SL

LEVEL-I

1. If $a^2 + b^2 - c^2 + 2ab = 0$, then family of straight lines $ax + by + c = 0$ is concurrent at the points.
(A) (–1, 1) (B) (1, –1) (C) (1, –2) (D) (–1, –1), (1, 1)

2. The pair of straight lines perpendicular to the pair of lines $ax^2 + 2hxy + by^2 = 0$ has the equation.
(A) $ax^2 - 2hxy + by^2 = 0$ (B) $ay^2 + 2hxy + bx^2n = 0$
(C) $bx^2 + 2hxy + ay^2$ (D) $bx^2 - 2hxy + ay^2 = 0$

3. If x_1, x_2, x_3 as well as y_1, y_2, y_3 are in G.P with same common ratio ($\neq 1$) then the points (x_1, y_1), (x_2, y_2) and (x_3, y_3).
(A) lie on a straight line (B) lie on an ellipse
(C) lie on a circle (D) are the vertices of a triangle

4. If a, c, b are in A.P the family of line $ax + by + c = 0$ passes through the point.
(A) $\left(\frac{1}{2}, \frac{1}{2}\right)$ (B) (1, – 2) (C) (1, 2) (D) $\left(\frac{-1}{2}, \frac{-1}{2}\right)$

5. The image of the point (3, –8) in the line $x + y = 0$ is
(A) (–8, 3) (B) (–3, 8) (C) (8, – 3) (D) (3, 8)

6. The nearest point on the line $2x + 3y = 5$ from the origin is.
(A) (3, –1/3) (B) $\left(\frac{10}{13}, \frac{15}{13}\right)$ (C) (0, 5/3) (D) (1, 1)

7. A straight line through A(2, 1) is such that its intercept between the axis is bisected at A. its equation is.
(A) $2x + y - 4= 0$ (B) $x + 2y - 4 = 0$ (C) $x + 2y - 4 = 0$ (D) $x + 2y - 2 = 0$

8. The incentre of the triangle with vertices $(1, \sqrt{3})$, (0, 0) and (2, 0) is.
(A) $\left(1, \frac{\sqrt{3}}{2}\right)$ (B) $\left(\frac{2}{3}, \frac{1}{\sqrt{3}}\right)$ (C) $\left(\frac{2}{3}, \frac{\sqrt{3}}{2}\right)$ (D) $\left(1, \frac{1}{\sqrt{3}}\right)$

9. It is desired to construct a right angled triangle ABC ($\angle C = \pi/2$) in xy plane so that it's sides are parallel to coordinates axis and the medians through A and B lie on the lines $y = 3x+1$ and $y = mx +2$ respectively. The values of 'm' for which such a triangle is possible is /are ,
(A) 12 (B) 3/4 (C) 4/3 (D) 1/12

10. The equation of the line bisecting the obtuse angle between $y - x = 2$ and $\sqrt{3}y + x = 5$ is
(A) $\frac{y - x - 2}{\sqrt{2}} = \frac{\sqrt{3}y + x - 5}{2}$ (B) $\frac{y + x - 2}{\sqrt{2}} = \frac{\sqrt{3}y + x - 5}{2}$
(C) $\frac{-y + x + 2}{\sqrt{2}} = \frac{\sqrt{3}y - x - 5}{2}$ (D) none of these

11. If the intercept made on the line $y = mx$ by the lines $x = 2$ and $x = 5$ is less then 5, then the range of m is

(A) $(-4/3, 4/3)$ (B) $(-\infty, -4/3)\cup(4/3, \infty)$ (C) $[-4/3, 4/3)$ (D) none of these.

12. The equations of three sides of a triangle are $x = 5$, $y - 2 = 0$ and $x + y = 9$. The coordinates of the circumcentre of the triangle are

(A) (6, 3) (B) (6, -3)

(C) (-6, 3) (D) none of these.

