VARIOUS FORMS OF STRIGHT LINE

1. The equation of the line cutting an intercept of 3 on negative y-axis and inclined at an angle $\tan^{-1}\frac{3}{5}$ to the x-axis is

(A) $5y - 3x + 15 = 0$

(C) $5y - 3x = 15$

(B) $3y - 5x + 15 = 0$

(D) $3x + 5y = 15$

2. The equation of a straight line which passes through the point $(-3,5)$ such that the portion of it between the axes is divided by the point in the ratio $5:3$ (reckoning from x-axis) will be

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

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

(C) $\mathrm{x} + 2\mathrm{y} - 7 = 0$

(D) $x - y + 8 = 0$

3. The equation of perpendicular bisector of the line segment joining the points $(1,2)$ and $(-2,0)$ is

(A) $5x + 2y = 1$

(B) $4x + 6y = 1$

(C) $6x + 4y = 1$

(D) $\mathrm{x} - \mathrm{y} = 1$

4. The number of possible straight lines, passing through $(2,3)$ and forming a triangle with coordinate axes, whose area is 12 sq. units, is

(A) one

(B) two

(C) three

(D) four

5. A line is perpendicular to $3x + y = 3$ and passes through a point $(2,2)$. Its y intercept is

(A) $2/3$

(B) $1/3$

(C) 1

(D) $4/3$

6. The equation of the line passing through the point (c, d) and parallel to the line $\mathrm{ax} + \mathrm{by} + \mathrm{c} = 0$ is

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

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

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

(D) $ax+by+c-abc=0$

7. A straight line through the point A(3,4) is such that its intercept between the axes is bisected at A. Its equation is -

(A) $3x-4y+7=0$

(B) $4x+3y=24$

(C) $3x+4y=25$

(D) $x+y=7$

8. Points A & B are in the first quadrant; point ' O ' is the origin. If the slope of OA is 1, slope of OB is 7 and $OA=OB$, then the slope of AB is

(A) $-1/5$

(B) $-1/4$

(C) $1/3$

(D) $-1/2$

9. $A(x_1,y_1), B(x_2,y_2)$ and $C(x_3,y_3)$ are three non-collinear points in cartesian plane. Number of parallelograms that can be drawn with these three points as vertices are

(A) one

(B) two

(C) three

(D) four

10. If line $y-x+2=0$ is shifted parallel to itself towards the positive direction of the x-axis by a perpendicular distance of $3\sqrt{2}$ units, then the equation of the new line is

(A) $y=x-4$

(B) $y=x+1$

(C) $y=x-(2+3\sqrt{2})$

(D) $y=x-8$

11. If the axes are rotated through an angle of 30° in the anti-clockwise direction, the coordinates of point $(4,-2\sqrt{3})$ with respect to new axes are

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

(B) $(\sqrt{3},-5)$

(C) $(2,3)$

(D) $(\sqrt{3},2)$

12. A ray of light passing through the point A(1,2) is reflected at a point B on the x-axis and then passes through (5,3). Then the equation of AB is

(A) $5x + 4y = 13$

(B) $5x - 4y = -3$

(C) $4x + 5y = 14$

(D) $4x - 5y = -6$

13. A square of side a lies above the x-axis and has one vertex at the origin. The side passing through the origin makes an angle $\alpha \left(0 < \alpha < \frac{\pi}{4}\right)$ with the positive direction of x-axis. The equation of its diagonal not passing through the origin is -

(A) $y(\cos\alpha + \sin\alpha) + x(\cos\alpha - \sin\alpha) = a$

(B) $y(\cos\alpha - \sin\alpha) - x(\sin\alpha - \cos\alpha) = a$

(C) $y(\cos\alpha + \sin\alpha) + x(\sin\alpha - \cos\alpha) = a$

(D) $y(\cos\alpha + \sin\alpha) + x(\sin\alpha + \cos\alpha) = a$

14. The equation of the straight line passing through the point (4,3) and making intercepts on the coordinate axes whose sum is -1 is -

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

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

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

(D) $\frac{x}{2} - \frac{y}{3} = 1$ and $\frac{x}{-2} + \frac{y}{1} = 1$

15. The line parallel to the x-axis and passing through the intersection of the lines $ax + 2by + 3b = 0$ anc $bx - 2ay - 3a = 0$, where $(a, b) \neq (0,0)$ is -

(A) below the x-axis at a distance of $3/2$ from it

(B) below the x-axis at a distance of $2/3$ from it

(C) above the x-axis at a distance of $3/2$ from it

(D) above the x-axis at a distance of $2/3$ from it

16. A and B are two fixed points whose co-ordinates are (3,2) and (5,4) respectively. The co-ordinates of a point P if ABP is an equilateral triangle, is/are

(A) $(4 - \sqrt{3}, 3 + \sqrt{3})$

(B) $(4 + \sqrt{3}, 3 - \sqrt{3})$

(C) $(3 - \sqrt{3}, 4 + \sqrt{3})$

(D) $(3 + \sqrt{3}, 4 - \sqrt{3})$

17. Straight lines $2x + y = 5$ and $x - 2y = 3$ intersect at the point A. Points B and C are chosen on these two lines such that $AB = AC$. Then the equation of a line BC passing through the point (2,3) is

