EXERCISE-I

Hyperbola

1. The one which does not represent a hyperbola is

(A) $xy = 1$ (B) $x^2 - y^2 = 5$

(C) $(x-1)(y-3) = 3$ (D) $x^2 - y^2 = 0$

2. The equation of the hyperbola whose conjugate axis is 5 and the distance between the foci is 13, is

(A) $25x^2 - 144y^2 = 900$

(B) $144x^2 - 25y^2 = 900$

(C) $144x^2 + 25y^2 = 900$

(D) $25x^2 + 144y^2 = 900$

3. The length of the transverse axis of a hyperbola is 7 and it passes through the point (5, –2). The equation of the hyperbola is

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

(C) $\frac{4}{49}x^2 - \frac{51}{196}y^2 = 1$ (D) None of these

4. If (4, 0) and (–4, 0) be the vertices and (6, 0) and (–6, 0) be the foci of a hyperbola, then its eccentricity is

(A) 5/2 (B) 2

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

5. The eccentricity of the hyperbola $x^2 - y^2 = 25$ is

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

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

6. The equation of the transverse and conjugate axis of the hyperbola $16x^2 - y^2 + 64x + 4y + 44 = 0$ are

(A) $x = 2, y + 2 = 0$ (B) $x = 2, y = 2$

(C) $y = 2, x + 2 = 0$ (D) None of these

7. If the length of the transverse and conjugate axes of a hyperbola be 8 and 6 respectively, then the difference focal distances of any point of the hyperbola will be

(A) 8 (B) 6

(C) 14 (D) 2

8. If $(0, \pm 4)$ and $(0, \pm 2)$ be the foci and vertices of a hyperbola, then its equation is

(A) $\frac{x^2}{4} - \frac{y^2}{12} = 1$ (B) $\frac{x^2}{12} - \frac{y^2}{4} = 1$

(C) $\frac{y^2}{4} - \frac{x^2}{12} = 1$ (D) $\frac{y^2}{12} - \frac{x^2}{4} = 1$

9. The locus of the point of intersection of the lines $bxt - ayt = ab$ and $bx + ay = abt$ is

(A) A parabola (B) An ellipse

(C) A hyperbola (D) None of these

10. The locus of the point of intersection of the lines $ax\sec\theta + by\tan\theta = a$ and $ax\tan\theta + by\sec\theta = b$, where θ is the parameter, is

(A) A straight line (B) A circle

(C) An ellipse (D) A hyperbola

11. The eccentricity of the hyperbola $4x^2 - 9y^2 = 16$, is

(A) $\frac{8}{3}$ (B) $\frac{5}{4}$

(C) $\frac{\sqrt{13}}{3}$ (D) $\frac{4}{3}$

12. The eccentricity of the conic $x^2 - 4y^2 = 1$, is

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

(C) $\frac{2}{\sqrt{5}}$ (D) $\frac{\sqrt{5}}{2}$

13. The locus of the centre of a circle, which touches externally the given two circles, is

(A) Circle (B) Parabola

(C) Hyperbola (D) Ellipse

14. The foci of the hyperbola $2x^2 - 3y^2 = 5$, is

(A) $\left(\pm\frac{5}{\sqrt{6}}, 0\right)$ (B) $\left(\pm\frac{5}{6}, 0\right)$

(C) $\left(\pm\frac{\sqrt{5}}{6}, 0\right)$ (D) None of these

15. The latus-rectum of the hyperbola $16x^2 - 9y^2 = 144$, is

(A) $\frac{16}{3}$ (B) $\frac{32}{3}$

(C) $\frac{8}{3}$ (D) $\frac{4}{3}$

16. The foci of the hyperbola $9x^2 - 16y^2 = 144$ are

(A) $(\pm 4, 0)$ (B) $(0, \pm 4)$

(C) $(\pm 5, 0)$ (D) $(0, \pm 5)$

17. The length of transverse axis of the parabola $3x^2 - 4y^2 = 32$ is

(A) $\frac{8\sqrt{2}}{\sqrt{3}}$ (B) $\frac{16\sqrt{2}}{\sqrt{3}}$

(C) $\frac{3}{32}$ (D) $\frac{64}{3}$

18. The directrix of the hyperbola is $\frac{x^2}{9} - \frac{y^2}{4} = 1$

(A) $x = 9/\sqrt{13}$ (B) $y = 9/\sqrt{13}$

(C) $x = 6/\sqrt{13}$ (D) $y = 6/\sqrt{13}$

19. Locus of the point of intersection of straight lines $\frac{x}{a} - \frac{y}{b} = m$ and $\frac{x}{a} + \frac{y}{b} = \frac{1}{m}$ is