13. The equation of a straight line passing through the point (–2, 3) and making intercepts of equal length on the axes is

(A) $2x + y + 1 = 0$ (B) $x - y = 5$

(C) $x - y + 5 = 0$ (D) none of these

14. If the intercept made on the line $y = mx$ by the lines $y = 2$ and $y = 6$ is less than 5 then the range of values of m is

(A) $\left(-\infty, -\frac{4}{3}\right)\cup\left(\frac{4}{3}, \infty\right)$ (B) $\left(-\frac{4}{3}, \frac{4}{3}\right)$

(C) $\left(-\frac{3}{4}, \frac{3}{4}\right)$ (D) none of these

15. If a, c, b are in G.P then the line $ax + by + c = 0$

(A) has a fixed direction

(B) always passes through a fixed point

(C) forms a triangle with axes whose area is constant

(D) none of these

16. If a ray travelling along the line $x = 1$ gets reflected from the line $x + y = 1$, then the equation the line along which the reflected ray travels is

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

(C) $x = 0$ (D) none of these

17. The equations of the lines representing the sides of a triangle are $3x - 4y = 0$, $x + y = 0$ and $2x - 3y = 7$. The line $3x + 2y = 0$ always passes through the

(A) incentre (B) centroid

(C) circumcentre (D) orthocentre

18. If the lines $x = a + m$, $y = -2$ and $y = mx$ are concurrent, the least value of $|a|$ is

(A) 0 (B) $\sqrt{2}$

(C) $2\sqrt{2}$ (D) None of these

19. Equation of a line passing through the intersection of the lines $2x + y = 3$ and $x + y = 1$ and perpendicular to the line $y = 2x + k$ is

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

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

20. If the sum of the reciprocals of the intercepts made by a line on the coordinate axes is 1/5, then the line always passes through

(A) (5, -5) (B) (-5, 5)

(C) (-5, -5) (D) (5, 5)

21. If $4a^2 + 9b^2 - c^2 + 12ab = 0$, $a, b, c \in R^+$, then the family of straight lines $ax + by + c = 0$ is concurrent at

(A) (2, 3) (B) (– 2, – 3)

(C) 2, – 3) (D) (– 3, 2)

22. Point P (2, 4) is translated parallel to the line y – x – 1 = 0, through a distance $3\sqrt{2}$ so that its ordinate is decreased and it reaches at Q. If R is the mirror image of Q in the line y – x – 1 = 0, its coordinate are
(A) (– 1, 1) (B) (0, 0)
(C) (6, 6) (D) none of these

23. If the line $y = \sqrt{3}x$ cuts the curve $x^3 + y^2 + 3x^2 + 9 = 0$ at the points A, B, C, then OA.OB.OC (O being origin) equals
(A) 36 (B) 72
(C) 108 (D) none of these

24. Let O be the origin, and let A(1, 0), B(0, 1) be two points. If P(x, y) is a point such that xy > 0 and x + y < 1, then
(A) P lies either inside the ΔOAB or in the third quadrant
(B) P cannot be inside the ΔOAB
(C) P lies inside the ΔOAB
(D) none of these

25. Let ABC be a triangle with equation of sides AB, BC, CA respectively x – 2 =0, y – 5 = 0 and 5x + 2y – 10 = 0, then the orthocentre of triangle lies on the line
(A) x – y = 0 (B) 3x + y =1
(C) 4x + y = 13 (D) x – 2y =1

26. The foot of the perpendicular on the line 3x + y = λ drawn from the origin is C if the line cuts the x–axis and y–axis at A and B respectively then BC : CA is
(A) 1: 3 (B) 3 : 1
(C) 1: 9 (D) 9 : 1

27. A straight line is drawn through the centre of the circle $x^2 + y^2 – 2ax = 0$, parallel to the straight line x + 2y = 0 and intersecting the circle at A and B. Then the area of ΔAOB is
(A) $\frac{a^2}{\sqrt{5}}$ (B) $\frac{a^3}{\sqrt{5}}$ (C) $\frac{a^2}{\sqrt{3}}$ (D) $\frac{a^3}{\sqrt{3}}$

28. In what ratio does the point (3, –2) divide the line segment joining the points (1, 4) and (–3, 16)?
(A) 1 : 3 (externally) (B) 3 : 1 (externally) (C) 1 : 3 (internally) (D) 3 : 1 (internally)

29. For what value of x will the points (x, –1), (2, 1) and (4, 5) lie on a line?
(A) 1 (B) 0 (C) 2 (D) none of these

30. The angle between straight lines $x^2 – y^2 – 2y – 1 = 0$ is
(A) 90^0 (B) 60^0 (C) 75^0 (D) 36^0

31. The distance between the lines 4x + 3y = 11 and 8x + 6y = 15 is
(A) 7/2 (B) 7/10 (C) 4 (D) none of these

32. Find the length of the perpendicular from origin to the straight line 3x –y + 2 = 0
(A) 2 (B) $-2/\sqrt{10}$ (C) $2/\sqrt{10}$ (D) none of these

33. If the sum of the slopes of the lines given by $4x^2 + 2kxy – 7y^2 = 0$ is equal to the product of the slopes then k =
(A) –4 (B) 4 (C) –2 (D) 2