(A) $3x - y - 3 = 0$

(B) $x + 3y - 11 = 0$

(C) $3x + y - 9 = 0$

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

18. The equation of straight line which is equidistant from the points $A(2,-2), B(6,1), C(-3,4)$ can be

(A) $2x + 6y - 5 = 0$

(B) $12x + 10y - 43 = 0$

(C) $6x - 8y - 11 = 0$

(D) $6x - 8y + 11 = 0$

ANGLE BETWEEN TWO LINES

19. The angle between the lines $y - x + 5 = 0$ and $\sqrt{3}x - y + 7 = 0$ is

(A) 15°

(B) 60°

(C) 45°

(D) 75°

20. If the line passing through the points (4,3) and $(2, \lambda)$ is perpendicular to the line $y = 2x + 3$, then λ is equal to -

(A) 4

(B) -4

(C) 1

(D) -1

21. The equation of two equal sides of an isosceles triangle are $7x - y + 3 = 0$ and $x + y - 3 = 0$ and its third side is passes through the point $(1, -10)$. The equation of the third side is

(A) $x - 3y - 31 = 0$ but not $3x + y + 7 = 0$

(B) neither $3x + y + 7 = 0$ nor $x - 3y - 31 = 0$

(C) $3x + y + 7 = 0$ or $x - 3y + 31 = 0$

(D) $3x + y + 7 = 0$ or $x - 3y - 31 = 0$

22. Triangle formed by lines $x+y=0,3x+y=4$ and $x+3y=4$ is -

(A) equilateral

(B) right angled

(C) isosceles

(D) concurrent line

23. If origin and $(3,2)$ are contained in the same angle of the lines $2x+y-a=0, x-3y+a=0$, then ' a ' must lie in the interval

(A) $(-\infty, 0) \cup (8, \infty)$

(B) $(-\infty, 0) \cup (3, \infty)$

(C) $(0,3)$

(D) $(3,8)$

24. Find the equation to the sides of an isosceles right-angled triangled, the equation of whose hypotenuse is $3x+4y=4$ and the opposite vertex is the point $(2,2)$.

(A) $7y-x-12=0$ and $7x+y=16$.

(B) $7y+x-12=0$ and $7x+y=16$.

(C) $7y+x-12=0$ and $7x-y=16$.

(D) $7y-x+12=0$ and $7x-y=16$.

DISTANCE OF A POINT FROM A LINE

25. Co-ordinates of a point which is at 3 distance from point $(1,-3)$ of line $2x+3y+7=0$ is

(A) $\left(1+\frac{9}{\sqrt{13}}, 3-\frac{6}{\sqrt{13}}\right)$

(B) $\left(1-\frac{9}{\sqrt{13}}, -3+\frac{6}{\sqrt{13}}\right)$

(C) $\left(1+\frac{9}{\sqrt{13}}, -3+\frac{6}{\sqrt{13}}\right)$

(D) $\left(1-\frac{9}{\sqrt{13}}, 3-\frac{6}{\sqrt{13}}\right)$

26. The length of perpendicular from the origin on the line $x/a+y/b=1$ is -

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

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

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

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

27. The foot of the perpendicular drawn from the point (7,8) to the line $2x+3y-4=0$ is -

(A) $\left(\frac{23}{13},\frac{2}{13}\right)$

(B) $\left(13,\frac{23}{13}\right)$

(C) $\left(-\frac{23}{13},-\frac{2}{13}\right)$

(D) $\left(-\frac{2}{13},\frac{23}{13}\right)$

28. The coordinates of the point Q symmetric to the point $\mathrm{P}(-5,13)$ with respect to the line $2\mathrm{x}-3\mathrm{y}-3=0$ are -

(A) $(11,-11)$

(B) $(5,-13)$

(C) $(7,-9)$

(D) $(6,-3)$

29. Let the algebraic sum of the perpendicular distances from the point (3,0), (0,3)&(2,2) to a variable straight line be zero, then the line passes through a fixed point whose co-ordinates are

(A) (3,2)

(B) (2,3)

(C) $\left(\frac{3}{5},\frac{3}{5}\right)$

(D) $\left(\frac{5}{3},\frac{5}{3}\right)$

30. Three lines $x+2y+3=0, x+2y-7=0$ and $2x-y-4=0$ form 3 sides of two squares. Find the equation of remaining sides of these squares.

