Assignment

Definition, Standard form of hyperbola, Conjugate hyperbola

Basic Level

1. The locus of the centre of a circle, which touches externally the given two circle, is **[Karnataka CET 1999; Kurukshetra CE**

(a) Circle (b) Parabola (c) Hyperbola (d) Ellipse

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

[UPSEAT 1995; Kerala (Engg.) 1998; Karnataka CET 2003]

(a) A straight line (b) A circle (c) An ellipse (d) A hyperbola

3. The one which does not represent a hyperbola is **[MP PET 1992]**

(a) $xy = 1$ (b) $x^2 - y^2 = 5$ (c) $(x-1)(y-3) = 3$ (d) $x^2 - y^2 = 0$

4. The equation of the hyperbola whose directrix is $x + 2y = 1$, focus (2, 1) and eccentricity 2 will be **[MP PET 1988, 1989]**

(a) $x^2 - 16xy - 11y^2 - 12x + 6y + 21 = 0$ (b) $3x^2 + 16xy + 15y^2 - 4x - 14y - 1 = 0$

(c) $x^2 + 16xy + 11y^2 - 12x - 6y + 21 = 0$ (d) None of these

5. The locus of the point of intersection of the lines $\sqrt{3}x - y - 4\sqrt{3}k = 0$ and $\sqrt{3}kx + ky - 4\sqrt{3} = 0$ for different value of k is

(a) Circle (b) Parabola (c) Hyperbola (d) Ellipse

6. Locus of the point of intersection of straight line $\frac{x}{a} - \frac{y}{b} = m$ and $\frac{x}{a} + \frac{y}{b} = \frac{1}{m}$ is **[MP PET 1991, 2003]**

(a) An ellipse (b) A circle (c) A hyperbola (d) A parabola

7. The eccentricity of the hyperbola $2x^2 - y^2 = 6$ is **[MP PET 1992]**

(a) $\sqrt{2}$ (b) 2 (c) 3 (d) $\sqrt{3}$

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

(a) (1, –1) (b) (–1, 1) (c) (–1, –1) (d) (1, 1)

9. The eccentricity of the conic $x^2 - 4y^2 = 1$, is **[MP PET 1999; Kurukshetra CEE 1998]**

(a) $\frac{2}{\sqrt{3}}$ (b) $\frac{\sqrt{3}}{2}$ (c) $\frac{2}{\sqrt{5}}$ (d) $\frac{\sqrt{5}}{2}$

10. The eccentricity of a hyperbola passing through the point (3, 0), $(3\sqrt{2}, 2)$ will be **[MNR 1985]**

(a) $\sqrt{13}$ (b) $\frac{\sqrt{13}}{3}$ (c) $\frac{\sqrt{13}}{4}$ (d) $\frac{\sqrt{13}}{2}$

11. 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) $\sqrt{2}$

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

[UPSEAT 1999; EAMCET 1994, 95; MNR 1984; MP PET 1995; DCE 2000]

(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) $\frac{1}{e}+\frac{1}{e'}=2$

13. 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 $ee'=$ **[EAMCET 2002]**

(a) 9 (b) 4 (c) 5 (d) 1

14. The directrix of the hyperbola is $\frac{x^2}{9}-\frac{y^2}{4}=1$ **[UPSEAT 2003]**

(a) $x=9/\sqrt{13}$ (b) $y=9/\sqrt{13}$ (c) $x=6/\sqrt{13}$ (d) $y=6/\sqrt{13}$

15. The latus rectum of the hyperbola $16x^2-9y^2=144$, is **[MP PET 2000]**

(a) $\frac{16}{3}$ (b) $\frac{32}{3}$ (c) $\frac{8}{3}$ (d) $\frac{4}{3}$

16. The foci of the hyperbola $2x^2-3y^2=5$, is **[MP PET 2000]**

(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

17. The distance between the directrices of a rectangular hyperbola is 10 units, then distance between its foci is **[MP PET**

(a) $10\sqrt{2}$ (b) 5 (c) $5\sqrt{2}$ (d) 20

18. The difference of the focal distances of any point on the hyperbola $9x^2-16y^2=144$, is **[MP PET 1995]**

(a) 8 (b) 7 (c) 6 (d) 4

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

(a) 8 (b) 6 (c) 14 (d) 2

20. The length of transverse axis of the hyperbola $3x^2-4y^2=32$ is **[Karnataka CET 2001]**

(a) $\frac{8\sqrt{2}}{\sqrt{3}}$ (b) $\frac{16\sqrt{2}}{\sqrt{3}}$ (c) $\frac{3}{32}$ (d) $\frac{64}{3}$

