Circles

Choose the appropriate option (a, b, c or d).

Q 1. If the equation of a circle is $ax^2 + (2a - 3)y^2 - 4x - 1 = 0$ then its centre is

(a) (2, 0) (b) (2/3, 0) (c) (-2/3, 0) (d) none of these

Q 2. If $2x^2 + \lambda xy + 2y^2 + (\lambda - 4)x + 6y - 5 = 0$ is the equation of a circle then its radius is

(a) $3\sqrt{2}$ (b) $2\sqrt{3}$ (c) $2\sqrt{2}$ (d) none of these

Q 3. The equation $x^2 + y^2 - 2x + 4y + 5 = 0$ represents

(a) a point (b) a pair of straight lines

(c) a circle of nonzero radius (d) none of these

Q 4. Three sides of a triangle have the equations $L_r \equiv y = m_r x - c_r = 0$; r = 1, 2, 3. Then $\lambda L_2L_3 + \mu L_3L_1 + \nu L_1L_2 = 0$, where $\lambda \neq 0, \mu \neq 0, \nu \neq 0$, is the equation of the circumcircle of the triangle if

(a) $\lambda(m_2 + m_3) + \mu(m_3 + m_1) + \nu(m_1 + m_2) = 0$ (b) $\lambda(m_2m_3 - 1) + \mu(m_3m_1 - 1) + \nu(m_1m_2 - 1) = 0$

(c) both (a) and (b) hold together (d) none of these

Q 5. The number of integral values of λ for which

$$x^2 + y^2 + \lambda x + (1 - \lambda)y + 5 = 0$$

is the equation of a circle whose radius cannot exceed 5, is

(a) 14 (b) 18 (c) 16 (d) none of these

Q 6. If $2(x^2 + y^2) + 4\lambda x + \lambda^2 = 0$ represents a circle of meaningful radius then the range of real values of λ is

(a) R (b) $(0, +\infty)$ (c) $(-\infty, 0)$ (d) none of these

Q 7. If a circle passes through the points of intersection of the lines $2x - y + 1 = 0$ and $x + \lambda y - 3 = 0$ with the axes of reference then the value of λ is

(a) 1/2 (b) 2 (c) 1 (d) -2

Q 8. The equation of the circle passing through the point (1, 1) and having two diameters along the pair lines $x^2 - y^2 - 2x + 4y - 3 = 0$ is

(a) $x^2 + y^2 - 2x - 4y + 4 = 0$ (b) $x^2 + y^2 + 2x + 4y - 4 = 0$

(c) $x^2 + y^2 - 2x + 4y + 4 = 0$ (d) none of these

Q 9. Two vertices of an equilateral triangle are (-1, 0) and (1, 0), and its third vertex lies above the x-axis. The equation of the circumcircle of the triangle is

(a) $x^2 + y^2 = 1$ (b) $\sqrt{3}(x^2+y^2)+2y-\sqrt{3}=0$

(c) $\sqrt{3}(x^2+y^2)-2y-\sqrt{3}=0$ (d) none of these

Q 10. A triangle is formed by the lines whose combined equation is given by $(x + y - 4)(xy - 2x - y + 2) = 0$. The equation of its circumcircles is

(a) $x^2 + y^2 - 5x - 3y + 8 = 0$ (b) $x^2 + y^2 - 3x - 5y + 8 = 0$

(c) $x^2 + y^2 - 3x - 5y - 8 = 0$ (d) none of these

Q 11. If the centroid of an equilateral triangle is (1, 1) and its one vertex is

(a) $x^2 + y^2 - 2x - 2y - 3 = 0$ (b) $x^2 + y^2 + 2x - 2y - 3 = 0$

(c) $x^2 + y^2 + 2x + 2y - 3 = 0$ (d) none of these

Q 12. The equation of the circle whose one diameter is PQ, where is ordinates of P, Q are the roots of the equation $x^2 + 2x - 3 = 0$ and the abscissa are the roots of the equation $y^2 + 4y - 12 = 0$, is

(a) $x^2 + y^2 + 2x + 4y - 15 = 0$ (b) $x^2 + y^2 - 4x - 2y - 15 = 0$

(c) $x^2 + y^2 + 4x + 2y - 15 = 0$ (d) none of these

Q 13. The maximum number of points with rational coordinates on a circle whose centre is ($\sqrt{3}$, 0) is

(a) one (b) two (c) four (d) infinite

Q 14. A circle touches the y-axis at (0, 2) and has an intercept of 4 units on the positive side of the x-axis. Then the equation of the circle is

(a) $x^2 + y^2 - 4(\sqrt{2}x+y) + 4 = 0$ (b) $x^2 + y^2 - 4(x+\sqrt{2}y) + 4 = 0$

(c) $x^2 + y^2 - 2(\sqrt{2}x+y)$ (d) none of these

Q 15. C_1 is a circle of radius 1 touching the x-axis and the y-axis. C_2 is another circle of radius > 1 and touching the axes as well as the circle C_1. Then the radius of C_2 is

(a) $3-2\sqrt{2}$ (b) $3+2\sqrt{2}$ (c) $3+2\sqrt{3}$ (d) none of these

Q 16. The intercept on the line y = x by the circle $x^2 + y^2 - 2x = 0$ is AB. The equation of the circle with AB as a diameter is

(a) $x^2+y^2+x+y=0$ (b) $x^2+y^2=x+y$ (c) $x^2+y^2-3x+y=0$ (d) none of these

Q 17. Two circles, each of radius 5, have a common tangent at (1, 1) whose equation is $3x + 4y - 7 = 0$. Then their centres are

