EXERCISE-I

Ellipse

1. The equations of the directrices of the ellipse $16x^2 + 25y^2 = 400$ are

(A) $2x = \pm 25$ (B) $5x = \pm 9$
(C) $3x = \pm 10$ (D) None of these

2. The eccentricity of an ellipse is 2/3, latus rectum is 5 and centre is (0, 0). The equation of the ellipse is

(A) $\frac{x^2}{81} + \frac{y^2}{45} = 1$ (B) $\frac{4x^2}{81} + \frac{4y^2}{45} = 1$
(C) $\frac{x^2}{9} + \frac{y^2}{5} = 1$ (D) $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

3. The latus rectum of an ellipse is 10 and the minor axis is equal to the distance between the foci. The equation of the ellipse is

(A) $x^2 + 2y^2 = 100$ (B) $x^2 + \sqrt{2}y^2 = 10$
(C) $x^2 - 2y^2 = 100$ (D) None of these

4. The distance between the directrices of the ellipse $\frac{x^2}{36} + \frac{y^2}{20} = 1$ is

(A) 8 (B) 12
(C) 18 (D) 24

5. The distance between the foci of the ellipse $3x^2 + 4y^2 = 48$ is

(A) 2 (B) 4
(C) 6 (D) 8

6. The equation of the ellipse whose vertices are $(\pm 5, 0)$ and foci are $(\pm 4, 0)$ is

(A) $9x^2 + 25y^2 = 225$
(B) $25x^2 + 9y^2 = 225$
(C) $3x^2 + 4y^2 = 192$
(D) None of these

7. The equation of the ellipse whose foci are $(\pm 5, 0)$ and one of its directrix is $5x = 36$, is

(A) $\frac{x^2}{36} + \frac{y^2}{11} = 1$ (B) $\frac{x^2}{6} + \frac{y^2}{\sqrt{11}} = 1$
(C) $\frac{x^2}{6} + \frac{y^2}{11} = 1$ (D) None of these

8. If the eccentricity of an ellipse be $1/\sqrt{2}$, then its latus rectum is equal to its

(A) Minor axis (B) Semi-minor axis
(C) Major axis (D) Semi-major axis

9. The length of the latus rectum of the ellipse $5x^2 + 9y^2 = 45$ is

(A) $\sqrt{5}/4$ (B) $\sqrt{5}/2$
(C) 5/3 (D) 10/3

10. If the distance between a focus and corresponding directrix of an ellipse be 8 and the eccentricity be 1/2, then length of the minor axis is

(A) 3 (B) $4\sqrt{2}$
(C) 6 (D) None of these

11. Eccentricity of the conic $16x^2 + 7y^2 = 112$ is

(A) $3/\sqrt{7}$ (B) 7/16
(C) 3/4 (D) 4/3

12. If the distance between the foci of an ellipse be equal to its minor axis, then its eccentricity is

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

13. An ellipse passes through the point (–3, 1) and its eccentricity is $\sqrt{\frac{2}{5}}$. The equation of the ellipse is

(A) $3x^2 + 5y^2 = 32$ (B) $3x^2 + 5y^2 = 25$
(C) $3x^2 + y^2 = 4$ (D) $3x^2 + y^2 = 9$

14. The lengths of major and minor axis of an ellipse are 10 and 8 respectively and its major axis along the *y*-axis. The equation of the ellipse referred to its centre as origin is

