EXERCISE – I SINGLE CORRECT (OBJECTIVE QUESTIONS)

1. The points $\left(0, \frac{8}{3}\right)$, (1,3) and (82,30) are vertices of
(A) an obtuse angled triangle (B) an acute angled triangle
(C) a right angled triangle (D) none of these

2. The ratio in which the line joining the points (3, –4) and (–5, 6) is divided by x-axis
(A) 2 : 3 (B) 6 : 4 (C) 3 : 2 (D) none of these

3. The circumcentre of the triangle with vertices (0, 0), (3, 0) and (0, 4) is
(A) (1, 1) (B) (2, 3/2)
(C) (3/2, 2) (D) none of these

4. The mid points of the sides of a triangle are (5, 0), (5, 12) and (0, 12), then orthocentre of this triangle is
(A) (0, 0) (B) (0, 24) (C) (10, 0) (D) $\left(\frac{13}{3}, 8\right)$

5. Area of a triangle whose vertices are ($a \cos \theta$, $b \sin\theta$), ($-a \sin \theta$, $b \cos \theta$) and ($-a \cos \theta$, $-b \sin \theta$) is
(A) $ab \sin \theta \cos \theta$ (B) $a \cos \theta \sin \theta$
(C) $\frac{1}{2}ab$ (D) ab

6. The point A divides the join of the points (–5, 1) and (3, 5) in the ratio k : 1 and coordinates of points B and C are (1, 5) and (7, –2) respectively. If the area of ΔABC be 2 units, then k equals
(A) 7, 9 (B) 6, 7 (C) 7, 31/9 (D) 9, 31/9

7. If A($\cos\alpha$, $\sin\alpha$), B($\sin\alpha$, $-\cos\alpha$), C(1, 2) are the vertices of a ΔABC, then as a varies, the locus of its centroid is
(A) $x^2 + y^2 - 2x - 4y+3=0$ (B) $x^2+y^2 - 2x-4y+1 = 0$
(C) $3(x^2 + y^2) - 2x - 4y+1=0$ (D) none of these

8. The points with the co-ordinates (2a, 3a), (3b, 2b) & (c, c) are collinear
(A) for no value of a, b, c (B) for all values of a, b, c
(C) If a, $\frac{c}{5}$, b are in H.P. (D) if a, $\frac{2}{5}$c, b are in H.P.

9. A stick of length 10 units rests against the floor and a wall of a room. If the stick begins to slide on the floor then the locus of its middle point is
(A) $x^2 + y^2 = 2.5$ (B) $x^2 + y^2 = 25$
(C) $x^2 + y^2 = 100$ (D) none

10. 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) $5y - 3x + 15 = 0$ (B) $5y - 3x = 15$
(C) $3y - 5x + 15 = 0$ (D) none of these

11. 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) $x + 2y - 7 = 0$ (D) $x - y + 8 = 0$

12. The co-ordinates of the vertices P, Q, R & S of square PQRS inscribed in the triangle ABC with vertices A(0, 0), B(3, 0) & C(2, 1) given that two of its vertices P, Q are on the side AB are respectively
(A) $\left(\frac{1}{4}, 0\right), \left(\frac{3}{8}, 0\right), \left(\frac{3}{8}, \frac{1}{8}\right)$ & $\left(\frac{1}{4}, \frac{1}{8}\right)$
(B) $\left(\frac{1}{2}, 0\right), \left(\frac{3}{4}, 0\right), \left(\frac{3}{4}, \frac{1}{4}\right)$ & $\left(\frac{1}{2}, \frac{1}{4}\right)$
(C) $(1, 0) \left(\frac{3}{2}, 0\right), \left(\frac{3}{2}, \frac{1}{2}\right)$ & $\left(1, \frac{1}{2}\right)$
(D) $\left(\frac{3}{2}, 0\right), \left(\frac{9}{4}, 0\right), \left(\frac{9}{4}, \frac{3}{4}\right)$ & $\left(\frac{3}{2}, \frac{3}{4}\right)$

13. 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) none of these

14. 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

15. 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

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

17. The angle between the lines y − x + 5 = 0 and $\sqrt{3}x - y + 7 = 0$ is
(A) 15º (B) 60º (C) 45º (D) 75º

18. 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

19. The equation of the line passing through the point (c, d) and parallel to the line ax + by + 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) none of these

20. 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

21. 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) (−∞, 0) ∪ (8, ∞) (B) (−∞, 0) ∪ (3, ∞)
(C) (0, 3) (D) (3, 8)

