**EL**

**LEVEL-I**

1. If equation of ellipse is $16x^2 + 25y^2 = 400$, then eccentricity of the ellipse
(A) 2/5 (B) 4/5
(C) 3/5 (D) 1/5

2. If any tangent to the ellipse is $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ intercepts lengths h and k on the axes, then
(A) $\frac{h^2}{a^2}+\frac{k^2}{b^2}=1$ (B) $\frac{h^2}{a^2}+\frac{k^2}{b^2}=2$
(C) $\frac{a^2}{h^2}+\frac{b^2}{k^2}=1$ (D) $\frac{a^2}{h^2}+\frac{b^2}{k^2}=2$

3. Two perpendicular tangents drawn to the ellipse $\frac{x^2}{25}+\frac{y^2}{16}=1$ intersect on the curve
(A) $x= 4$ (B) $y = 5$
(C) $x^2 +y^2 = 41$ (D) $x^2 +y^2 = 9$

4. Equation to an ellipse whose centre is (-2, 3) and whose semi-axes are 3 and 2 and major axis parallel to x-axis, is given by
(A) $4x^2 + 9y^2 + 16x – 54y – 61 = 0$ (B) $4x^2 + 9y^2 - 16x + 54y + 61 = 0$
(C) $4x^2 + 9y^2 + 16x – 54y + 61 = 0$ (D) none of these

5. The angle between the tangents drawn from the point (1, 2) to the ellipse $3x^2 + 2y^2 = 5$ is
(A) $\tan^{-1}\left(\frac{12}{5}\right)$ (B) $\tan^{-1}\left(\frac{6}{\sqrt{5}}\right)$
(C) $\tan^{-1}\left(\frac{12}{\sqrt{5}}\right)$ (D) $\tan^{-1}\left(\frac{6}{5}\right)$

6. Eccentric angle of a point on the ellipse $x^2 + 3y^2 = 6$ at a distance 2 units from the centre of the ellipse is
(A) $\frac{\pi}{4}$ or $\frac{3\pi}{4}$ (B) $\frac{\pi}{3}$ or $\frac{2\pi}{3}$ (C) $\frac{\pi}{6}$ or $\frac{5\pi}{6}$ (D) none of these

7. If latus rectum of the ellipse $x^2 \tan^2\alpha + y^2 \sec^2\alpha = 1$ is 1/2 then $\alpha$ ($0 < \alpha \le \pi$) is
(A) $\frac{\pi}{12}$ (B) $\frac{\pi}{6}$ (C) $\frac{8\pi}{12}$ (D) none of these

8. Equation of the ellipse whose minor axis is equal to the distance between foci and whose latus rectum is 10, is given by
(A) $2x^2 + 3y^2 = 100$ (B) $2x^2 + 3y^2 = 80$
(C) $x^2 + 2y^2 = 100$ (D) none of these

9. If P is a point on the ellipse $\frac{x^2}{16}+\frac{y^2}{20}=1$ whose foci are S and S′. Then PS + PS′ is
(A) 8 (B) $4\sqrt{5}$
(C) 10 (D) 4

10. The distance between the directrices of the ellipse $\frac{x^2}{4}+\frac{y^2}{9}=1$ is
(A) $\frac{9}{\sqrt{5}}$ (B) $\frac{24}{\sqrt{5}}$
(C) $\frac{18}{\sqrt{5}}$ (D) none of these

11. If $F_1 \equiv (0,0)$, $F_2 \equiv (3,4)$ and $|PF_1| + |PF_2| = 10$, then the locus of $\gamma$ is
(A) An ellipse (B) A straight line
(C) A hyperbola (D) A line segment

12. The locus of a point represented by $x = \frac{a}{2}\left(\frac{t+1}{t}\right)$, $y = \frac{a}{2}\left(\frac{t-1}{t}\right)$ is
(A) an ellipse (B) a circle
(C) a pair of line (D) none of these

13. The eccentricity of the conic $7x^2 + 16y^2 = 112$ is
(A) $\sqrt{\frac{23}{7}}$ (B) $-\frac{3}{4}$
(C) $\frac{3}{4}$ (D) none of these