21. A hyperbola passes through the points (3, 2) and (–17, 12) and has its centre at origin and transverse axis is along x-axis. The length of its transverse axis is

(a) 2 (b) 4 (c) 6 (d) None of these

22. 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) $\frac{x^2}{12}-\frac{y^2}{4}=1$

23. The distance between the foci of a hyperbola is double the distance between its vertices and the length of its conjugate axis is 6. The equation of the hyperbola referred to its axes as axes of coordinates is

(a) $3x^2-y^2=3$ (b) $x^2-3y^2=3$ (c) $3x^2-y^2=9$ (d) $x^2-3y^2=9$

24. 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) $\frac{y^2}{12}-\frac{x^2}{4}=1$

25. 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

26. If the centre, vertex and focus of a hyperbola be (0, 0),(4, 0) and (6, 0) respectively, then the equation of the hyperbola is

(a) $4x^2 - 5y^2 = 8$ (b) $4x^2 - 5y^2 = 80$ (c) $5x^2 - 4y^2 = 80$ (d) $5x^2 - 4y^2 = 8$

27. 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) $9x^2 - 16y^2 = 12$ (d) $16x^2 - 9y^2 = 12$

28. If the latus rectum of an hyperbola be 8 and eccentricity be $3/\sqrt{5}$, then the equation of the hyperbola is

(a) $4x^2 - 5y^2 = 100$ (b) $5x^2 - 4y^2 = 100$ (c) $4x^2 + 5y^2 = 100$ (d) $5x^2 + 4y^2 = 100$

29. 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) $25x^2 + 144y^2 = 900$

30. For hyperbola $\frac{x^2}{\cos^2\alpha} - \frac{y^2}{\sin^2\alpha} = 1$ which of the following remains constant with change in 'α' **[IIT Screening 2003]**

(a) Abscissae of vertices (b) Abscissae of foci (c) Eccentricity (d) Directrix

31. The hyperbola is the conic with eccentricity **[BIT Ranchi 1998, UPSEAT 1998]**

(a) $e > 1$ (b) $e < 1$ (c) $e = 1$ (d) $e = 0$

32. The eccentricity of the conic $9x^2 - 16y^2 = 144$ is **[DCE 1994]**

(a) $\frac{4}{5}$ (b) $\frac{5}{4}$ (c) $\frac{4}{3}$ (d) $\sqrt{7}$

33. If e, e' be the eccentricities of two conics S and S' and if $e^2 + e'^2 = 3$, then both S and S' can be **[Kerala (Engg.) 2001]**

(a) Ellipses (b) Parabolas (c) Hyperbolas (d) None of these

34. If e_1, e_2 be respectively the eccentricities of ellipse $9x^2 + 4y^2 = 36$ and hyperbola $9x^2 - 4y^2 = 36$, then

(a) $e_1^2 + e_2^2 > 3$ (b) $e_1^2 + e_2^2 = 2$ (c) $e_1^2 + e_2^2 > 4$ (d) $e_1^2 + e_2^2 < 4$

35. The length of the latus rectum of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = -1$ is

(a) $\frac{2a^2}{b}$ (b) $\frac{2b^2}{a}$ (c) $\frac{b^2}{a}$ (d) $\frac{a^2}{b}$

36. The distance between the foci of a hyperbola is 16 and its eccentricity is $\sqrt{2}$, then the equation of hyperbola is **[DCE 1998; MNR 1984; UPSEAT 2000]**

(a) $x^2 + y^2 = 32$ (b) $x^2 - y^2 = 16$ (c) $x^2 + y^2 = 16$ (d) $x^2 - y^2 = 32$

37. The equation of the hyperbola with vertices (3, 0) and (–3, 0) and semi-latus-rectum 4, is given by

(a) $4x^2 - 3y^2 + 36 = 0$ (b) $4x^2 - 3y^2 + 12 = 0$ (c) $4x^2 - 3y^2 - 36 = 0$ (d) None of these

38. Equation of the hyperbola with eccentricity 3/2 and foci at $(\pm 2, 0)$ is

(a) $\frac{x^2}{4} - \frac{y^2}{5} = \frac{4}{9}$ (b) $\frac{x^2}{9} - \frac{y^2}{9} = \frac{4}{9}$ (c) $\frac{x^2}{4} - \frac{y^2}{9} = 1$ (d) None of these

39. The eccentricity of the hyperbola with latus rectum 12 and semi-conjugate axis $2\sqrt{3}$, is

(a) 2 (b) 3 (c) $\frac{\sqrt{3}}{2}$ (d) $2\sqrt{3}$

40. The eccentricity of the hyperbola $3x^2 - 4y^2 = -12$ is

(a) $\sqrt{\frac{7}{3}}$ (b) $\frac{\sqrt{7}}{2}$ (c) $-\sqrt{\frac{7}{3}}$ (d) $-\frac{\sqrt{7}}{2}$

