EXERCISE – I | SINGLE CORRECT (OBJECTIVE QUESTIONS)

1. Latus rectum of the parabola whose focus is (3, 4) and whose tangent at vertex has the equation $x + y = 7 + 5\sqrt{2}$ is

(A) 5 (B) 10 (C) 20 (D) 15

Sol.

2. Directrix of a parabola is x + y = 2. If it's focus is origin, then latus rectum of the parabola is equal to

(A) $\sqrt{2}$ units (B) 2 units (C) $2\sqrt{2}$ units (D) 4 units

Sol.

3. Which one of the following equations represents parametrically, parabolic profile ?

(A) x = 3 cost ; y = 4 sint

(B) $x^2 - 2 = -\cos t$; $y = 4\cos^2 \frac{t}{2}$

(C) $\sqrt{x} = \tan t$; $\sqrt{y} = \sec t$

(D) $x = \sqrt{1-\sin t}$; $y = \sin\frac{t}{2} + \cos\frac{1}{2}$

Sol.

4. Let C be a circle and L a line on the same plane such that C and L do not intersect. Let P be a moving point such that the circle drawn with centre at P to touch L also touches C. Then the locus of P is

(A) a straight line parallel to L not intersecting C

(B) a circle concentric with C

(C) a parabola whose focus is centre of C and whose directrix is L.

(D) a parabola whose focus is the centre of C and whose directrix is a straight line parallel to L.

Sol.

5. If $(t^2, 2t)$ is one end of a focal chord of the parabola $y^2 = 4x$ then the length of the focal chord will be

(A) $\left(t+\frac{1}{t}\right)^2$ (B) $\left(t+\frac{1}{t}\right)\sqrt{\left(t^2+\frac{1}{t^2}\right)}$

(C) $\left(t-\frac{1}{t}\right)\sqrt{\left(t^2+\frac{1}{t^2}\right)}$ (D) none

Sol.

6. From the focus of the parabola $y^2 = 8x$ as centre, a circle is described so that a common chord of the curves is equidistant from the vertex and focus of the parabola. The equation of the circle is

(A) $(x - 2)^2 + y^2 = 3$ (B) $(x - 2)^2 + y^2 = 9$

(C) $(x + 2)^2 + y^2 = 9$ (D) none

Sol.

7. The point of intersection of the curves whose parametric equations are $x = t^2 + 1$, $y = 2t$ and $x = 2s$, $y = 2/s$ is given by

(A) (1, –3) (B) (2, 2) (C) (–2, 4) (D) (1, 2)

Sol.

8. If M is the foot of the perpendicular from a point P of a parabola $y^2 = 4ax$ to its directrix and SPM is an equilateral triangle, where S is the focus, then SP is equal to

(A) a (B) 2a (C) 3a (D) 4a

Sol.

9. Through the vertex 'O' of the parabola $y^2 = 4ax$, variable chords OP and OQ are drawn at right angles. If the variable chord PQ intersects the axis of x at R, then distance OR

(A) varies with different positions of P and Q

(B) equals the semi latus rectum of the parabola

(C) equals latus rectum of the parabola

(D) equals double the latus rectum of the parabola

Sol.

10. The triangle PQR of area 'A' is inscribed in the parabola $y^2 = 4ax$ such that the vertex P lies at the vertex of the parabola and the base QR is a focal chord. The modulus of the difference of the ordinates of the points Q and R is

(A) $\frac{A}{2a}$ (B) $\frac{A}{a}$ (C) $\frac{2A}{a}$ (D) $\frac{4A}{a}$

Sol.

11. PN is an ordinate of the parabola $y^2 = 4ax$. A straight line is drawn parallel to the axis to bisect NP and meets the curve in Q. NQ meets the tangent at the vertex in a point T such that AT = kNP, then the value of k is (where A is the vertex)

(A) 3/2 (B) 2/3 (C) 1 (D) none

Sol.

12. The tangents to the parabola $x = y^2 + c$ from origin are perpendicular then c is equal to

(A) 1/2 (B) 1 (C) 2 (D) 1/4

Sol.

