Hyperbola

1. The equation of the common tangent to the curves $y^2 = 8x$ and $xy = -1$ is

(a) $3y = 9x + 2$ (b) $y = 2x + 1$ (c) $2y = x + 8$ (d) $y = x + 2$

2. The product of the lengths of perpendicular drawn from any point on the hyperbola $x^2 - 2y^2 - 2 = 0$ to its asymptotes is

(a) $\frac{1}{2}$ (b) $\frac{2}{3}$ (c) $\frac{3}{2}$ (d) 2

3. The angle between the asymptotes of $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is equal to

(a) $2\tan^{-1}\left(\frac{b}{a}\right)$ (b) $2\tan^{-1}\frac{a}{b}$ (c) $\tan^{-1}\frac{a}{b}$ (d) $\tan^{-1}\frac{b}{a}$

4. If $x = 9$ is the chord of contact of the hyperbola $x^2 - y^2 = 9$, then the equation of the corresponding pair of tangent 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) $9x^2 - 8y^2 + 18x + 9 = 0$

5. Let $P(a\sec\theta, b\tan\theta)$ and $Q(a\sec\phi, b\tan\phi)$, where $\theta + \phi = \frac{\pi}{2}$, be two points on the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$. If (h, k) is the point of intersection of the normals at *P* and *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) $-\left(\frac{a^2 + b^2}{b}\right)$

6. Let *P* be a point on the hyperbola $x^2 - y^2 = a^2$ where *a* is a parameter such that *P* is nearest to the line $y = 2x$. The locus of *P* is

(a) $x - 2y = 0$ (b) $2y - x = 0$ (c) $x + 2y = 0$ (d) $2y + x = 0$

7. An ellipse has eccentricity $\frac{1}{2}$ and one focus at the point $P\left(\frac{1}{2}, 1\right)$. Its one directrix is the common tangent nearer to the point *P*, to the circle $x^2 + y^2 = 1$ and the hyperbola $x^2 - y^2 = 1$. The equation of the ellipse in the standard form, is

(a) $\frac{(x - 1/3)^2}{1/9} + \frac{(y - 1)^2}{1/12} = 1$ (b) $\frac{(x - 1/3)^2}{1/9} + \frac{(y + 1)^2}{1/12} = 1$

(c) $\frac{(x - 1/3)^2}{1/9} - \frac{(y - 1)^2}{1/12} = 1$ (d) $\frac{(x - 1/3)^2}{1/9} - \frac{(y + 1)^2}{1/12} = 1$

8. If the two intersecting lines intersect the hyperbola and neither of them is a tangent to it, then number of intersecting points are

(a) 1 (b) 2 (c) 2, 3 or 4 (d) 2 or 3

9. The equation of a tangent parallel to $y = x$ drawn to $\frac{x^2}{3} - \frac{y^2}{2} = 1$ is

(a) $x - y + 1 = 0$ (b) $x + y + 2 = 0$ (c) $x + y - 1 = 0$ (d) $x - y + 2 = 0$

10. The tangents to the hyperbola $x^2 - y^2 = 3$ are parallel to the straight line $2x + y + 8 = 0$ at the following points.

(a) (2, 1) or (1, 2) (b) (2, –1) or (–2, 1) (c) (–1, –2) (d) (–2, –1)

11. If the straight line $x\cos\alpha + y\sin\alpha = p$ be a tangent to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, then

(a) $a^2\cos^2\alpha + b^2\sin^2\alpha = p^2$ (b) $a^2\cos^2\alpha - b^2\sin^2\alpha = p^2$

(c) $a^2\sin^2\alpha + b^2\cos^2\alpha = p^2$ (d) $a^2\sin^2\alpha - b^2\cos^2\alpha = p^2$

12. The equation of the tangent at the point $(a\sec\theta, b\tan\theta)$ of the conic $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, is

(a) $x\sec^2\theta - y\tan^2\theta = 1$ (b) $\frac{x}{a}\sec\theta - \frac{y}{b}\tan\theta = 1$

(c) $\frac{x + a\sec\theta}{a^2} - \frac{y + b\tan\theta}{b^2} = 1$ (d) None of these

13. The auxiliary equation of circle of hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, is

(a) $x^2 + y^2 = a^2$ (b) $x^2 + y^2 = b^2$ (c) $x^2 + y^2 = a^2 + b^2$ (d) $x^2 + y^2 = a^2 - b^2$

14. A point on the curve $\frac{x^2}{A^2} - \frac{y^2}{B^2} = 1$ is

(a) $(A\cos\theta, B\sin\theta)$ (b) $(A\sec\theta, B\tan\theta)$ (c) $(A\cos^2\theta, B\sin^2\theta)$ (d) None of these

15. The locus of the point of intersection of the lines $ax\sec\theta + by\tan\theta = a$ and $ax\tan\theta + by\sec\theta = b$, where θ is the parameter, is

(a) A straight line (b) A circle (c) An ellipse (d) A hyperbola