EXERCISE – II MULTIPLE CORRECT (OBJECTIVE QUESTIONS)

1. The straight line joining any point P on the parabola $y^2 = 4ax$ to the vertex and perpendicular from the focus to the tangent at P, intersect at R, then the equation of the locus of R is

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

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

Sol.

2. Let A be the vertex and L the length of the latus rectum of parabola, $y^2 - 2y - 4x - 7 = 0$. The equation of the parabola with point A as vertex, 2L as the length of the latus rectum and the axis at right angles to that of the given curve is

(A) $x^2 + 4x + 8y - 4 = 0$ (B) $x^2 + 4x - 8y + 12 = 0$

(C) $x^2 + 4x + 8y + 12 = 0$ (D) $x^2 + 8x - 4y + 8 = 0$

Sol.

3. Tangent to the parabola $y^2 = 4ax$ at point P meets the tangents at vertex A at point B and the axis of parabola at T, Q is any point on this tangent and N as the foot of perpendicular from Q on SP, where S is focus, M is the foot of perpendicular from Q on the directrix then

(A) B bisects PT (B) B trisects PT

(C) QM = SN (D) QM = 2SN

Sol.

4. The parametric coordinates of any point on the parabola $y^2 = 4ax$ can be

(A) $(at^2, 2at)$ (B) $(at^2, -2at)$

(C) $(a\sin^2 t, 2a\sin t)$ (D) $(a\sin t, 2a\cos t)$

Sol.

5. PQ is a normal chord of the parabola $y^2 = 4ax$ at P, A being the vertex of the parabola. Through P a line is drawn parallel to AQ meeting the x-axis in R. Then the length of AR is

(A) equal to the length of the latus rectum

(B) equal to the focal distance of the point P.

(C) equal to twice the focal distance of the point P.

(D) equal to the distance of the point P from the directrix

Sol.

6. The length of the chord of the parabola $y^2 = x$ which is bisected at the point (2, 1) is

(A) $5\sqrt{2}$ (B) $4\sqrt{5}$ (C) $4\sqrt{50}$ (D) $2\sqrt{5}$

Sol.

7. If the tangents and normals at the extremities of a focal chord of a parabola intersect at (x_1, y_1) and (x_2, y_2) respectively, then

(A) $x_1 = x_2$ (B) $x_1 = y_2$ (C) $y_1 = y_2$ (D) $x_2 = y_1$

Sol.

8. Locus of the intersection of the tangents at the ends of the normal chords of the parabola $y^2 = 4ax$ is

(A) $(2a + x)y^2 + 4a^3 = 0$ (B) $(x + 2a)y^2 + 4a^2 = 0$

(C) $(x + 2a)y^2 + 4a^3 = 0$ (D) none

Sol.

9. The locus of the mid point of the focal radii of a variable point moving on the parabola, $y^2 = 4ax$ is a parabola whose
(A) latus rectum is half the latus rectum of the original parabola
(B) vertex is (a/2, 0) (C) directrix is y-axis
(D) focus has the co-ordinates (a, 0)
Sol.

10. The equation of a straight line passing through the point (3, 6) and cutting the curve $y = \sqrt{x}$ orthogonally is
(A) $4x + y - 18 = 0$ (B) $x + y - 9 = 0$
(C) $4x - y - 6 = 0$ (D) none
Sol.

11. The tangent and normal at P (t), for all real positive t, to the parabola $y^2 = 4ax$ meet the axis of the parabola in T and G respectively, then the angle at which the tangent at P to the parabola is inclined to the tangent at P to the circle through the points P, T and G is

(A) $\cot^{-1} t$ (B) $\cot^{-1} t^2$ (C) $\tan^{-1} t$ (D) $\sin^{-1}\left(\frac{t}{\sqrt{1+t^2}}\right)$

Sol.

12. A variable circle is described to passes through the point (1, 0) and tangent to the curve $y = \tan(\tan^{-1}x)$. The locus of the centre of the circle is a parabola whose
(A) length of the latus rectum is $2\sqrt{2}$
(B) axis of symmetry has the equation $x + y = 1$
(C) vertex has the co-ordinates (3/4, 1/4)
(D) none of these
Sol.

13. AB, AC are tangents to a parabola $y^2 = 4ax$. p_1 p_2 and p_3 are the lengths of the perpendiculars from A, B and C respectively on any tangent to the curve, then p_2, p_1, p_3 are in

(A) A.P. (B) G.P. (C) H.P. (D) none of these

Sol.

14. Through the vertex O of the parabola, $y^2 = 4ax$ two chords OP and OQ are drawn and the circles on OP and OQ as diameter intersect in R. If q_1, q_2 and f are the angles made with the axis by the tangent at P and Q on the parabola and by OR then the value of $\cot q_1 + \cot q_2$ equals

(A) – 2tanf (B) – 2tan(p – f) (C) 0 (D) 2cotf

Sol.

15. Two parabolas have the same focus. If their directrices are the x-axis & the y-axis respectively, then the slope of their common chord is

(A) 1 (B) –1 (C) 4/3 (D) 3/4

Sol.