14. The area of the ellipse $\frac{x^2}{16}+\frac{y^2}{25}=1$ is
(A) $16\pi$ (B) $20\pi$
(C) $25\pi$ (D) $36\pi$

15. The locus of the point (3h+2, k), where (h, k) lies on the circle $x^2+y^2 = 1$ is
(A) a hyperbola (B) a circle
(C) a parabola (D) an ellipse

16. The equation of ellipse, whose focus is (1, 0), directrix is x = 4 and whose eccentricity is a root of the quadratic equation $2x^2 - 3x + 1 = 0$, is-
(A) $\frac{x^2}{4}+\frac{y^2}{3}=1$ (B) $\frac{x^2}{3}+\frac{y^2}{4}=1$
(C) $4x^2 + 3y^2 = 24$ (D) None of these

17. Area of the quadrilateral formed by the tangents to the ellipse $\frac{x^2}{4}+y^2=1$ at the end points of its major and minor axes is

(A) 8 (B) 4
(C) 16 (D) 2

18. The centre of the ellipse $3x^2 + 6x + 4y^2 - 8y - 5 = 0$, is

(A) (1, 1) (B) (1, –1)
(C) (–1, 1) (D) None of these

19. Length of major axis of the ellipse, $3x^2 - 6x + 4y^2 - 8y - 5 = 0$, is

(A) 4 (B) 1
(C) $\sqrt{3}$ (D) 2

20. Length of minor axis of the ellipse, $3x^2 - 6x + 4y^2 - 8y - 5 = 0$, is

(A) 4 (B) 2
(C) 3 (D) $2\sqrt{3}$

## LEVEL-II

1. The equation $\frac{x^2}{2-r}+\frac{y^2}{r-5}+1=0$ represents an ellipse only if
(A) r > 2 (B) r < 5
(C) 2 < r < 5 (D) none of these

2. If any tangent to the ellipse $\frac{x^2}{16}+\frac{y^2}{9}=1$ intercepts equal length l on the axes, then l equals to
(A) 25 (B) 7
(C) 12 (D) 5

3. An ellipse has its axes along co-ordinate axes. The distance between its foci is 2h and the focal distance
of an end of the minor axis is k. The equation of the ellipse is
(A) $\frac{x^2}{h^2}+\frac{y^2}{k^2}=1$ (B) $\frac{x^2}{k^2}+\frac{y^2}{k^2+h^2}=1$
(C) $\frac{x^2}{k^2}+\frac{y^2}{k^2-h^2}=1$ (D) $\frac{x^2}{k^2+h^2}+\frac{y^2}{h^2}=1$

4. Equation of the ellipse, referred to its axes as the x and y axes respectively, which passes through the point (-3, 1) and the eccentricity $\sqrt{\frac{2}{5}}$ is
(A) $2x^2 + 14y^2 = 32$ (B) $3x^2 + 5y^2 = 32$
(C) $4x^2 + 3y^2 = 39$ (D) none of these

5. Equation of tangents to the ellipse $9x^2 + 10y^2 = 144$ from the point (2, 3) are
(A) y = 3, x + y = 5 (B) x = 3, x – y = 5
(C) x + y = 3, x – y + 5 = 0 (D) none of these

6. If a tangent of slope 'm' at a point of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ passes through (2a, 0) and if 'e' denotes the eccentricity of the ellipse then
(A) $m^2 + e^2 = 1$ (B) $2m^2 + e^2 = 1$
(C) $3m^2 + e^2 = 1$ (D) none of these

7. The tangent to the curve $x = a(\theta - \sin\theta)$; $y = a(1 + \cos\theta)$ at the points $\theta = (2k + 1)\pi$, $k \in Z$ are parallel to
(A) y = x (B) y = –x
(C) y = 0 (D) x = 0

8. The equation(s) of the tangent(s) to the ellipse $9(x - 1)^2 + 4y^2 = 36$ parallel to the latus rectum, is (are)
(A) y = 3 (B) y = -3
(C) x = 3 (D) x = -3.

