

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 S 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 $x^2/9 + y^2/8 = 1$. 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_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 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 $p(\frac{1}{2}, 2)$ 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 latus rectum 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)