HYPERBOLA
DPP - 1

1. The co-ordinates of the centre of the hypererbola, $x^2 + 3xy + 2y^2 + 2x + 3y + 2 = 0$ is :
(A) $(-1, 0)$ (B) $(1, 0)$ (C) $(-1, 1)$ (D) $(1, -1)$

2. The eccentricity of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ whose length of conjugate axis is equal to half of the distance between the focus is
(A) $\frac{4}{3}$ (B) $\frac{4}{\sqrt{3}}$ (C) $\frac{2}{\sqrt{3}}$ (D) $\sqrt{3}$

3. Given the points A(0, 4) and B(0, –4) then the locus of the point P(x, y) such that $|AP - BP| = 4$, is
(A) $\frac{x^2}{4} + \frac{y^2}{12} = 1$ (B) $\frac{x^2}{12} - \frac{y^2}{4} = 1$ (C) $\frac{x^2}{4} - \frac{y^2}{12} = 1$ (D) $\frac{x^2}{12} - \frac{y^2}{4} = -1$

4. The locus of centre of a variable circle touching the circles of radius r_1 and r_2 externally, which also touch each other externally, is a conic of the eccentricity e. If $\frac{r_1}{r_2} = 3 + 2\sqrt{2}$, then e^2 is
(A) 2 (B) 3 (C) 4 (D) 5

5. If a hyperbola whose foci are (–2, 4) and (4, 6) touches y-axis, then equation of hyperbola is
(A) $\frac{(3x+y-8)^2}{2} - \frac{(x-3y+14)^2}{8} = 1$ (B) $\frac{(x-3y+14)^2}{2} - \frac{(3x+y-8)^2}{8} = 20$
(C) $\frac{(x+3y-7)^2}{2} - \frac{(x-3y+8)^2}{8} = 1$ (D) $\frac{(3x+y-8)^2}{1} - \frac{(x-3y+14)^2}{4} = 20$

6. If the foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{b^2} = 1$ and the hyperbola $\frac{x^2}{144} - \frac{y^2}{81} = \frac{1}{25}$ coincide, then the value of b^2 is
(A) 1 (B) 5 (C) 7 (D) 9

7. The equation $16x^2 - 3y^2 - 32x + 12y - 44 = 0$ represents a hyperbola
(A) the length of whose transverse axis is $4\sqrt{3}$
(B) the length of whose conjugate axis is 4
(C) whose centre is (– 1,2)
(D) whose eccentricity is $\sqrt{\frac{19}{3}}$

8. If e_1 and e_2 are the eccentricities of the conic sections $16x^2 + 9y^2 = 144$ and $9x^2 - 16y^2 = 144$, then
(A) $e_1^2 - e_2^2 = 1$ (B) $e_1^2 + e_2^2 = 3$ (C) $e_1^2 + e_2^2 > 3$ (D) $e_1^2 + e_2^2 < 3$

9. A hyperbola has centre at origin and one focus at (6, 8). If its two directrices are $3x + 4y + 10 = 0$ and $3x + 4y - 10 = 0$ and eccentricity is e, then the value of $\frac{4e^2}{5}$ is equal to

(A) 1 (B) 2 (C) 3 (D) 4

10. If the eccentricity of the hyperbola $x^2 - y^2 \sec^2 \alpha = 5$ is $\sqrt{3}$ times the eccentricity of the ellipse $x^2 \sec^2\alpha + y^2 = 25$, then a value of α is

(A) $\frac{\pi}{6}$ (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{3}$ (D) $\frac{\pi}{2}$

HYPERBOLA
DPP - 2

1. The parametric equations for the conic section $x^2 - 8x - 4y^2 - 16y - 4 = 0$ are
(A) $x = -4 + 2\sec\theta,\ y = 2 + \tan\theta$ (B) $x = 4 + 2\tan\theta,\ y = -2 + \sec\theta$
(C) $x = -4 + 2\tan\theta,\ y = 2 + \sec\theta$ (D) $x = 4 + 2\sec\theta,\ y = -2 + \tan\theta$

2. The reflection of hyperbola $\frac{x^2}{9} - \frac{y^2}{4} = 1$ in the line $y = x$ will be a conic. The eccentricity of that conic will be
(A) $\frac{\sqrt{13}}{2}$ (B) $\frac{\sqrt{13}}{3}$ (C) $\frac{\sqrt{5}}{2}$ (D) $\frac{\sqrt{5}}{3}$

3. If the curves $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ and $x^2 = cy$ touch each other at the point $(2\sqrt{2}, 4)$ then the value of $(a^2 + b^2 + c)$ is equal to
(A) 38 (B) 26 (C) 22 (D) 18

4. A common tangent to the conics $x^2 = 6y$ and $2x^2 - 4y^2 = 9$, is
(A) $x + y = 1$ (B) $x - y = 1$ (C) $x + y = \frac{9}{2}$ (D) $x - y = \frac{3}{2}$

