Shiksha Classes Bhandara

Mathematics **Topic : Point and Straight lines** **MM 100**

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

Q.2 OAB is an equilateral triangle of side 2 units and one vertex at origin. If OA is inclined at 60° to the positive x-axis, then the mid point of AB has coordinates
(A) $\left(\frac{1-\sqrt{3}}{2}, \frac{1+\sqrt{3}}{2}\right)$ (B) $\left(\frac{\sqrt{3}-1}{2}, \frac{\sqrt{3}+1}{2}\right)$
(C) $(1-\sqrt{3}, 1+\sqrt{3})$ (D) $\left(\frac{\sqrt{3}-1}{2}, \frac{\sqrt{3}-1}{2}\right)$

Q.3 S_1 and S_2 are two points on AB of a ΔABC with vertices (–2, 3), (4, –6) and (1, 1). CS_1 and CS_2 divide the triangle into three of equal area. The equation of the lines through the origin drawn parallel to CS_1 and CS_2 is-
(A) $y^2 + 4xy - 3x^2 = 0$ (B) $3y^2 + 4xy + x^2 = 0$
(C) $y^2 + 3xy - 4x^2 = 0$ (D) $y^2 + 5xy + 4x^2 = 0$

Q.4 Locus of a point that is equidistant from the lines $x + y - 2\sqrt{2} = 0$ and $x + y - \sqrt{2} = 0$ is
(A) $x + y - 5\sqrt{2} = 0$ (B) $x + y - 3\sqrt{2} = 0$
(C) $2x + 2y - 3\sqrt{2} = 0$ (D) $2x + 2y - 5\sqrt{2} = 0$

Q.5 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) None of these

Q.6 If the quadrilateral formed by the lines $ax + by + c = 0$, $ax + by + c_1 = 0$ $a_1x + b_1y + c_1 = 0$, $a_1x + b_1y + c_1 = 0$, $a_1x + b_1y + c = 0$ has perpendicular diagonals, then
(A) $a^2 + b^2 = a_1^2 + b_1^2$ (B) $b^2 + c^2 = b_1^2 + c_1^2$
(C) $a^2 + c^2 = a_1^2 + c_1^2$ (D) $a + b = a_1 + b_1$

Q.7 The diagonals AC and BD of a rhombus intersect at (5, 6). If $A \equiv (3, 2)$ then equation of diagonal BD is
(A) $y - x = 1$ (B) $2y - x = 17$
(C) $y - 2x + 4 = 0$ (D) $2y + x = 17$

Q.8 The family of straight lines $(2a + 3b)x + (a - b)y + 2a - 4b = 0$ is concurrent at the point
(A) $\left(\frac{2}{5}, \frac{-14}{5}\right)$ (B) $\left(\frac{-2}{5}, \frac{-14}{5}\right)$
(C) $\left(\frac{-2}{5}, \frac{14}{5}\right)$ (D) $\left(\frac{2}{5}, \frac{14}{5}\right)$

Q.9 If the lines $\left.\begin{array}{l} \lambda x + (\sin\alpha)\, y + \cos\alpha = 0 \\ x + (\cos\alpha)\, y + \sin\alpha = 0 \\ x - (\sin\alpha)\, y + \cos\alpha = 0 \end{array}\right]$
pass through the same point where $\alpha \in R$ then λ lies in the interval.
(A) $[-1, 1]$ (B) $[-\sqrt{2}, -\sqrt{2}]$
(C) $[-2, 2]$ (D) $(-\infty, \infty)$

Q.10 Consider the straight line $ax + by = c$ where $a, b, c \in R^+$. This line meets the coordinate axes at 'P' and 'Q' respectively. If the area of triangle OPQ, 'O' being origin, does not depend upon a, b and c, then
(A) a, b, c are in G.P. (B) a, c, b are in G.P.
(C) a, b, c are in A.P. (D) a, c, b are in A.P.