9. The area of the triangle formed by the points on the ellipse $25x^2 + 16y^2 = 400$ whose eccentric angles are $\pi/2$, $\pi$ and $3\pi/2$ is

(A) 10 sq. units
(B) 20 sq. units
(C) 30 sq. units
(D) 40 sq. units

10. If $\left(\sqrt{3}\right)$ bx+ay = 2ab touched the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}$ = 1 then eccentric angle $\theta$ is

(A) $\frac{\pi}{6}$
(B) $\frac{\pi}{4}$
(C) $\frac{\pi}{3}$
(D) $\frac{\pi}{2}$

11. The vaue of ‘c’ for which lie y = x + c is tangent to the ellipse $2x^2 + 3y^2 = 1$ is

(A) $\sqrt{\frac{6}{7}}$
(B) $\sqrt{\frac{5}{6}}$
(C) $\sqrt{\frac{2}{3}}$
(D) $\sqrt{\frac{3}{2}}$

12. Foci of the ellipse; $25\,(x + 1)^2 + 9(y + 2)^2 = 225$, are

(A) (–1, –2) and (–1, –6)
(B) (–2, 1) and (–2, 6)
(C) (–1, 2) and (–1, –6)
(D) (–1, 2) and (–1, –6)

13. Let ‘E’ be the ellipse $\frac{x^2}{9}+\frac{y^2}{4}=1$ and ‘C’ be the circle $x^2 + y^2 = 9$. Let P and Q be points (1, 2) and (2, 1) respectively. Then

(A) ‘Q’ lies in side ‘C’ but outside E
(B) ‘Q’ lies outside both C and E
(C) P lies inside both C and E
(D) P lies inside ‘C’ but outside E

14. The equation $3\,(x + y – 5)^2 + 2\,(x – y + 7)^2 = 6$ represents an ellipse, whose centre is

(A) (–1, 6)
(B) (6, –1)
(C) (1, –6)
(D) (–6, 1)

15. Eccentricity of the ellipse $3\,(x + y – 5)^2 + 2\,(x – y + 7)^2 = 6$ is

(A) $\frac{1}{\sqrt{2}}$
(B) $\sqrt{\frac{2}{3}}$
(C) $\frac{1}{\sqrt{3}}$
(D) $\frac{1}{2}$

16. One foot of normal of the ellipse $4\,x^2 + 9y^2 = 36$, that is parallel to the line 2 x + y = 3, is

(A) $\left(\frac{9}{5}, \frac{-8}{5}\right)$
(B) $\left(\frac{-9}{5}, \frac{8}{5}\right)$
(C) $\left(\frac{-9}{5}, \frac{-8}{5}\right)$
(D) None of these

17. Equation of the ellipse whose axes are co–ordinate axes and whose length of latus rectum, and eccentricity are equal and equal to ½ each is

(A) $6\,x^2 + 12\,y^2 = 1$
(B) $12\,x^2 + 6\,y^2 = 1$
(C) $3\,x^2 + 12\,y^2 = 1$
(D) $9\,x^2 + 12\,y^2 = 1$

18. The line $y = x - 1$ touches the ellipse $3x^2 + 4y^2 = 12$, at
(A) $(1/2, -1/2)$ (B) $(3, 2)$
(C) $(-1, -2)$ (D) None of these

19. The equation of common tangents to the curves $x^2 + 4y^2 = 8$ and $y^2 = 4x$ are
(A) $2y - x - 4 = 0$ and $2y + x + 4 = 0$ (B) $y - 2x - 4 = 0$ and $y + 2x + 4 = 0$
(C) $2y - x - 2 = 0$ and $2y + x + 2 = 0$ (D) $y - 2x - 2 = 0$ and $y + 2x + 2 = 0$

20. If the line $y = mx + c$ is a tangent to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ then corresponding point of contact is
(A) $\left(\frac{a^2m}{c}, \frac{b^2}{c}\right)$ (B) $\left(\frac{-a^2m}{c}, \frac{-b^2}{c}\right)$
(C) $\left(\frac{a^2m}{c}, \frac{-b^2}{c}\right)$ (D) $\left(\frac{-a^2m}{c}, \frac{b^2}{c}\right)$

## LEVEL-III

1. The length of the major axis of the ellipse
$(5x - 10)^2 + (5y + 15)^2 = \frac{(3x - 4y + 7)^2}{4}$ is
(A) 10 (B) 20/3
(C) 20/7 (D) 4

2. An ellipse has eccentricity 1/2 and one focus at the point P(1/2, 1). One of Its directrix is the common tangent, nearer to the point P to the circle $x^2+y^2 = 1$ and the hyperbola $x^2-y^2 = 1$. Area of the ellipse is
(A) $\pi$ (B) $\frac{\pi}{2\sqrt{2}}$
(C) $\frac{2\pi}{3\sqrt{3}}$ (D) none of these.