34. Find the value of k, so that the equation $–2x^2 + xy + y^2 –5x + y + k = 0$ may represent a pair of straight lines

(A) –2 (B) 2 (C) 0 (D) none of these

35. The image of the point (1, 3) in the line $x + y - 6 = 0$ is
(A) (3, 5) (B) (5, 3) (C) (1, –3) (D) (–1, 3)

36. The lines joining the origin to the points of intersection of $2x^2 + 3xy - 4x + 1 = 0$ and $3x + y = 1$ given by
(A) $x^2 - y^2 - 5xy = 0$ (B) $x^2 - y^2 + 5xy = 0$ (C) $x^2 + y^2 - 5xy = 0$ (D) $x^2 + y^2 + 5xy = 0$

37. The distance between the lines $3x + 4y = 9$ and $6x + 8y + 15 = 0$
(A) 3 /10 (B) 33 /10
(C) 33 /5 (D) None of these

38. The equations of the three sides of a triangle are $x = 2$, $y + 1 = 0$ and $x + 2y = 4$. The coordinates of the circumcentre of the triangle are
(A) (4, 0) (B) (2, – 1)
(C) (0, 4) (D) None of these

39. If the lines $y - x = 5$, $3x + 4y = 1$ and $y = mx + 3$ are concurrent then the value of m is
(A) 19/5 (B) 1
(C) 5/19 (D) None of these

40. A line passing through the origin and making an angle $\pi/4$ with the line $y - 3x = 5$ has the equation
(A) $x + 2y = 0$ (B) $2x = y$
(C) $x = 2y$ (D) $y - 2x = 0$

41. The points (– 1, 1) and (1, – 1) are symmetrical about the line
(A) $y + x = 0$ (B) $y = x$
(C) $x + y = 1$ (D) None of these

42. The member of the family of lines $(p + q)x + (2p + q)y = p + 2q$, where $p \neq 0$, $q \neq 0$, pass through the point
(A) (3, – 1) (B) – 3 ,1)
(C) (1, 1) (D) None of these

43. The equation of straight line which passes through the point (1, 2) and makes an angle $\cos^{-1}\left(-\frac{1}{3}\right)$ with the x– axis is
(A) $2\sqrt{2}\,x + y - 2\left(\sqrt{2}+1\right) = 0$ (B) $2x + \sqrt{2}\,y - \sqrt{2} = 0$
(C) $x + 2\sqrt{2}\,y - 2\sqrt{2}\left(\sqrt{2}-1\right) = 0$ (D) none of these

44. The quation of the line joining the points (– 1, 3) and (4, – 2) is
(A) $x + y - 1 = 0$ (B) $x + y + 1 = 0$
(C) $x + y + 2 = 0$ (D) $x + y - 2 = 0$

45. The equation of the line through (3, 4) and parallel to the line $y = 3x + 5$ is
(A) $3x - y - 5 = 0$ (B) $3x + y - 5 = 0$
(C) $3x + y + 5 = 0$ (D) $3x - y + 5 = 0$

46. Locus of the point of intersection of lines
$x \cos\alpha + y \sin\alpha = a$ and $x \sin\alpha - y \cos\alpha = a$ ($\alpha \in R$) is
(A) $x^2 + y^2 = a^2$ (B) $x^2 + y^2 = 2a^2$
(C) $x^2 + y^2 + 2x + 2y = a^2$ (D) none of these

47. The quadratic equation whose roots are the x and y intercepts of the line passing through (1, 1) and making a triangle of area A with axes is
(A) $x^2 + Ax + 2A = 0$ (B) $x^2 - 2Ax + 2A = 0$
(C) $x^2 - Ax + 2A = 0$ (D) None of these

48. The area of the quadrilateral formed by $y = 1 - x$, $y = 2 - x$ and the coordinate axes is
(A) 1 (B) 2
(C) 3/2 (D) None of these

49. The incentre of the triangle formed by the lines $y = |x|$ and $y = 1$ is
(A) $(0, 2 - \sqrt{2})$ (B) $(2 - \sqrt{2}, 0)$
(C) $(2 + \sqrt{2}, 0)$ (D) $(0, 2 + \sqrt{2})$

50. If one vertex of an equilateral triangle is at (1, –2) and the base is $x + y + 2 = 0$, then the length of each side is
(A) $\sqrt{\frac{3}{2}}$ (B) $\sqrt{\frac{2}{3}}$ (C) $\frac{2}{3}$ (D) $\frac{3}{2}$