(A) $2x-y+6=0, 2x-y-14=0$

(B) $2x+y-6=0, 2x+y-14=0$

(C) $2x+y+6=0, 2x-y+14=0$

(D) $2x-y-6=0, 2x+y+14=0$

31. Let there are three points $\mathrm{A}(0,4/3)$ $\mathrm{B}(-1,0)$ and $\mathrm{C}(1,0)$ in $\mathrm{x}-\mathrm{y}$ plane. The distance from a variable point P to the line BC is the geometic mean of the distances from this point to lines AB and AC then locus of P can be

(A) A pair of straight lines

(B) Circle

(C) Ellipse

(D) Hyperbola

32. If $\frac{x}{c}+\frac{y}{d}=1$ is a line through the intersection of $\frac{x}{a}+\frac{y}{b}=1$ and $\frac{x}{b}+\frac{y}{a}=1$ and the lengths of the perpendiuclars drawn from the origin to these lines are equal in lengths then

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

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

(C) $\frac{1}{a}+\frac{1}{b}=\frac{1}{c}+\frac{1}{d}$

(D) $ab-cd=0$

POSITION OF A POINT W.R. TO A LINE

33. The position of the point $(8,-9)$ with respect to the lines $2x+3y-4=0$ and $6x+9y+8=0$ is

(A) point lies on the same side of the lines

(B) point lies on one of the lines

(C) point lies on the different sides of the line

(D) none of these

34. The line $3x+2y=6$ will divide the quadrilateral formed by the lines $x+y=5, y-2x=8$, $3y+2x=0 \& 4y-x=0$ in

(A) two quadrilaterals

(B) one pentagon and one triangle

(C) two triangles

(D) none of these

35. If the point $(a,2)$ lies between the lines $x-y-1=0$ and $2(x-y)-5=0$, then the set of values of a is

(A) $(-\infty,3)\cup(9/2,\infty)$

(B) $(3,9/2)$

(C) $(-\infty,3)$

(D) $(9/2,\infty)$

36. The area of triangle formed by the lines $x+y-3=0, x-3y+9=0$ and $3x-2y+1=0$

(A) $\frac{16}{7}$ sq. units

(B) $\frac{10}{7}$ sq. units

(C) 4 sq. units

(D) 9 sq. units

37. The co-ordinates of foot of the perpendicular drawn on line $3x - 4y - 5 = 0$ from the point (0,5) is

(A) (1,3)

(B) (2,3)

(C) (3,2)

(D) (3,1)

38. The co-ordinates of the point of reflection of the origin (0,0) in the line $4x - 2y - 5 = 0$ is

(A) $(1, -2)$

(B) $(2, -1)$

(C) $\left(\frac{4}{5}, \frac{2}{5}\right)$

(D) (2,5)

39. If one diagonal of a square is along the line $x = 2y$ and one of its vertex is (3,0), then its sides through this vertex are given by the equations

(A) $y - 3x + 9 = 0, x - 3y - 3 = 0$

(B) $y - 3x + 9 = 0, x - 3y - 3 = 0$

(C) $y + 3x - 9 = 0, x + 3y - 3 = 0$

(D) $y - 3x + 9 = 0, x + 3y - 3 = 0$

40. A triangle is formed by the lines $2x - 3y - 6 = 0$; $3x - y + 3 = 0$ and $3x + 4y - 12 = 0$. If the points $\mathrm{P}(\alpha, 0)$ and $\mathrm{Q}(0, \beta)$ always lie on or inside the $\triangle$ ABC, then

(A) $\alpha \in [-1,2]$ & $\beta \in [-2,3]$

(B) $\alpha \in [-1,3]$ & $\beta \in [-2,4]$

(C) $\alpha \in [-2,4]$ & $\beta \in [-3,4]$

(D) $\alpha \in [-1,3]$ & $\beta \in [-2,3]$

41. If (a, a^2) falls inside the angle made by the lines $\mathrm{y} = \frac{x}{2}, \mathrm{x} > 0$ and $\mathrm{y} = 3\mathrm{x}, \mathrm{x} > 0$, then a belongs to

(A) $(3, \infty)$

(B) $\left(\frac{1}{2}, 3\right)$

(C) $\left(-3, -\frac{1}{2}\right)$

(D) $\left(0, \frac{1}{2}\right)$

42. If the point $\mathrm{P}(0, \beta)$ lies inside or on the triangle formed by the lines $y = x + 1, y = -3x + 4$ and $y = 7x + 17$ then the range of β is $[\mathrm{m}, \mathrm{M}]$. Then $(\mathrm{m} + \mathrm{M})$

(A) lies in interval (4,10)

(B) is a prime number

(C) is an odd number

(D) is a perfect square

CONDITION OF CONCURRENCY

43. If the lines

$x\sin^2 A + y\sin A + 1 = 0$

$x\sin^2 B + y\sin B + 1 = 0$

$x\sin^2 C + y\sin C + 1 = 0$

are concurrent where A, B, C are angles of triangle then $\triangle$ ABC must be

(A) equilateral

(B) isosceles

(C) right angle

(D) no such triangle exists

44. Lines, $\mathrm{L}_1: \mathrm{x} + \sqrt{3}\mathrm{y} = 2$, and $\mathrm{L}_2: \mathrm{ax} + \mathrm{by} = 1$, meet at P and enclose an angle of 45° between them. Line $L_3: y = \sqrt{3}x$, also passes through P then

