1. The number of normals that can be drawn from a point to a given ellipse is
(a) 2 (b) 3 (c) 4 (d) 1

If $\frac{x}{a} + \frac{y}{b} = \sqrt{2}$ touches the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, then its eccentric angle θ is equal to

2. If $\frac{x}{a} + \frac{y}{b} = \sqrt{2}$ touches the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, then its eccentric angle θ is equal to
(a) 0 (b) 90° (c) 45° (d) 60°

3. The radius of the circle passing through the foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$, and having its centre (0, 3) is
(a) 4 (b) 3 (c) $\sqrt{12}$ (d) 7/2

4. The centre of the ellipse $\frac{(x+y-2)^2}{9} + \frac{(x-y)^2}{16} = 1$ is
(a) (0, 0) (b) (1, 1) (c) (1, 0) (d) (0, 1)

5. The length of the latus rectum of an ellipse is one third of its major axis. Its eccentricity would be
(a) $\frac{2}{3}$ (b) $\sqrt{\frac{2}{3}}$ (c) $\frac{1}{\sqrt{3}}$ (d) $\frac{1}{\sqrt{2}}$

6. The distance between the foci of the ellipse $5x^2 + 9y^2 = 45$ is
(a) $2\sqrt{2}$ (b) 4 (c) $4\sqrt{2}$ (d) 2

7. The length of the latus rectum of the ellipse $\frac{x^2}{36} + \frac{y^2}{49} = 1$ is
(a) 98/6 (b) 72/7 (c) 72/14 (d) 98/12

8. The equation of the ellipse whose one focus is at (4, 0) and whose eccentricity is 4/5 is
(a) $\frac{x^2}{3^2} + \frac{y^2}{5^2} = 1$ (b) $\frac{x^2}{5^2} + \frac{y^2}{3^2} = 1$ (c) $\frac{x^2}{5^2} + \frac{y^2}{4^2} = 1$ (d) $\frac{x^2}{4^2} + \frac{y^2}{5^2} = 1$

9. The equation of the ellipse passing through (2, 1) having e = 1/2 is
(a) $3x^2 + 4y^2 = 16$ (b) $3x^2 + 5y^2 = 17$
(c) $5x^2 + 3y^2 = 23$ (d) none of these

10. The foci of the ellipse $25(x + 1)^2 + 9(y + 2)^2 = 225$, are at
(a) (– 1, 2) and (– 1, – 6) (b) (– 2, 1) and (– 2, 6)
(c) (– 1, – 2) and (– 2, – 1) (d) (– 1, – 2) and (– 1, – 6)

11. If y = mx + c is a tangent to the ellipse $x^2 + 2y^2 = 6$, then c^2 =
(a) $36/m^2$ (b) $6m^2 - 3$ (c) $3m^2 + 6$ (d) $6m^2 + 3$

12. The equation of the conic with focus at (1, – 1), directrix along x – y + 1 = 0 and with eccentricity $\sqrt{2}$ is
(a) $x^2 - y^2 = 1$ (b) xy = 1 (c) 2xy – 4x + 4y + 1 = 0 (d) 2xy + 4x – 4y – 1 = 0

13. The equation of the tangent to the hyperbola $2x^2 - 3y^2 = 6$ which is parallel to the line y = 3x + 4 is
(a) y = 3x + 5 (b) y = 3x – 5 (c) y = 3x + 5 and y = 3x – 5 (d) none of these

14. The locus of the middle points of chords of hyperbola $3x^2 - 2y^2 + 4x - 6y = 0$ parallel to $y = 2x$ is

(a) $3x - 4y = 4$ (b) $3y - 4x + 4 = 0$
(c) $4x - 4y = 3$ (d) $3x - 4y = 2$

15. The eccentricity of the hyperbola with latus rectum 12 and semi–conjugate axis $2\sqrt{3}$, is

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

16. The value of m for which $y = mx + 6$ is a tangent to the hyperbola $\frac{x^2}{100} - \frac{y^2}{49} = 1$ is

(a) $\sqrt{\frac{17}{20}}$ (b) $\sqrt{\frac{20}{17}}$ (c) $\sqrt{\frac{3}{20}}$ (d) $\sqrt{\frac{20}{3}}$

