Assignment

Equation of Pair of Straight lines

Basic Level

1. The values of h for which the equation $3x^2 + 2hxy - 3y^2 - 40x + 30y - 75 = 0$ represents a pair of straight lines, are **[MP PE**

(a) 4, 4 (b) 4, 6 (c) 4, –4 (d) 0, 4

2. Which of the following second degree equation represents a pair of straight lines **[MP PET 1990]**

(a) $x^2 - xy - y^2 = 1$ (b) $-x^2 + xy - y^2 = 1$ (c) $4x^2 - 4xy + y^2 = 4$ (d) $x^2 + y^2 = 4$

3. The equation $2y^2 - xy - x^2 + 6x - 8 = 0$ represents **[MP PET 1992]**

(a) A pair of straight lines (b) A circle (c) An ellipse (d)

4. One of the lines represented by the equation $x^2 + 6xy = 0$ is

(a) Parallel to x-axis (b) Parallel to y-axis (c) x-axis (d) y-axis

5. The equation $x^2 - 7xy + 12y^2 = 0$ represents a **[Ranchi BIT 1991]**

(a) Circle (b) Pair of parallel straight lines

(c) Pair of perpendicular straight lines (d) Pair of non-perpendicular intersecting straight lines

6. The equation $y^2 - x^2 + 2x - 1 = 0$ represents **[MNR 1991]**

(a) A pair of straight lines (b) A circle (c) A parabola (d)

7. If the equation $\lambda x^2 + 2y^2 - 5xy + 5x - 7y + 3 = 0$ represents two straight lines, then the value of λ will be

(a) 3 (b) 2 (c) 8 (d) – 8

8. The joint equation of the straight lines $x + y = 1$ and $x - y = 4$ is

(a) $x^2 - y^2 = -4$ (b) $x^2 - y^2 = 4$ (c) $(x + y - 1)(x - y - 4) = 0$ (d) $(x + y + 1)(x - y + 4) = 0$

9. The value of λ for which the equation $x^2 - \lambda xy + 2y^2 + 3x - 5y + 2 = 0$ may represent a pair of straight lines is **[Kurukshetra CEE 1996]**

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

10. $2x^2 + 7xy + 3y^2 + 8x + 14y + \lambda = 0$ will represent a pair of straight lines, when λ = **[MP PET 1996]**

(a) 2 (b) 4 (c) 6 (d) 8

11. If $Lx^2 - 10xy + 12y^2 + 5x - 16y - 3 = 0$ represents a pair of straight line, then L is **[MP PET 2001]**

(a) 1 (b) 2 (c) 3 (d) –1

12. Separate equations of lines, for a pair of lines, whose equation is $x^2 + xy - 12y^2 = 0$, are

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

(c) $x - 6y = 0$ and $x - 3y = 0$ (d) $x + 4y = 0$ and $x - 3y = 0$

13. If the equation $2x^2 + 7xy + 3y^2 - 9x - 7y + k = 0$ represents a pair of lines, then k is equal to

(a) 4 (b) 2 (c) 1 (d) – 4

14. If equation $3x^2 + xy - y^2 - 3x + 6y + k = 0$ represents a pair of lines, then k is equal to **[Karnataka CET 2002]**

(a) 9 (b) 1 (c) 0 (d) – 9

15. Equation $3x^2+7xy+2y^2+5x+3y+2=0$ represents **[UPSEAT 2002]**

(a) Pair of straight lines (b) Ellipse (c) Hyperbola (d) None of these

16. For what value of 'p' , $y^2+xy+px^2-x-2y=0$ represents two straight lines **[UPSEAT 2002]**

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

17. If $6x^2+11xy-10y^2+x+31y+k=0$ represents a pair of straight lines, then k = **[MP PET 1991]**

(a) –15 (b) 6 (c) –10 (d) –4

18. If the equation $x^2+y^2+2gx+2fy+1=0$ represents a pair of lines, then **[Karnataka CET 1999]**

(a) $g^2-f^2=1$ (b) $f^2-g^2=1$ (c) $g^2+f^2=1$ (d) $f^2+g^2=1/2$

19. The equation $x^2+kxy+y^2-5x-7y+6=0$ represents a pair of straight lines, then k is

(a) $\frac{5}{3}$ (b) $\frac{10}{3}$ (c) $\frac{3}{2}$ (d) $\frac{3}{10}$

20. The equation $2x^2+4xy-ky^2+4x+2y-1=0$ represents a pair of lines. The value of k is

(a) $-\frac{5}{3}$ (b) $\frac{5}{3}$ (c) $\frac{1}{3}$ (d) $-\frac{1}{3}$

21. The equation $4x^2-24xy+11y^2=0$ represents **[Orissa JEE 2003]**

(a) Two parallel lines (b) Two perpendicular lines (c) Two lines through the origin (d) A circle

