Multiple Choice Questions

[MHT-CET 2022]

1. The combined equation of the lines passing through the origin and making an acute angle α with the line $y = x$ is
   a) $x^2 + 2xy \sec 2\alpha + y^2 = 0$
   b) $x^2 - 2xy \tan 2\alpha + y^2 = 0$
   c) $x^2 + 2xy \tan 2\alpha + y^2 = 0$
   d) $x^2 - 2xy \sec 2\alpha + y^2 = 0$

2. If the slope of one of the two lines $\frac{x^2}{a} + \frac{2xy}{h} + \frac{y^2}{b} = 0$ is twice that of the other, then $ab : h^2 =$ .....
   a) 1 : 2
   b) 2 : 1
   c) 8 : 9
   d) 9 : 8

3. The joint equation of two lines passing through the origin and perpendicular to the lines given by $2x^2 + 5xy + 3y^2 = 0$ is
   a) $3x^2 - 5xy - 2y^2 = 0$
   b) $3x^2 + 5xy + 2y^2 = 0$
   c) $3x^2 - 5xy + 2y^2 = 0$
   d) $2x^2 - 5xy + 3y^2 = 0$

4. If the slope of one of the lines given by $ax^2 + 2hxy + by^2 = 0$ is two times the other,
   a) $8h^2 = 9ab$
   b) $8h^2 = 9ab^2$
   c) $8h = 9ab$
   d) $8h = 9ab^2$

5. The joint equation of the lines passing through the origin and trisecting the first quadrant is
   a) $x^2 - \sqrt{3}\,xy - y^2 = 0$
   b) $\sqrt{3}\,x^2 - 4xy + \sqrt{3}\,y^2 = 0$
   c) $x^2 + \sqrt{3}\,xy - y^2 = 0$
   d) $3x^2 - y^2 = 0$

6. If sum of the slopes of lines represented by $x^2 - 2xy \tan\theta - y^2 = 0$ is 4 then $\theta =$ .....
   a) $\tan^{-1}(-2)$
   b) $\tan^{-1}(2)$
   c) $\tan^{-1}(1)$
   d) $\tan^{-1}(-1)$

7. If the lines $x^2 - 4xy + y^2 = 0$ and $x + y = 10$ contain the sides of an equilateral triangle, then the area of the equilateral triangle is
   a) $\frac{5\sqrt{2}}{\sqrt{3}}$ sq. units
   b) $\frac{25}{\sqrt{3}}$ sq. units
   c) $\frac{50}{\sqrt{3}}$ sq. units
   d) $\frac{25\sqrt{2}}{\sqrt{3}}$ sq. units

8. If the slopes of the lines $kx^2 - 4xy + 5y^2 = 0$ differ by 2, then $k =$ .....
   a) $\frac{4}{5}$
   b) $\frac{-21}{5}$
   c) $\frac{21}{5}$
   d) $\frac{5}{21}$

9. The joint equation of pair of lines which bisect the angle between the lines $x^2 + 3xy + 2y^2 = 0$ is
   a) $2x^2 - 3xy - 2y^2 = 0$
   b) $2x^2 + 3xy - 2y^2 = 0$
   c) $3x^2 + 2xy - 3y^2 = 0$
   d) $3x^2 - 2xy - 3y^2 = 0$

10. If θ is an acute angle between the lines $kx^2 - 4xy + y^2 = 0$ and $\tan\theta = \frac{1}{2}$, then the value of k is
    a) 3
    b) -3
    c) 21
    d) 4

[MHT-CET 2021]

11. If the acute angle between the lines given by $ax^2 + 2hxy + by^2 = 0$ is $\frac{\pi}{4}$ then $4h^2 =$
a) $(a+2b)(a+3b)$ b) $a^2 + 4ab + b^2$ c) $a^2 + 6ab + b^2$ d) $(a-2b)(2a+b)$

12. If the equation $3x^2 - kxy - 3y^2 = 0$ represents the bisectors of angles between the lines $x^2 - 3xy - 4y^2 = 0$ then the value of k is
a) -6 b) -10 c) 6 d) 10

13. If the two lines given by $ax^2 + 2hxy + by^2 = 0$ make inclinations α and β then $\tan(\alpha + \beta)$ = ...
a) $\frac{h}{a+b}$ b) $\frac{2h}{a+b}$ c) $\frac{h}{a-b}$ d) $\frac{2h}{a-b}$