51. Points on the line $x + y = 4$ that lie at a unit distance from the line $4x + 3y - 10 = 0$ are
(A) (3, 1) and (–7, 11) (B) (–3, 7) and (2, 2)
(C) (–3, 7) and (–7, 11) (D) none of these

52. The locus of the mid-point of the portion intercepted between the axes by the line $x \cos \alpha + y \sin \alpha = p$, where p is a constant is
(A) $x^2 + y^2 = 4p^2$ (B) $\frac{1}{x^2} + \frac{1}{y^2} = \frac{4}{p^2}$
(C) $x^2 + y^2 = \frac{4}{p^2}$ (D) $\frac{1}{x^2} + \frac{1}{y^2} = \frac{2}{p^2}$

53. The straight lines of the family $x(a+b) + y(a-b) = 2a$ (a and b being parameters) are
(A) not concurrent (B) Concurrent at (1, -1)
(C) Concurrent at (1, 1) (D) None of these

54. If the sum of the distances of a point from two perpendicular lines in a plane is 1, then its locus is
(A) square (B) a circle
(C) straight line (D) two intersecting lines

55. If the line $y = mx$ meets the lines $x + 2y - 1 = 0$ and $2x - y + 3 = 0$ at the same point, then m is equal to
(A) 1 (B) -1
(C) 2 (D) -2

56. The area inclosed by $3|x| + 4|y| \le 12$ is
(A) 6 squar units (B) 12 sq. units
(C) 24 square units (D) 36 square units

57. If a, b, c are in A.P. then line $2ax + 3by + 3c = 0$ always passes through fixed point
(A) (2, –2) (B) (3/2, 2)
(C) (3/2, –2) (D) none of these

58. Equation $(3a - 2b)x^2 + (c - 2a)y^2 + 2hxy = 0$ represents pair of straight lines which are perpendicular to each other then $(a - b)$ is equal to
(A) $b + c$ (B) $b - c$
(C) $c - b$ (D) $2c$

59. $ax + by + c = 0$ represents a line parallel to x–axis if
(A) $a = 0, b = 0$ (B) $a = 0, b \neq 0$
(C) $a \neq 0, b = 0$ (D) $c = 0$

60. If the angle between the two straight lines represented by $2x^2 + 5xy + 3y^2 + 7y + 4 = 0$ is $\tan^{-1} m$ then m equals to
(A) 1/5 (B) 1
(C) 7/5 (D) 7

61. The diagonals of a parallelogram PQRS are along the straight lines $ax + 2by = 50$ and $4bx - 2ay = 100$. Then PQRS must be a
(A) rhombus (B) rectangle
(C) square (D) none of these

62. The area enclosed by $|x| + |y| = 1$ is
(A) 1 (B) 2
(C) 3 (D) 4

63. If the line $6x - y + 2 + k(2x + 3y + 13) = 0$ is parallel to x-axis, then the value of k is
(A) $-\frac{1}{3}$ (B) $\frac{1}{3}$ (C) -3 (D) 3

64. The straight line passing through the point of intersection of the straight lines $x - 3y + 1 = 0$ and $2x + 5y - 9 = 0$ and having infinite slope has the equation
(A) $x = 2$ (B) $3x + y - 1 = 0$ (C) $y = 1$ (D) none of these

65. The equations of the lines through $(-1, -1)$ and making angle 45° with the line $x + y = 0$ are given by
(A) $x^2 - xy + x - y = 0$ (B) $xy - y^2 + x - y = 0$
(C) $xy + x + y = 0$ (D) $xy + x + y + 1 = 0$

66. If a line is perpendicular to the line $5x - y = 0$ and forms a triangle with coordinate axes of area 5 sq. units, then its equation is
(A) $x + 5y \pm 5\sqrt{2} = 0$ (B) $x - 5y \pm 5\sqrt{2} = 0$
(C) $5x + y \pm 5\sqrt{2} = 0$ (D) $5x - y \pm 5\sqrt{2} = 0$

67. The co-ordinates of foot of the perpendicular form the point (2, 4) on the line $x + y = 1$ are
(A) $\left(\frac{1}{2}, \frac{3}{2}\right)$ (B) $\left(-\frac{1}{2}, \frac{3}{2}\right)$ (C) $\left(\frac{4}{3}, \frac{1}{2}\right)$ (D) $\left(\frac{3}{4}, -\frac{1}{2}\right)$

68. The distance of the line $2x - 3y = 4$ from the point (1, 1) in the direction of the line $x + y = 1$ is ……………………………………………

69. If the point (2, a) lies between the lines $x + y = 1$ and $2(x + y) = 5$, then a lies between ……………………….. and …………………………………..