3. If the normal at the point $P(\theta)$ to the ellipse $\frac{x^2}{14} + \frac{y^2}{5} = 1$ intersects it again at the point $Q(2\theta)$, then $\cos\theta$ =
(A) 2/3 (B) -2/3 (C) 1/3 (D) -1/3

4. The equation of the ellipse centered at (1, 2) having the point (6, 2) as one of its focus and passing through the point (4, 6) is
(A) $\frac{(x-1)^2}{36} + \frac{3(y-2)^2}{64} = 1$ (B) $\frac{(x-1)^2}{45} + \frac{(y-2)^2}{20} = 1$
(C) $\frac{(x-1)^2}{18} + \frac{(y-2)^2}{32} = 1$ (D) $\frac{(x-1)^2}{72} + \frac{7(y-2)^2}{128} = 1$

5. The tangent drawn to the ellipse $\frac{x^2}{16}+\frac{11y^2}{256}=1$ at the point P ($\theta$); touches the circle $(x-1)^2 + y^2 = 16$; then '$\theta$' equal to

(A) $\pi/6$ (B) $\pi/4$
(C) $\pi/3$ (D) None of these

6. Length of latus rectum of the ellipse, $3(x + y - 5)^2 + 2(x - y + 7)^2 = 6$ is

(A) $4\sqrt{\frac{2}{3}}$ (B) $2\sqrt{\frac{2}{3}}$
(C) $\frac{1}{\sqrt{3}}$ (D) $\sqrt{\frac{2}{3}}$

7. Focii of the ellipse; $3(x + y - 5)^2 + 2(x - y + 7)^2 = 6$ are

(A) (–1/2, 13/2) and (–3/2, 11/2) (B) (–1/2, 11/2) and (–3/2, 13/2)
(C) (–1/2, –11/2) and (-3/2, 11/2) (D) (1/2, 11/2) and (3/2, 13/2)

8. Locus of the mid–point of chords of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ that are parallel to the line $y = 2x + c$, is

(A) $2b^2y - a^2x = 0$ (B) $2a^2y - b^2x = 0$
(C) $2b^2y + a^2x = 0$ (D) $2a^2y + b^2x = 0$

9. Consider an ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$, centered at point 'O' and having AB and CD as its major and minor axes respectively. If $S_1$ be one of the focus of the ellipse, radius of incircle of triangle $OCS_1$ = 6 units, then area of the ellipse is equal to

(A) $16\pi$ sq. units (B) $\frac{65\pi}{4}$ sq. units
(C) $\frac{65}{2}$ sq. uints (D) $65\pi$ sq. units

10. 'P' is any variable point on the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ having the points $S_1$ and $S_2$ as its foci . maximum area of the triangle $PS_1S_2$ is

(A) $b^2c$ sq. units (B) $a^2c$ sq. units
(C) ab sq. units (D) abc sq. units

11. Consider an ellipse having its axes as co–ordinate axes and passing through the point (4, –1). If the line $x + 4y - 10 = 0$ is one of its tangent, then area of ellipse is

(A) $10\pi$ (B) $20\pi$
(C) $25\pi$ (D) $15\pi$

12. $S_1$ and $S_2$ are foci of an ellipse 'B' be one of the extremity of its minor axes. If $\Delta\, S_1 S_2 B$ is right angled then eccentricity of the ellipse is equal to

(A) $\frac{\sqrt{3}}{2}$ (B) $\frac{1}{\sqrt{2}}$

(C) $\sqrt{\frac{3}{2}}$ (D) None of these

13. If 'L' is the length of perpendicular drawn from the origin to any normal of the ellipse $\frac{x^2}{25}+\frac{y^2}{16}=1$, then maximum value of 'L' is