(A) $\frac{x^2}{25}+\frac{y^2}{16}=1$ (B) $\frac{x^2}{16}+\frac{y^2}{25}=1$

(C) $\frac{x^2}{100}+\frac{y^2}{64}=1$ (D) $\frac{x^2}{64}+\frac{y^2}{100}=1$

15. If the centre, one of the foci and semi-major axis of an ellipse be (0, 0), (0, 3) and 5 then its equation is

(A) $\frac{x^2}{16}+\frac{y^2}{25}=1$ (B) $\frac{x^2}{25}+\frac{y^2}{16}=1$

(C) $\frac{x^2}{9}+\frac{y^2}{25}=1$ (D) None of these

16. For the ellipse $\frac{x^2}{64}+\frac{y^2}{28}=1$, the eccentricity is

(A) $\frac{3}{4}$ (B) $\frac{4}{3}$

(C) $\frac{1}{\sqrt{7}}$ (D) $\frac{x^2}{4}+y^2 = 1$

17. If the length of the major axis of an ellipse is three times the length of its minor axis, then its eccentricity is

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

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

18. The length of the latus rectum of an ellipse is $\frac{1}{3}$ of the major axis. Its eccentricity is

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

(C) $\frac{5\times4\times3}{7^3}$ (D) $\left(\frac{3}{4}\right)^4$

19. An ellipse is described by using an endless string which is passed over two pins. If the axes are 6 *cm* and 4 *cm*, the necessary length of the string and the distance between the pins respectively in *cm*, are

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

(C) $4, 2\sqrt{5}$ (D) None of these

20. The equation $\frac{x^2}{2-r}+\frac{y^2}{r-5}+1=0$ represents an ellipse, if

(A) $r>2$ (B) $2<r<5$

(C) $r>5$ (D) None of these

21. The locus of the point of intersection of perpendicular tangents to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$, is

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

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

22. The length of the latus rectum of the ellipse $\frac{x^2}{36}+\frac{y^2}{49}=1$

(A) 98/6 (B) 72/7

(C) 72/14 (D) 98/12

23. The distance of the point $'\theta'$ on the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ from a focus is

(A) $a(e+\cos\theta)$ (B) $a(e-\cos\theta)$

(C) $a(1+e\cos\theta)$ (D) $a(1+2e\cos\theta)$

24. The equation of the ellipse whose one focus is at (4, 0) and whose eccentricity is 4/5, is

(A) $\frac{x^2}{3^2}+\frac{y^2}{5^2}=1$ (B) $\frac{x^2}{5^2}+\frac{y^2}{3^2}=1$

(C) $\frac{x^2}{5^2}+\frac{y^2}{4^2}=1$ (D) $\frac{x^2}{4^2}+\frac{y^2}{5^2}=1$

25. The foci of $16x^2 + 25y^2 = 400$ are

(A) $(\pm 3, 0)$ (B) $(0, \pm 3)$

(C) $(3, -3)$ (D) $(-3, 3)$

26. *P* is any point on the ellipse $9x^2 + 36y^2 = 324$, whose foci are *S* and *S*'. Then $SP + S'P$ equals

(A) 3 (B) 12

(C) 36 (D) 324

27. What is the equation of the ellipse with foci $(\pm 2, 0)$ and eccentricity $= \frac{1}{2}$

(A) $3x^2 + 4y^2 = 48$ (B) $4x^2 + 3y^2 = 48$

(C) $3x^2 + 4y^2 = 0$ (D) $4x^2 + 3y^2 = 0$

28. The eccentricity of the ellipse $4x^2 + 9y^2 = 36$, is

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

(C) $\frac{\sqrt{5}}{3}$ (D) $\frac{\sqrt{5}}{6}$

29. The eccentricity of the ellipse $25x^2 + 16y^2 = 400$ is

(A) 3/5 (B) 1/3

(C) 2/5 (D) 1/5

30. The distance between the foci of an ellipse is 16 and eccentricity is $\frac{1}{2}$. Length of the major axis of the ellipse is

(A) 8 (B) 64

(C) 16 (D) 32

31. If the eccentricity of the two ellipse $\frac{x^2}{169} + \frac{y^2}{25} = 1$ and $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ are equal, then the value of a/b is

