EXERCISE – II MULTIPLE CORRECT (OBJECTIVE QUESTIONS)

1. $x - 2y + 4 = 0$ is a common tangent to $y^2 = 4x$ & $\frac{x^2}{4} + \frac{y^2}{b^2} = 1$. Then the value of b and the other common tangent are given by

(A) $b = \sqrt{3}$; $x + 2y + 4 = 0$ (B) $b = 3$; $x + 2y + 4 = 0$

(C) $b = \sqrt{3}$; $x + 2y - 4 = 0$ (D) $b = \sqrt{3}$; $x - 2y - 4 = 0$

Sol.

2. The tangent at any point P on a standard ellipse with foci as S & S′ meets the tangents at the vertcies A & A′ in the points V & V′, then

(A) $\ell(AV).\ell(A'V') = b^2$ (B) $\ell(AV).\ell(A'V') = a^2$

(C) $\angle V'SV = 90^o$ (D) VS′ VS is a cyclic quadrilateral

Sol.

3. The area of the rectangle formed by the perpendiculars from the centre of the standard ellipse to the tangent and normal at its point whose eccentric angle is $\pi/4$ is

(A) $\dfrac{(a^2-b^2)ab}{a^2+b^2}$ (B) $\dfrac{(a^2+b^2)ab}{a^2-b^2}$

(C) $\dfrac{(a^2-b^2)}{ab(a^2+b^2)}$ (D) $\dfrac{(a^2+b^2)}{(a^2-b^2)ab}$

Sol.

4. An ellipse is such that the length of the latus rectum is equal to the sum of the lengths of its semi principal axes. Then

(A) Ellipse becomes a circle

(B) Ellipse becomes a line segment between the two foci

(C) Ellipse becomes a parabola (D) none of these

Sol.

5. The line, $lx + my + n = 0$ will cut the ellipse $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = 1$ in points whose eccentric angles differ by $\pi/2$ if

(A) $x^2 l^2 + b^2n^2 = 2m^2$ (B) $a^2m^2 + b^2 l = 2n^2$

(C) $a^2 l^2 + b^2m^2 = 2n^2$ (D) $a^2n^2 + b^2m^2 = 2l$

Sol.

6. A circle has the same centre as an ellipse & passes through the foci F_1 & F_2 of the ellipse, such that the two curves intersect in 4 points. Let 'P' be any one of their point of intersection. If the major axis of the ellipse is 17 & the area of the triangle PF_1F_2 is 30, then the distance between the foci is

(A) 11 (B) 12 (C) 13 (D) none

Sol.

7. The normal at a variable point P on an ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ of eccentricity e meets the axes of the ellipse in Q and R then the locus of the mid-point of QR is a conic with an eccentricity e′ such that

(A) e′ is independent of e (B) e′ = 1

(C) e′ = e (D) e′ = 1/e

Sol.

8. The length of the normal (terminated by the major axis) at a point of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is

(A) $\frac{b}{a}(r + r_1)$ (B) $\frac{b}{a}\,|\,r - r_1\,|$

(C) $\frac{b}{a}\sqrt{rr_1}$ (D) independent of r, r_1

where r and r_1 are the focal distance of the point.

Sol.

9. Point 'O' is the centre of the ellipse with major axis AB and minor axis CD. Point F is one focus of the ellipse. If OF = 6 and the diameter of the inscribed circle of triangle OCF is 2, then the product (AB)(CD) is equal to

(A) 65 (B) 52 (C) 78 (D) none

Sol.

10. If P is a point of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$, whose focii are S and S′. Let ∠PSS′ = α and ∠PS′S = β, then

(A) SP + PS′ = 2a, if a > b

(B) PS + PS′ = 2b, if a < b

(C) $\tan\frac{\alpha}{2}\ \tan\frac{\beta}{2} = \frac{1-e}{1+e}$

(D) $\tan\frac{\alpha}{2}\tan\frac{\beta}{2}=\frac{\sqrt{a^2-b^2}}{b^2}\ [a-\sqrt{a^2-b^2}\ ]$ when a > b

Sol.

11. If the chord through the points whose eccentric angles are θ & ϕ on the ellipse, $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ passes through the focus, then the value of tan (θ/2) tan (ϕ/2) is

(A) $\frac{e+1}{e-1}$ (B) $\frac{e-1}{e+1}$ (C) $\frac{1+e}{1-e}$ (D) $\frac{1-e}{1+e}$

Sol.