SUBJECT- MATHEMATICS, CLASS-XI

CHAPTER-(CONIC SECTIONS)

WORKSHEET (HOTS)

1. If 'p' and 'q' be the longest distance and the shortest distance of the point (-7,2) from any point (α, β) on the curve whose equation is $x^2+y^2-10x-14y-51=0$, then find the Geometric mean of p and q.

2. Two rods of length 'a' and 'b' slide along the co-ordinate axes, which are rectangular, in such a way that their ends are always Concyclic ,then find the locus of the centre of the circle passing through these ends.

3. If on a given base, triangle be described such that the sum of the tangents of the base angle is constant(k). Then find the locus of the third vertex.

4. The Parabola $y^2=\lambda x$ and $25[(x-3)^2+(y+2)^2] = (3x-4y-2)^2$ are equal , then find the value of λ.

5. The equation of Latus-rectum of a parabola is x+y-8=0 and the equation of the tangent at the vertex is x+y-12=0, then find the length of the latus rectum.

6. If a triangle is inscribed in an ellipse and two of its sides are parallel to given straight lines , then find the envelop of the third side.

7. A tangent to the ellipse $x^2+4y^2=4$ meets the ellipse $x^2+2y^2=6$ at P and Q. Find the angle at which the tangents at P and Q of the ellipse $x^2+ 2y^2=6$ are inclined.

8. If e and e' are the eccentricities of a hyperbola and its conjugate , then find the value of $\frac{1}{e^2}+\frac{1}{e'^2}$

9. If CF is the perpendicular from the centre 'C' of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ on the tangent at any point 'P' and G is the point when the normal at 'P' meets the major axis , then find CF.BG.

10. If the latus rectum of a hyperbola forms an equilateral triangle with the vertex at the centre of it, then what is the eccentricity of the hyperabola.

Multiple Choice Questions

11. A chord of the parabola $y=x^2-2x+5$ joins the point with the abscissas 1 and 3 Then the equation of the tangent to the parabola parallel to the chord is:

A. $2x - y - \frac{5}{4} = 0$

B. $2x - y - 2 = 0$

C. $2x - y - 1 = 0$

D. $2x - y - 1 = 0$

12. In the xy-plane, three distinct lines l_1, l_2, l_3 concur at point $(\lambda, 0)$. Further the lines l_1, l_2, l_3 are normals to the parabola $y^2 = 6x$ at the points $A = (x_1, y_1), B = (x_2, y_2), C = (x_3, y_3)$ respectively. Then we have

A. A $\lambda < -5$

B. $\lambda > 3$

C. $-5 < \lambda < -3$

D. $0 < \lambda < 3$

13. 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

A. 2

B. 4

C. 6

D. 8

14. How many real tangents can be drawn from the point (4,3) to the hyperbola $x^2/16 - y^2/9 = 1$ and find angle between the tangents respectively.

A. 2, $arctan\left(\frac{3}{4}\right)$

B. 2, $arctan\left(\frac{4}{3}\right)$

C..1, $arctan\left(\frac{4}{3}\right)$

D. 1, $arctan\left(\frac{3}{4}\right)$

15. The tangent at an extremity (in the first quadrant) of latus rectum of the hyperbola $\frac{x^2}{4}-\frac{y^2}{5}=1$, meets x-axis and y-axis at A and B respectively. Then $(OA)^2-(OB)^2$, where O is the origin, equals:

A $-\frac{20}{9}$

B $\frac{16}{9}$

C4

D $-\frac{4}{3}$

16. What type of conic would pass through the intersection of two rectangular hyperbolas?

A. Ellipse

B. Parabola

C. Rectangular hyperbola

D. Circle

17. Find the equation of a line that makes $90°$ with the ellipse $\frac{x^2}{64}+\frac{y^2}{36}=1$ and the line perpendicular to this line at $\left(\sqrt{32}.\sqrt{18}\right)$.

A. $\frac{x\cdot\sqrt{32}}{36}+\frac{y\cdot\sqrt{18}}{64}=1$, $\sqrt{32}x-\sqrt{18}y=14$

B. $\frac{x\cdot\sqrt{32}}{64}+\frac{y\cdot\sqrt{18}}{36}=1$, $\sqrt{32}x-\sqrt{18}y=\sqrt{14}$

C. $\frac{x-\sqrt{32}}{64}+\frac{y-\sqrt{18}}{100}=1$, $\sqrt{32}x-\sqrt{18}y=7$

D. $\frac{x-\sqrt{32}}{64}+\frac{y-\sqrt{18}}{36}=1$, $\sqrt{32}x-\sqrt{18}y=14$

18. If a perpendicular to major axis of $\frac{x^2}{15}+\frac{y^2}{10}=1$ is drawn from (3,2), the perpendicular again cuts the ellipse at B. Find point of intersection of normal drawn from B with major axis.

A. (3,0)

B. (1,0)

C. (0,1)

D. (2,0)

19. A tangent of the ellipse $\frac{x^2}{25}+\frac{y^2}{16}=1$ at any point P meet the line x = 0 at a point Q. Let R be the image of Q in the line y = x, then circle whose extremities of a diameter are Q and R passes through a fixed point. The fixed point is

A. (3, 0)

B. (5, 0)

C .(0, 0)

D. (4, 0)

20. A circle has the same centre as an ellipse & passes through the focii F1 & F2 of the ellipse, such that the two curves intersect in 4 points. Let 'P' be any one on their point of intersection. If the major axis the ellipse is 17 & the area of the triangle PF1 F2 is 30, then the distance between the foci is

A. 11

B. 12

C. 13

D. 15