(A) 5/13 (B) 6/13

(C) 13/5 (D) 13/6

32. In the ellipse, minor axis is 8 and eccentricity is $\frac{\sqrt{5}}{3}$. Then major axis is

(A) 6 (B) 12

(C) 10 (D) 16

33. In an ellipse $9x^2 + 5y^2 = 45$, the distance between the foci is

(A) $4\sqrt{5}$ (B) $\frac{49}{4}x^2 - \frac{51}{196}y^2 = 1$

(C) 3 (D) 4

34. Equation of the ellipse with eccentricity $\frac{1}{2}$ and foci at $(\pm 1, 0)$ is

(A) $\frac{x^2}{3} + \frac{y^2}{4} = 1$ (B) $\frac{x^2}{4} + \frac{y^2}{3} = 1$

(C) $\frac{x^2}{3} + \frac{y^2}{4} = \frac{4}{3}$ (D) None of these

35. The sum of focal distances of any point on the ellipse with major and minor axes as $2a$ and $2b$ respectively, is equal to

(A) $2a$ (B) $\frac{2a}{b}$

(C) $\frac{2b}{a}$ (D) $\frac{b^2}{a}$

36. Eccentricity of the ellipse $4x^2 + y^2 - 8x + 2y + 1 = 0$ is

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

(C) $1/2$ (D) None of these

37. The equation of an ellipse whose eccentricity is 1/2 and the vertices are (4, 0) and (10, 0) is

(A) $3x^2 + 4y^2 - 42x + 120 = 0$

(B) $3x^2 + 4y^2 + 42x + 120 = 0$

(C) $3x^2 + 4y^2 + 42x - 120 = 0$

(D) $3x^2 + 4y^2 - 42x - 120 = 0$

38. The equation of the ellipse whose centre is (2, –3), one of the foci is (3, –3) and the corresponding vertex is (4, –3) is

(A) $\frac{(x-2)^2}{3}+\frac{(y+3)^2}{4}=1$

(B) $\frac{(x-2)^2}{4}+\frac{(y+3)^2}{3}=1$

(C) $\frac{x^2}{3}+\frac{y^2}{4}=1$

(D) None of these

39. The equation

$14x^2-4xy+11y^2-44x-58y+71=0$ represents

(A) A circle

(B) An ellipse

(C) A hyperbola

(D) A rectangular hyperbola

40. The centre of the ellipse $\frac{(x+y-2)^2}{9}+\frac{(x-y)^2}{16}=1$ is

(A) (0, 0)

(B) (1, 1)

(C) (1, 0)

(D) (0, 1)

41. The equation of an ellipse whose focus (–1, 1), whose directrix is $x-y+3=0$ and whose eccentricity is $\frac{1}{2}$, is given by

(A) $7x^2+2xy+7y^2+10x-10y+7=0$

(B) $7x^2-2xy+7y^2-10x+10y+7=0$

(C) $7x^2-2xy+7y^2-10x-10y-7=0$

(D) $7x^2-2xy+7y^2+10x+10y-7=0$

42. The foci of the ellipse

$25(x+1)^2+9(y+2)^2=225$ are at

(A) (–1, 2) and (–1, –6)

(B) (–1, 2) and (6, 1)

(C) (1, –2) and (1, –6)

(D) (–1, –2) and (1, 6)

