

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 $r^2 - 8r(\sqrt{3}\cos\theta + \sin\theta) + 15 = 0$ is **[EAMCET 2008]**

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

Ans: 2

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

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

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

3. The area (in square units) of the triangle formed by the points with polar coordinates $(1, 0)$, $(2, \pi/3)$ and $(3, 2\pi/3)$ **[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) $r = 2\sin\theta$ 2) $r^2 \cos 2\theta = 1$ 3) $r(4\cos\theta + 5\sin\theta) = 3$ 4) $5 = r(1 + \sqrt{2}\cos\theta)$

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

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