14. If $(m + 3n)(3m + n) = 4h^2$, then the acute angle between the lines represented by $mx^2 + 2hxy + ny^2 = 0$ is
a) $\frac{\pi^c}{3}$ b) $\frac{\pi^c}{6}$ c) $\tan^{-1}(3/2)$ d) $\tan^{-1}(1/2)$

15. Area of the triangle formed by the lines $y^2 - 9xy + 18x^2 = 0$ and $y = 9$ is
a) 27/3 sq. units b) 27/2 sq. units c) 27/4 sq. units d) 27 sq. units

16. If two lines represented by $ax^2 + 2hxy + by^2 = 0$ make angles α and β with positive direction of x – axis then $\tan(\alpha + \beta) =$
a) $\frac{2h}{b-a}$ b) $\frac{2h}{a-b}$ c) $\frac{h}{a+b}$ d) $\frac{2h}{a+b}$

17. If $4ab = 3h^2$, then the ratio of the slopes of the lines represented by $ax^2 + 2hxy + by^2 = 0$ is
a) $\sqrt{2} : 1$ b) 2 : 1 c) $\sqrt{3} : 1$ d) 1 : 3

18. If the lines represented by $ax^2 - bxy - y^2 = 0$ make angles α and β with the positive direction of x – axis then $\tan(\alpha + \beta) =$ ...
a) $\frac{a}{a+b}$ b) $\frac{b}{1+b}$ c) $\frac{b}{1+a}$ d) $\frac{-b}{1+a}$

19. If the angle between the lines is $\frac{\pi^c}{4}$ and slope of one of the lines is $\frac{1}{2}$, then slope of the other line is
a) 3 or $-\frac{1}{3}$ b) 4 or $-\frac{1}{4}$ c) 2 or $-\frac{1}{2}$ d) 3 or – 3

20. If one of the lines given by $kx^2 + xy - y^2 = 0$ bisects the angle between the co-ordinate axes, then the values of k are
a) 1 and 2 b) 0 and 2 c) 0 and – 2 d) – 1 and 2

[MHT-CET 2020]

21. If the equation $x^2 - 3xy + \lambda y^2 + 3x - 5y + 2 = 0$ represents a pair of lines, where λ is a real number and θ is angle between them, then value of $\text{cosec}^2\theta$ is
a) 10 b) 3 c) 9 d) 1/3

34. If sum of the slopes of the lines given by $x^2 - 4pxy + 8y^2 = 0$ is three times their product, then p = ...
a) 3 b) 4 c) $\frac{1}{4}$ d) $\frac{3}{4}$

35. If lines represented by equation $e^{\alpha}x^2 + 2hxy + e^{-\alpha}y^2 = 0$ are coincident, then h = ...
a) $e^{2\alpha}$ b) ± 2 c) ± 1 d) e^2

36. If the acute angle between the lines $ax^2 + 2hxy + by^2 = 0$ is $60°$, then $(a + 3b)(3a + b)$ =
a) $4h^2$ b) $2h^2$ c) 0 d) h^2

37. The joint equation of the pair of lines passing through A (1, 1) and which are parallel to the co-ordinate axes is
a) $x + 2xy + y = 0$ b) $x^2 - 2xy + y^2 = 0$ c) $x^2 - 2xy - 1 = 0$ d) $xy - x - y + 1 = 0$

38. If line $qx - py + r = 0$ is perpendicular to one of the lines represented by $ax^2 + 2hxy + by^2 = 0$ then
a) $ap^2 + 2hpq + bq^2 = 0$ b) $ap^2 - 2hpq - bq^2 = 0$
c) $ap^2 + 2hpq - bq^2 = 0$ d) $bp^2 - 2hpq + aq^2 = 0$

39. The joint equation of lines through the origin having slopes $1 + \sqrt{3}$ and $1 - \sqrt{3}$ is
a) $2x^2 + 2xy + y^2 = 0$ b) $2x^2 + 2xy - y^2 = 0$ c) $2x^2 + xy + y^2 = 0$ d) $x^2 + 2xy + y^2 = 0$

[MHT-CET 2018]

40. The line $5x + y - 1 = 0$ coincides with one of the lines given by $5x^2 + xy - kx - 2y + 2 = 0$, then the value of k is
a) -11 b) 31 c) 11 d) -31