70. If $mn = 1$, then the lines $mx + y = 1$ and $y - nx = 2$ will be ………………………………………

71. If the point $(2a-3, a^2-1)$ is on the same side of the line $x + y - 4 = 0$ as that of the origin, then the set of values of a is ……………………………

72. The set of lines $ax + by + c = 0$ where $3a + 2b + 4c = 0$ is concurrent at the point ………………………………………………..

73. If the image of the point $(-2, 1)$ by a line mirror be $(2, -1)$ then the equation of the line mirror is ……………………………………..…………

74. If the point $(-2, 0)$, $(-1, 1/\sqrt{3})$ and $(\cos\theta, \sin\theta)$ are collinear then the cumber of values of $\theta \in [0, 2\pi]$.
(A) 0
(B) 1
(C) 2
(D) infinite

75. If 'a' and 'b' are real numbers between 0 and 1 such that the points (a, 1), (1, b) and (0, 0) from an equilateral triangle then the values of 'a' and 'b' respectively
(A) $2 - \sqrt{3}$, $2 - \sqrt{3}$
(B) $-2 + \sqrt{3}$, $-2 + \sqrt{3}$
(C) $2 \pm \sqrt{3}$, $2 \pm \sqrt{3}$
(D) none of these

76. If $f(x) = \begin{cases} \dfrac{\log(1+ax) - \log(1-bx)}{x}, & x \neq 0 \\ -c, & x = 0 \end{cases}$
is continuous at $x = 0$, then the line $ax + by + c = 0$ passes through the point
(A) $(1, -1)$
(B) $(-1, 1)$
(C) $(1, 1)$
(D) $(0, 0)$

LEVEL-II

1. The centroid ≡ (1, 2), circumcentre ≡ (–2, 1) then co– ordinate of orthocentre is.
(A) (4, 7) (B) (–4, 7) (C) (7, 4) (D) (5/2, 5/2)

2. It the co– ordinates of vertices of a triangle are (0, 5), (1, 4) and (2, 5) then the co– ordinate of circumcentre will be.
(A) (1, 5) (B) $\left(\frac{3}{2}, \frac{9}{2}\right)$ (C) (1, 4) (D) none of these

3. The equation of the image of pair of rays $y = |x|$ by the line $x = 1$ is
(A) $|y| = x + 2$ (B) $|y| + 2 = x$
(C) $y = |x - 2|$ (D) none of these

4. If the line segment on $lx + my = n^2$ intercepted by the curve $y^2 = ax$ subtends a right angle at the origin, then
(A) a, n, l are in G.P (B) l, m, n are in G.P
(C) l, m, n^2 are in G.P (D) l, n^2, m are in G.P

5. If the line $y = \sqrt{3}\,x$ cuts the curve $x^4 + ax^2y + bxy + cx + dy + 6 = 0$ at A, B, C and D, then OA.OB.OC.OD (where O is the origin) is
(A) a – 2b +c (B) $2c^2d$ (C) 96 (D) 6

6. A ray of light travelling along the line $x + y = 1$ is inclined on the x-axis and after refraction it enters the other side of the x-axis by turning 15° away from the x-axis. The equation of the line along which the refraction ray travels is
(A) $\sqrt{3}\,y - x + 1 = 0$ (B) $\sqrt{3}\,y + x + 1 = 0$
(C) $\sqrt{3}\,y + x - 1 = 0$ (D) none of these .

7. The coordinates of the point(s) on the line $x + y = 5$, which is/are equidistant from the lines $|x| = |y|$, is/are
(A) (5, 0) (B) (1, 4)
(C) (-5, 0) (D) (0, -5)

8. If the point (a, a) falls between the lines $|x + y| = 2$, then
(A) $|a| = 2$ (B) $|a| = 1$
(C) $|a| < 1$ (D) $|a| < 1/2$

9. A line has intercepts a and b on the coordinate axes. If keeping the origin fixed, the coordinate axes are rotated through 90°, the same line has intercepts p and q, then
(A) p =a, q = b (B) p = b, q = a
(C) p = -b, q = -a (D) p = b, q = -a