(A) $a^2 + b^2 = 1$

(B) $a^2 + b^2 = 2$

(C) $a^2 + b^2 = 3$

(D) $a^2 + b^2 = 4$

45. If the lines $ax + y + 1 = 0, x + by + 1 = 0$ & $\mathrm{x} + \mathrm{y} + \mathrm{c} = 0$ where a, b & c are distinct real numbers different from 1 are concurrent, then the value of $\frac{1}{1-a} + \frac{1}{1-b} + \frac{1}{1-c}$ equals

(A) 4

(B) 3

(C) 2

(D) 1

FAMITY OF STRAIGHT LINE

46. The line $(p+2q)x+(p-3q)y=p-q$ for different values of p and q passes through a fixed point whose co-ordinates are

(A) $\left(\frac{3}{2},\frac{5}{2}\right)$

(B) $\left(\frac{2}{5},\frac{2}{5}\right)$

(C) $\left(\frac{3}{5},\frac{3}{5}\right)$

(D) $\left(\frac{2}{5},\frac{3}{5}\right)$

47. Given the family of lines, $a(3x+4y+6)+b(x+y+2)=0$. The line of the family situated at the greatest distance from the point P(2,3) has equation

(A) $4x+3y+8=0$

(B) $5x+3y+10=0$

(C) $15x+8y+30=0$

(D) $2x+3y=5$

48. The base BC of a triangle ABC is bisected at the point (p, q) and the equation to the side AB & AC are $px+qy=1$ & $qx+py=1$ respectively. The equation of the median through A is

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

(B) $(\mathrm{p}+\mathrm{q})\mathrm{x}+\mathrm{y}-2=0$

(C) $(2pq-1)(px+qy-1)=(p^2+q^2-1)(qx+py-1)$

(D) $(p-q)x+(p+q)y+1=0$

49. If non-zero numbers a, b, c are in H.P., then the straight line $\frac{x}{a}+\frac{y}{b}+\frac{l}{c}=0$ always passes through a fixed point that point is -

(A) $(-1,2)$

(B) $(-1,-2)$

(C) $(1,-2)$

(D) $\left(1,-\frac{1}{2}\right)$

50. If $25a^2+16b^2-40ab-c^2=0$, then the family of straight line $2ax+by+c=0$ is concurrent at

(A) $\left(\frac{-5}{2},4\right)$

(B) $\left(\frac{5}{2},-4\right)$

(C) $\left(\frac{-5}{2}, -4\right)$

(D) $\left(\frac{5}{2}, 4\right)$

SHIFTING OF ORIGIN

51. Without changing the direction of coordinates axes, to which point origin should be transferred so that the equation $x^2 + y^2 - 4x + 6y - 7 = 0$ is changed to an equation which contains no term of first degree-

(A) (3,2)

(B) $(2, -3)$

(C) $(-2,3)$

(D) (2,3)

52. Reflecting the point $(2, -1)$ about y-axis, coordinate axes are rotated at $45°$ angle in negative direction without shifting the origin. The new coordinates of the points are -

(A) $\left(-\frac{1}{\sqrt{2}}, -\frac{3}{\sqrt{2}}\right)$

(B) $\left(\frac{1}{\sqrt{2}}, \frac{3}{\sqrt{2}}\right)$

(C) $\left(-\frac{3}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$

(D) None of these

53. Keeping coordinate axes parallel, the origin is shifted to a point $(1, -2)$, then transformed equation of $x^2 + y^2 = 2$ is -

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

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

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

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

54. To remove xy term from the second-degree equation $5x^2 + 8xy + 5y^2 + 3x + 2y + 5 = 0$, the coordinates axes are rotated through an angle θ, then θ equals -

(A) $\pi/2$

(B) $\pi/4$

(C) $3\pi/8$

(D) $\pi/8$

55. The point (4,1) undergoes two successive transformations -

(i) Reflection about the line $y = x$

(ii) Translation through a distance 2 units along the positive direction of x axis

The final position of the point is given by the coordinates -

(A) (4,3)

(B) (3,4)

(C) (7/2,7/2)

(D) (1,4)

56. Keeping the origin constant axes are rotated at an angle 30° in anticlockwise direction then new coordinate of (2,1) with respect to old axes is

(A) $\left(\frac{2+\sqrt{3}}{2}, \frac{\sqrt{3}}{2}\right)$

(B) $\left(\frac{2\sqrt{3}+1}{2}, \frac{-2+\sqrt{3}}{2}\right)$

(C) $\left(\frac{2\sqrt{3}+1}{2}, \frac{2-\sqrt{3}}{2}\right)$

(D) (1,2)

57. The line PQ whose equation is $x-y=2$ cuts the X-axis at P and Q is (4,2). The line PQ is rotated about P through 45° in the anticlockwise direction. The equation of the line PQ in the new position is