22. The value of k so that the equation $2x^2+5xy+3y^2+6x+7y+k=0$ represents a pair of straight lines, is

(a) 4 (b) 6 (c) 0 (d) 8

23. The equation to the pair of straight lines through the origin which are perpendicular to the lines $2x^2-5xy+y^2=0$, is **[MP PET 1990]**

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

24. The equation $xy+a^2=a(x+y)$ represents **[MP PET 1991]**

(a) A parabola (b) A pair of straight lines (c) An ellipse (d) Two parallel straight lines

25. If the equation $Ax^2+2Bxy+Cy^2+Dx+Ey+F=0$ represents a pair of straight lines, then B^2-AC

(a) < 0 (b) = 0 (c) > 0 (d) None of these

26. The equation of pair of straight lines perpendicular to the pair $ax^2+2hxy+by^2=0$ is **[MP PET 1989]**

(a) $ax^2-2hxy+by^2=0$ (b) $bx^2+2hxy+ay^2=0$ (c) $ay^2-2hxy+bx^2=0$ (d) $ay^2-bx^2=0$

27. If the equation $ax^2+2hxy+by^2=0$ represents two lines $y=m_1x$ and $y=m_2x$, then **[Kurukshetra CEE 1993; MP PET 1988]**

(a) $m_1+m_2=\frac{-2h}{b}$ and $m_1m_2=\frac{a}{b}$ (b) $m_1+m_2=\frac{2h}{b}$ and $m_1m_2=\frac{-a}{b}$

(c) $m_1+m_2=\frac{2h}{b}$ and $m_1m_2=\frac{a}{b}$ (d) $m_1+m_2=\frac{2h}{b}$ and $m_1m_2=-ab$

28. Difference of slopes of the lines represented by equation $x^2(\sec^2\theta-\sin^2\theta)-2xy\tan\theta+y^2\sin^2\theta=0$ is

(a) 4 (b) 3 (c) 2 (d) None of these

29. If the ratio of gradients of the lines represented by $ax^2+2hxy+by^2=0$ is 1 : 3, then the value of the ratio $h^2:ab$ is **[MP PET 1998]**

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

30. If the sum of slopes of the pair of lines represented by $4x^2+2hxy-7y^2=0$ is equal to the product of the slopes, then the value of h is

(a) –6 (b) –2 (c) –4 (d) 4

31. The gradient of one of the lines of $ax^2+2hxy+by^2=0$ is twice that of the other, then **[MP PET 2000]**

(a) $h^2 = ab$ (b) $h = a + b$ (c) $8h^2 = 9ab$ (d) $9h^2 = 8ab$

32. If the slope of one line of the pair of lines represented by $ax^2 + 4xy + y^2 = 0$ is 3 times the slope of the other line, then a is **[DCE 1999]**

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

33. If the slope of one of the lines given by $ax^2 + 2hxy + by^2 = 0$ is 5 times the other, then

(a) $5h^2 = ab$ (b) $5h^2 = 9ab$ (c) $9h^2 = 5ab$ (d) $h^2 = ab$

34. The value of k such that $3x^2 - 11xy + 10y^2 - 7x + 13y + k = 0$ may represent a pair of straight lines, is

(a) 3 (b) 4 (c) 6 (d) 8

35. If $x^2 - kxy + y^2 + 2y + 2 = 0$ denotes a pair of straight lines, then k =

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

36. The equation $4x^2 + mxy - 3y^2 = 0$ represents a pair of real and distinct lines if

(a) $m \in R$ (b) $m \in (3,4)$ (c) $m \in (-3,4)$ (d) $m > 4$

37. Lines represented by $9x^2 + y^2 + 6xy - 4 = 0$ are **[EAMCET 1988]**

(a) Coincident (b) Parallel but not coincident (c) Not parallel (d) Perpendicular

38. If $kx^2 + 10xy + 3y^2 - 15x - 21y + 18 = 0$ represents a pair of straight lines, then k = **[Kurukshetra CEE 1982]**

(a) 3 (b) 4 (c) −3 (d) None of these

39. Equation of pair of straight lines drawn through (1, 1) and perpendicular to the pair of lines $3x^2 - 7xy - 2y^2 = 0$ is **[Roorkee 1984: MNR 1988]**

