UNIT-6 CONIC SECTION

SUCCESS TIP: DIVIDE AND RULE POLICY WILL HELP YOU SOLVE TOUGH PROBLEMS EASILY

1. The angle of intersection between the curves, $y = x^2$ and $y^2 = 4x$ at the point (0, 0) is

(a) $\pi/2$ (b) 0

(c) π (d) none of these

2. The point on the curve $y^2 = 4x$ which is nearest to the point (2, 1) is

(a) (1, –2) (b) (–2, 1)

(c) $\left(1, 2\sqrt{2}\right)$ (d) (1, 2)

3. Length of latus rectum of the parabola $25[(x-1)^2 + (y-2)^2] = (3x - 4y + 8)^2$ is

(a) 6/5 units (b) 6 units

(c) 3/5 units (d) none of these

4. The normal chord at a point 't' on the parabola $16y^2 = x$ subtends a right angle at the vertex. Then t is equal to

(a) $-\sqrt{2}$ (b) 2

(c) 1/64 (d) none of these

5. The point on the parabola $4x = y^2 + 9 - 6y$ which is closest to the circle $x^2 + y^2 - 10x - 10y + 49 = 0$ is

(a) (9/4, 0) (b) (4, 11)

(c) (1, 1) (d) none of these

6. A ray of light moving parallel to the x-axis gets reflected from a parabolic mirror whose equation is $(y-2)^2 = 4(x+1)$. After reflection, the ray must pass through the point

(a) (2, 0) (b) (–1, 2)

(c) (0, –2) (d) none of these

7. The locus of the point of intersection of normals at the points on the parabola where tangents drawn meet at the directrix is

(a) a parabola (b) a circle

(c) an ellipse (d) a hyperbola

8. The tangents and normals at the ends of a focal chord of a parabola meet in P and Q respectively. Then slope of PQ is

(a) 1 (b) 0

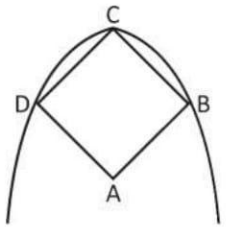
(c) undefined (d) $\sqrt{3}$

9. The normals at the extremities of a chord PQ of the parabola $y^2 = 4ax$ meet on the parabola, then locus of the middle point of PQ is

(a) a straight line (b) a circle

(c) a parabola (d) a pair of straight lines

10. In the figure, a parabola is drawn to pass through the vertices B, C and D of the square ABCD. If A(2, 1), C(2, 3), then focus of this parabola is



(a) (3, 13/4) (b) (2, 13/4)

(c) (2, 11/4) (d) (1, 11/4)

11. Mutually perpendicular tangents TA and TB are drawn to $y^2 = 4ax$. Minimum length of AB is equal to

(a) 2a (b) 4a

(c) 6a (d) 8a

12. The parabola $y^2 = 4x$ and the circle $(x-6)^2 + y^2 = r^2$ will have no common tangent if r satisfies

(a) $r < \sqrt{20}$ (b) $r > \sqrt{20}$

(c) $r > \sqrt{18}$ (d) $r \in \left(\sqrt{20}, \sqrt{28}\right)$

13. If the normal at three points A, B, C of $y^2 = 4ax$ meet in a point, then the centroid of ΔABC lies on

(a) X-axis (b) Y-axis

(c) x = –a (d) x = a

14. The eccentricity of the ellipse which meets the straight line $\frac{x}{7} + \frac{y}{2} = 1$ on the X-axis and the straight line $\frac{x}{3} - \frac{y}{5} = 1$ on the Y-axis and whose axes lie along the axes of co-ordinates, is

(a) $\frac{\sqrt{3}}{7}$ (b) $\frac{3\sqrt{2}}{7}$

(c) $\frac{2\sqrt{6}}{7}$ (d) $\frac{3}{\sqrt{7}}$

15. The angle between the normals of ellipse $4x^2 + y^2 = 5$, at the intersection of $2x + y = 3$ and the ellipse, is

(a) $\tan^{-1}(3/5)$ (b) tan–1(3/4)

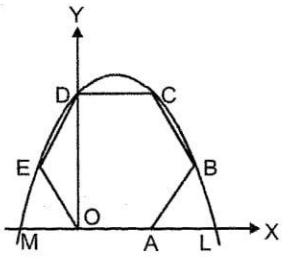
(c) $\tan^{-1}(4/3)$ (d) $\tan^{-1}(4/5)$

16. A man running around a race course notes that the sun of the distances of two flag posts from him is always 10 metres and the distance between the flag posts is 8 metres. The area of the path he encloses in square metres is