(A) An ellipse (B) A circle

(C) A hyperbola (D) A parabola

20. The locus of a point which moves such that the difference of its distances from two fixed points is always a constant is

(A) A straight line (B) A circle

(C) An ellipse (D) A hyperbola

21. The equation $x^2 + 4xy + y^2 + 2x + 4y + 2 = 0$ represents

(A) An ellipse

(B) A pair of straight lines

(C) A hyperbola

(D) None of these

22. The equation of the directrices of the conic $x^2 + 2x - y^2 + 5 = 0$ are

(A) $x = \pm 1$ (B) $y = \pm 2$

(C) $y = \pm\sqrt{2}$ (D) $x = \pm\sqrt{3}$

23. Foci of the hyperbola $\frac{x^2}{16} - \frac{(y-2)^2}{9} = 1$ are

(A) (5, 2) (–5, 2) (B) (5, 2) (5, –2)

(C) (5, 2) (–5, –2) (D) None of these

24. Centre of hyperbola $9x^2 - 16y^2 + 18x + 32y - 151 = 0$ is

(A) (1, –1) (B) (–1, 1)

(C) (–1, –1) (D) (1, 1)

25. The equation of the hyperbola whose foci are (6, 4) and (–4, 4) and eccentricity 2 is given by

(A) $12x^2 - 4y^2 - 24x + 32y - 127 = 0$

(B) $12x^2 + 4y^2 + 24x - 32y - 127 = 0$

(C) $12x^2 - 4y^2 - 24x - 32y + 127 = 0$

(D) $12x^2 - 4y^2 + 24x + 32y + 127 = 0$

26. The auxiliary equation of circle of hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, is

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

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

27. The equation $x^2 - 16xy - 11y^2 - 12x + 6y + 21 = 0$ represents

(A) Parabola (B) Ellipse

(C) Hyperbola (D) Two straight lines

28. The latus rectum of the hyperbola $9x^2 - 16y^2 - 18x - 32y - 151 = 0$ is

(A) $\frac{9}{4}$ (B) 9

(C) $\frac{3}{2}$ (D) $\frac{9}{2}$

29. The equation of the hyperbola whose directrix is $2x + y = 1$, focus (1, 1) and eccentricity $= \sqrt{3}$, is

(A) $7x^2 + 12xy - 2y^2 - 2x + 4y - 7 = 0$

(B) $11x^2 + 12xy + 2y^2 - 10x - 4y + 1 = 0$

(C) $11x^2 + 12xy + 2y^2 - 14x - 14y + 1 = 0$

(D) None of these

30. $x^2 - 4y^2 - 2x + 16y - 40 = 0$ represents

(A) A pair of straight lines

(B) An ellipse

(C) A hyperbola

(D) A parabola

31. The distance between the directrices of the hyperbola $x = 8\sec\theta,\ y = 8\tan\theta$ is

(A) $16\sqrt{2}$ (B) $\sqrt{2}$

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

32. The eccentricity of the hyperbola $5x^2 - 4y^2 + 20x + 8y = 4$ is

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

(C) 2 (D) 3

33. The latus rectum of the hyperbola $9x^2 - 16y^2 + 72x - 32y - 16 = 0$ is

(A) $\frac{9}{2}$ (B) $-\frac{9}{2}$

(C) $\frac{32}{3}$ (D) $-\frac{32}{3}$

34. The point of contact of the tangent $y = x + 2$ to the hyperbola $5x^2 - 9y^2 = 45$ is

(A) (9/2, 5/2) (B) (5/2, 9/2)

(C) (–9/2, –5/2) (D) None of these

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

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

(C) $am^2 - b^2n^2 = a^2l^2$ (D) None of these

36. If the line $y = 2x + \lambda$ be a tangent to the hyperbola $36x^2 - 25y^2 = 3600$, then $\lambda =$

(A) 16 (B) –16

(C) ±16 (D) None of these

37. The line $3x - 4y = 5$ is a tangent to the hyperbola $x^2 - 4y^2 = 5$. The point of contact is

(A) (3, 1) (B) (2, 1/4)

(C) (1, 3) (D) None of these

38. The equation of the tangent at the point $(a\sec\theta, b\tan\theta)$ of the conic $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, is