(a) $2x^2 + 7xy - 11x + 6 = 0$ (b) $2(x-1)^2 + 7(x-1)(y-1) - 3y^2 = 0$

(c) $2(x-1)^2 + 7(x-1)(y-1) + 3(y-1)^2 = 0$ (d) None of these

40. If the lines represented by the equation $2x^2 - 3xy + y^2 = 0$ make angles α and β with x-axis, then $\cot^2\alpha + \cot^2\beta$ =

(a) 0 (b) $\frac{3}{2}$ (c) $\frac{7}{4}$ (d) $\frac{5}{4}$

41. If one of the lines given by $6x^2 - xy + 4cy^2 = 0$ is $3x + 4y = 0$, then c equals **[AIEEE 2004]**

(a) −3 (b) −1 (c) 3 (d) 1

42. If $ax^2 - y^2 + 4x - y = 0$ represents a pair of lines, then a = **[Karnataka CET 2004]**

(a) −16 (b) 16 (c) 4 (d) − 4

43. The value of λ, for which the equation $x^2 - y^2 - x + \lambda y - 2 = 0$ represent a pair of straight lines, are

(a) 3, −3 (b) −3, 1 (c) 3, 1 (d) −1, 1

Advance Level

44. The equation $\sqrt{(x-2)^2 + y^2} + \sqrt{(x+2)^2 + y^2} = 4$ represents a

(a) Circle (b) Pair of straight lines (c) Parabola (d) Ellipse

45. The locus of the point $P(x, y)$ satisfying the relation $\sqrt{(x-3)^2 + (y-1)^2} + \sqrt{(x+3)^2 + (y-1)^2} = 6$ is a

(a) Straight line (b) Pair of straight lines (c) Circle (d) Ellipse

46. If the equation $12x^2 + 7xy - py^2 - 18x + qy + 6 = 0$ represents a pair of perpendicular straight lines, then

(a) $p = 12,\ q = 1$ (b) $p = 1, q = 12$ (c) $p = -1, q = 12$ (d) $p = 1, q = -12$

47. The equation of the pair of straight lines parallel to x-axis and touching the circle $x^2 + y^2 - 6x - 4y - 12 = 0$ is **[Kerala (En**

(a) $y^2-4y-21=0$ (b) $y^2+4y-21=0$ (c) $y^2-4y+21=0$ (d) $y^2+4y+21=0$

48. Two pairs of straight lines have the equations $y^2+xy-12x^2=0$ and $ax^2+2hxy+by^2=0$. One line will be common among them if

(a) $a=-3(2h+3b)$ (b) $a=8(h-2b)$ (c) $a=2(b+h)$ (d) $a=-3(b+h)$

49. If $u\equiv a_1x+b_1y+c_1=0$, $v\equiv a_2x+b_2y+c_2=0$ and $\frac{a_1}{a_2}=\frac{b_1}{b_2}=\frac{c_1}{c_2}$, then curve $u+kv=0$ is **[MNR 1987]**

(a) A line represented by u (b) A different line (c) Not a line (d)

50. If one of the line represented by the equation $ax^2+2hxy+by^2=0$ is coincident with one of the line represented by $a'x^2+2h'xy+b'y^2=0$, then

(a) $(ab'-a'b)^2=4(ah'-a'h)(hb'-h'b)$ (b) $(ab'+a'b)^2=4(ah'-a'h)(hb'-h'b)$

(c) $(ab'-a'b)^2=(ah'-a'h)(hb'-h'b)$ (d) None of these

Angle between the Pair of Lines

Basic Level

51. The angle between the lines represented by the equation $ax^2+2hxy+by^2=0$ is given by

(a) $\tan\theta=\frac{2(h^2-ab)}{(a+b)}$ (b) $\tan\theta=\frac{2\sqrt{(h^2-ab)}}{(a+b)}$ (c) $\tan\theta=\frac{2(h^2-ab)}{\sqrt{a+b}}$ (d) $\tan\theta=\frac{2\sqrt{h^2+ab}}{(a+b)}$

52. The angle between the pair of straight lines $x^2-y^2-2y-1=0$, is

(a) 90^o (b) 60^o (c) 75^o (d) 36^o

53. If the angle 2θ is acute, then the acute angle between $x^2(\cos\theta-\sin\theta)+2xy\cos\theta+y^2(\cos\theta+\sin\theta)=0$ is **[EAMCET 2002]**