Q.11 The nearest point on the line $3x + 4y = 12$ from the origin is
(A) $\left(\frac{36}{25}, \frac{48}{25}\right)$ (B) $\left(3, \frac{3}{4}\right)$
(C) (2, 3/2) (D) none of these

Q.12 If a, b, c are in A.P. then $ax + by + c = 0$ represents
(A) a single line
(B) a family of concurrent lines
(C) a family of parallel lines (D) none of these

Q.13 Image of the point P(1, 5) with respect to the line $4x + 3y + 6 = 0$ is -
(A) $\left(\frac{19}{25}, \frac{13}{25}\right)$ (B) $\left(\frac{13}{25}, \frac{19}{25}\right)$
(C) (–7, – 1) (D) $\left(\frac{191}{25}, \frac{113}{25}\right)$

Q.14 If the points $P(a^2, a)$ lies in the region corresponding to the acute angle between the lines $2y = x$ and $4y = x$, then
(A) $a \in (2, 6)$ (B) $a \in (4, 6)$
(C) $a \in (2, 4)$ (D) none of these

Q.15 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 –
(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) $\sqrt{3}y + x - 3 + 2\sqrt{3} = 0$

Q.16 If the equations of the pairs of opposite sides of a parallelogram are $x^2 - 5x + 6 = 0$ and $y^2 - 6y + 5 = 0$, then equations of its diagonals are
(A) $x + 4y = 13$, $y = 4x - 7$ (B) $4x + y = 13$, $4y = x - 7$
(C) $4x + y = 13$, $y = 4x - 7$ (D) $y - 4x = 13$, $y + 4x = 7$

Q.17 The vertices of a triangle ABC are A $(p^2, -p)$, B (q^2, q), C $(r^2, -r)$. The area of the triangle ABC is –
(A) $\frac{1}{2}(p + q)(q + r)(r + p)$ (B) $\frac{1}{2}(p - q)(q + r)(r + p)$
(C) $\frac{1}{2}(p + q)(q - r)(r - p)$ (D) $\frac{1}{2}(p + q)(q + r)(p - r)$

Q.18 Let $0 < \alpha < \pi/2$ be fixed angle. If $P = (\cos\theta, \sin\theta)$ and $Q = (\cos(\alpha - \theta), \sin(\alpha - \theta))$, then Q is obtained from P by
(A) clockwise rotation around origin through an angle α
(B)anticlockwise rotation around origin through an angle α
(C) reflection in the line through origin with slope $\tan\alpha$
(D) reflection in the line through origin with slope $\tan(\alpha/2)$

Q.19 The incentre of the triangle with vertices $(1, \sqrt{3}), (0, 0)$ and (2, 0) is –
(A) $(1, \sqrt{3}/2)$ (B) $(2/3, 1/\sqrt{3})$
(C) $(2/3, \sqrt{3}/2)$ (D) $(1, 1/\sqrt{3})$

Q.20 The vertices of a triangle are (0, 0), (3, 0) and (0, 4). Its orthocentre is at –

(A) (3/2, 2) (B) (0, 0)

(C) (1, 4/3) (D) None of these

For Q.21-Q.25 :

The answer to each question is a NUMERICAL VALUE.

Q.21 If the slope of one of the lines represented by $ax^2 + 2hxy + by^2 = 0$ be the square of the other, then $\frac{a+b}{h} + \frac{8h^2}{ab}$ is equal to –

Q.22 If $7x + 3y + 9 = 0$ and $y = kx + 7$ are two parallel lines than

(–3k) is –

Q.23 The straight lines $7x – 2y + 10 = 0$ and $7x + 2y – 10 = 0$ forms an isosceles triangle with the line $y = 2$. Area of this triangle is (18 / X) sq. units. Find the value of X.

Q.24 A straight line through the origin O meets the parallel lines $4x + 2y = 9$ and $2x + y + 6 = 0$ at points P and Q respectively. Then the point O divides the segment PQ in the ratio is

X : 4. Find the value of X.

Q.25 If one vertex of equilateral Δ is at A (3, 4) and the base BC is $x + y – 5 = 0$, then the length of each side of the Δ is $\frac{X\sqrt{2}}{\sqrt{3}}$. Find the value of X.