41. The equation $\frac{x^2}{12-k}+\frac{y^2}{8-k}=1$ represents

(a) A hyperbola if $k<8$ (b) An ellipse if $k>8$

(c) A hyperbola if $8 < k < 12$ (d) None of these

Parametric equations of Hyperbola, Special form of Hyperbola

Basic Level

42. 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) $x^2+y^2=a^2-b^2$

43. A point on the curve $\frac{x^2}{A^2}-\frac{y^2}{B^2}=1$ is **[Karnataka CET 1993; MP PET 1988]**

(a) $(A\cos\theta, B\sin\theta)$ (b) $(A\sec\theta, B\tan\theta)$ (c) $(A\cos^2\theta, B\sin^2\theta)$ (d) None of these

44. 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

45. The eccentricity of the conic represented by $x^2-y^2-4x+4y+16=0$ is

(a) 1 (b) $\sqrt{2}$ (c) 2 (d) 1/2

46. The latus rectum of the hyperbola $9x^2-16y^2-18x-32y-151=0$ is **[MP PET 1996]**

(a) $\frac{9}{4}$ (b) 9 (c) $\frac{3}{2}$ (d) $\frac{9}{2}$

47. The vertices of a hyperbola are at $(0,0)$ and $(10,0)$ and one of its foci is at $(18,0)$. The equation of the hyperbola is

(a) $\frac{x^2}{25}-\frac{y^2}{144}=1$ (b) $\frac{(x-5)^2}{25}-\frac{y^2}{144}=1$ (c) $\frac{x^2}{25}-\frac{(y-5)^2}{144}=1$ (d) $\frac{(x-5)^2}{25}-\frac{(y-5)^2}{144}=1$

48. The equations 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

49. 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

50. The eccentricity of the conic $x^2-2x-4y^2=0$ is

(a) $\frac{1}{4}$ (b) $\frac{3}{2}$ (c) $\frac{\sqrt{5}}{2}$ (d) $\frac{\sqrt{5}}{4}$

51. The equation $16x^2-3y^2-32x+12y-44=0$ represents a hyperbola

(a) The length of whose transverse axis is $4\sqrt{3}$ (b) The length of whose conjugate axis is 4

(c) Whose centre is (–1, 2) (d) Whose eccentricity is $\sqrt{\frac{19}{3}}$

52. The equation of the hyperbola whose foci are $(6,5),(-4,5)$ and eccentricity $\frac{5}{4}$ is

(a) $\frac{(x-1)^2}{16}-\frac{(y-5)^2}{9}=1$ (b) $\frac{x^2}{16}-\frac{y^2}{9}=1$ (c) $\frac{(x-1)^2}{16}-\frac{(y-5)^2}{9}=-1$ (d) None of these

53. The equation $x=\frac{e^t+e^{-t}}{2}; y=\frac{e^t-e^{-t}}{2}; t\in R$ represents **[Kerala (Engg.) 2001]**

(a) An ellipse (b) A parabola (c) A hyperbola (d) A circle

54. The vertices of the hyperbola $9x^2-16y^2-36x+96y-252=0$ are

(a) (6, 3) and (–6, 3) (b) (6, 3) and (–2, 3) (c) (–6, 3) and (–6, –3) (d) None of these

55. The curve represented by $x=a(\cosh\theta+\sinh\theta), y=b(\cosh\theta-\sinh\theta)$ is **[EAMCET 1994]**

(a) A hyperbola (b) An ellipse (c) A parabola (d) A circle

56. The foci of the hyperbola $9x^2-16y^2+18x+32y-151=0$ are

(a) (2, 3), (5, 7) (b) (4, 1), (–6, 1) (c) (0, 0), (5, 3) (d) None of these

Advance Level

57. The equations of the transverse and conjugate axes of a hyperbola respectively are $x+2y-3=0$, $2x-y+4=0$ and their respective lengths are $\sqrt{2}$ and $\frac{2}{\sqrt{3}}$. The equation of the hyperbola is

(a) $\frac{2}{5}(x+2y-3)^2-\frac{3}{5}(2x-y+4)^2=1$ (b) $\frac{2}{5}(2x-y+4)^2-\frac{3}{5}(x+2y-3)^2=1$

(c) $2(2x-y+4)^2-3(x+2y-3)^2=1$ (d) $2(x+2y-3)^2-3(2x-y+4)^2=1$

58. The points of intersection of the curves whose parametric equations are $x=t^2+1, y=2t$ and $x=2s, y=2/s$ is given by