(A) $y=-\sqrt{2}$

(B) $y=2$

(C) $x=2$

(D) $x=-2$

ANGLE BISECTOR

58. The equation of the bisector of the angle between the lines $3x-4y+7=0$ and $12x-5y-8=0$ is -

(A) $99x-77y+51=0, 21x+27y-131=0$

(B) $99x-77y+51=0, 21x+27y+131=0$

(C) $99x-77y+131=0, 21x+27y-51=0$

(D) $99x+77y+131=0, 21x+27y+131=0$

59. The equation of the bisector of the acute angle between the lines $3x-4y+7=0$ and $12x+5y-2=0$ is -

(A) $11x-3y-9=0$

(B) $11x-3y+9=0$

(C) $21x+77y-101=0$

(D) $11x+3y+9=0$

PAIR OF STRAIGHT LINES

60. The image of the pair of lines represented by $ax^2 + 2hxy + by^2 = 0$ by the line mirror $y = 0$ is

(A) $ax^2 - 2hxy + by^2 = 0$

(B) $bx^2 - 2hxy + ay^2 = 0$

(C) $bx^2 + 2hxy + ay^2 = 0$

(D) $ax^2 - 2hxy - by^2 = 0$

61. Area of the triangle formed by the line $x + y = 3$ and the angle bisector of the pairs of st. lines $x^2 - y^2 + 2y = 1$ is

(A) 2 sq. unit

(B) 4 sq. unit

(C) 6 sq. unit

(D) 8 sq. unit

62. The equation $2x^2 + 4xy - py^2 + 4x + qy + 1 = 0$ will represent two mutually perpendicular straight lines, if

(A) $p = 1$ and $q = 2$ or 6

(B) $p = -2$ and $q = -2$ or 8

(C) $p = 2$ and $q = 0$ or 8

(D) $p = 2$ and $q = 0$ or 6

63. The line $x + 3y - 2 = 0$ bisects the angle between a pair of straight lines of which one has equation $x - 7y + 5 = 0$. The equation of the other line is

(A) $3x + 3y - 1 = 0$

(B) $x - 3y + 2 = 0$

(C) $5x + 5y - 3 = 0$

(D) $5x - 5y - 3 = 0$

64. The pair of straight lines $x^2 - 4xy + y^2 = 0$ together with the line $x + y + 4\sqrt{6} = 0$ form a triangle which is

(A) right angled but not isosceles

(B) right isosceles

(C) scalene

(D) equilateral

65. Distance between two lines represented by the line pair, $x^2 - 4xy + 4y^2 + x - 2y - 6 = 0$ is

(A) $\frac{1}{\sqrt{5}}$

(B) $\sqrt{5}$

(C) $2\sqrt{5}$

(D) 5

66. If the equation $ax^2 - 6xy + y^2 + bx + cy + d = 0$ represents pair of lines whose slopes are m and m^2, then value of a is/are

(A) $a = -8$

(B) $a = 8$

(C) $a = 27$

(D) $a = -27$

67. The lines joining the origin to the point of intersection of $3x^2 + \lambda xy - 4x + 1 = 0$ and $2x + y - 1 = 0$ are at right angles for

(A) $\lambda = -4$

(B) $\lambda = 4$

(C) $\lambda = 7$

(D) no value of λ

MIXED PROBLEM

68. The co-ordinates of a point P on the line $2x - y + 5 = 0$ such that $|PA - PB|$ is maximum where A is $(4, -2)$ and B is $(2, -4)$ will be

(A) $(11, 27)$

(B) $(-11, -17)$

(C) $(-11, 17)$

(D) $(0, 5)$

69. The line $x + y = p$ meets the axis of x and y at A and B respectively. A triangle APQ is inscribed in the triangle OAB, O being the origin, with right angle at Q, P and Q lie respectively on OB and AB. If the area of the triangle APQ is $3/8^{\text{th}}$ of the area of the triangle OAB, then $\frac{AQ}{BQ}$ is equal to

(A) 2

(C) 1/3

(B) 2/3

(D) 3

70. Let A ≡ (3,2) and B ≡ (5,1). ABP is an equilateral triangle is constructed on the side of AB remote from the origin then the orthocentre of triangle ABP is

(A) $\left(4-\frac{1}{2}\sqrt{3}, \frac{3}{2}-\sqrt{3}\right)$

(B) $\left(4+\frac{1}{2}\sqrt{3}, \frac{3}{2}+\sqrt{3}\right)$

(C) $\left(4-\frac{1}{6}\sqrt{3}, \frac{3}{2}-\frac{1}{3}\sqrt{3}\right)$

(D) $\left(4+\frac{1}{6}\sqrt{3}, \frac{3}{2}+\frac{1}{3}\sqrt{3}\right)$

71. The point (4,1) undergoes the following three transformations successively

(i) Reflection about the line $y=x$

(ii) Translation through a distance 2 units along the positive direction of x-axis

(iii) Rotation through an angle $\pi/4$ about the origin in the counter clockwise direction.