10. Two sides of a rhombus OABC (lying entirely in first quadrant or fourth quadrant) of area equal to 2 sq. units, are $y = \frac{x}{\sqrt{3}}$, $y = \sqrt{3}\,x$. Then possible coordinates of B is / are ('O' being the origin)
(A) $\left(1+\sqrt{3}, 1+\sqrt{3}\right)$ (B) $\left(-1-\sqrt{3}, -1-\sqrt{3}\right)$
(C) $\left(\sqrt{3}-1, \sqrt{3}-1\right)$ (D) none of these

13. Equation of the bisector of angle B of the triangle ABC is y = x. If A is (2, 6) and B is (1, 1); equation of side BC is
(A) $2x + y - 3 = 0$
(B) $x - 5y + 4 = 0$
(C) $x - 6y + 5 = 0$
(D) none of these

14. Vertex opposite to the side $x + y - 2 = 0$ of the equilateral triangle, with centroid at the origin; is
(A) $(-1, 1)$
(B) $(2, 2)$
(C) $(-2, -2)$
(D) none of these

15. A = $\left(\sqrt{1-t^2}+t,\ 0\right)$ and B = $\left(\sqrt{1-t^2}-t,\ 2t\right)$ are two variable points where t is a parameter, the locus of the middle point of AB is
(A) a straight line
(B) a pair of straight line
(C) circle
(D) none of these

16. The ends of a diagonal of a square are (2 ,– 3) and (– 1 ,1). Another vertex of the square can be
(A) (– 3/2, – 5/2)
(B) (– 5/2, 3/2)
(C) (1/2 , 5/2)
(D) None of these

17. If the equations of the three sides of a triangle are $2x + 3y = 1$, $3x - 2y + 6 = 0$ and $x + y = 1$, then the orthocentre of the triangle lies on the line
(A) $13x + 13y = 1$
(B) $169x + 26y = -178$
(C) $169x + y = 0$
(D) none of these.

18. The orthocentre of the triangle formed by the lines $2x^2 + 3xy - 2y^2 - 9x + 7y - 5 = 0$ $4x + 5y - 3 = 0$ lies at
(A) (3/5 , 11/5)
(B) (6/5, 11/5)
(B) (5/6, 11/5)
(D) None of these

19. The number of lines that can be drawn from the point (2, 3), so that its distance from (-1, 6) is equal to 6, is
(A) 1
(B) 2
(C) 0
(D) infinite

20. If ΔOAB is an equilateral triangle (O is the origin and A is a point on the x-axis), then centroid of the triangle will be
(A) always rational
(B) rational if B is rational
(C) rational if A is rational
(D) never rational
(a point P(x, y) is said to be rational if both x and y are rational)

21. Equation of a straight line passing through the point (4, 5) and equally inclined to the lines $3x = 4y + 7$ and $5y = 12x + 6$ is
(A) $9x - 7y = 1$
(B) $9x + 7y = 71$
(C) $7x - 9y = 73$
(D) $7x - 9y + 17 = 0$

22. Two vertices of a triangle are (5, -1) and (-2, 3). If the orthocentre of the triangle is the origin, then the third vertex is
(A) (-4, 7) (B) (-4, -7) (C) (4, -7) (D) (4, 7)

23. Drawn from the origin are two mutually perpendicular lines forming an isosceles triangle with the straight line $2x + y = a$. Then the area of this triangle is ………………………….

24. Two particles start form the same point (2, –1), one moving 2 units along the line x + y = 1 and the other 5 units along the line x –2y = 4. If the particles move towards increasing y, then their new positions are ………………., ……………………………

25. The points (α, β), (γ, δ), (α, δ) and (γ, β) where $\alpha, \beta, \gamma, \delta$ are different real numbers, are
(A) collinear
(B) vertices of square
(C) vertices of rhombus
(D) concyclic

26. A ray travelling along the line 3x – 4y = 5 after being reflected from a line l travels along the line 5x + 12y = 13. Then the equation of line l is
(A) x + 8y = 0
(B) x = 8y + 3
(C) 32x + 4y = 65
(D) 32x – 4y + 65 = 0

27. A light ray emerging from the point source placed at P(2, 3) is reflected at a point 'Q' on the y−axis and then passes through the point R(5, 10). Co−ordinates of 'Q' is
(A) (0, 3)
(B) (0, 2)
(C) (0, 5)
(D) none of these

28. Equation $ax^2 + 2hxy + by^2 = 0$ represents a pair of lines combined equation of lines that can be obtained by reflecting these lines about the x−axis is
(A) $ax^2 - 2hxy + by^2$
(B) $bx^2 - 2hxy + ay^2 = 0$
(C) $bx^2 + 2hxy + ay^2$
(D) none of these