43. The eccentricity of the ellipse

$9x^2+5y^2-30y=0$, is

(A) 1/3 (B) 2/3

(C) 3/4 (D) None of these

44. The curve represented by $x=3(\cos t+\sin t)$, $y=4(\cos t-\sin t)$ is

(A) Ellipse (B) Parabola

(C) Hyperbola (D) Circle

45. Equation $x=a\cos\theta, y=b\sin\theta(a>b)$ represent a conic section whose eccentricity *e* is given by

(A) $e^2=\frac{a^2+b^2}{a^2}$

(B) $e^2=\frac{a^2+b^2}{b^2}$

(C) $e^2=\frac{a^2-b^2}{a^2}$

(D) $e^2=\frac{a^2-b^2}{b^2}$

46. The length of the axes of the conic

$9x^2+4y^2-6x+4y+1=0$, are

(A) $\frac{1}{2}, 9$ (B) $3, \frac{2}{5}$

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

47. The eccentricity of the ellipse

$9x^2+5y^2-18x-2y-16=0$ is

(A) 1/2 (B) 2/3

(C) 1/3 (D) 3/4

48. The eccentricity of the conic

$4x^2+16y^2-24x-3y=1$ is

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

(C) $\frac{\sqrt{3}}{4}$ (D) $\sqrt{3}$

49. If the line $y = 2x + c$ be a tangent to the ellipse $\frac{x^2}{8} + \frac{y^2}{4} = 1$, then $c =$

(A) ± 4 (B) ± 6

(C) ± 1 (D) ± 8

50. The position of the point (4, –3) with respect to the ellipse $2x^2 + 5y^2 = 20$ is

(A) Outside the ellipse (B) On the ellipse

(C) On the major axis (D) None of these

51. The equation of the tangent to the ellipse $x^2 + 16y^2 = 16$ making an angle of 60^o with *x*-axis is

(A) $\sqrt{3}x - y + 7 = 0$ (B) $\sqrt{3}x - y - 7 = 0$

(C) $\sqrt{3}x - y \pm 7 = 0$ (D) None of these

52. The position of the point (1, 3) with respect to the ellipse $4x^2 + 9y^2 - 16x - 54y + 61 = 0$

(A) Outside the ellipse (B) On the ellipse

(C) On the major axis (D) On the minor axis

53. The line $lx + my - n = 0$ will be tangent to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, if

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

(C) $a^2l + b^2m = n$ (D) None of these

54. The locus of the point of intersection of mutually perpendicular tangent to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, is

(A) A straight line (B) A parabola

(C) A circle (D) None of these

55. The equation of the tangent at the point (1/4, 1/4) of the ellipse $\frac{x^2}{4} + \frac{y^2}{12} = 1$ is

(A) $3x + y = 48$ (B) $3x + y = 3$

(C) $3x + y = 16$ (D) None of these

56. The angle between the pair of tangents drawn to the ellipse $3x^2 + 2y^2 = 5$ from the point (1, 2), is

(A) $\tan^{-1}\left(\frac{12}{5}\right)$ (B) $\tan^{-1}(6\sqrt{5})$

(C) $\tan^{-1}\left(\frac{12}{\sqrt{5}}\right)$ (D) $\tan^{-1}(12\sqrt{5})$

57. The equations of the tangents of the ellipse $9x^2 + 16y^2 = 144$ which passes through the point (2, 3) is

(A) $y = 3, x + y = 5$

(B) $y = -3, x - y = 5$

(C) $y = 4, x + y = 3$

(D) $y = -4, x - y = 3$

58. If any tangent to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ cuts off intercepts of length *h* and *k* on the axes, then $\frac{a^2}{h^2} + \frac{b^2}{k^2} =$

(A) 0 (B) 1

(C) –1 (D) None of these

59. If the line $y = mx + c$ touches the ellipse $\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1$, then $c =$

(A) $\pm\sqrt{b^2m^2 + a^2}$

(B) $\pm\sqrt{a^2m^2 + b^2}$

(C) $\pm\sqrt{b^2m^2 - a^2}$

(D) $\pm\sqrt{a^2m^2 - b^2}$

60. The ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ and the straight line $y = mx + c$ intersect in real points only if

(A) $a^2m^2 < c^2 - b^2$ (B) $a^2m^2 > c^2 - b^2$

(C) $a^2m^2 \geq c^2 - b^2$ (D) $c \geq b$

61. The equation of the normal to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ at the point $(a\cos\theta, b\sin\theta)$ is

(A) $\frac{ax}{\sin\theta}-\frac{by}{\cos\theta}=a^2-b^2$

(B) $\frac{ax}{\sin\theta}-\frac{by}{\cos\theta}=a^2+b^2$

(C) $\frac{ax}{\cos\theta}-\frac{by}{\sin\theta}=a^2-b^2$

(D) $\frac{ax}{\cos\theta}-\frac{by}{\sin\theta}=a^2+b^2$

62. 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 $\cos\theta$ is equal to