(A) $x\sec^2\theta - y\tan^2\theta = 1$

(B) $\frac{x}{a}\sec\theta - \frac{y}{b}\tan\theta = 1$

(C) $\frac{x + a\sec\theta}{a^2} - \frac{y + b\tan\theta}{b^2} = 1$

(D) None of these

39. The equation of the tangents to the conic $3x^2 - y^2 = 3$ perpendicular to the line $x + 3y = 2$ is

(A) $y = 3x \pm \sqrt{6}$ (B) $y = 6x \pm \sqrt{3}$

(C) $y = x \pm \sqrt{6}$ (D) $y = 3x \pm 6$

40. The equation of the tangent to the hyperbola $2x^2 - 3y^2 = 6$ which is parallel to the line $y = 3x + 4$, is

(A) $y = 3x + 5$

(B) $y = 3x - 5$

(C) $y = 3x + 5$ and $y = 3x - 5$

(D) None of these

41. The equation of the tangent to the conic $x^2 - y^2 - 8x + 2y + 11 = 0$ at (2, 1) is

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

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

42. The point of contact of the line $y = x - 1$ with $3x^2 - 4y^2 = 12$ is

(A) (4, 3) (B) (3, 4)

(C) (4, –3) (D) None of these

43. If the straight line $x\cos\alpha + y\sin\alpha = p$ be a tangent to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, then

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

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

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

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

44. If the tangent on the point $(2\sec\varphi, 3\tan\varphi)$ of the hyperbola $\frac{x^2}{4} - \frac{y^2}{9} = 1$ is parallel to $3x - y + 4 = 0$, then the value of ϕ is

(A) 45^o (B) 60^o

(C) 30^o (D) 75^o

45. The radius of the director circle of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, is

(A) $a - b$ (B) $\sqrt{a - b}$

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

46. What is the slope of the tangent line drawn to the hyperbola $xy = a\,(a \neq 0)$ at the point (a, 1)

(A) $1/a$ (B) $-1/a$

(C) a (D) $-a$

47. The line $y = mx + c$ touches the curve $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, if

(A) $c^2 = a^2m^2 + b^2$ (B) $c^2 = a^2m^2 - b^2$

(C) $c^2 = b^2m^2 - a^2$ (D) $a^2 = b^2m^2 + c^2$

48. The straight line $x + y = \sqrt{2}p$ will touch the hyperbola $4x^2 - 9y^2 = 36$, if

(A) $p^2 = 2$ (B) $p^2 = 5$

(C) $5p^2 = 2$ (D) $2p^2 = 5$

49. The equation of the director circle of the hyperbola $\frac{x^2}{16} - \frac{y^2}{4} = 1$ is given by

(A) $x^2 + y^2 = 16$ (B) $x^2 + y^2 = 4$

(C) $x^2 + y^2 = 20$ (D) $x^2 + y^2 = 12$

50. The equation of the tangent parallel to $y - x + 5 = 0$ drawn to $\frac{x^2}{3} - \frac{y^2}{2} = 1$ is

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

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

51. The equation of the normal at the point (6, 4) on the hyperbola $\frac{x^2}{9} - \frac{y^2}{16} = 3$, is

(A) $3x + 8y = 50$ (B) $3x - 8y = 50$

(C) $8x + 3y = 50$ (D) $8x - 3y = 50$

52. What will be equation of that chord of hyperbola $25x^2 - 16y^2 = 400$, whose mid point is (5, 3)

(A) $115x - 117y = 17$ (B) $125x - 48y = 481$

(C) $127x + 33y = 341$ (D) $15x + 121y = 105$

53. The value of m, for which the line $y = mx + \frac{25\sqrt{3}}{3}$, is a normal to the conic $\frac{x^2}{16} - \frac{y^2}{9} = 1$, is

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

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

54. The equation of the normal to the hyperbola $\frac{x^2}{16} - \frac{y^2}{9} = 1$ at (–4, 0) is

(A) $y = 0$ (B) $y = x$

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

55. The eccentricity of the conjugate hyperbola of the hyperbola $x^2 - 3y^2 = 1$, is

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

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

56. If e and e' are eccentricities of hyperbola and its conjugate respectively, then

(A) $\left(\frac{1}{e}\right)^2 + \left(\frac{1}{e'}\right)^2 = 1$ (B) $\frac{1}{e} + \frac{1}{e'} = 1$

(C) $\left(\frac{1}{e}\right)^2 + \left(\frac{1}{e'}\right)^2 = 0$ (D) $\frac{1}{e} + \frac{1}{e'} = 2$

57. The product of the lengths of perpendiculars drawn from any point on the hyperbola $x^2 - 2y^2 - 2 = 0$ to its asymptotes is