The final position of the points is given by the coordinates

(A) $\left(\frac{7}{\sqrt{2}}, -\frac{1}{\sqrt{2}}\right)$

(B) $\left(\frac{7}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$

(C) $\left(-\frac{1}{\sqrt{2}}, \frac{7}{\sqrt{2}}\right)$

(D) none of these

72. The straight lines $x+y=0, 3x+y-4=0$ and $x+3y-4=0$ form a triangle which is

(A) isosceles

(B) right angled

(C) obtuse angled

(D) equilateral

73. In the xy plane, the line ' ℓ_1 ' passes through the point (1,1) and the line ' ℓ_2 ' passes through the point (−1,1). If the difference of the slopes of the lines is 2. Find the locus of the point of intersection of the lines ℓ_1 and ℓ_2.

(A) $y=-x^2$

(B) $y=2+x^2$

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

(D) $y=x^2$

74. Two consecutive sides of a parallelogram are $4x+5y=0 \& 7x+2y=0$. If the equation to one diagonal is $11x+7y=9$, then

(A) Equation of other diagonal is $x-y=0$

(B) End points of other diagonal are (0,0) and (1,1)

(C) Other two sides are $4x+5y-9=0$&$7x+2y+9=0$

(D) None of these

75. The points (1,3) & (5,1) are two opposite vertices of a rectangle. The other two vertices lie on the line $y=2x+c$.

(A) Vertices are (2,0) & (4,4)

(B) Value of c is 4

(C) Vertices are (0,2) & (4,4)

(D) Value of c is -4

SUBJECTIVE(JEE ADVANCED)

76. The points $(-6,1),(6,10),(9,6)$ and $(-3,-3)$ are the vertices of a rectangle. If the area of the portion of this rectangle that lies above the x-axis is a/b, find the value of $(a+b)$, given a and b are coprime.

77. A point P is such that its perpendicular distance from the line $y-2x+1=0$ is equal to its distance from the origin. Find the equation of the locus of the point P. Prove that the line $y=2x$ meets the locus in two points Q and R, such that the origin is the mid point of QR.

78. A line through the point $P(2,-3)$ meets the lines $x-2y+7=0$ and $x+3y-3=0$ at the points A and B respectively. If P divides AB externally in the ratio 3: 2 then find the equation of the line AB.

79. If the straight line drawn through the point $P(\sqrt{3},2)$ and inclined at an angle $\frac{\pi}{6}$ with the x-axis, meets the line $\sqrt{3}x-4y+8=0$ at Q. Find the length PQ

80. A variable line, drawn through the point of intersection of the straight lines $\frac{x}{a}+\frac{y}{b}=1$ &, $\frac{x}{b}+\frac{y}{a}=1$ meets the coordinate axes in A & B. Show that the locus of the mid point of AB is the curve $2xy(a+b)=ab(x+y)$

81. The line $3x+2y=24$ meets the y-axis at A and the X-axis at B. The perpendicular bisector of AB meets the line through $(0,-1)$ parallel to x-axis at C. Find the area of the triangle ABC.

82. Two equal sides of an isosceles triangle are given by the equations $7x-y+3=0$ and $x+y-3=0$ and its third side passes through the point $(1,-10)$. Determine the equation of the third side.

83. The interior angle bisector of angle A for the triangle ABC whose coordinates of the vertices are $A(-8,5)$: $B(-15,-19)$ and $C(1,-7)$ has the equation $ax+2y+c=0$. Find ' a ' and ' c '.

84. Find the equations of the sides of a triangle having $(4,-1)$ as a vertex, if the lines $x-1=0$ and $x-y-1=0$ are the equations of two internal bisectors of it angles

85. Show that all the chords of the curve $3x^2 - y^2 - 2x + 4y = 0$ which subtend a right angle at the origin are concurrent. Does this result also hold for the curve, $3x^2 + 3y^2 - 2x + 4y = 0$? If yes, what is the point of concurrency and if not, give reasons.

86. The equations of the perpendicular bisectors of the sides AB and AC of a triangle ABC are $x - y + 5 = 0$ and $x + 2y = 0$, respectively. If the point A is $(1, -2)$ find the equation of the line BC.

87. Triangle ABC lies in the Cartesian plane and has an area of 70 sq. units. The coordinates of B and C are (12,19) and (23,20) respectively and the coordinates of A are (p, q). The line containing the median to the side BC has slope -5 . Find the largest possible value of $(p + q)$.

88. Consider a triangle ABC with sides AB and AC having the equations $L_1 = 0$ and $L_2 = 0$. Let the centroid, orthocentre and circumcentre of the Δ ABC are G, H and S respectively. $L = 0$ denotes the equation of side BC.

(a) If $L_1: 2x - y = 0$ and $L_2: x + y = 3$ and $G(2,3)$ then find the slope of the line $L = 0$.

(b) If $L_1: 2x + y = 0$ and $L_2: x - y + 2 = 0$ and $H(2,3)$ then find the y-intercept of $L = 0$.

(c) If $L_1: x + y - 1 = 0$ and $L_2: 2x - y + 4 = 0$ and $S(2,1)$ then find the x-intercept of the line L=0.

89. The equations of perpendiculars of the sides AB and AC of triangle ABC are $x - y - 4 = 0$ and $2x - y - 5 = 0$ respectively. If the vertex A is $(-2,3)$ and point of intersection of perpendiculars bisectors is $\left(\frac{3}{2}, \frac{5}{2}\right)$, find the equation of medians to the sides AB and AC respectively.