29. Let $A(x_1, y_1)$, $B(x_2, y_2)$ and $C(x_3, y_3)$ be three points such that abscissae and ordinates form 2 different A.P.'s . Then these points
(A) form an equilateral triangle
(B) are collinear
(C) are concyclic
(D) none of these

30. a, b, c are in A.P. and ax + by + c = 0 represents the family of line. Equation of line of this family passing through $P(\alpha, \beta)$; where α = values of 'x' where $\frac{x^2-1}{x^2+1}$ has the least value and $\beta = \int_{-1}^{1}(x-[x])dx$; is
(A) 3x + y − 1 = 0
(B) x + y + 1 = 0
(C) 3x − 2y − 7 = 0
(D) none of these

31. The co-ordinates of the vertices of rectangle ABCD; where A(0, 0), B(4, 0), C(4, 2), D(0, 2) undergoes following '3' successive tranformations
a. $(x, y) \to (y, x)$
b. $(x, y) \to (x + 3y, y)$
c. $(x, y) \to \left(\frac{x-y}{2}, \frac{x+y}{2}\right)$
Then the final figure formed will be
(A). a square
(B) a rhombus
(C) a rectangle
(D) a parallelogram

LEVEL-III

1. If the straight lines ax + by + p = 0 and x cosα + y sinα = p are inclined at an angle $\pi/4$ and concurrent with the straight line x sinα - y cosα = 0, then the value of $a^2 + b^2$ is
(A) 0 (B) 1
(C) 2 (D) none of these .

2. If one vertex of an equilateral triangle of side 2 is the origin and another vertex lies on the line $x = \sqrt{3}y$, then the third vertex can be
(A) (0, 2) (B) $\left(-\sqrt{3},\ -1\right)$
(C) (–2, –2) (D) $\left(\sqrt{3}, 1\right)$

3. The locus of a point which divides a line segment AB = 4cm in 1 : 2, where A lies on the line y = x and B lies on the y = 2x is
(A) $234x^2 + 153y^2 - 378xy - 32 = 0$ (B) $234x^2 + 153y^2 - 378xy + 32 = 0$
(C) $234x^2 + 153y^2 + 378xy + 32 = 0$ (D) None of these

4. All points lying inside the triangle formed by the points (1, 3), (5, 0) and (–1, 2) satisfy
(A) $3x + 2y \geq 0$ (B) $2x + y - 13 \geq 0$
(C) $2x - 3y - 12 \geq 0$ (D) $-2x + y \geq 0$

5. A family of lines is given by $(1 + 2\lambda)x + (1 - \lambda)y + \lambda = 0$, λ being the parameter. The line belonging to this family at the maximum distance from the point (1, 4) is
(A) 4x – y + 1 (B) 12x + 33y = 7
(C) 13x + 12y + 9 = 0 (D) none of these

6. If A $\equiv$ (0, 1) and B(2, 0) be two points and 'P' be a point on the line 4x + 3y + 9 = 0. Co-ordinates of the point 'P' such that |PA − PB| is minimum is
(A) $\left(\frac{3}{20}, -\frac{14}{5}\right)$ (B) $\left(-\frac{3}{20}, \frac{14}{5}\right)$
(C) $\left(\frac{3}{20}, -\frac{12}{5}\right)$ (D) $\left(-\frac{24}{5},\ \frac{17}{5}\right)$

7. Consider the points A (0, 1) and B (2, 0). 'P' be a point on the line 4 x + 3 y + 9 = 0 Co–ordinates of the point 'P' such that $|PA - PB|$ is maximum, is
(A) $\left(\frac{-12}{5}, \frac{17}{5}\right)$ (B) $\left(\frac{24}{5}, \frac{-17}{5}\right)$
(C) $\left(\frac{-24}{5}, \frac{17}{5}\right)$ (D) $\left(\frac{12}{5}, \frac{-17}{5}\right)$

8. A straight line passing through P (3, 1) meet the co–ordinate axes at 'A' and 'B'. It is given that distance of this straight line from the origin 'O' is maximum. Area of Δ OAB is equal to
(A) $\frac{50}{3}$ sq. units (B) $\frac{100}{3}$ sq. units
(C) $\frac{25}{3}$ sq. units (D) 1 sq. units

9. Consider the points A (0, 1) and B (2, 0) P be a point on the line y = x. Co–ordinates of the point 'P' such that PA+ PB is minimum, is
(A) (2/3, 2/3) (B) (3/2, 3/2)
(C) (1, ½) (D) (–2, 2)