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

(C) 3/2 (D) 2

58. The equation of a hyperbola, whose foci are (5, 0) and (–5, 0) and the length of whose conjugate axis is 8, is

(A) $9x^2 - 16y^2 = 144$ (B) $16x^2 - 9y^2 = 144$

(C) $9x^2 + 16y^2 = 144$ (D) $16x^2 - 9y^2 = 12$

59. The equation of the hyperbola whose foci are the foci of the ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1$ and the eccentricity is 2, is

(A) $\frac{x^2}{4} + \frac{y^2}{12} = 1$ (B) $\frac{x^2}{4} - \frac{y^2}{12} = 1$

(C) $\frac{x^2}{12} + \frac{y^2}{4} = 1$ (D) $\frac{x^2}{12} - \frac{y^2}{4} = 1$

60. The coordinates of the foci of the rectangular hyperbola $xy = c^2$ are

(A) $(\pm c, \pm c)$ (B) $(\pm c\sqrt{2}, \pm c\sqrt{2})$

(C) $\left(\pm\frac{c}{\sqrt{2}}, \pm\frac{c}{\sqrt{2}}\right)$ (D) None of these

61. The eccentricity of curve $x^2 - y^2 = 1$ is

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

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

62. The locus of the point of intersection of lines $(x + y)t = a$ and $x - y = at$, where t is the parameter, is

(A) A circle

(B) An ellipse

(C) A rectangular hyperbola

(D) None of these

63. The equation of the hyperbola referred to its axes as axes of coordinate and whose distance between the foci is 16 and eccentricity is $\sqrt{2}$, is

(A) $x^2 - y^2 = 16$ (B) $x^2 - y^2 = 32$

(C) $x^2 - 2y^2 = 16$ (D) $y^2 - x^2 = 16$

64. If the foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{b^2} = 1$ and the hyperbola $\frac{x^2}{144} - \frac{y^2}{81} = \frac{1}{25}$ coincide, then the value of b^2 is

(A) 1 (B) 5

(C) 7 (D) 9

65. A tangent to a hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ intercepts a length of unity from each of the co-ordinate axes, then the point (*a, b*) lies on the rectangular hyperbola

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

(C) $x^2 - y^2 = -1$ (D) None of these

66. The equation of the hyperbola referred to the axis as axes of co-ordinate and whose distance between the foci is 16 and eccentricity is $\sqrt{2}$, is

(A) $x^2 - y^2 = 16$ (B) $x^2 - y^2 = 32$

(C) $x^2 - 2y^2 = 16$ (D) $y^2 - x^2 = 16$

67. If *e* and *e'* are the eccentricities of the ellipse $5x^2 + 9y^2 = 45$ and the hyperbola $5x^2 - 4y^2 = 45$ respectively, then $ee' =$

(A) 9 (B) 4

(C) 5 (D) 1

68. The distance between the directrices of a rectangular hyperbola is 10 units, then distance between its foci is

(A) $10\sqrt{2}$ (B) 5

(C) $5\sqrt{2}$ (D) 20

69. Eccentricity of the curve $x^2 - y^2 = a^2$ is

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

(C) 4 (D) None of these

70. Eccentricity of rectangular hyperbola is

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

(C) $\sqrt{2}$ (D) > 2

71. The eccentricity of the hyperbola conjugate to $x^2 - 3y^2 = 2x + 8$ is

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

(C) 2 (D) None of these

72. The locus of a point $P(\alpha, \beta)$ moving under the condition that the line $y = \alpha x + \beta$ is a tangent to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is

(A) A parabola (B) A hyperbola

(C) An ellipse (D) A circle

73. The eccentricity of the hyperbola $\frac{x^2}{16} - \frac{y^2}{25} = 1$ is

(A) 3/4 (B) 3/5

(C) $\sqrt{41}/4$ (D) $\sqrt{41/5}$

74. The equation to the hyperbola having its eccentricity 2 and the distance between its foci is 8

(A) $\frac{x^2}{12} - \frac{y^2}{4} = 1$ (B) $\frac{x^2}{4} - \frac{y^2}{12} = 1$

(C) $\frac{x^2}{8} - \frac{y^2}{2} = 1$ (D) $\frac{x^2}{16} - \frac{y^2}{9} = 1$

75. If θ is the acute angle of intersection at a real point of intersection of the circle $x^2 + y^2 = 5$ and the parabola $y^2 = 4x$ then $\tan\theta$ is equal to

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

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