(a) 8π (b) 12π

(c) 15π (d) 18π

17. In this given figure, OABCDE is a regular hexagon, whose vertices B, C, D, E lie on a parabola. If OA = a, then



(a) vertex of parabola is $\left(a/2, 7a\sqrt{3}/6\right)$

(b) equation of parabola is

$$3ay + 2\sqrt{3}x^2 - 2\sqrt{3}ax - 3a^2\sqrt{3} = 0$$

(c) span on X-axis is $a\sqrt{7}$

(d) axis of parabola is x = a

18. The equation $\frac{x^2}{10-a} + \frac{y^2}{4-a} = 1$ represents an ellipse, if

(a) a > 10 (b) a > 4

(c) 4 < a < 10 (d) a < 4

19. The sum of squares of the perpendiculars on any tangent to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ from the points on the minor axis, each at a distance $\sqrt{a^2 - b^2}$ from the centre is

(a) $a^2 + b^2$ (b) $a^2 - b^2$

(c) $2a^2$ (d) $2b^2$

20. The eccentricity of an ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ whose latus rectum is half of its major axis is

(a) $\sqrt{3}/2$ (b) $1/\sqrt{2}$

(c) $\sqrt{2/3}$ (d) none of these

21. The locus of the mid-point of the portion of a tangent to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ included between the axes is the curve

(a) $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 4$ (b) $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 4$

(c) $\frac{a^2}{x^2} + \frac{b^2}{y^2} = 4$ (d) none of these

22. The equation of the chord of the ellipse $2x^2 + 5y^2 = 20$ which is bisected at the point (2, 1) is

(a) 5x + 4y + 13 = 0 (b) 5x + 4y = 13

(c) 4x + 5y + 13 = 0 (d) 4x + 5y = 13

23. If e_1 and e_2 be the eccentricities of hyperbola and its conjugate, then $1/e_1^2 + 1/e_2^2 =$

(a) $\sqrt{2}/8$ (b) 1/4

(c) 1 (d) 4

24. If a tangent to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ cuts the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ at P and Q, then the locus of mid-point of PQ is

(a) $\left(\frac{x^2}{a^2} + \frac{y^2}{b^2}\right)^2 = \frac{x^2}{a^2} - \frac{y^2}{b^2}$

(b) $\frac{x^2}{a^2} + \frac{y^2}{b^2} = \left(\frac{x^2}{a^2} - \frac{y^2}{b^2}\right)^2$

(c) $\left(\frac{x^2}{a^4} + \frac{y^2}{b^4}\right) = \frac{x^2}{a^2} - \frac{y^2}{b^2}$

(d) $\frac{x^2}{a^4} + \frac{y^2}{b^4} = \left(\frac{x^2}{a^2} - \frac{y^2}{b^2}\right)^2$

25. Tangents are drawn from points on the line $x - y - 5 = 0$ to $x^2 + 4y^2 = 4$. Then, all chords of contact pass through a fixed point whose co-ordinates are

(a) (4/5, –1/5) (b) (4/5, 1/5)

(c) (1/5, 4/5) (d) none of these

26. The eccentricity of ellipse $ax^2 + by^2 + 2gx + 2fy + c = 0$ of its axis is parallel to x-axis is

(a) $\sqrt{\frac{a+b}{4}}$ (b) $\sqrt{\frac{a-b}{2}}$

(c) $\sqrt{\frac{b-a}{a}}$ (d) $\sqrt{\frac{b-a}{b}}$

27. 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) 9 (b) 1

(c) 5 (d) 7

28. Let P be the point (1, 0) and Q, a point on the locus $y^2 = 8x$. The locus of mid-point of PQ is

(a) $x^2 + 4y + 2 = 0$ (b) $x^2 - 4y + 2 = 0$

(c) $y^2 - 4x + 2 = 0$ (d) $y^2 + 4x + 2 = 0$

29. The locus of the vertices of the family of parabolas

$$y = \frac{a^3}{3}x^2 + \frac{a^2}{2}x - 2a \text{ is}$$

(a) $xy = \frac{64}{105}$ (b) $xy = \frac{105}{64}$

(c) $xy = \frac{3}{4}$ (d) $xy = \frac{35}{16}$

30. The ellipse $x^2 + 4y^2 = 4$ is inscribed in a rectangle aligned with the coordinate axes, which in turn is inscribed in another ellipse that passes through the point (4, 0). Then the equation of the ellipse is

(a) $x^2 + 12y^2 = 16$ (b) $4x^2 + 48y^2 = 48$

(c) $4x^2 + 64y^2 = 48$ (d) $x^2 + 16y^2 = 16$