(a) (1, –3) (b) (2, 2) (c) (–2, 4) (d) (1, 2)

59. Equation $\frac{1}{r}=\frac{1}{8}+\frac{3}{8}\cos\theta$ represents **[EAMCET 2002]**

(a) A rectangular hyperbola (b) A hyperbola (c) An ellipse (d)

Position of a Point, Intersection of a line and Hyperbola, Tangents, Director circle, Pair of

Basic Level

60. The line $y=mx+c$ touches the curve $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$, if **[Kerala (Engg.) 2002]**

(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) $a^2=b^2m^2+c^2$

61. 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 **[MP PET 2001]**

(a) $a^2l^2+b^2m^2=n^2$ (b) $a^2l^2-b^2m^2=n^2$ (c) $a^2m^2-b^2n^2=a^2l^2$ (d) None of these

62. 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 **[Karnataka CET 1999]**

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

63. 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

64. 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

65. The equation of the tangent to the hyperbola $4y^2 = x^2 - 1$ at the point (1, 0) is **[Karnataka CET 1994]**

(a) $x = 1$ (b) $y = 1$ (c) $y = 4$ (d) $x = 4$

66. The straight line $x + y = \sqrt{2}p$ will touch the hyperbola $4x^2 - 9y^2 = 36$, is **[Orissa JEE 2003]**

(a) $p^2 = 2$ (b) $p^2 = 5$ (c) $5p^2 = 2$ (d) $2p^2 = 5$

67. The equation of the tangent to the hyperbola $2x^2 - 3y^2 = 6$ which is parallel to the line $y = 3x + 4$, is **[UPSEAT 1993, 99, 2**

(a) $y = 3x + 5$ (b) $y = 3x - 5$ (c) $y = 3x + 5$ and $y = 3x - 5$ (d) None of these

68. The equation of tangents to the hyperbola $3x^2 - 4y^2 = 12$ which cuts equal intercepts from the axes, are

(a) $y + x = \pm 1$ (b) $y - x = \pm 1$ (c) $3x + 4y = \pm 1$ (d) $3x - 4y = \pm 1$

69. 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

70. The equation of a common tangent to the conics $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ and $\frac{y^2}{a^2}-\frac{x^2}{b^2}=1$, is

(a) $x + y = a^2 - b^2$ (b) $x + y = \sqrt{a^2 - b^2}$ (c) $x - y = \sqrt{a^2 - b^2}$ (d) $x + y = \sqrt{b^2 - a^2}$

71. The equation of common tangents to the parabola $y^2 = 8x$ and hyperbola $3x^2 - y^2 = 3$, is

(a) $2x \pm y + 1 = 0$ (b) $2x \pm y - 1 = 0$ (c) $x \pm 2y + 1 = 0$ (d) $x \pm 2y - 1 = 0$

72. The radius of the director circle of the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$, is **[MP PET 1999]**

(a) $a - b$ (b) $\sqrt{a-b}$ (c) $\sqrt{a^2 - b^2}$ (d) $\sqrt{a^2 + b^2}$

73. The tangents to the hyperbola $x^2 - y^2 = 3$ are parallel to the straight line $2x + y + 8 = 0$ at the following points. **[Roorkee**

(a) (2, 1) or (1, 2) (b) (2, –1) or (–2, 1) (c) (–1, –2) (d) (–2, –1)

74. The line $y = 4x + c$ touches the hyperbola $x^2 - y^2 = 1$ iff **[Kurukshetra CEE 2001]**

(a) $c = 0$ (b) $c = \pm\sqrt{2}$ (c) $c = \pm\sqrt{15}$ (d) $c = \pm\sqrt{17}$

75. The line $5x + 12y = 9$ touches the hyperbola $x^2 - 9y^2 = 9$ at the point

(a) $\left(-5, \frac{4}{3}\right)$ (b) $\left(5, -\frac{4}{3}\right)$ (c) $\left(3, -\frac{1}{2}\right)$ (d) None of these

76. The number of tangents to the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ from an external point is

(a) 2 (b) 4 (c) 6 (d) 5

77. The slope of the tangent to the hyperbola $2x^2 - 3y^2 = 6$ at (3, 2)is **[SCRA 1999]**

(a) –1 (b) 1 (c) 0 (d) 2

78. A common tangent to $9x^2 - 16y^2 = 144$ and $x^2 + y^2 = 9$ is

(a) $y=\frac{3}{\sqrt{7}}x+\frac{\pi}{\sqrt{7}}$ (b) $y=3\sqrt{\frac{2}{7}}x+\frac{15}{\sqrt{7}}$ (c) $y=2\sqrt{\frac{3}{7}}x+15\sqrt{7}$ (d) None of these