13. The locus of a point such that two tangents drawn from it to the parabola $y^2 = 4ax$ are such that the slope of one is double the other is

(A) $y^2 = \frac{9}{2}ax$ (B) $y^2 = \frac{9}{4}ax$

(C) $y^2 = 9ax$ (D) $x^2 = 4ay$

Sol.

14. T is a point on the tangent to a parabola $y^2 = 4ax$ at its point P. TL and TN are the perpendiculars on the focal radius SP and the directrix of the parabola respectively. Then

(A) SL = 2 (TN) (B) 3 (SL) = 2 (TN)

(C) SL = TN (D) 2 (SL) = 3 (TN)

Sol.

15. The equation of the circle drawn with the focus of the parabola $(x - 1)^2 - 8y = 0$ as its centre and touching the parabola at its vertex is

(A) $x^2 + y^2 - 4y = 0$ (B) $x^2 + y^2 - 4y + 1 = 0$

(C) $x^2 + y^2 - 2x - 4y = 0$ (D) $x^2 + y^2 - 2x - 4y + 1 = 0$

Sol.

16. Length of the normal chord of the parabola, $y^2 = 4x$, which makes an angle of $\frac{\pi}{4}$ with the axis of x is

(A) 8 (B) $8\sqrt{2}$ (C) 4 (D) $4\sqrt{2}$

Sol.

17. Tangents are drawn from the point (–1, 2) on the parabola $y^2 = 4x$. The length, these tangents will intercept on the line x = 2

(A) 6 (B) $6\sqrt{2}$ (C) $2\sqrt{6}$ (D) none of these

Sol.

18. Locus of the point of intersection of the perpendicular tangents of the curve $y^2 + 4y - 6x - 2 = 0$ is

(A) $2x - 1 = 0$ (B) $2x + 3 = 0$

(C) $2y + 3 = 0$ (D) $2x + 5 = 0$

Sol.

19. Tangents are drawn from the points on the line $x - y + 3 = 0$ to parabola $y^2 = 8x$. Then the variable chords of contact pass through a fixed point whose coordinates are

(A) (3, 2) (B) (2, 4) (C) (3, 4) (D) (4, 1)

Sol.

20. The line $4x - 7y + 10 = 0$ intersects the parabola, $y^2 = 4x$ at the points A & B. The co-ordinates of the point of intersection of the tangents drawn at the points A & B are

(A) $\left(\frac{7}{2}, \frac{5}{2}\right)$ (B) $\left(-\frac{5}{2}, \frac{7}{2}\right)$ (C) $\left(\frac{5}{2}, \frac{7}{2}\right)$ (D) $\left(-\frac{7}{2}, \frac{5}{2}\right)$

Sol.

21. From the point (4, 6) a pair of tangent lines are drawn to the parabola, $y^2 = 8x$. The area of the triangle formed by these pair of tangent lines & the chord of contact of the point (4, 6) is

(A) 2 (B) 4 (C) 8 (D) none

Sol.

22. TP & TQ are tangents to the parabola, $y^2 = 4ax$ at P & Q. If the chord PQ passes through the fixed point $(-a, b)$ then the locus of T is

(A) $ay = 2b (x - b)$ (B) $bx = 2a (y - a)$
(C) $by = 2a (x - a)$ (D) $ax = 2b (y - b)$

Sol.

23. If the tangent at the point P (x_1, y_1) to the parabola $y^2 = 4ax$ meets the parabola $y^2 = 4a (x + b)$ at Q & R, then the mid point of QR is

(A) $(x_1 + b, y_1 + b)$ (B) $(x_1 - b, y_1 - b)$
(C) (x_1, y_1) (D) $(x_1 + b, y_1)$

Sol.

24. Let PSQ be the focal chord of the parabola, $y^2 = 8x$. If the length of SP = 6 then, l(SQ) is equal to(where S is the focus)

(A) 3 (B) 4 (C) 6 (D) none

Sol.

25. Two parabolas $y^2 = 4a(x - l_1)$ and $x^2 = 4a(y - l_2)$ always touch one another, the quantities l_1 and l_2 are both variable. Locus of their point of contact has the equation

(A) $xy = a^2$ (B) $xy = 2a^2$ (C) $xy = 4a^2$ (D) none

Sol.