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

54. The angle between the pair of lines $2x^2+5xy+2y^2+3x+3y+1=0$ is **[EAMCET 1994]**

(a) $\cos^{-1}\left(\frac{4}{5}\right)$ (b) $\tan^{-1}\left(\frac{4}{5}\right)$ (c) 0 (d) $\frac{\pi}{2}$

55. The equation $x^2-3xy+\lambda y^2+3x-5y+2=0$ when λ is a real number, represents a pair of straight lines. If θ is the angle between the lines, then $\text{cosec}^2\theta$ =

(a) 3 (b) 9 (c) 10 (d) 100

56. The equation $12x^2+7xy+ay^2+13x-y+3=0$ represents a pair of perpendicular lines. Then the value of 'a' is **[Karnataka CET**

(a) $\frac{7}{2}$ (b) –19 (c) –12 (d) 12

57. The angle between the lines $x^2+4xy+y^2=0$ is **[Karnataka CET 2001]**

(a) 60^o (b) 15^o (c) 30^o (d) 45^o

58. If the angle between the two lines represented by $2x^2+5xy+3y^2+6x+7y+4=0$ is $\tan^{-1}m$, then $m=$ **[MNR 1993]**

(a) $\frac{1}{5}$ (b) 1 (c) $\frac{7}{5}$ (d) 7

59. Pair of straight lines perpendicular to each other represented by

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

60. The angle between the pair of straight lines $x^2+4y^2-7xy=0$, is

[MNR 1983; Kurukshetra CEE 1999]

(a) $\tan^{-1}\left(\frac{1}{3}\right)$ (b) $\tan^{-1}(3)$ (c) $\tan^{-1}\left(\frac{\sqrt{33}}{5}\right)$ (d) $\tan^{-1}\left(\frac{5}{\sqrt{33}}\right)$

61. The angle between the pair of straight lines $y^2\sin^2\theta - xy\sin^2\theta + x^2(\cos^2\theta - 1) = 1$, is **[MNR 1985; UPSEAT 2000]**

(a) $\frac{\pi}{3}$ (b) $\frac{\pi}{4}$ (c) $\frac{2\pi}{3}$ (d) None of these

62. The angle between the pair of lines given by equation $x^2 + 2xy - y^2 = 0$, is **[MNR 1990]**

(a) $\frac{\pi}{3}$ (b) $\frac{\pi}{6}$ (c) $\frac{\pi}{2}$ (d) 0

63. Acute angle between the lines represented by $(x^2 + y^2)\sqrt{3} = 4xy$ is

(a) $\pi/6$ (b) $\pi/4$ (c) $\pi/3$ (d) None of these

64. The angle between the lines given by $x^2 - y^2 = 0$ is **[MP PET 1999]**

(a) 15^o (b) 45^o (c) 75^o (d) 90^o

65. The angle between the lines $xy = 0$ is **[MP PET 1990, 92]**

(a) 45^o (b) 60^o (c) 90^o (d) 180^o

66. The angle between the lines represented by the equation $4x^2 - 24xy + 11y^2 = 0$ are

(a) $\tan^{-1}\left(\frac{3}{4}\right), \tan^{-1}\left(-\frac{3}{4}\right)$ (b) $\tan^{-1}\left(\frac{1}{3}\right), \tan^{-1}\left(\frac{-1}{3}\right)$ (c) $\tan^{-1}\left(\frac{4}{3}\right), \tan^{-1}\left(-\frac{4}{3}\right)$ (d) $\tan^{-1}\left(\frac{1}{2}\right), \tan^{-1}\left(-\frac{1}{2}\right)$

67. Condition that the two lines represented by the equation $ax^2 + 2hxy + by^2 = 0$ to be perpendicular is **[Kurukshetra CEE 1998; MP PET 2001]**

(a) $ab = -1$ (b) $a = -b$ (c) $a = b$ (d) $ab = 1$

68. The straight lines represented by the equation $9x^2 - 12xy + 4y^2 = 0$ are

(a) Coincident (b) Perpendicular (c) Parallel (d) Inclined at an angle of 45^o

69. The nature of straight lines represented by the equation $4x^2 + 12xy + 9y^2 = 0$ is **[MP PET 1988]**

(a) Real and coincident (b) Real and different (c) Imaginary and different (d) None of these

70. The equation $x^2 + ky^2 + 4xy = 0$ represents two coincident lines, if k =

(a) 0 (b) 1 (c) 4 (d) 16

71. The straight lines joining the origin to the points of intersection of the line $2x + y = 1$ and curve $3x^2 + 4xy - 4x + 1 = 0$ include an angle

(a) $\frac{\pi}{2}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{4}$ (d) $\frac{\pi}{6}$