79. The product of the perpendiculars from two foci on any tangent to the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$

(a) a^2 (b) $-a^2$ (c) b^2 (d) $-b^2$

80. If the two intersecting lines intersect the hyperbola and neither of them is a tangent to it, then number of intersecting points are

[IIIT Allahabad 2001]

(a) 1 (b) 2 (c) 2, 3 or 4 (d) 2 or 3

81. The equation of a tangent parallel to $y=x$ 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) $x-y+2=0$

82. The equation of the tangent to the conic $x^2-y^2-8x+2y+11=0$ at (2, 1) is **[Karnataka CET 1993]**

(a) $x+2=0$ (b) $2x+1=0$ (c) $x-2=0$ (d) $x+y+1=0$

83. The equation of tangents to the hyperbola $x^2-4y^2=36$ which are perpendicular to the line $x-y+4=0$

(a) $y=-x+3\sqrt{3}$ (b) $y=-x-3\sqrt{3}$ (c) $y=-x\pm 2$ (d) None of these

84. The position of point (5, – 4) relative to the hyperbola $9x^2-y^2=1$

(a) Outside the hyperbola (b) Inside the hyperbola (c) On the conjugate axis(d)

Advance Level

85. If the two tangents drawn on hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ in such a way that the product of their gradients is c^2, then they intersects on the curve

(a) $y^2+b^2=c^2(x^2-a^2)$ (b) $y^2+b^2=c^2(x^2+a^2)$ (c) $ax^2+by^2=c^2$ (d) None of these

86. C the centre of the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$. The tangent at any point P on this hyperbola meets the straight lines $bx-ay=0$ and $bx+ay=0$ in the points Q and R respectively. Then $CQ.\,CR=$

(a) a^2+b^2 (b) a^2-b^2 (c) $\frac{1}{a^2}+\frac{1}{b^2}$ (d) $\frac{1}{a^2}-\frac{1}{b^2}$

87. Let $P(a\sec\theta, b\tan\theta)$ and $Q(a\sec\phi, b\tan\phi)$, where $\theta+\phi=\frac{\pi}{2}$, be two points on the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$. If (h,k) is the point of intersection of the normals at P and Q, then k is equal to **[IIT 1999; MP PET 2002]**

(a) $\frac{a^2+b^2}{a}$ (b) $-\left(\frac{a^2+b^2}{a}\right)$ (c) $\frac{a^2+b^2}{b}$ (d) $-\left(\frac{a^2+b^2}{b}\right)$

88. Let P be a point on the hyperbola $x^2-y^2=a^2$ where a is a parameter such that P is nearest to the line $y=2x$. The locus of P is

(a) $x-2y=0$ (b) $2y-x=0$ (c) $x+2y=0$ (d) $2y+x=0$

89. An ellipse has eccentricity $\frac{1}{2}$ and one focus at the point $P\left(\frac{1}{2},1\right)$. Its one directrix is the common tangent nearer to the point P, to the circle $x^2+y^2=1$ and the hyperbola $x^2-y^2=1$. The equation of the ellipse in the standard form, is **[IIT 1996]**

(a) $\frac{(x-1/3)^2}{1/9}+\frac{(y-1)^2}{1/12}=1$ (b) $\frac{(x-1/3)^2}{1/9}+\frac{(y+1)^2}{1/12}=1$

(c) $\frac{(x-1/3)^2}{1/9}-\frac{(y-1)^2}{1/12}=1$ (d) $\frac{(x-1/3)^2}{1/9}-\frac{(y+1)^2}{1/12}=1$

Normals, Co-normal points

Basic Level

90. The condition that the straight line $lx+my=n$ may be a normal to the hyperbola $b^2x^2-a^2y^2=a^2b^2$ is given by **[MP PET**

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

91. The equation of the normal to the hyperbola $\frac{x^2}{16}-\frac{y^2}{9}=1$ at (–4, 0) is **[UPSEAT 2002]**

(a) $y=0$ (b) $y=x$ (c) $x=0$ (d) $x=-y$

92. The equation of the normal at the point $(a\sec\theta, b\tan\theta)$ of the curve $b^2x^2-a^2y^2=a^2b^2$ is **[Karnataka CET 1999]**

(a) $\frac{ax}{\cos\theta}+\frac{by}{\sin\theta}=a^2+b^2$ (b) $\frac{ax}{\tan\theta}+\frac{by}{\sec\theta}=a^2+b^2$ (c) $\frac{ax}{\sec\theta}+\frac{by}{\tan\theta}=a^2+b^2$ (d) $\frac{ax}{\sec\theta}+\frac{by}{\tan\theta}=a^2-b^2$