17. The equation of the tangent to the hyperbola $4y^2 = x^2 - 1$ at the point (1, 0) is

(a) $x = 1$ (b) $y = 1$ (c) $y = 4$ (d) $x = 4$

18. The equation of the parabola whose vertex is (a, 0) is

(a) $y^2 = 4ax$ (b) $y^2 = 4a(x - a)$ (c) $y^2 = 4a(x + a)$ (d) $x^2 = 4ay$

19. The focus of the parabola $4y^2 + 12x - 20y + 67 = 0$ is

(a) $(-7/2, 5/2)$ (b) $(-3/4, 5/2)$ (c) $(-17/4, 5/2)$ (d) $(5/2, -3/4)$

20. The equation $ax^2 + 2hxy + by^2 = 0$ represents a pair of perpendicular lines if

(a) $a = 3, b = 4$ (b) $a = 4, b = -3$
(c) $a = b = 7$ (d) $a = 11, b = -11$

21. The equation $ax^2 + 2hxy + ay^2$ represents a pair of coincident lines through the origin if,

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

22. If θ_1 and θ_2 be the angles which the lines $(x^2 + y^2)(\cos^2\theta \sin^2\alpha + \sin^2\theta) = (x \tan\alpha - y \sin\theta)^2$ make with the axis of x, then if $\theta = \pi/6$, $\tan\theta_1 + \tan\theta_2$ is equal to

(a) $(-8/3)\sin^2\alpha$ (b) $(-8/3)\operatorname{cosec} 2\alpha$
(c) $-8\sqrt{3}\operatorname{cosec} 2\alpha$ (d) $-4\operatorname{cosec} 2\alpha$

23. If θ_1 and θ_2 are the angles which the lines $x^2(\tan^2\theta + \cos^2\theta) - 2xy\tan\theta + y^2\sin^2\theta = 0$ make with the axis of x, then $\tan\theta_1 - \tan\theta_2$ is equal to

(a) sin 2a (b) $2\cos\theta\sin\theta$
(c) 2 (d) 1

24. The equation $ax^2 + by^2 + cx + cy = 0$ represents a pair of straight lines if

(a) $a = 0$ (b) $b = 0$ (c) $c = 0$ (d) none of these

25. The locus represented by the equation $(x - y + c)^2 + (x + y - c)^2 = 0$ is

(a) a point (b) a pair of real distinct lines
(c) a circle (d) a parabola

26. The equation $x^3 - 6x^2y + 11xy^2 - 6y^3 = 0$ represent three straight lines passing through the origin, the slope of which form an

(a) A.P. (b) G.P. (c) H.P. (d) none of these

27. If the equation in $x^3 + ax^2y + bxy^2 + y^2 = 0$ represent three straight lines, two of which are perpendicular then the equation of the line third is

(a) $y = ax$ (b) $y = bx$ (c) $y = x$ (d) $y = -x$

28. The equation $2x^2 + 3xy - 2y^2 + 3x - 9y - 9 = 0$ represents a pair of straight lines, the distance of the point of intersection from the origin is

(a) 3/5 (b) 9/5 (c) $3\sqrt{10}/5$ (d) 18/5

29. The equation $ax^2 + 2\sqrt{ab}\, xy + by^2 + 2gx + 2fy + c = 0$ represents a pair of parallel straight lines if

(a) $ag^2 = bf^2$ (b) $a^2g = b^2f$

(c) $bg^2 = af^2$ (d) $b^2g = a^2f$

30. The pair of straight lines joining the origin to the point of intersection of the straight line $y = mx + c$ and the curve $x^2 + y^2 = a^2$ are at right angles if

(a) $c^2 = a^2 (1 + m^2)$ (b) $c^2 - a^2 = m^2$

(c) $2c^2 = a^2 (1 + m^2)$ (d) $c^2 = 2a^2 (1 + m^2)$