72. If the acute angles between the pairs of lines $3x^2 - 7xy + 4y^2 = 0$ and $6x^2 - 5xy + y^2 = 0$ be θ_1 and θ_2 respectively, then

(a) $\theta_1 = \theta_2$ (b) $\theta_1 = 2\theta_2$ (c) $2\theta_1 = \theta_2$ (d) None of these

73. The point of lines represented by $3ax^2 + 5xy + (a^2 - 2)y^2 = 0$ and perpendicular to each other for

(a) Two values of *a* (b) For all values of *a* (c) For one value of *a* (d) For no values of *a*

Advance Level

74. The figure formed by the lines $x^2 + 4xy + y^2 = 0$ and $x - y = 4$, is

(a) A right angled triangle (b) An isosceles triangle (c) An equilateral triangle (d)

75. The equation of the pair of straight lines, each of which makes an angle α with the line $y = x$, is

(a) $x^2 + 2xy\sec 2\alpha + y^2 = 0$ (b) $x^2 + 2xy\,\text{cosec}\,2\alpha + y^2 = 0$

(c) $x^2 - 2xy\,\text{cosec}\,2\alpha + y^2 = 0$ (d) $x^2 - 2xy\sec 2\alpha + y^2 = 0$

76. The combined equation of the lines l_1, l_2 is $2x^2 + 6xy + y^2 = 0$ and that of the lines m_1, m_2 is $4x^2 + 18xy + y^2 = 0$. If the angle between l_1 and m_2 be α then the angle between l_2 and m_1 will be

(a) $\frac{\pi}{2} - \alpha$ (b) 2α (c) $\frac{\pi}{4} + \alpha$ (d) α

77. If θ_1 and θ_2 are the angles which the lines $x^2(\tan^2\theta + \cos^2\theta) - 2xy\ \tan\theta + y^2\sin^2\theta = 0$ make with the axis of **x**, then $\tan\theta_1 - \tan\theta_2$ is equal to

(a) $\cos 2\theta$ (b) $2\cos\theta\sin\theta$ (c) 2 (d) 1

Bisectors of the Angles between the Lines

Basic Level

78. The combined equation of bisectors of angles between coordinate axes, is

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

79. The equation of the bisectors of the angle between the lines represented by the equation $x^2 - y^2 = 0$, is

(a) $x = 0$ (b) $y = 0$ (c) $xy = 0$ (d) None of these

80. If $y = mx$ be one of the bisectors of the angle between the lines $ax^2 - 2hxy + by^2 = 0$, then

(a) $h(1+m^2) + m(a-b) = 0$ (b) $h(1-m^2) + m(a+b) = 0$ (c) $h(1-m^2) + m(a-b) = 0$ (d) $h(1+m^2) + m(a+b) = 0$

81. The combined equation of the bisectors of the angle between the lines represented by $(x^2 + y^2)\sqrt{3} = 4xy$ is **[MP PET 1992**

(a) $y^2 - x^2 = 0$ (b) $xy = 0$ (c) $x^2 + y^2 = 2xy$ (d) $\frac{x^2 - y^2}{\sqrt{3}} = \frac{xy}{2}$

82. One bisector of the angle between the lines given by $a(x-1)^2 + 2h(x-1)y + by^2 = 0$ is $2x + y - 2 = 0$. The other bisector is

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

Advance Level

83. If the equation $ax^2 + 2hxy + by^2 = 0$ has the one line as the bisector of angle between the coordinate axes, then **[Bihar CEE 1990; Roorkee 1992]**

(a) $(a-b)^2 = h^2$ (b) $(a+b)^2 = h^2$ (c) $(a-b)^2 = 4h^2$ (d) $(a+b)^2 = 4h^2$

84. If the bisectors of the angles between the pairs of lines given by the equation $ax^2 + 2hxy + by^2 = 0$ and $ax^2 + 2hxy + by^2 + \lambda(x^2 + y^2) = 0$ be coincident, then $\lambda =$

(a) *a* (b) *b* (c) *h* (d) Any real number

85. If the bisectors of the angles of the lines represented by $3x^2 - 4xy + 5y^2 = 0$ and $5x^2 + 4xy + 3y^2 = 0$ are same, then the angle made by the lines represented by first with the second, is

(a) 30^o (b) 60^o (c) 45^o (d) 90^o

86. If pairs of straight lines $x^2 - 2mxy - y^2 = 0$ and $x^2 - 2nxy - y^2 = 0$ be such that each pair bisects the angle between the other pair, then $mn =$ **[MP PET 1991;UPSEAT 2001]**

