EXERCISE – II MULTIPLE CORRECT (OBJECTIVE QUESTIONS)

1. Variable circles are drawn touching two fixed circles externally then locus of centre of variable circle is

(A) parabola (B) ellipse (C) hyperbola (D) circle

Sol.

2. The locus of the mid points of the chords passing through a fixed point (α, β) of the hyperbola, $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is

(A) a circle with centre $\left(\frac{\alpha}{2}, \frac{\beta}{2}\right)$

(B) an ellipse with centre $\left(\frac{\alpha}{2}, \frac{\beta}{2}\right)$

(C) a hyperbola with centre $\left(\frac{\alpha}{2}, \frac{\beta}{2}\right)$

(D) straight line through $\left(\frac{\alpha}{2}, \frac{\beta}{2}\right)$

Sol.

3. The locus of the foot of the perpendicular from the centre of the hyperbola $xy = c^2$ on a variable tangent is

(A) $(x^2 - y^2)^2 = 4c^2xy$ (B) $(x^2 + y^2)2 = 2c^2xy$

(C) $(x^2 - y^2) = 4c^2xy$ (D) $(x^2 + y^2)^2 = 4c^2xy$

Sol.

4. The equation to the chord joining two points (x_1, y_1) and (x_2, y_2) on the rectangular hyperbola $xy = c^2$ is

(A) $\frac{x}{x_1 + x_2} + \frac{y}{y_1 + y_2} = 1$ (B) $\frac{x}{x_1 - x_2} + \frac{y}{y_1 - y_2} = 1$

(C) $\frac{x}{y_1 - y_2} + \frac{y}{x_1 - x_2} = 1$ (D) $\frac{x}{y_1 - y_2} + \frac{y}{x_1 - x_2} = 1$

Sol.

5. The equation $9x^2 - 16y^2 - 18x + 32y - 151 = 0$ represent a hyperbola

(A) The length of the transverse axes is 4

(B) Length of latus rectum is 9

(C) Equation of directrix is $x = \frac{21}{5}$ and $x = -\frac{11}{5}$

(D) none of these

Sol.

6. From the points of the circle $x^2 + y^2 = a^2$, tangents are drawn to the hyperbola $x^2 - y^2 = a^2$; then the locus of the middle points of the chords of contact is

(A) $(x^2 - y^2)^2 = a^2(x^2 + y^2)$

(B) $(x^2 - y^2)^2 = 2a^2(x^2 + y^2)$

(C) $(x^2 + y^2)^2 = a^2(x^2 - y^2)$

(D) $2(x^2 - y^2)^2 = 3a^2(x^2 + y^2)$

Sol.

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 PNT′ 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

Sol.

8. The tangent to the hyperbola, $x^2 - 3y^2 = 3$ at the point $(\sqrt{3}, 0)$ when associated with two asymptotes constitutes.
(A) isosceles triangle (B) an equilateral triangle
(C) a triangle whose area is $\sqrt{3}$ sq. unit
(D) a right isosceles triangle
Sol.

9. The asymptote of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ form with any tangent to the hyperbola a triangle whose area is $a^2 \tan \lambda$ in magnitude then its eccentricity is
(A) $\sec \lambda$ (B) $\operatorname{cosec} \lambda$ (C) $\sec^2 \lambda$ (D) $\operatorname{cosec}^2 \lambda$
Sol.

10. From any point on the hyperbola $H_1 : (x^2/a^2) - (y^2/b^2) = 1$ tangents are drawn to the hyperbola $H_2 : (x^2/a^2) - (y^2/b^2) = 2$. The area cut-off by the chord of contact on the asymptotes of H_2 is equal to
(A) ab/2 (B) ab (C) 2 ab (D) 4 ab
Sol.

11. The tangent at P on the hyperbola $(x^2/a^2) - (y^2/b^2) = 1$ meets the asymptote $\frac{x}{a} - \frac{y}{b} = 0$ at Q. If the locus of the mid point of PQ has the equation $(x^2/a^2) - (y^2/b^2) = k$, then k has the value equal to
(A) 1/2 (B) 2 (C) 3/4 (D) 4/3
Sol.

12. If θ is the angle between the asymptotes of the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ with eccentricity e, then $\sec\theta/2$ can be

(A) e (B) e/2 (C) e/3 (D) 1/e

Sol.

13. If (5, 12) and (24, 7) are the focii of a conic passing through the origin then the eccentricity of conic is

(A) $\sqrt{386}/12$ (B) $\sqrt{386}/13$

(C) $\sqrt{386}/25$ (D) $\sqrt{386}/38$

Sol.

14. The point of contact of $5x+12y=19$ and $x^2 - 9y^2 = 9$ will lie on

(A) $4x+15y=0$ (B) $7x+12y=19$

(C) $4x + 15y + 1 = 0$ (D) $7x-12y=19$

Sol.

15. Equation $(2+\lambda)x^2-2\lambda xy+(\lambda-1)y^2-4x-2=0$ represents a hyperbola if

(A) $\lambda=4$ (B) $\lambda=1$ (C) $\lambda=4/3$ (D) $\lambda=-1$

Sol.