41. If the slope of one of the lines given by $ax^2 + 2hxy + by^2 = 0$ is two times the other, then
a) $8h^2 = 9ab$ b) $8h^2 = 9ab^2$ c) $8h = 9ab$ d) $8h = 9ab^2$

42. The point of intersection of lines represented by $x^2 - y^2 + x + 3y - 2 = 0$ is
a) (1, 0) b) (0, 2) c) $(-\frac{1}{2}, \frac{3}{2})$ d) $(\frac{1}{2}, \frac{1}{2})$

[MHT-CET 2017]

43. O (0, 0), A (1, 2), B (3, 4) are the vertices of ΔOAB. The joint equation of the altitude and median drawn from O is
a) $x^2 + 7xy - y^2 = 0$ b) $x^2 + 7xy + y^2 = 0$
c) $3x^2 - xy - 2y^2 = 0$ d) $3x^2 + xy - 2y^2 = 0$

44. If lines represented by equation $px^2 - qy^2 = 0$ are distinct, then
a) $pq > 0$ b) $pq < 0$ c) $pq = 0$ d) $p + q = 0$

45. If slopes of lines represented by $kx^2 + 5xy + y^2 = 0$ differ by 1, then k =
a) 2 b) 3 c) 6 d) 8

[MHT-CET 2016]

46. The joint equation of lines passing through the origin and trisecting the first quadrant is
a) $x^2 + \sqrt{3}\,xy - y^2 = 0$ b) $x^2 - \sqrt{3}\,xy - y^2 = 0$
c) $\sqrt{3}\,x^2 - 4xy + \sqrt{3}\,y^2 = 0$ d) $3x^2 - y^2 = 0$

47. The joint equation of bisectors of angle between lines $x = 5$ and $y = 3$ is
a) $(x-5)(y-3)=0$ b) $x^2 - y^2 - 10x + 6y + 16 = 0$
c) $xy = 0$ d) $xy - 5x - 3y + 15 = 0$

48. Which of the following equations does not represent a pair of lines ?
a) $x^2 - x = 0$ b) $xy - x = 0$ c) $y^2 - x + 1 = 0$ d) $xy + x + y + 1 = 0$

[MHT-CET 2015] (JEE – 2015)

49. Let L be the line passing through the point P(1, 2) such that its intercepted segment between the co-ordinate axes is bisected at P. If L_1 is the line perpendicular to L and passing through the point (–2, 1) then the point of intersection of L and L_1 is
a) $\left(\frac{4}{5}, \frac{12}{5}\right)$ b) $\left(\frac{3}{5}, \frac{23}{10}\right)$ c) $\left(\frac{11}{20}, \frac{29}{10}\right)$ d) $\left(\frac{3}{10}, \frac{17}{5}\right)$

50. A straight line L through the point (3, –2) is inclined at an angle of 60° to the line $\sqrt{3}\,x + y = 1$. If L also intersects the axis, then the equation of L is
a) $y + \sqrt{3}\,x + 2 - 3\sqrt{3} = 0$ b) $\sqrt{3}\,y + x - 3 + 2\sqrt{3} = 0$
c) $y - \sqrt{3}\,x + 2 + 3\sqrt{3} = 0$ d) $\sqrt{3}\,y - x + 3 + 2\sqrt{3} = 0$

[MHT-CET 2014] (JEE – 2014)

51. If a line intercepted between the co-ordinated axes is trisected at a point A (4, 3), which is nearer to x – axis, then its equation is
a) $4x - 3y = 7$ b) $3x + 2y = 18$ c) $3x + 8y = 36$ d) $x + 3y = 13$

52. Let a, b, c and d be non – zero numbers. If the point of intersection of the lines $4ax + 2ay + c = 0$ and $5bx + 2by + d = 0$ lies in the fourth quadrant and is equidistant from the two axes, then
a) $3bc - 2ad = 0$ b) $3bc + 2ad = 0$ c) $2bc - 3ad = 0$ d) $2bc + 3ad = 0$

53. Let PS be the median of the triangle with vertices P (2, 2), Q (6, –1) and R (7, 3). The equation of line passing through (1, –1) and parallel to PS is
a) $4x + 7y + 3 = 0$ b) $2x - 9y - 11 = 0$ c) $4x - 7y - 11 = 0$ d) $2x + 9y + 7 = 0$

