PARABOLA

PREVIOUS EAMCET BITS

1. The number of normals drawn to the parobola $y^2 = 4x$ from the point (1, 0) is **[EAMCET 2009]**

   1) 0 2) 1 3) 2 4) 3

   Ans: 2

Sol. Given point is the focus, then no. of normals =1

2. If $2x + 3y + 12 = 0$ and $x - y + 4\lambda = 0$ are conjugate with respect to the parabola $y^2 = 8x$, then λ = **[EAMCET 2008]**

   1) 2 2) – 2 3) 3 4) – 3

   Ans: 4

Sol. $2x + 3y + 12 = 0$, $x - y + 4\lambda = 0$ are conjugate w.r.t the parabola $y^2 = 8x$, then

$\Rightarrow 2(4\lambda)+1(12) = 2(2)(3)(-1) \quad [\because \ell_1 n_2 + \ell_2 n_1 = 2am_1m_2]$

$\Rightarrow 8\lambda + 12 = -12 \Rightarrow 8\lambda = -24$

$\Rightarrow \lambda = -3$

3. For the parabola $y^2 + 6y - 2x + 5 = 0$ (I) The vertex is (–2, –3) (II) The directrix is $y + 3 = 0$
   Which of the following is correct? **[EAMCET 2007]**

   1) Both I and II are true 2) I is true, II is false

   3) I is false, II is true 4) Both I and II are false

   Ans: 2

Sol. $(y+3)^2 = 2(x+2)$

Vertex = (–2, –3); directrix = $x = -3/2$

4. If the lines $2x + 3y + 12 = 0$ and $x - y + 4k = 0$ are conjugate with respect to the parabola $y^2 = 8x$, then the value of k is **[EAMCET 2006]**

   1) – 3 2) 3 3) 2 4) – 2

   Ans: 1

Sol. Condition for lines to be conjugate is $\ell_1 n_2 + \ell_2 n_1 = 2am_1m_2$

$a = 2$

$2(4k) + 12 = 4(3)(-1)$

$k = -3$

5. The parabola with directrix $x + 2y - 1 = 0$ and focus (1, 0) is **[EAMCET 2005]**

   1) $4x^2 - 4xy + y^2 - 8x + 4y + 4 = 0$ 2) $4x^2 + 4xy + y^2 - 8x + 4y + 4 = 0$

   3) $4x^2 + 4xy + y^2 - 8x - 4y + 4 = 0$ 4) $4x^2 - 4xy + y^2 - 8x - 4y + 4 = 0$

   Ans: 1

Sol. $SP^2 = PM^2$

$$(x-1)^2 + y^2 = \frac{|x+2y-1|^2}{5}$$

$\Rightarrow 4x^2 - 4xy + y^2 - 8x + 4y + 4 = 0$

6. The line, among the following, that touches the parabola $y^2 = 4ax$ is **[EAMCET 2005]**

1) $x + my + am^3 = 0$ 2) $x - my + am^2 = 0$ 3) $x + my - am^2 = 0$ 4) $y + mx + am^2 = 0$

Ans: 2

Sol. Equation of tangent to the parabola $y^2 = 4ax$ is $y = mx + \frac{a}{m}$ or $y = \frac{1}{m}x + am$

7. The equation of the parabola with focus (0, 0) and directrix x + y = 4 is **[EAMCET 2003]**

1) $x^2 + y^2 - 2xy + 8x + 8y - 16 = 0$ 2) $x^2 + y^2 - 2xy + 8x + 8y = 0$

3) $x^2 + y^2 + 8x + 8y - 16 = 0$ 4) $x^2 - y^2 + 8x + 8y - 16 = 0$

Ans: 1

Sol. $SP = PM \Rightarrow SP^2 = PM^2$

$$x^2 + y^2 = \left(\frac{x + y - 4}{\sqrt{2}}\right)^2 \Rightarrow x^2 - 2xy + y^2 + 8x + 8y - 16 = 0$$

8. A variable circle passes through the fixed point (2, 0) and touches the y-axis. Then locus of its centre is **[EAMCET 2002]**

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

Ans: 1

Sol. The distance between the centre and pt(2, 0) is equal to the for distance from centre to y-axis.