93. The number of normals to the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ from an external point is **[EAMCET 1995]**

(a) 2 (b) 4 (c) 6 (d) 5

Chord of Contact, Equation of the Chord whose Mid point is given and Equation of Chord joining two points

Basic Level

94. The locus of the middle points of the chords of hyperbola $3x^2-2y^2+4x-6y=0$ parallel to $y=2x$ is **[EAMCET 1989]**

(a) $3x-4y=4$ (b) $3y-4x+4=0$ (c) $4x-4y=3$ (d) $3x-4y=2$

95. The equation of the chord of the hyperbola $x^2-y^2=9$ which is bisected at $(5,-3)$ is

(a) $5x+3y=9$ (b) $5x-3y=16$ (c) $5x+3y=16$ (d) $5x-3y=9$

96. If the chords of contact of tangents from two points (x_1,y_1) and (x_2,y_2) to the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ are at right angles, then $\frac{x_1x_2}{y_1y_2}$ is equal to

(a) $-\frac{a^2}{b^2}$ (b) $-\frac{b^2}{a^2}$ (c) $-\frac{b^4}{a^4}$ (d) $-\frac{a^4}{b^4}$

97. Equation of the chord of the hyperbola $25x^2-16y^2=400$ which is bisected at the point (6, 2) is

(a) $16x-75y=418$ (b) $75x-16y=418$ (c) $25x-4y=400$ (d) None of these

Advance Level

98. If $x=9$ is the chord of contact of the hyperbola $x^2-y^2=9$, then the equation of the corresponding pair of tangent is **[IIT 1999]**

(a) $9x^2-8y^2+18x-9=0$ (b) $9x^2-8y^2-18x+9=0$ (c) $9x^2-8y^2-18x-9=0$ (d) $9x^2-8y^2+18x+9=0$

99. If $(a\sec\theta, b\tan\theta)$ and $(a\sec\phi, b\tan\phi)$ are the ends of a focal chord of $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$, then $\tan\frac{\theta}{2}\tan\frac{\phi}{2}$ equals to

(a) $\frac{e-1}{e+1}$ (b) $\frac{1-e}{1+e}$ (c) $\frac{1+e}{1-e}$ (d) $\frac{e+1}{e-1}$

100. If $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ $(a>b)$ and $x^2-y^2=c^2$ cut at right angles, then

(a) $a^2+b^2=2c^2$ (b) $b^2-a^2=2c^2$ (c) $a^2-b^2=2c^2$ (d) $a^2b^2=2c^2$

101. The locus of the middle points of the chords of contact of tangents to the hyperbola $x^2-y^2=a^2$ from points on the auxiliary circle, is

(a) $a^2(x^2+y^2)=(x^2-y^2)$ (b) $a^2(x^2+y^2)=(x^2-y^2)^2$ (c) $a^2(x^2+y^2)=(x-y)^2$ (d) None of these

102. The locus of the mid points of the chords of the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$, which subtend a right angle at the origin

(a) $\left(\frac{x^2}{a^2}-\frac{y^2}{b^2}\right)^2\left(\frac{1}{a^2}-\frac{1}{b^2}\right)=\frac{x^2}{a^4}+\frac{y^2}{b^4}$ (b) $\left(\frac{x^2}{a^2}-\frac{y^2}{b^2}\right)^2\left(\frac{1}{a^2}-\frac{1}{b^2}\right)=\frac{x^2}{a^2}+\frac{y^2}{b^2}$

(c) $\left(\frac{x^2}{a^2}-\frac{y^2}{b^2}\right)\left(\frac{1}{a^2}-\frac{1}{b^2}\right)=\frac{x^2}{a^2}+\frac{y^2}{b^2}$ (d) None of these

Pole and Polar, Diameter and Conjugate diameter

Basic Level

103. The diameter of $16x^2-9y^2=144$ which is conjugate to $x=2y$ is

(a) $y=\frac{16}{9}x$ (b) $y=\frac{32}{9}x$ (c) $x=\frac{16}{9}y$ (d) $x=\frac{32}{9}y$

104. The lines $2x+3y+4=0$ and $3x-2y+5=0$ may be conjugate *w.r.t* the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$, if

(a) $a^2+b^2=\frac{10}{3}$ (b) $a^2-b^2=\frac{10}{3}$ (c) $b^2-a^2=\frac{10}{3}$ (d) None of these

105. The polars of (x_1,y_1) and (x_2,y_2) *w.r.t* $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ are perpendicular to each other if **[AMU 1998]**