54. If a line L is perpendicular to the line $5x - y = 1$ and the area of the triangle formed by the line L and the co-ordinate axes is 5, then the distance of Line L from the line $x + 5y = 0$ is
a) $\frac{7}{\sqrt{5}}$ b) $\frac{5}{\sqrt{13}}$ c) $\frac{7}{\sqrt{13}}$ d) $\frac{5}{\sqrt{7}}$

[MHT-CET 2013]

55. If the line $ay^2 + bxy + ex + dy = 0$ represents a pair of lines then
a) $bd - ae = 0$ or $e = 0$ b) $be - ad = 0$ or $e = 0$
c) $ad - eb = 0$ or $e = 0$ d) $ad + be = 0$ or $e = 0$

56. The joint equation of pair of lines through the origin each of which makes an angle of 60° with the Y – axis is
a) $x^2 - 3y^2 = 0$ b) $x^2 + 3y^2 = 0$ c) $3x^2 - y^2 = 0$ d) $3x^2 + y^2 = 0$

57. If the equation $kxy + 10x + 6y + 4 = 6$ represents a pair of lines then the value of k is
a) 0 b) 15 c) -15 d) $\frac{1}{15}$

[MHT-CET 2012]

58. If $2a + b + 3c = 0$ then the line $ax + by + c = 0$ passes through the fixed point that is
a) $(\frac{2}{3}, \frac{1}{3})$ b) $(0, 1)$ c) $(\frac{2}{3}, 0)$ d) None of these

[MHT-CET 2011]

59. If one of the lines of the pair $ax^2 + 2hxy + by^2 = 0$ bisects the angle between positive directions of the axes, then a, b and h satisfy the relation
a) $a + b = 2|h|$ b) $a + b = -2h$ c) $a - b = 2|h|$ d) $(a - b)^2 = 4h^2$

60. If a pair of lines $x^2 - 2pxy - y^2 = 0$ and $x^2 - 2qxy - y^2 = 0$ is such that each pair bisects the angle between the other pair, then
a) $pq = -1$ b) $pq = 1$ c) $\frac{1}{p} + \frac{1}{q} = 0$ d) $\frac{1}{p} - \frac{1}{q} = 0$

[MHT-CET 2010]

61. The angle between the lines $3x^2 + 7xy + 2y^2 + 5x + 5y + 2 = 0$ is given by
a) 0 b) $\pi/2$ c) $\pi/4$ d) $\pi/6$

62. Find the equation of pair of lines at a distance of 5 units from the line $y = 1$.
a) $y^2 - y - 24 = 0$ b) $y^2 - 2y - 24 = 0$ c) $y^2 + y + 24 = 0$ d) $y^2 + 2y - 24 = 0$

[MHT-CET 2009]

63. Joint equation of lines passing through (3, –2) and parallel to the lines given by $x^2 - 4xy + 3y^2 = 0$ is
a) $x^2 - 4xy + 3y^2 - 14x + 24y + 45 = 0$ b) $x^2 - 4xy - 3y^2 - 14x - 24y - 45 = 0$
c) $3x^2 + 4xy + y^2 + 14x - 24y - 45 = 0$ d) $3x^2 + 4xy + y^2 - 14x - 24y + 45 = 0$

64. If the equation $kxy + 10x + 6y + 4 = 0$ represents pair of lines, then the value of k = ..
a) (0, 18) b) (0, 16) c) (0, 15) d) (0, 20)

65. The angle between the lines $x^2 + 2xy \sec\theta + y^2 = 0$ is
a) 2θ b) 3θ c) θ d) $\theta/2$

[MHT-CET 2008]

66. Find the equation of the pair of lines through origin, one of which is parallel and the other is perpendicular to $6x - 4y + k = 0$
a) $6x^2 - 13xy - 6y^2 = 0$ b) $6x^2 + 18xy - 6y^2 = 0$
c) $6x^2 + 5xy - 6y^2 = 0$ d) $6x^2 - 5xy - 6y^2 = 0$

67. The equation of pair of lines perpendicular to the given pair of lines $2x^2 - 3xy + y^2 = 0$ is
a) $2x^2 + 3xy + y^2 = 0$ b) $2y^2 - 3xy + x^2 = 0$
c) $x^2 + 3xy + 2y^2 = 0$ d) $x^2 - 3xy - 2y^2 = 0$