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

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

63. The line $y=mx+c$ is a normal to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{a^2}=1$, if $c=$

(A) $-(2am+bm^2)$

(B) $\frac{(a^2+b^2)m}{\sqrt{a^2+b^2m^2}}$

(C) $-\frac{(a^2-b^2)m}{\sqrt{a^2+b^2m^2}}$

(D) $\frac{(a^2-b^2)m}{\sqrt{a^2+b^2}}$

64. The equation of normal at the point (0, 3) of the ellipse $9x^2+5y^2=45$ is

(A) $y-3=0$

(B) $y+3=0$

(C) *x*-axis

(D) *y*-axis

65. The equation of the normal at the point (2, 3) on the ellipse $9x^2+16y^2=180$, is

(A) $3y=8x-10$

(B) $3y-8x+7=0$

(C) $8y+3x+7=0$

(D) $3x+2y+7=0$

66. If the line $x\cos\alpha+y\sin\alpha=p$ be normal to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$, then

(A) $p^2(a^2\cos^2\alpha+b^2\sin^2\alpha)=a^2-b^2$

(B) $p^2(a^2\cos^2\alpha+b^2\sin^2\alpha)=(a^2-b^2)^2$

(C) $p^2(a^2\sec^2\alpha+b^2\operatorname{cosec}^2\alpha)=a^2-b^2$

(D) $p^2(a^2\sec^2\alpha+b^2\operatorname{cosec}^2\alpha)=(a^2-b^2)^2$

67. The line $lx+my+n=0$ is a normal to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$, if

(A) $\frac{a^2}{m^2}+\frac{b^2}{l^2}=\frac{(a^2-b^2)}{n^2}$

(B) $\frac{a^2}{l^2}+\frac{b^2}{m^2}=\frac{(a^2-b^2)^2}{n^2}$

(C) $\frac{a^2}{l^2}-\frac{b^2}{m^2}=\frac{(a^2-b^2)^2}{n^2}$

(D) None of these

68. The equation of tangent and normal at point (3, –2) of ellipse $4x^2+9y^2=36$ are

(A) $\frac{x}{3}-\frac{y}{2}=1, \frac{x}{2}+\frac{y}{3}=\frac{5}{6}$

(B) $\frac{x}{3}+\frac{y}{2}=1, \frac{x}{2}-\frac{y}{3}=\frac{5}{6}$

(C) $\frac{x}{2}+\frac{y}{3}=1, \frac{x}{3}-\frac{y}{2}=\frac{5}{6}$

(D) None of these

69. The value of λ, for which the line $2x-\frac{8}{3}\lambda y=-3$ is a normal to the conic $x^2+\frac{y^2}{4}=1$ is

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

(B) $\frac{1}{2}$

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

(D) $\frac{3}{8}$

70. The pole of the straight line $x+4y=4$ with respect to ellipse $x^2+4y^2=4$ is

(A) (1, 4) (B) (1, 1)

(C) (4, 1) (D) (4, 4)

71. In the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$, the equation of diameter conjugate to the diameter $y=\frac{b}{a}x$, is

(A) $y=-\frac{b}{a}x$ (B) $y=-\frac{a}{b}x$

(C) $x=-\frac{b}{a}y$ (D) None of these

72. An ellipse has *OB* as semi minor axis, *F* and *F′* its foci and the angle *FBF′* is a right angle. Then the eccentricity of the ellipse is

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

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

73. If the foci of an ellipse are $(\pm\sqrt{5},0)$ and its eccentricity is $\frac{\sqrt{5}}{3}$, then the equation of the ellipse is

(A) $9x^2+4y^2=36$ (B) $4x^2+9y^2=36$

(C) $36x^2+9y^2=4$ (D) $9x^2+36y^2=4$

74. The sum of the focal distances of any point on the conic $\frac{x^2}{25}+\frac{y^2}{16}=1$ is

(A) 10 (B) 9

(C) 41 (D) 18

75. Minimum area of the triangle by any tangent to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ with the coordinate axes is

(A) $\frac{a^2+b^2}{2}$ (B) $\frac{(a+b)^2}{2}$

(C) *ab* (D) $\frac{(a-b)^2}{2}$