(A) 5 (B) 4

(C) 1 (D) None of these

14. The maximum distance of the centre of the ellipse $\frac{x^2}{9}+\frac{y^2}{4}=1$ from the chord of contact of mutually perpendicular tangents of the ellipse is

(A) $\frac{9}{\sqrt{13}}$ (B) $\frac{3}{\sqrt{13}}$

(C) $\frac{6}{\sqrt{13}}$ (D) $\frac{36}{\sqrt{13}}$

15. Tangents PA and PB are drawn to the ellipse $\frac{x^2}{16}+\frac{y^2}{9}=1$ from the point P (0, 5). Area of triangle PAB is

(A) $\frac{16}{5}$ (B) $\frac{256}{25}$

(C) $\frac{35}{2}$ (D) $\frac{1024}{25}$

16. The straight line $x - 2y + 4 = 0$ is one of the common tangents of the parabola $y^2 = 4x$ and $\frac{x^2}{4}+\frac{y^2}{b^2}=1$. The equation of the another common tangent to these curves is

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

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

17. A variable tangent of the ellipse $\frac{x^2}{16}+\frac{y^2}{36}=1$ meets the tangents drawn at the extremities of the major axis at point $A_1$ and $A_2$ Circle drawn on $A_1A_2$ as diameter will always pass through two fixed points whose co–ordinates are

(A) $(0, \pm 6)$ (B) $(0, \pm 5\sqrt{2})$

(C) $(0, \pm 2\sqrt{5})$ (D) $(0, \pm 4)$

18. There are exactly two points on the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ whose distance from the center of the ellipse are equal and equal to $\sqrt{\frac{a^2+b^2}{2}}$. Eccentricity of this ellipse is

(A) $\sqrt{\frac{3}{2}}$ (B) $\sqrt{\frac{2}{3}}$

(C) $\frac{1}{\sqrt{3}}$ (D) $\sqrt{\frac{2}{3}}$

19. For all admissible values of the parameter 'a' the straight line 2 ax + y $\sqrt{1-a^2}=1$ will touch an ellipse whose eccentricity is equal to

(A) $\frac{\sqrt{3}}{2}$ (B) $\frac{\sqrt{2}}{3}$

(C) $\sqrt{\frac{3}{2}}$ (D) $\sqrt{\frac{2}{3}}$

20. The normal to the ellipse 4 $x^2$ + 5 $y^2$ = 20 at the point 'P' touches the parabola $y^2$ = 4x, the eccentric angle of 'P' is

(A) $\pi+\sin^{-1}\frac{1}{\sqrt{5}}$ (B) $\frac{\pi}{2}+\tan^{-1}\left(\frac{1}{\sqrt{5}}\right)$

(C) $\pi-\tan^{-1}\left(\frac{1}{\sqrt{5}}\right)$ (D) $\pi-\cos^{-1}\left(\frac{1}{\sqrt{5}}\right)$

**ANSWERS**

**LEVEL −I**

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|---|---|---|---|---|---|---|---|
| 1. | C | 2. | C | 3. | C | 4. | C |
| 5. | | 6. | C | 7. | A | 8. | C |
| 9. | B | 10. | C | 11. | A | 12. | D |
| 13. | C | 14. | B | 15. | D | 16. | A |
| 17. | A | 18. | C | 19. | A | 20. | D |

**LEVEL −II**

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|---|---|---|---|---|---|---|---|
| 1. | C | 2. | D | 3. | C | 4. | B |
| 5. | D | 6. | C | 7. | C | 8. | A |
| 9. | B | 10. | A | 11. | B | 12. | C |
| 13. | D | 14. | A | 15. | C | 16. | C |
| 17. | D | 18. | D | 19. | A | 20. | D |

**LEVEL −III**

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|---|---|---|---|---|---|---|---|
| 1. | B | 2. | D | 3. | B | 4. | B |
| 5. | C | 6. | B | 7. | A | 8. | D |
| 9. | B | 10. | A | 11. | A | 12. | B |
| 13. | C | 14. | A | 15. | B | 16. | A |
| 17. | C | 18. | D | 19. | A | 20. | D |