[MHT-CET 2007]

68. A second degree equation always represents a pair of lines through origin if
a) $h^2 - ab \geq 0$ b) $h^2 + ab = 0$ c) $h^2 - ab \leq 0$ d) $h^2 - ab < 0$

103. If one of the lines represented by $ax^2 + 2hxy + by^2 = 0$ is perpendicular to line the $mx + ny = 18$, then
a) $am^2 + 2hmn + bn^2 = 0$ b) $am^2 - 2hmn + bn^2 = 0$
c) $an^2 + 2hmn + bm^2 = 0$ d) $an^2 - 2hmn + bm^2 = 0$

104. The acute angle between the lines given by $x^2 + 2(\cot\alpha)xy + y^2 = 0$ is
a) $0°$ b) $60°$ c) $90°$ d) $\tan^{-1}\left(\operatorname{cosec}\alpha\sqrt{\cos 2\alpha}\right)$

105. If the angle θ is acute, then the acute angle between the pair of lines given by $(\cos\theta - \sin\theta)x^2 + 2(\cos\theta)xy + (\cos\theta + \sin\theta)y^2 = 0$ is
a) θ b) 2θ c) $\frac{\theta}{2}$ d) $\frac{\theta}{3}$

106. If the angle between the lines given by $(\tan^2 A)x^2 - kxy - y^2 = 0$ is 2A, then $k =$
a) 0 b) 1 c) 2 d) tan A

107. The joint equation of pair of lines passing through the origin and making an angle of 45° with the line $3x + y = 0$ is
a) $2x^2 + 3xy + 2y^2 = 0$ b) $2x^2 - 3xy - 2y^2 = 0$
c) $2x^2 + 3xy - 2y^2 = 0$ d) $2x^2 - 3xy + 2y^2 = 0$

108. The joint equation of pair of lines through the origin and making an angle of 30° with line the $3x + y - 6 = 0$ is
a) $13x^2 - 12xy - 3y^2 = 0$ b) $13x^2 - 12xy + 3y^2 = 0$
c) $13x^2 + 12xy - 3y^2 = 0$ d) $13x^2 + 12xy + 3y^2 = 0$

109. If the lines $kx^2 + 6xy + 2y^2 = 0$ and $x + 3y = 9$ form an isosceles triangle, then $k =$
a) -8 b) 8 c) 6 d) -6

110. The equation of pair of lines $y = px$ and $y = qx$ can be written as $(y - px)(y - qx) = 0$. Then the equation of the pair of the angle bisectors of the lines given by $x^2 - 4xy - 5y^2 = 0$ is
a) $x^2 + 4xy - y^2 = 0$ b) $x^2 - 3xy - y^2 = 0$ c) $x^2 - 3xy + y^2 = 0$ d) $x^2 + 3xy - y^2 = 0$

111. The product of lengths of the perpendiculars from point $(2, -1)$ on the lines given by $2x^2 - 5xy + 2y^2 = 0$ is
a) 4 b) 9 c) $\frac{1}{\sqrt{5}}$ d) $\frac{9}{\sqrt{5}}$

112. Let Δ OAB be formed by the lines $x^2 - 4xy + y^2 = 0$ and the line AB given by $2x + 3y - 1 = 0$. Then the equation of the median of the triangle drawn from O is
a) $x + y = 0$ b) $x - y = 0$ c) $7x + y = 0$ d) $7x - 8y = 0$

113. O (0, 0), A (1, 2), B (3, 4) are the vertices of Δ OAB. The joint equation of the altitude and median drawn from O is
a) $x^2 + 7xy - y^2 = 0$ b) $x^2 + 7xy + y^2 = 0$ c) $3x^2 - xy - 2y^2 = 0$ d) $3x^2 + xy - 2y^2 = 0$

114. Circumcenter of the triangle formed by the lines $xy = 0$ and $x + y = 1$ is
a) (0, 0) b) (1, 0) c) (0, 1) d) $\left(\frac{1}{2}, \frac{1}{2}\right)$

115. A diagonal of the rectangle formed by the lines given by $x^2 - 7x + 6 = 0$ and $y^2 - 14y + 40 = 0$ is
a) $6x - 5y - 14 = 0$ b) $6x - 5y + 14 = 0$ c) $5x - 6y = 0$ d) $5x + 6y = 0$