(a) $\frac{x_1x_2}{y_1y_2}=-\frac{b^2}{a^4}$ (b) $\frac{x_1x_2}{y_1y_2}=-\frac{a^4}{b^4}$ (c) $x_1x_2+y_1y_2=\frac{a^2}{b^2}$ (d) $x_1x_2-y_1y_2=\frac{a^2}{b^2}$

Advance Level

106. The locus of the pole of normal chords of the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ is

(a) $a^6/x^2-b^6/y^2=(a^2+b^2)^2$ (b) $x^2/a^2-y^2/b^2=(a^2+b^2)^2$

(c) $a^2/x^2-b^2/y^2=(a^2+b^2)^2$ (d) None of these

107. The locus of the pole with respect to the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ of any tangent to the circle, whose diameter is the line joining the foci is the

(a) Ellipse (b) Hyperbola (c) Parabola (d) None of these

Asymptotes of Hyperbola

Basic Level

108. The product of the lengths of perpendicular drawn from any point on the hyperbola $x^2 - 2y^2 - 2 = 0$ to its asymptotes is **[EAMCET 2003]**

(a) $\frac{1}{2}$ (b) $\frac{2}{3}$ (c) $\frac{3}{2}$ (d) 2

109. The angle between the asymptotes of $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is equal to **[BIT Ranchi 1999]**

(a) $2\tan^{-1}\left(\frac{b}{a}\right)$ (b) $2\tan^{-1}\frac{a}{b}$ (c) $\tan^{-1}\frac{a}{b}$ (d) $\tan^{-1}\frac{b}{a}$

Advance Level

110. The product of perpendicular drawn from any point on a hyperbola to its asymptotes is **[Karnataka CET 2000]**

(a) $\frac{a^2b^2}{a^2+b^2}$ (b) $\frac{a^2+b^2}{a^2b^2}$ (c) $\frac{ab}{\sqrt{a}+\sqrt{b}}$ (d) $\frac{ab}{a^2+b^2}$

111. From any point on the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ tangents are drawn to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 2$. The area cut-off by the chord of contact on the asymptotes is equal to

(a) $\frac{ab}{2}$ (b) ab (c) $2ab$ (d) $4ab$

112. The equation of the hyperbola whose asymptotes are the straight lines $3x - 4y + 7 = 0$ and $4x + 3y + 1 = 0$ and which passes through origin is

(a) $(3x - 4y + 7)(4x + 3y + 1) = 0$ (b) $12x^2 - 7xy - 12y^2 + 31x + 17y = 0$

(c) $12x^2 - 7xy + 2y^2 = 0$ (d) None of these

113. The equation of the asymptotes of the hyperbola $2x^2 + 5xy + 2y^2 - 11x - 7y - 4 = 0$ are

(a) $2x^2 + 5xy + 2y^2 - 11x - 7y - 5 = 0$ (b) $2x^2 + 4xy + 2y^2 - 7x - 11y + 5 = 0$

(c) $2x^2 + 5xy + 2y^2 - 11x - 7y + 5 = 0$ (d) None of these

Rectangular Hyperbola

Basic Level

114. Eccentricity of the curve $x^2 - y^2 = a^2$ is **[UPSEAT 2002]**

(a) 2 (b) $\sqrt{2}$ (c) 4 (d) None of these

115. The eccentricity of curve $x^2 - y^2 = 1$ is **[MP PET 1995]**

(a) $\frac{1}{2}$ (b) $\frac{1}{\sqrt{2}}$ (c) 2 (d) $\sqrt{2}$

116. The eccentricity of the hyperbola $x^2 - y^2 = 25$ is **[MP PET 1987]**

(a) $\sqrt{2}$ (b) $\frac{1}{\sqrt{2}}$ (c) 2 (d) $1+\sqrt{2}$

117. If transverse and conjugate axes of a hyperbola are equal, then its eccentricity is **[MP PET 2003]**

(a) $\sqrt{3}$ (b) $\sqrt{2}$ (c) $\frac{1}{\sqrt{2}}$ (d) 2

118. The eccentricity of the hyperbola $\frac{\sqrt{1999}}{3}(x^2-y^2)=1$ is **[Karnataka CET 1999]**

(a) $\sqrt{3}$ (b) $\sqrt{2}$ (c) 2 (d) $2\sqrt{2}$

119. Eccentricity of the rectangular hyperbola $\int_0^1 e^x\left(\frac{1}{x}-\frac{1}{x^3}\right)dx$ is **[UPSEAT 2002]**

