CONIC SECTIONS

EE24BTECH11035 - KOTHAPALLI AKHIL

G .COMPREHENSION QUESTIONS

1) The equation of the locus of the point whose distances from the point **P** and the line AB are equal, is

1) $9x^2 + y^2 - 6xy - 54x - 62y + 241 = 0$
2) $x^2 + 9y^2 + 6xy - 54x - 62y - 241 = 0$
3) $9x^2 + 9y^2 - 6xy - 54x - 62y - 241 = 0$
4) $x^2 + y^2 - 2xy + 27x + 31y - 120 = 0$

Passage 4

1) Let PQ be a focal chord of the parabola $y^2 = 4ax$.The tangents to the parabola at **P** and **Q** meet at a point lying on the line $y = 2x + a, a > 0$ Length of the chord PQ is (JEE Adv.2013)

a) $7a$
b) $5a$
c) $2a$
d) $3a$

2) If chord PQ subtends an angle θ at the vertex of $y^2 = 4ax$ (JEE Adv.2013)

a) $\frac{2}{3}\sqrt{7}$
b) $\frac{-2}{3}\sqrt{7}$
c) $\frac{2}{3}\sqrt{5}$
d) $\frac{-2}{3}\sqrt{5}$

Passage 5

Let a,r,s,t be nonzero real numbers. Lets $\mathbf{P}(at^2, 2as)$,$\mathbf{Q}$,$\mathbf{R}(as^2, 2as)$ be distinct points on the parabola $y^2 = 4ax$.suppose that PQ is the focal chord and lines QR and PK are parallel,where K is the point $(2a, 0)$

1) The value of r is (JEE Adv.2014)

a) $\frac{-1}{t}$
b) $\frac{t^2+1}{t}$
c) $\frac{1}{t}$
d) $\frac{t^2-1}{t}$

2) If $st = 1$, then the tangent at **P** and the normal at **M** to the parabola meet at a point whose ordinate is

a) $\frac{a(t^2+1)^2}{t^3}$
b) $\frac{a(t^2+1)}{2t^3}$
c) $\frac{1}{t}$
d) $\frac{t^2-1}{t}$

Passage 6

Let $\mathbf{F_1}(x_1,0)$ and $\mathbf{F_2}(x_2,0)$ for $x_1 < 0$ and $x_2 > 0$, be the focii of the ellipse $\frac{x^2}{9}+\frac{y^2}{8} = 1$. Suppose a parabola having vertex at the origin and focus at $\mathbf{F_2}$ intersects the ellipse at point **M** in the first quadrant and the point **N** in the first quadrant.

1) The orthocentre of the triangle F_1MN is (JEE Adv. 2016)

a) $(\frac{-9}{10}, 0)$
b) $(\frac{2}{3}, 0)$
c) $(9/10, 0)$
d) $(\frac{2}{3}, \sqrt{6})$

2) If the tangents to the ellipse at **M** and **N** meet at **R** and the normal to the parabola at **M** meets the X-Axis at **Q**, the the ratio of area of the triangle MQR to the area of the quadrilateral MF_1NF_2 is (JEE Adv.2016)

a) 3 : 4
b) 4 : 5
c) 5 : 8
d) 2 : 3

H. ASSERTION AND REASON TYPE QUESTIONS

1) STATEMENT-1: The curve $y = \frac{-x^2}{2} + x + 1$ is symmetric with respect to the line $x = 1$.because STATEMENT-2: A Parabola is symmetric about its axis. (2007-3 marks)

a) Statement-1 is True,Statement-2 is True;Statement-2 is a correct explanation for Statement-1
b) Statement-1 is True,Statement-2 is True;Statement-2 is NOT a correct explanation for Statement-1
c) Statement-1 is True,Statement-2 is False
d) Statement-1 is False,Statement-2 is True

I. INTEGER VALUE CORRECT TYPE

1) The line $2x + y = 1$ is the tangent to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$. If this line passes through the point of intersection of the nearest directrix and the X-axis, then the eccentricity of the hyperbola is (2010)

2) Consider the parabola $y^2 = 8x$. Let Δ_1 be the area of the triangle formed by the end points of its latus rectum and the point $\mathbf{P}(\frac{1}{2}, 2)$ on the parabola and Δ_2 be the area of the triangle formed by drawing tangents at **P** and at the end points of the latus rectum.Then $\frac{\Delta_1}{\Delta_2}$ is (2011)

3) Let **S** be the focus of the parabola $y^2 = 8x$ and let PQ be the common chord of the circle $x^2 + y^2 - 2x - 4y = 0$ and the given parabola. The area of the triangle PQS is (2012)

4) A Vertical line passing through point $(h, 0)$ intersects the ellipse at the points **P** and **Q** . Let the tangents to the ellipse at **P** and **Q** meet at the points **R**.If $\Delta(h)$= area of the triangle PQR, Δ_1= ma then (JEE Adv.2013)

   a) $g(x)$ is continuous but not differentiable at a
   b) $g(x)$ is differentiable on R
   c) $g(x)$ is continuous but not differentiable at b
   d) $g(x)$ is continuous and differentiable either(a) or (b) but not both

5) If the normal of the parabola $y^2 = 4x$ drawn at the end points of its latusrectum are the tangents of th circle $(x - 3)^2 + (y + 2)^2 = r^2$, then the value of r^2 is (JEE Adv.2015)

6) Let the curve C be the mirror image of the parabola $y^2 = 4x$ with respect to the line $x + y + 4 = 0$.If **A** and **B** are the points of the intersection of C with the line $y = -5$,then the distance between **A**and **B** is (JEE Adv.2015)

7) Suppose that the focii of the ellipse $\frac{x^2}{9} + \frac{y^2}{5} = 1$ are $(f_1, 0)$ and $(f_2,0)$ where $f_1 > 0$ and $f_1 < 0$.Let P_1 and P_2 be two parabolas with a common vertex at $(0, 0)$ and with foci at $(f_1,0)$ and $(2f_2,0)$,respectively. Let T_1 be a tangent to P_1 which passes through $(2f_2,0)$ and T_2 be a tangent to P_2 which passes through $(f_1,0)$.If m_1 is the slope of T_1 and m_2 is the slope of T_2,then the value of (JEE Adv. 2015)