1. The normals at three points P, Q, R of the parabola $y^2 = 4ax$ meet in (h, k). The centroid of triangle PQR lies on
(a) $y = 0$ (b) $x = 0$ (c) $x = -a$ (d) $y = a$

2. The equation of the tangent at the vertex of the parabola $x^2 + 4x + 2y = 0$ is
(a) $x = -2$ (b) $y = 2$ (c) $x = 2$ (d) $y = -2$

3. The distances from the foci of P (x_1, y_1) on the ellipse $\frac{x^2}{9} + \frac{y^2}{25} = 1$ are
(a) $4 \pm \frac{5}{4} y_1$ (b) $5 \pm \frac{4}{5} y_1$ (c) $5 \pm \frac{4}{5} x_1$ (d) None of these

4. The normal drawn at a point $(at_1^2, 2at_1)$ of the parabola $y^2 = 4ax$ meets it again in the point $(at_2^2, 2at_2)$, then
(a) $t_1 = 2t_2$ (b) $t_1^2 = 2t_2$ (c) $t_1 t_2 = -1$ (d) none of these

5. Equation of the normal to the parabola $y^2 = 4x$ which is parallel to the line $y = 2x - 5$ is
(a) $y = 2x$ (b) $y = 2x - 10$ (c) $y = 2x - 12$ (d) None of these

6. The line $y = mx + 1$ is a tangent to the parabola $y^2 = 4x$, is
(a) $m = 2$ (b) $m = 1$ (c) $m = 4$ (d) $m = 3$

7. The number of tangents to the parabola $y^2 = 8x$ through (2, 1) is
(a) 3 (b) 1 (c) 2 (d) 0

8. The equation of the hyperbolas having vertices as $(\pm 5, 0)$, foci $(\pm 7, 0)$ is
(a) $24x^2 + 25y^2 = 600$ (b) $25x^2 - 24y^2 = 600$
(c) $24x^2 - 25y^2 = 600$ (d) $25x^2 - 24y^2 - 600 = 0$

9. The equation of the hyperbola referred to its axes of coordinates whose latus–rectum is 4 and eccentricity is 3 is
(a) $16x^2 + 2y^2 = 1$ (b) $16^2 - 16y^2 = 1$
(c) $2x^2 - 16y^2 = 1$ (d) $16x^2 - 2y^2 = 1$

10. The eccentricity of the hyperbola whose latus–rectum is 8 and conjugate axis is equal to half the distance between the foci, is
(a) $\frac{4}{5}$ (b) $\frac{2}{\sqrt{3}}$ (c) $\frac{4}{\sqrt{3}}$ (d) None of these

11. The eccentricity of the hyperbola $3x^2 - 4y^2 = -12$ is
(a) $-\sqrt{\frac{7}{3}}$ (b) $\frac{\sqrt{7}}{2}$ (c) $\sqrt{\frac{7}{3}}$ (d) $-\frac{\sqrt{7}}{2}$

12. If e_1 and e_2 are the eccentricities of a hyperbola and its conjugate hyperbola, then $1/e_1^2 =$
(a) $1 - 1/e_2^2$ (b) $1 + 1/e_1^2$ (c) $1/e_2^2 - 1$ (d) None of these

13. 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) both (a) and (b) (d) None of these

14. The locus of the mid–point of a focal chord of a parabola is
(a) circle (b) parabola (c) ellipse (d) hyperbola

15. The line $x + y = 6$ is a normal to the parabola. $y^2 = 8x$ at the point
(a) (18, – 12) (b) (4, 2) (c) (2, 4) (d) (3, 3)

16. The straight line $x + y = k + 1$ touches the parabola $y = x(1 - x)$ if
(a) $k = -1$ (b) $k = 0$ (c) $k = 1$ (d) k takes any value

17. The locus of the point of intersection of the tangents to the ellipse $x^2/a^2 + y^2/b^2 = 1$ which are at right angles is
(a) a circle (b) parabola (c) an ellipse (d) a hyperbola

18. If the line $y = mx + a$ meets the parabola $y^2 = 4ax$ in two points whose abcissa are x_1 and x_2, then $x_1 + x_2$ is equal to zero if
(a) $m = -1$ (b) $m = 1$ (c) $m = 2$ (d) $m = -1/2$

19. If P, Q, R are three points on a parabola $y^2 = 4ax$ whose ordinates are in geometrical progression, then the tangents at P and R meet on
(a) the line through Q parallel to x–axis (b) the line through Q parallel to y–axis
(c) the line joining Q to the vertex (d) the line joining Q to the focus

20. The tangents at three points A, B, C on the parabola $y^2 = 4x$, taken in pairs intersect at the points P, Q and R. If Δ, Δ' be the areas of the triangles ABC and PQR respectively, then
(a) $\Delta = 2\Delta'$ (b) $\Delta' = 2\Delta$ (c) $\Delta = \Delta'$ (d) none of these

21. An arc of a bridge is semi–elliptical with major axis horizontal. If the length of the base is 9 meter and the highest part of the bridge is 3 meter from the horizontal; the best approximation of the height of the arch 2 meter from the centre of the base is
(a) 11/4 m (b) 8/3 m (c) 7/2 m (d) 2 m

22. Sum of the focal distances of any point on the ellipse $x^2/a^2 + y^2/b^2 = 1$ is equal to the length of the
(a) major axis (b) minor axis (c) latus rectum (d) none of these

23. Two tangents are drawn from the pt. $(-2, -1)$ to the parabola $y^2 = 4x$. If α is the angle between these tangents, then $\tan\alpha =$
(a) 3 (b) 1/3 (c) 2 (d) 1/2

24. The graph represented by the equations $x = \sin^2 t$, $y = 2\cos t$ is
(a) a portion of a parabola (b) a parabola
(c) a part of a sine graph (d) a part of a hyperbola

25. The tangents at the points $(at_1^2, 2at_1), (at_2^2, 2at_2)$ on the parabola $y^2 = 4ax$ are at right angle if
(a) $t_1 t_2 = -1$ (b) $t_1 t_2 = 1$ (c) $t_1 t_2 = 2$ (d) $t_1 t_2 = -2$

26. The vertex of the parabola $x^2 + 8x + 12y + 4 = 0$ is
(a) $(-4, 1)$ (b) $(4, -1)$ (c) $(-4, -1)$ (d) $(4, 1)$

27. The focus of the parabola $y^2 - 4y - 8x + 4 = 0$ is
(a) (1, 1) (b) (1, 2) (c) (2, 1) (d) (2, 2)

28. At what point on the parabola $y^2 = 4x$ the normal makes equal angles with the axes ?
(a) (4, 4) (b) (9, 6) (c) (4, – 4) (d) (1, – 2)

29. If $x = my + c$ is a normal to the parabola $x^2 = 4ay$, then the value of c is

(a) $-2am - am^3$ (b) $2am + am^3$ (c) $-\frac{2a}{m} - \frac{a}{m^3}$ (d) $\frac{2a}{m} + \frac{a}{m^3}$

30. The angle between the tangents drawn from a point $(-a, 2a)$ to $y^2 = 4ax$ is

(a) $\frac{\pi}{4}$ (b) $\frac{\pi}{2}$ (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{6}$