$\therefore$ Locus of centre is parabola.

9. The equation of the parabola with the focus (3, 0) and the directrix x + 3 = 0 is **[EAMCET 2002]**

1) $y^2 = 3x$ 2) $y^2 = 6x$ 3) $y^2 = 12x$ 4) $y^2 = 2x$

Ans: 3

Sol. Focus (a, 0) = (3, 0) a = 3

Directrix $x + a = 0 \Rightarrow x + 3 = 0$

$\therefore$ Equation of parabola is $y^2 = 4ax = 12x$

10. Locus of the poles of focal chords of a parabola is……. of the parabola **[EAMCET 2002]**

1) the axis 2) a focal chord 3) the directrix 4) the tangent at the vertex

Ans: 3

Sol. Locus of poles of focal chords of Parabola is its directrix.

11. The length of the latus rectum of the parabola $y^2 + 8x - 2y + 17 = 0$ is **[EAMCET 2001]**

1) 2 2) 4 3) 8 4) 16

Ans: 3

Sol. Length of the L.R = $\frac{8}{1} = 8$

$$\left(\frac{\text{Coefficient of 'x'}}{\text{Coefficient of 'y}^2\text{'}}\right)$$

12. If the normal to the parabola $y^2 = 4x$ at P(1, 2) meets the parabola again in Q, then Q = **[EAMCET 2001]**

1) (–6, 9) 2) (9, –6) 3) (–9, –6) 4) (–6, –9)

Ans: 2

Sol. Normal at $\left(at_1^2, 2at_1\right)$ meet the parabola $y^2 = 4ax$

At $\left(at_2^2, 2at_2\right)$ then $t_2 = -t_1 - \frac{2}{t_1}$

Let $2at_1 = 2t_1 = 2\left(\because a = 1\right) \Rightarrow t_1 = 1$

$t_2 = -1 - \frac{2}{1} = -3$

$\therefore \left(at_2^2, 2at_2\right) = (9, -6)$

13. A variable circle passes through the fixed point (2, 0) and touches the y-axis. Then the locus of its centre is **[EAMCET 2000]**

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

Ans: 1

Sol. Let the centre of the circle be (x_1, y_1) equation of the circle is $S = x^2 + y^2 - 2x_1x - 2y_1y + c = 0$

$S = 0^-$, touches y-axis

$\therefore \ C = y_1^2$

$\therefore \ S = x^2 + y^2 - 2x_1x - 2y_1y + y_1^2 = 0$ it passes through (2, 0)$4 - 4x_1 + y_1^2 = 0$

$\therefore$ Locus of (x_1, y_1) is $y^2 = 4(x - 1)$ (parabola)

14. The vertex of the parabola $x^2 + 8x + 12y + 4 = 0$ **[EAMCET 2000]**

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

Ans: 1

Sol. $x^2 + 8x + 12y + 4 = 0$

$\Rightarrow (x + 4)2 = -12(y - 1)$

$\therefore$ Vertex = (–4, 1)

15. The line 4x + 6y + 9 = 0 touches the parabola $y^2 = 4x$ at the point. **[EAMCET 200]**

1) $\left(-3, \frac{9}{4}\right)$ 2) $\left(3, -\frac{9}{4}\right)$ 3) $\left(\frac{9}{4}, -3\right)$ 4) $-\left(\frac{9}{4}, -3\right)$

Ans: 3

Sol. $y = \left(\frac{-2}{3}\right)x - \frac{3}{2}$ …….(1)

1 tangent to $y^2 = 4x$

$\therefore$ Point of contact = $\left(\frac{a}{m^2}; \frac{2a}{m}\right) = \left(\frac{9}{4} - 3\right)$

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