(a) 1 (b) –1 (c) 0 (d) $-\frac{1}{2}$

87. If the lines represented by $x^2 - 2pxy - y^2 = 0$ are rotated about the origin through an angle θ, one in clockwise direction and other in anti –clockwise direction , then the equation of the bisectors of the angle between the lines in the new position is

(a) $px^2 + 2xy - py^2 = 0$ (b) $px^2 + 2xy + py^2 = 0$ (c) $x^2 - 2pxy + y^2 = 0$ (d) None of these

88. If $r(1-m^2)+m(p-q)=0,$ then a bisector of the angle between the lines represented by the equation $px^2 - 2rxy + qy^2 = 0$ is

(a) $y = x$ (b) $y = -x$ (c) $y = mx$ (d) $my = x$

Point of intersection of the Lines

Basic Level

89. If the pair of lines $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ intersect on the *y*-axis, then **[AIEEE 2002]**

(a) $2fgh = bg^2 + ch^2$ (b) $bg^2 \neq ch^2$ (c) $abc = 2fgh$ (d) None of these

90. The point of intersection of the lines represented by equation $2(x+2)^2 + 3(x+2)(y-2) - 2(y-2)^2 = 0$ is

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

Advance Level

91. The equations to a pair of opposite sides of a parallelogram are $x^2 - 5x + 6 = 0$ and $y^2 - 6y + 5 = 0$. The equations to its diagonals are

(a) $x + 4y = 13$ and $y = 4x - 7$ (b) $4x + y = 13$ and $4y = x - 7$

(c) $4x + y = 13$ and $y = 4x - 7$ (d) $y - 4x = 13$ and $y + 4x = 7$

92. The circumcentre of the triangle formed by the lines $xy + 2x + 2y + 4 = 0$ and $x + y + 2 = 0$ is

(a) $(0, 0)$ (b) $(-2, -2)$ (c) $(-1, -1)$ (d) $(-1, -2)$

93. If the equations of opposite sides of a parallelogram are $x^2 - 7x + 6 = 0$ and $y^2 - 14y + 40 = 0,$ then the equation of its one diagonal is

(a) $6x + 5y + 14 = 0$ (b) $6x - 5y + 14 = 0$ (c) $5x + 6y + 14 = 0$ (d) $5x - 6y + 14 = 0$

94. The limiting position of the point of intersection of the straight lines $3x + 5y = 1$ and $(2 + c)x + 5c^2 y = 1$ as $c \to 1$ is

(a) $\left(\frac{2}{5}, \frac{-1}{25}\right)$ (b) $\left(\frac{1}{2}, -\frac{1}{10}\right)$ (c) $\left(\frac{3}{8}, \frac{-1}{40}\right)$ (d) None of these

95. If two sides of a triangle are represented by $x^2 - 7xy + 6y^2 = 0$ and the centroid is (1, 0), then the equation of third side is

(a) $2x + 7y + 3 = 0$ (b) $2x - 7y + 3 = 0$ (c) $2x + 7y - 3 = 0$ (d) $2x - 7y - 3 = 0$

96. If the lines $ax^2 + 2hxy + by^2 = 0$ represents the adjacent sides of a parallelogram, then the equation of second diagonal if one is $lx + my = 1$, will be

(a) $(am + hl)x = (bl + hm)y$ (b) $(am - hl)x = (bl - hm)y$ (c) $(am - hl)x = (bl + hm)y$ (d) None of these

Equation of lines joining the origin to the point of intersection of a curve and a Line, Distance between the

Basic Level

97. The lines joining the origin to the points of intersection of the line $3x-2y=1$ and the curve $3x^2+5xy-3y^2+2x+3y=0$, are

(a) Parallel to each other (b) Perpendicular to each other

(c) Inclined at 45^o to each other (d) None of these

98. The distance between the parallel lines $9x^2-6xy+y^2+18x-6y+8=0$ is **[EAMCET 1994]**

(a) $\frac{1}{\sqrt{10}}$ (b) $\frac{2}{\sqrt{10}}$ (c) $\frac{4}{\sqrt{10}}$ (d) $\sqrt{10}$

99. The equation $8x^2+8xy+2y^2+26x+13y+15=0$ represents a pair of straight lines. The distance between them is **[UPSEAT 2001]**

(a) $\frac{7}{\sqrt{5}}$ (b) $\frac{7}{2\sqrt{5}}$ (c) $\frac{\sqrt{7}}{5}$ (d) None of these