89. Two sides of a rhombus ABCD are parallel to the lines $y = x + 2$ and $y = 7x + 3$. If the diagonals of the rhombus intersect at the point (1,2) and the vertex A is on the y-axis, find the possible coordinates of A. $x - y - 1 = 0$ are the equations of two internal bisectors of its angles.

90. P is the point $(-1,2)$, a variable line through P cuts the x and y axes at A and B respectively Q is the point on AB such that PA, PQ, PB are H.P. Show that the locus of Q is the line $y = 2x$.

91. Find the equation of the two straight lines which together with those given by the equation $6x^2 - xy - y^2 + x + 12y - 35 = 0$ will make a parallelogram whose diagonals intersect in the origin.

PREVIOS YEAR QUESTIONS (JEE MAIN)

92. A line is drawn through the point (1,2) to meet the coordinate axes at P and Q such that it forms a triangle OPQ, where O is the origin. If the area of the triangle OPQ is least, then the slope of the line PQ is: **[AIEEE-2012]**

(A) -2 (B) $-1/2$ (C) $-1/4$ (D) -4

93. A ray of light along $x + \sqrt{3}y = \sqrt{3}$ gets reflected upon reaching x-axis, the equation of the reflected ray is: **[JEE-MAIN 2013]**

(A) $y = \sqrt{3}x - \sqrt{3}$ (B) $\sqrt{3}y = x - 1$ (C) $y = x + \sqrt{3}$ (D) $\sqrt{3}y = x - \sqrt{3}$

94. The x-coordinate of the incentre of the triangle that has the coordinates of mid points of its sides as (0,1)(1,1) and (1,0) is: **[JEE-MAIN 2013]**

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

95. 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: **[JEE-MAIN 2014]**

(A) $2\text{bc} - 3\text{ad} = 0$ (B) $2bc + 3ad = 0$ (C) $3\text{bc} - 2\text{ad} = 0$ (D) $3bc + 2ad = 0$

96. Let PS be the median of the triangle with vertices $P(2,2)$, $Q(6,-1)$ and $R(7,3)$. The equation of the line passing through $(1,-1)$ and parallel to PS is: **[JEE-MAIN 2014]**

(A) $4x - 7y - 11 = 0$ (B) $2x + 9y + 7 = 0$

(C) $4x + 7y + 3 = 0$ (D) $2x - 9y - 11 = 0$

97. The number of points, having both co-ordinates as integers, that lie in the interior of the triangle with vertices (0,0), (0,41) and (41,0), is **[JEE-MAIN 2015]**

(A) 820 (B) 780 (C) 901 (D) 861

98. Locus of the image of the point (2,3) in the line $(2x - 3y + 4) + k(x - 2y + 3) = 0, k \in R$, is a: **[JEE-MAIN 2015]**

(A) circle of radius $\sqrt{2}$ (B) circle of radius $\sqrt{3}$

(C) straight line parallel to x-axis (D) straight line parallel to y-axis

99. Two sides of a rhombus are along the lines, $x - y + 1 = 0$ and $7x - y - 5 = 0$. If its diagonals intersect at $(-1,-2)$, then which one of the following is a vertex of this rhombus? **[JEE-MAIN 2016]**

(A) $(-3,-8)$ (B) $\left(\frac{1}{3}, -\frac{8}{3}\right)$ (C) $\left(-\frac{10}{3}, -\frac{7}{3}\right)$ (D) $(-3,-9)$

100. Let k be an interger such that a triangle with vertices $(k,-3k)$, $(5,k)$ and $(-k,2)$ has area 28 sq. units. Then the orthocenter of this triangle is at the point **[JEE-MAIN 2017]**

(A) $\left(2, -\frac{1}{2}\right)$ (B) $\left(1, \frac{3}{4}\right)$ (C) $\left(1, -\frac{3}{4}\right)$ (D) $\left(2, \frac{1}{2}\right)$

101. A straight line through a fixed point (2,3) intersects the coordinate axes at distinct points P and Q. If O is the origin and the rectangle OPRQ is completed, then the locus of R is:

[JEE-MAIN 2018]

(A) $3x + 2y = 6xy$ (B) $3x + 2y = 6$ (C) $2x + 3y = xy$ (D) $3x + 2y = xy$

PREVIOS YEAR QUESTIONS (JEE ADVANCED)

102. The locus of the orthocenter of the triangle formed by the lines **[JEE 2009, 3]**

$(1 + p)x - py + p(1 + p) = 0$

$(1 + q)x - qy + q(1 + q) = 0$

and $y = 0$, where $p \neq q$, is

(A) a hyperbola (B) a parabola (C) an ellipse (D) a straight line

103. A straight line L through the point $(3, -2)$ is inclined at an angle $60°$ to the line $\sqrt{3}x + y = 1$. If L also intersects the x-axis, then the equation of L is **[JEE 2011]**