22. The line 3x + 2y = 6 will divide the quadrilateral formed y 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

23. 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) (−∞, 3) ∪ (9/2, ∞) (B) (3, 9/2)
(C) (−∞, 3) (D) (9/2, ∞)

24. 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

25. If P(1, 0) ; Q(−1, 0) & R(2, 0) are three give points, then the locus of the points S satisfying the relation, $SQ^2 + SR^2 = 2\,SP^2$ is
(A) A straight line parallel to x-axis
(B) A circle passing through the origin
(C) A circle with the centre at the origin
(D) A straight line parallel to y-axis

26. 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

27. 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)

28. Distance of the point (2, 5) from the line 3x + y + 4 = 0 measured parallel to the line 3x − 4y + 8 = 0 is
(A) 15/2 (B) 9/2 (C) 5 (D) none

29. Three vertices of triangle ABC are A(−1, 11), B(−9, −8) and C(15, −2). The equation of angle bisector of angle A is
(A) 4x − y=7 (B) 4x + y=7 (C) x + 4y=7 (D) x−4y=7

30. 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

31. 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)

32. If the axes are rotated through an angle of 30º 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) $(\sqrt{3}, 2)$

33. Keeping the origin constant axes are rotated at an angle 30º in clockwise 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) none of these

34. 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

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

36. 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

37. 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. The equation of the median through A is
(A) (p–2q)x+(q–2p)y+1=0 (B) (p + q) x+y – 2=0
(C) $(2pq - 1)(px + gy - 1) = (p^2 + q^2 - 1)(qx + py - 1)$
(D) none

38. 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

39. Equation of the pair of straight lines through origin and perpendicular to the pair of straight lines $5x^2 - 7xy - 3y^2 = 0$ is
(A) $3x^2 - 7xy - 5y^2 = 0$ (B) $3x^2 + 7xy + 5y^2 = 0$
(C) $3x^2 - 7xy + 5y^2 = 0$ (D) $3x^2 + 7xy - 5y^2 = 0$

40. One of the diameter of the circle circumscribing the rectangle ABCD is 4y = x + 7. If A and B are the points (–3, 4) and (5, 4) respectively then the area of rectangle is equal to
(A) 30 (B) 8 (C) 25 (D) 32

41. If the lines $x\sin^2A + y\sin A + 1 = 0$
$x\sin^2B + y\sin B + 1 = 0$
$x\sin^2C + y\sin C + 1 = 0$
are concurrent where A, B, C are angles of triangle then ΔABC must be
(A) equilateral (B) isosceles
(C) right angle (D) no such triangle exist

42. 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)

43. 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 3/8th of the area of the triangle OAB, then $\frac{AQ}{BQ}$ is equal to
(A) 2 (B) 2/3 (C) 1/3 (D) 3

44. Lines, $L_1 : x + \sqrt{3}y = 2$, and $L_2 : ax + by = 1$, meet at P and enclose an angle of 45º 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. A triangle is formed by the lines 2x – 3y – 6 = 0 ; 3x – y + 3 = 0 and 3x + 4y – 12 = 0. If the points P(α, 0) and Q(0, β) always lie on or inside the ΔABC, 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) $\alpha \in [-1, 3]$ & $\beta \in [-2, 3]$

46. 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) none

47. 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

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

49. The image of the pair of lines represented by $ax^2 + 2h\,xy + by^2 = 0$ by the line mirror y = 0 is
(A) $ax^2 - 2hxy + by^2 = 0$ (B) $bx^2 - 2h\,xy + ay^2 = 0$
(C) $bx^2 + 2h\,xy + ay^2 = 0$ (D) $ax^2 - 2h\,xy - by^2 = 0$

50. 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

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

52. 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 45º 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

53. 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) none

54. The circumcentre of the triangle formed by the lines, xy + 2x + 2y + 4 = 0 and x + y + 2 = 0 is
(A) (−1, −1) (B) (−2, −2) (C) (0, 0) (D) (−1, −2)

55. Area of the rhombus bounded by the four lines, ax ± by ± c = 0 is
(A) $\frac{c^2}{2ab}$ (B) $\frac{2c^2}{|ab|}$ (C) $\frac{4c^2}{ab}$ (D) $\frac{ab}{4c^2}$

56. If the lines ax + y + 1 = 0, x + by + 1 = 0 & x + y + 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

57. The area enclosed by 2 | x | + 3| y | ≤ 6 is
(A) 3 sq. units (B) 4 sq. units
(C) 12 sq. units (D) 24 sq. units

58. 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 π/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