5. The locus of a point P(h, k) such that the line $y = hx + k$ touches the hyperbola $\frac{x^2}{1} - \frac{y^2}{9} = 1$, is another hyperbola whose eccentricity is
(A) $\sqrt{3}$ (B) $\sqrt{2}$ (C) 2 (D) 3

6. A tangent to the hyperbola $x^2 - 2y^2 = 4$ meets x-axis at P and y-axis at Q. Line PR and QR are drawn such that OPRQ is a rectangle (where O is origin). The locus of R is
(A) $\frac{4}{x^2} + \frac{2}{y^2} = 1$ (B) $\frac{4}{x^2} - \frac{2}{y^2} = 1$ (C) $\frac{2}{x^2} - \frac{4}{y^2} = 1$ (D) $\frac{2}{x^2} + \frac{4}{y^2} = 1$

7. If PQ is a double ordinate of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ such that OPQ is an equilateral triangle, O being the centre of the hyperbola, then the eccentricity e of the hyperbola satisfies
(A) $1 < e < \frac{2}{\sqrt{3}}$ (B) $e = \frac{2}{\sqrt{3}}$ (C) $e = \frac{\sqrt{3}}{2}$ (D) $e > \frac{2}{\sqrt{3}}$

8. If the locus of midpoints of portions of tangents intercepted between co-ordinate axes of hyperbola $\frac{x^2}{16} - \frac{y^2}{9} = 1$ is $\frac{\alpha}{x^2} - \frac{9}{y^2} = \beta$, then $(\alpha + \beta)$ is equal to
(A) 14 (B) 16 (C) 18 (D) 20

9. If the latus rectum of a hyperbola subtends right angle at its centre, then its eccentricity is

(A) $\sqrt{2}$ (B) $\frac{\sqrt{3}+\sqrt{5}}{2}$ (C) $\frac{\sqrt{3}+1}{2}$ (D) $\frac{\sqrt{5}+1}{2}$

10. Consider hyperbola : $16x^2 - 2y^2 = 1$. Let tangent to hyperbola at one end of latus rectum lying in I-quadrant meet axes at points A and B , then area of rectangle AOBC (O is origin) is

(A) $\frac{1}{12}$ (B) $\frac{1}{48}$ (C) $\frac{1}{96}$ (D) $\frac{3}{48}$

HYPERBOLA
DPP - 3

1. If the chord of the hypererbola $x^2 - y^2 = 9$ touches the parabola $y^2 = 12x$, then the locus of the middle points of these chord is
(A) $x^3 = (x - 3)y^2$ (B) $x^3 = (x + 3) y^2$ (C) $x (x^2 - y^2) = 3y$ (D) $x^3 = x - 3y^2$

2. If the chords of contact of tangents from two points (– 4, 2) and (2, 1) to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ are at right angle, then the eccentricity of the hyperbola, is
(A) $\frac{\sqrt{7}}{2}$ (B) $\sqrt{\frac{5}{3}}$ (C) $\sqrt{\frac{3}{2}}$ (D) $\sqrt{2}$

3. A tangent to the hypererbola $\frac{x^2}{4} - \frac{y^2}{1} = 1$ meets ellipse $x^2 + 4y^2 = 4$ at two distinct points. The locus of mid point of this chord is
(A) $(x^2 + 4y^2)^2 = 4(x^2 - 4y^2)$ (B) $(x^2 - 4y^2) = 4(x^2 + 4y^2)$
(C) $(x^2 - 4y^2)^2 = 4(4x^2 + y^2)$ (D) $(x^2 + 4y^2)^2 = 4(4x^2 - y^2)$

4. Let P (a sec θ, b tan θ) and Q (a sec φ, b tan φ), where $\theta + \phi = \frac{\pi}{2}$, be two points on the hypererbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$. If (h, k) is the point of intersection of the normals at P & Q, then k is equal to :
(A) $\frac{a^2 + b^2}{a}$ (B) $-\left(\frac{a^2 + b^2}{a}\right)$ (C) $\frac{a^2 + b^2}{b}$ (D) $-\left(\frac{a^2 + b^2}{b}\right)$

5. If x = 9 is the chord of contact of the hypererbola $x^2 - y^2 = 9$, then the equation of the corresponding pair of tangents, is :
(A) $9x^2 - 8y^2 + 18x - 9 = 0$ (B) $9x^2 - 8y^2 - 18x + 9 = 0$
(C) $9x^2 - 8y^2 - 18x - 9 = 0$ (D) $9x^2 - 8y^2 + 18x + 9 = 0$

6. Normals to the hypererbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, at the point P(θ) passes through (2a, 0), at Q(φ) passes through (0, – 2b) then
(A) $-\infty < \tan\phi < \infty$ (B) $-1 \le \tan\phi < 0$ (C) $0 < \tan\phi \le 1$ (D) $\tan\phi > \sqrt{2}$