(A) $y + \sqrt{3}x + 2 - 3\sqrt{3} = 0$ (B) $y - \sqrt{3}x + 2 + 3\sqrt{3} = 0$

(C) $\sqrt{3}y - x + 3 + 2\sqrt{3} = 0$ (D) $\sqrt{3}y + x - 3 + 2\sqrt{3} = 0$

104. For a > b > c > 0, the distance between (1,1) and the point of intersection of the lines $ax + by + c = 0$ and $bx + ay + c = 0$ is less than $2\sqrt{2}$. Then **[JEE 2013]**

(A) $a + b - c > 0$ (B) $a - b + c < 0$ (C) $a - b + c > 0$ (D) a + b − c < 0

105. For a point P in the plane, let $d_1(P)$ and $d_2(P)$ be the distances of the point P from the lines $x - y = 0$ and $x + y = 0$ respectively. The area of the region R consisting of all points P lying in the first quadrant of the plane and satisfying $2 \leq d_1(P) + d_2(P) \leq 4$ is **[JEE 2014]**

106. Let L_1 and L_2 be the following straight lines.

$L_1: \frac{x-1}{1} = \frac{y}{-1} = \frac{z-1}{3}$ and $L_2: \frac{x-1}{-3} = \frac{y}{-1} = \frac{z-1}{1}$

Suppose the straight line

$L: \frac{x-\alpha}{l} = \frac{y-1}{m} = \frac{z-\gamma}{-2}$

lies in the plane containing L_1 and L_2, and passes through the point of intersection of L_1 and L_2. If the line L bisects the acute angle between the lines L_1 and L_2, then which of the following statements is/are TRUE? **[JEE 2020]**

(A) $\alpha - \gamma = 3$ (B) $l + m = 2$ (C) $\alpha - \gamma = 1$ (D) $l + m = 0$

Paragraph for Q.107 & Q.108

Consider the lines L_1 and L_2 defined by

$L_1: x\sqrt{2} + y - 1 = 0$ and $L_2: x\sqrt{2} - y + 1 = 0$

For a fixed constant λ, let C be the locus of a point P such that the product of the distance of P from L_1 and the distance of P from L_2 is λ^2. The line $y = 2x + 1$ meets C at two points R and S, where the distance between R and S is $\sqrt{270}$.

Let the perpendicular bisector of RS meet C at two distinct points R' and S'. Let D be the square of the distance between R' and S'. **[JEE 2021]**

107. The value of λ^2 is

108. The value of D is

ANSWER KEY

1.	(A)	2.	(D)	3.	(C)	4.	(C)	5.	(D)
6.	(C)	7.	(B)	8.	(D)	9.	(C)	10.	(D)
11.	(B)	12.	(A)	13.	(A)	14.	(D)	15.	(A)
16.	(A,B)	17.	(A,B)	18.	(A,B,D)	19.	(A)	20.	(A)
21.	(C)	22.	(C)	23.	(A)	24.	(A)	25.	(B)
26.	(C)	27.	(A)	28.	(A)	29.	(D)	30.	(A)
31.	(B,D)	32.	(A,C)	33.	(A)	34.	(A)	35.	(B)
36.	(B)	37.	(D)	38.	(B)	39.	(D)	40.	(D)
41.	(B)	42.	(A,B,C)	43.	(B)	44.	(B)	45.	(D)
46.	(D)	47.	(A)	48.	(C)	49.	(C)	50.	(A,B)
51.	(B)	52.	(A)	53.	(A)	54.	(B)	55.	(B)
56.	(B)	57.	(C)	58.	(A)	59.	(B)	60.	(A)
61.	(A)	62.	(C)	63.	(C)	64.	(D)	65.	(B)
66.	(B,D)	67.	(A,B,C)	68.	(B)	69.	(D)	70.	(D)
71.	(C)	72.	(A,C)	73.	(C,D)	74.	(A,B)	75.	(A,D)

76. 533

77. $x^2 + 4y^2 + 4xy + 4x - 2y - 1 = 0$

78. $2x + y - 1 = 0$

79. 6 units

80. 91 sq. units

81. $x - 3y - 31 = 0$ *or* $3x + y + 7 = 0$

82. $a = 11, \ c = 78$

83. $2x - y + 3 = 0, 2x + y - 7 = 0, x - 2y - 6 = 0$

84. $(1, -2), yes \left(\frac{1}{3}, \frac{2}{3}\right)$

85. $14x + 23y = 40$

86. 47

87. $(a)\ 5; (b)\ 2; (c) \frac{3}{2}$

88. $x + 4y = 4; 5x + 2y = 8$

89. $(0, 0)$ *or* $(0, 5/2)$

90.

91. $6x^2 - xy - y^2 - x - 12y - 35 = 0$

92.	(A)	93.	(D)	94.	(D)		
95.	(C)	96.	(B)	97.	(B)	98.	(A)
99.	(B)	100.	(D)	101.	(D)	102.	(D)
103.	(B)	104.	(A,C)	105.	(6)	106.	(A,B)
107.	(9)	108.	(77.14)				