100. The equation of second degree $x^2+2\sqrt{2}xy+2y^2+4x+4\sqrt{2}y+1=0$ represents a pair of straight lines. The distance between them is

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

101. If the straight lines joining origin to the points of intersections of the line $x+y=1$ with the curve $x^2+y^2+x-2y-m=0$ are perpendicular to each other, then the value of *m* should be

(a) 0 (b) 1/2 (c) 1 (d) – 1

102. The lines joining the points of intersection of the curve $(x-h)^2+(y-k)^2-c^2=0$ and the line $kx+hy=2hk$ to the origin are perpendicular, then

(a) $c=h\pm k$ (b) $c^2=h^2+k^2$ (c) $c^2=(h+k)^2$ (d) $4c^2=h^2+k^2$

103. The equation of pair of lines joining origin to the points of intersection of $x^2+y^2=9$ and $x+y=3$ is

(a) $(x+y)^2=9$ (b) $x^2+(3-x)^2=9$ (c) $xy=0$ (d) $(3-x)^2+y^2=9$

104. The acute angle formed between the lines joining the origin to the points of intersection of the curves $x^2+y^2-2x-1=0$ and $x+y=1$, is

(a) $\tan^{-1}\left(-\frac{1}{2}\right)$ (b) $\tan^{-1}(2)$ (c) $\tan^{-1}\left(\frac{1}{2}\right)$ (d) 60^o

105. The lines joining the origin to the points of intersection of the line $y=mx+c$ and the circle $x^2+y^2=a^2$ will be mutually perpendicular, if

(a) $a^2(m^2+1)=c^2$ (b) $a^2(m^2-1)=c^2$ (c) $a^2(m^2+1)=2c^2$ (d) $a^2(m^2-1)=2c^2$

106. The angle between lines joining the origin to the points of intersection of the line $x\sqrt{3}+y=2$ and the curve $x^2+y^2=4$ is

[Roorkee 1998]

(a) $\pi/6$ (b) $\pi/4$ (c) $\pi/3$ (d) $\pi/2$

Advance Level

107. The pair of lines joining the origin to the points of intersection of the curves $ax^2+2hxy+by^2+2gx=0$ and $a'x^2+2h'xy+b'y^2+2g'x=0$ will be at right angles to one another if

(a) $g(a'+b')=g'(a+b)$ (b) $g(a+b)=g'(a'+b')$ (c) $gg'=(a+b)(a'+b')$ (d) None of these

108. The square of distance between the point of intersection of the lines represented by the equation $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ and origin, is

(a) $\frac{c(a+b) - f^2 - g^2}{ab - h^2}$ (b) $\frac{c(a-b) + f^2 + g^2}{\sqrt{ab - h^2}}$ (c) $\frac{c(a+b) - f^2 - g^2}{ab + h^2}$ (d) None of these

109. If the portion of the line $lx + my = 1$ falling inside the circle $x^2 + y^2 = a^2$ subtends an angle of 45^o at the origin, then

(a) $4[a^2(l^2 + m^2) - 1] = a^2(l^2 + m^2)$ (b) $4[a^2(l^2 + m^2) - 1] = a^2(l^2 + m^2) - 2$

(c) $4[a^2(l^2 + m^2) - 1] = [a^2(l^2 + m^2) - 2]^2$ (d) None of these

Miscellaneous problems

Basic Level

110. The product of perpendiculars drawn from the origin to the lines represented by the equation $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ will be

(a) $\frac{ab}{\sqrt{a^2 - b^2 + 4h^2}}$ (b) $\frac{bc}{\sqrt{a^2 - b^2 + 4h^2}}$ (c) $\frac{ca}{\sqrt{(a^2 + b^2) + 4h^2}}$ (d) $\frac{c}{\sqrt{(a-b)^2 + 4h^2}}$

111. A curve with equation of the form $y = ax^4 + bx^3 + cx + d$ has zero gradient at the point (0,1) and also touches the x-axis at the point (–1,0). Then the values of x for which the curve has negative gradients are

(a) $x > -1$ (b) $x < 1$ (c) $x < -1$ (d) $-1 \le x \le 1$

Advance Level

112. Two of the lines represented by the equation $ay^4 + bxy^3 + cx^2y^2 + dx^3y + ex^4 = 0$ will be perpendicular, then **[Kurukshetra CE**

(a) $(b+d)(ad+be) + (e-a)^2(a+c+e) = 0$ (b) $(b+d)(ad+be) + (e+a)^2(a+c+e) = 0$

(c) $(b-d)(ad-be) + (e-a)^2(a+c+e) = 0$ (d) $(b-d)(ad-be) + (e+a)^2(a+c+e) = 0$

113. Let PQR be a right angled isosceles triangle, right angled at $P(2,1)$. If the equation of the line QR is $2x + y = 3$, then the equation representing the pair of lines PQ and PR is

