

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) $x^2 + y^2 - 2xy + 27x + 31y - 120 = 0$

A. 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) $\frac{-2}{3}\sqrt{5}$

B. Passage 5

Let a, r, s, t be nonzero real numbers. Let **P**($at^2, 2as$), **Q**, **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) $\frac{1}{2t^3}$
- d) $\frac{t^2-1}{t}$

C. Passage 6

Let **F**₁($x_1, 0$) and **F**₂($x_2, 0$) for $x_1 < 0$ and $x_2 > 0$, be the foci of the ellipse $\frac{x^2}{9} + \frac{y^2}{8} = 1$. Suppose a parabola having vertex at the origin and focus at **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**₁**MN** 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 ratio of area of the triangle **MQR** to the area of the quadrilateral **MF**₁**NF**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 $P(\frac{1}{2}, 2)$ 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 , $\Delta_1 = ma$ 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 the 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 foci 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)