(a) 2 (b) $\sqrt{2}$ (c) 1 (d) $\frac{1}{\sqrt{2}}$

120. The reciprocal of the eccentricity of rectangular hyperbola, is **[MP PET 1994]**

(a) 2 (b) $\frac{1}{2}$ (c) $\sqrt{2}$ (d) $\frac{1}{\sqrt{2}}$

121. The locus of the point of intersection of the 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

122. Curve $xy=c^2$ is said to be

(a) Parabola (b) Rectangular hyperbola (c) Hyperbola (d) Ellipse

123. What is the slope of the tangent line drawn to the hyperbola $xy=a(a\neq 0)$ at the point $(a,1)$ **[AMU 2000]**

(a) $\frac{1}{a}$ (b) $\frac{-1}{a}$ (c) a (d) $-a$

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

(a) $(\pm c,+c)$ (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

125. 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 coordinate 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

126. A rectangular hyperbola is one in which

(a) The two axes are rectangular (b) The two axes are equal

(c) The asymptotes are perpendicular (d) The two branches are perpendicular

127. If e and e_1 are the eccentricities of the hyperbolas $xy=c^2$ and $x^2-y^2=c^2$, then $e^2+e_1^2$ is equal to **[EAMCET 1995; UPSE**

(a) 1 (b) 4 (c) 6 (d) 8

128. If the line $ax+by+c=0$ is a normal to the curve $xy=1$, then

(a) $a>0, b>0$ (b) $a>0, b<0$ or $a<0, b>0$ (c) $a<0, b<0$ (d) None of these

129. The number of normals that can be drawn from any point to the rectangular hyperbola $xy=c^2$ is

(a) 1 (b) 2 (c) 3 (d) 4

130. The equation of the chord joining two points (x_1,y_1) and (x_2,y_2) on the rectangular hyperbola $xy=c^2$ is

(a) $\frac{x}{x_1+x_2}+\frac{y}{y_1+y_2}=1$ (b) $\frac{x}{x_1-x_2}+\frac{y}{y_1-y_2}=1$ (c) $\frac{x}{y_1+y_2}+\frac{y}{x_1+x_2}=1$ (d) $\frac{x}{y_1-y_2}+\frac{y}{x_1-x_2}=1$

131. If a triangle is inscribed in a rectangular hyperbola, its orthocentre lies

(a) Inside the curve (b) Outside the curve (c) On the curve (d) None of these

Advance Level

132. The equation of the common tangent to the curves $y^2 = 8x$ and $xy = -1$ is **[IIT Screening 2002]**

(a) $3y = 9x + 2$ (b) $y = 2x + 1$ (c) $2y = x + 8$ (d) $y = x + 2$

133. A rectangular hyperbola whose centre is C is cut by any circle of radius r in four points P,Q, R and S, then $CP^2 + CQ^2 + CR^2 + CS^2 =$

(a) r^2 (b) $2r^2$ (c) $3r^2$ (d) $4r^2$

134. If $P(x_1, y_1), Q(x_2, y_2) R(x_3, y_3)$ and $S(x_4, y_4)$ are four concyclic points on the rectangular hyperbola $xy = c^2$, the coordinates of orthocentre of the ΔPQR are

(a) $(x_4, -y_4)$ (b) (x_4, y_4) (c) $(-x_4, -y_4)$ (d) $(-x_4, y_4)$

135. If a circle cuts the rectangular hyperbola $xy = 1$ in the points (x_r, y_r) where $r = 1,2,3,4$ then

(a) $x_1 x_2 x_3 x_4 = 2$ (b) $x_1 x_2 x_3 x_4 = 1$ (c) $x_1 + x_2 + x_3 + x_4 = 0$ (d) $y_1 + y_2 + y_3 + y_4 = 0$

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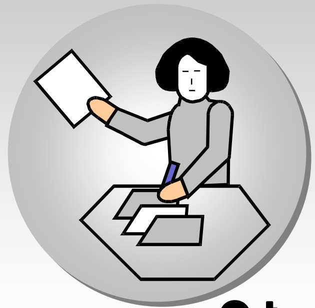

Answer Sheet

Conic Section : Hyperbola *Assignment (Basic and Advance level)*

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
c	d	d	a	c	c	d	b	d	b	c	a	d	a	b	a	d	a	a	a
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
a	b	c	c	c	c	b	a	a	b	a	b	c	a,d	a	d	c	a	a	a
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
c	a	b	d	b	d	b	c	a	c	d	a	c	b	a	b	b	b	b	b
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
b	b	b	c	a	d	c	b	a	b	a	c	b	c	b	a	b	b	c	c
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
a	c	a,b	a	a	a	d	a,b	a	a	a	c	b	a	c	d	b	b	b	c
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
b	a	b	a	b	a	a	b	a	a	d	b	c	b	d	a	b	b	b	d
121	122	123	124	125	126	127	128	129	130	131	132	133	134	135					
c	b	b	b	b	a,b,c	b	b	d	a	c	d	d	d	b					