7. The tangent to the hyperbola $xy = c^2$ at the point P intersects the x-axis at T and the y-axis at T′. The normal to the hyperbola at P intersects the x-axis at N and the y-axis at N′. The areas of the triangles PNT and PN'T' are Δ and Δ' respectively, then $\frac{1}{\Delta} + \frac{1}{\Delta'}$ is
(A) equal to 1 (B) depends on t (C) depends on c (D) equal to 2

8. If the ellipse $4x^2 + 9y^2 = 36$ and the hyperbola $\alpha^2x^2 - y^2 = 4$ intersects orthogonally then the value of α can be
(A) 5 (B) 4 (C) 3 (D) 2

9. Tangents are drawn from any point on the hyperbola $4x^2 - 9y^2 = 36$ to the circle $x^2 + y^2 - 9 = 0$. If the locus of the midpoint of the chord of contact is $\left(\frac{x^2}{9} - \frac{y^2}{4}\right) = \lambda\left(\frac{x^2 + y^2}{9}\right)^2$, then λ is equal to

(A) 1 (B) 4 (C) 9 (D) 16

10. Let $P\left(\frac{\pi}{6}\right)$ and $Q\left(\frac{5\pi}{6}\right)$ be two points on a hyperbola $x^2 - y^2 = 3$ with centre C. L_1 is tangent line at P and L_2 is normal line at Q. If from C, a line parallel to L_2 is drawn which meets L_1 at M then CM equals

(A) $\frac{3}{\sqrt{5}}$ (B) $\frac{6}{\sqrt{5}}$ (C) $\frac{4}{5}$ (D) $\frac{3}{5}$

HYPERBOLA
DPP - 4

1. If the circle $x^2 + y^2 = k^2$ and the rectangular hypererbola $xy = k$ have no points in common then the number of integral values of k, is
(A) 0 (B) 1 (C) 2 (D) 3

2. Let from the point $P(\alpha, \beta)$, tangents are drawn to the parabola $y^2 = 4x$, including the angle 45° to each other. Then locus of $P(\alpha, \beta)$ is
(A) a circle with centre (– 3, 0)
(B) an ellipse with centre (– 3, 0)
(C) a rectangular hypererbola with centre (3, 0)
(D) a rectangular hypererbola with centre (–3, 0)

3. Consider the hyperbola H given by the equation $xy = 6$ and the point P (3, 2) lies on H. Let L be the line tangent to H at P (3, 2). If L intersects the positive x-axis at a point A and the positive y-axis at a point B, then the area of the triangle ΔAOB, is
(A) 12 (B) 6 (C) 10 (D) 18

4. The angle between pair of tangents drawn to the curve $7x^2 - 12y^2 = 84$ from M(1, 2) is
(A) $2\tan^{-1}\frac{1}{2}$ (B) $2\tan^{-1}2$
(C) $2\left(\tan^{-1}\frac{1}{3}+\tan^{-1}\frac{1}{2}\right)$ (D) $2\tan^{-1}3$

5. The chord PQ of the rectangular hyperbola $xy = a^2$ meets the axis of x at A ; C is the mid point of PQ & 'O' is the origin. Then the Δ ACO is :
(A) equilateral (B) isosceles (C) right angled (D) right isosceles.

6. If $y = 2x + 3$ is a tangent to the rectangular hyperbola $x^2 - y^2 = c$, then c has the value
(A) 1 (B) 2 (C) 3 (D) 4

7. If two distinct tangents are drawn from a point $\left(a, \frac{-14}{9}\right)$ to the curve $y = \frac{3}{5}\sqrt{x^2-25}$ then number of integral values of a is
(A) 4 (B) 5 (C) 10 (D) 11

8. If radii of director circles of $\frac{x^2}{a^2}+\frac{y^2}{b^2} = 1$ and $\frac{x^2}{a^2}-\frac{y^2}{b^2} = 1$ are 2r and r respectively, let e_E and e_H are the eccentricities of ellipse and hyperbola respectively, then
(A) $2e_H^2 - e_E^2 = 6$ (B) $e_E^2 + 4e_H^2 = 6$ (C) $4e_H^2 - e_E^2 = 6$ (D) $2e_H^2 + e_E^2 = 6$

9. The asymptotes of hyperbola $xy = 3x - 4y$ are
(A) x = 3, y = 4 (B) x = 3, y = –4 (C) y = 3, x = –4 (D) None of these

10. A common tangent to $9x^2 - 16y^2 = 144$ and $x^2 + y^2 = 9$, is
(A) $y = \frac{3}{\sqrt{7}}x+\frac{15}{\sqrt{7}}$ (B) $y = 3\sqrt{\frac{2}{7}}x+\frac{15}{\sqrt{7}}$
(C) $y = 2\sqrt{\frac{3}{7}}x+15\sqrt{7}$ (D) $y = \frac{3}{\sqrt{7}}x-\frac{15}{\sqrt{7}}$