the circle $r^2 - 4r(\cos\theta + \sin\theta) - 4 = 0$ in cartesian coordinates is **[EAMCET 2004]**

1) (1, 1) 2) (–1, –1) 3) (2, 2) 4) (–2, –2)

Ans: 3

Sol. Cartesian equation of the circle is $x^2 + y^2 - 4x - 4y - 4 = 0$

$\therefore$ Centre = (2, 2)

9. The radius of the circle $r = \sqrt{3}\sin\theta + \cos\theta$ is **[EAMCET 2004]**

1) 1 2) 2 3) 3 4) 4

Ans: 1

Sol. $\text{radius} = \sqrt{\frac{3}{4}+\frac{1}{4}} = 1$

10. The line passing through $\left(-1, \frac{\pi}{2}\right)$ and perpendicular to $\sqrt{3}\sin\theta + 2\cos\theta = \frac{4}{r}$ is **[EAMCET 2003]**

1) $2 = \sqrt{3}r\cos\theta - 2r\sin\theta$ 2) $5 = -2\sqrt{3}r\cos\theta + 4r\sin\theta$

3) $2 = \sqrt{3}r\cos\theta + 2r\sin\theta$ 4) $5 = 2\sqrt{3}r\sin\theta + 4r\cos\theta$

Ans: 1

Sol. equation of the line passing through $\left(-1, \frac{\pi}{2}\right)$ and $\perp$ er to $\sqrt{3}\sin\theta + 2\cos\theta = \frac{4}{r}$ is

$\sqrt{3}\cos\theta - 2\sin\theta = \frac{K}{r}$

It passes through $\left(-1, \frac{\pi}{2}\right) \Rightarrow 0 - 2 = \frac{k}{-1} \Rightarrow k = 2$

$\therefore \sqrt{3}\cos\theta - 2\sin\theta = \frac{2}{r}$

11. The equation $\frac{1}{r} = \frac{1}{8} + \frac{3}{8}\cos\theta$ represents **[EAMCET 2002]**

1) A parabola 2) An ellipse 3) A hyperbola 4) A rectangular hyperbola

Ans: 3

Sol. $\frac{\ell}{r} = 1 + e\cos\theta \Rightarrow \frac{8}{r} = 1 + 3\cos\theta$

$e = 3 > 1$ represents Hyperbola.

12. The equation of curve in polar coordinates is $\frac{\ell}{r} = 2\sin^2\frac{\theta}{r}$. Then it represents: **[EAMCET 2001]**

1) A straight line 2) A circle 3) A parabola 4) An ellipse

Ans: 3

Sol. $\frac{\ell}{r} = 1 - \cos\theta \Rightarrow e = 1$

13. The radius of the circle $r^2 - 2\sqrt{2}r(\cos\theta + \sin\theta) - 5 = 0$ is **[EAMCET 2000]**

1) 9 2) 5 3) 3 4) 2

Ans: 3

Sol. $r^2 - 4r\cos\left(\theta - \frac{\pi}{4}\right) = 5 \quad \Rightarrow c = 2; a^2 - c^2 = 5 \Rightarrow a = 3$