10. Consider the points A (3, 4) and B (4, 13). If 'P' be a point on the line y = x such that PA + PB is minimum, then 'P' is

(A) $\left(\frac{-31}{7}, \frac{-31}{7}\right)$ (B) $\left(\frac{31}{7}, \frac{31}{7}\right)$

(C) $\left(\frac{13}{7}, \frac{13}{7}\right)$ (D) $\left(\frac{23}{7}, \frac{23}{7}\right)$

11. Equation $ax^2 + 2bxy + by^2 = 0$ represents a pair of lines. Combined equation of lines that can be obtained by reflecting these lines about the x – axis is

(A) $b x^2 - 2 b x y + a y^2 = 0$ (B) $a x^2 + 2 b x y + b y^2 = 0$

(C) $b x^2 + 2 b x y + a y^2 = 0$ (D) $a x^2 - 2 b x y + b y^2 = 0$

12. If the point P (a, a^2) lies completely inside the triangle formed by the lines x = 0, y = 0 and x + y = 2, then exhaustive range of 'a' is

(A) $a \in (0, 2)$ (B) $a \in (0, 1)$

(C) $a \in (1, \sqrt{2})$ (D) $a \in (-\sqrt{2}, 1)$

13. Equation of the straight line belonging to the family of lines $(x + y) + \lambda (2x - y + 1) = 0$, that is farthest from (1, –3) is

(A) 13 y – 6 x = 7 (B) 13 y + 6 x = 0

(C) 15 y + 6 x = 7 (D) 15 y – 6 x = 7

14. If a < b < c < d and 'k' is the number of real roots of the equation (x – a) (x – c) + 2 (x – b) (x – d) = 0, then equation of the line parallel to y–axis and cutting an intercept 'k' on x–axis is,

(A) x = 0 (B) x = 1

(C) x = 2 (D) None of these

15. If a, b, c are in A. P., then the straight lines a x + 2 y + 1 = 0, b x + 3 y + 1 = 0 and c x + 4 y + 1 = 0

(A are concurrent (B) form a triangle

(C) are parallel (D) Can't say

16. If a, b, c are in A. P. then the image of the point of intersection of the family of lines ax + b y + c = 0 in the line y = 0 lies on the line

(A) x + 2 y – 5 = 0 (B) 2 x = y = 0

(C) 3 x + 4 y + 5 = 0 (D) 3 x + 4 y – 11 = 0

17. If $f(x) = \frac{\log(1+ax) - \log(1-bx)}{x}, x \neq 0$ and is continuous at x = 0,

$= -c \qquad , x = 0$

then the line a x + b y + c = 0 passes through the point

(A) (1, –1) (B) (–1, 1)

(C) (–1, –1) (D) (1,1)

18. If $m = \left(\frac{i+\sqrt{3}}{2}\right)^{200} + \left(\frac{i-\sqrt{3}}{2}\right)^{200}$, then equation of the image of the line having slope 'm' and passing through (0, 0) in the x–axis is

(A) x – y = 0 (B) x + y = 0

(C) 2 x – 3 y = 0 (D) 2 x + 3 y = 0

19. If 3 a + 4 b + 2 c = 0, then the point of concurrent of the family of lines a x + b y + c = 0 and (1, 2) are

(A) on the same sides of the line 4 x – y + 1 = 0

(B) on the opposite side of the line 4 x – y + 1 = 0

(C) are at equal distances from the origin.

(D) None of these

20. If a, b, c are three consecutive integers, then the family of lines $a x + b y + c = 0$ are concurrent at the point,

(A) (1, 2) (B) (–2, 1)

(C) (1, –2) (D) None of these

ANSWERS

LEVEL –I

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

LEVEL –II

1.	C	2.	A	3.	C	4.	A
5.	C	6.	D	7.	A	8.	C
9.	D	10.	A, B	13.	B	14.	C
15.	D	16.	A	17.	B	18.	A
19.	C	20.	D	21.	A	22.	B
23.	$\frac{a^2}{5}$	24.	$\left(2-\sqrt{2},\ \sqrt{2}-1\right)$ and $\left(2+\frac{4}{\sqrt{5}}, -1+\frac{2}{\sqrt{5}}\right)$				
25.	D	26.		27.	C	28.	A
29.	B	30.	A	31.	D	32.	D

LEVEL –III

1.	C	2.	A	3.	A	4.	C
5.	B	6.	D	7.	d	8.	A
9.	A	10.	B	11.	D	12.	B
13.	D	14.	C	15.	a	16.	A
17.	D	18.	b	19.	A	20.	C