(a) $3x^2 - 3y^2 + 8xy + 20x + 10y + 25 = 0$ (b) $3x^2 - 3y^2 + 8xy - 20x - 10y + 25 = 0$

(c) $3x^2 - 3y^2 + 8xy + 10x + 15y + 20 = 0$ (d) $3x^2 - 3y^2 - 8xy - 10x - 15y - 20 = 0$

114. The area (in square units) of the quadrilateral formed by the two pairs of lines $l^2x^2 - m^2y^2 - n(lx + my) = 0$ and $l^2x^2 - m^2y^2 + n(lx - my) = 0$ is **[EAMCET 2003]**

(a) $\frac{n^2}{2|lm|}$ (b) $\frac{n^2}{|lm|}$ (c) $\frac{n}{2|lm|}$ (d) $\frac{n^2}{4|lm|}$

115. Two lines represented by the equation $x^2 - y^2 - 2x + 1 = 0$ are rotated about the point (1, 0), the line making the bigger angle with the positive direction of the x-axis being turned by 45^o in the clockwise sense and the other line being turned by 15^o in the anticlockwise sense. The combined equation of the pair of lines in their new positions is

(a) $\sqrt{3}x^2 - xy + 2\sqrt{3}x - y + \sqrt{3} = 0$ (b) $\sqrt{3}x^2 - xy - 2\sqrt{3}x + y + \sqrt{3} = 0$

(c) $\sqrt{3}x^2 - xy - 2\sqrt{3}x + \sqrt{3} = 0$ (d) None of these

116. The combined equation of three sides of a triangle is $(x^2 - y^2)(2x + 3y - 6) = 0$. If $(-2, a)$ is an interior point and $(b, 1)$ is an exterior point of the triangle, then

(a) $2 < a < \frac{10}{3}$ (b) $-2 < a < \frac{10}{3}$ (c) $-1 < b < \frac{9}{2}$ (d) $-1 < b < 1$

117. The diagonals of a square are along the pair of lines whose equation is $2x^2 - 3xy - 2y^2 = 0$. If (2, 1) is a vertex of the square, then another vertex consecutive to it can be

(a) $(1, -2)$ (b) $(1, 4)$ (c) $(-1, 2)$ (d) $(-1, -4)$

118. The equation $x^3 - 6x^2y + 11xy^2 - 6y^3 = 0$ represent three straight lines passing through the origin, the slopes of which form an

(a) A.P. (b) G.P. (c) H.P. (d) None of these

119. If P_1, P_2 denote the length of the perpendiculars from the point $(2, 3)$ on the lines given by $15x^2 + 31xy + 14y^2 = 0$ then

(a) $P_1 + P_2 = \frac{31}{14}$ (b) $|P_1 - P_2| = \frac{31}{\sqrt{74}} - \frac{12}{\sqrt{13}}$ (c) $P_1 P_2 = \frac{372}{\sqrt{962}}$ (d) $P_1 P_2 = \frac{15}{14}$

120. The equation of the locus of feet of perpendicular drawn from the origin to the line passing through a fixed point (a, b) is

(a) $x^2 + y^2 - ax - by = 0$ (b) $x^2 + y^2 + ax + by = 0$ (c) $x^2 + y^2 - 2ax - 2by = 0$ (d) None of these

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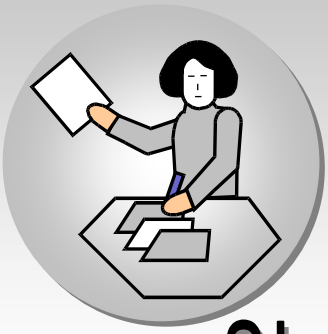

Answer Sheet

Pair of Straight Lines — *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
a	c	a	d	d	a	b	c	b	d	b	d	a	d	a	c	a	c	b	a
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
c	a	b	b	d	c	a	c	c	b	c	c	b	b	d	a	b	a	d	d
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
a	b	a	b	b	a	a	a,b	a	a	b	a	c	a	c	c	a	a	a	c
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
d	c	a	d	c	c	b	a	a	c	a	a	a	c	d	d	c	b	c	c
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
a	d	d	d	d	b	a	c	a	c	c	c	b	a	d	b	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	b	c	b	c	c	a	a	c	d	c	a	b	a	b	a,d	a,c	c	b,c	a