(a) (4, -5), (-2, 3) (b) (4, -3), (-2, 5) (c) (4, 5), (-2, -3) (d) none of these

Q 18. The equation of the circumcircle of the regular hexagon whose two consecutive vertices have the coordinates (-1, 0) and (1, 0) and which lies wholly above the x-axis, is

(a) $x^2 + y^2 - 2\sqrt{3}y - 1 = 0$ (b) $x^2 + y^2 - \sqrt{3}y - 1 = 0$

(c) $x^2 + y^2 - 2\sqrt{3}x - 1 = 0$ (d) none of these

Q 19. The equation of the incircle of the triangle formed by the axes and the line 4x + 3y = 6 is

(a) $x^2 + y^2 - 6x - 6y + 9 = 0$ (b) $4(x^2 + y^2 - x - y) + 1 = 0$

(c) $4(x^2 + y^2 + x + y) + 1 = 0$ (d) none of these

Q 20. IF p and q be the longest distance and the shortest distance respectively of the point (-7, 2) from any point (α, β) on the curve whose equation is $x^2 + y^2 - 10x - 14y - 51 = 0$ then GM of p and q is equal to

(a) $2\sqrt{11}$ (b) $5\sqrt{5}$ (c) 13 (d) none of these

Q 21. The equation of the circumcircle of an equilateral triangle is $x^2 + y^2 + 2gx + 2fy + c = 0$ and one vertex of the triangle is (1, 1). The equation of incircle of the triangle is

(a) $4(x^2 + y^2) = g^2 + f^2$ (b) $4(x^2 + y^2) + 8gx + 8fy = (1 - g)(1 + 3g) + (1 - f)(1 + 3f)$

(c) $4(x^2 + y^2) + 8gx + 8fy = g^2 + f^2$ (d) none of these

Q 22. Let f(x, y) = 0 be the equation of a circle. If $(0, \lambda) = 0$ has equal roots $\lambda = 2, 2$ and $f(\lambda, 0) = 0$ has roots $\lambda = \frac{4}{5}, 5$ then the centre of the circle is

(a) (2, 29/10) (b) (29/10, 2) (c) (-2, 29/10) (d) none of these

Q 23. For each $k \in N$, let C_k denote the circle whose equation is $x^2 + y^2 = k^2$. On the circle C_k, a particle moves k units in the anticlockwise direction. After completing its motion on C_k, the particle moves to C_{k+1} in the radial direction. The motion of the particle continues in this manner. The particle starts at (1, 0). If the particle crosses the positive direction of the x-axis for the first time on the circle C_n then n is

(a) 7 (b) 6 (c) 2 (d) none of these

Q 24. Two distinct chords drawn from the point (p, q) on the circle $x^2 + y^2 = px + qy$, where $pq \neq 0$, are bisected by the x-axis. Then

(a) $|p| = |q|$ (b) $p^2 = 8q^2$ (c) $p^2 < 8q^2$ (d) $p^2 > 8q^2$

Q 25. The length of the chord of the circle $x^2 + y^2 + 4x - 7y + 12 = 0$ along the y-axis is

(a) 1 (b) 2 (c) 1/2 (d) none of these

Q 26. If the line $y - 1 = m(x - 1)$ cuts the circle $x^2 + y^2 = 4$ at two real points then the number of possible values of m is

(a) 1 (b) 2 (c) infinite (d) none of these

Q 27. The length of the chord of the circle $x^2 + y^2 = 9$ passing through (3, 0) and perpendicular to the line $y + x = 0$ is

(a) $3/\sqrt{2}$ (b) $3\sqrt{2}$ (c) $2\sqrt{3}$ (d) none of these

Q 28. The number of points on the circle $2x^2 + 2y^2 - 3x = 0$ which are at a distance 2 from the point (-2, 1) is

(a) 2 (b) 0 (c) 1 (d) none of these

Q 29. The equation of the diameter of the circle $3(x^2 + y^2) - 2x + 6y - 9 = 0$ which is perpendicular to the line $2x + 3y = 12$ is

(a) $3x - 2y = 3$ (b) $3x - 2y + 1 = 0$ (c) $3x - 2y = 0$ (d) none of these

Q 30. The equation of a circle C is $x^2 + y^2 - 6x - 8y - 11 = 0$. The number of real points at which the circle drawn with the points (1, 8) and (0, 0) at the ends of a diameter cuts the circle C is

(a) 0 (b) 1 (c) 2 (d) none of these

Q 31. The equation of the circle of radius $2\sqrt{2}$ whose centre lies on the line $x - y = 0$ and which touches the line $x + y = 4$, and whose centre's coordinates satisfy the inequality $x + y > 4$ is

(a) $x^2 + y^2 - 8x - 8y + 24 = 0$ (b) $x^2 + y^2 = 8$

(c) $x^2 + y^2 - 8x + 8y = 24$ (d) none of these

Q 32. The equation of the chord of the circle $x^2 + y^2 = 25$ of length 8 that passes through the point ($2\sqrt{3}, 2$) and makes an acute angle with the positive direction of the x-axis is

(a) $(4\sqrt{3} - 3\sqrt{7})x + 3y = 18 - 6\sqrt{21}$ (b) $(4\sqrt{3} + 3\sqrt{7})x - 3y = 18 + 6\sqrt{21}$

(c) $(4\sqrt{3} + 3\sqrt{7})x - 3y + 18 + 6\sqrt{21} = 0$ (d) none of these

Q 33. If (a, b) is a point on the chord AB of the circle, where the ends of the chord are A = (2, -3) and B = (3, 2), then

(a) $a \in [-3, 2]$, $b \in [2, 3]$ (b) $a \in [2, 3]$, $b \in [-3, 2]$

(c) $a \in [-2, 2]$, $b \in [-3, 3]$ (d) none of these

Q 34. The number of points with integral coordinates that are interior to the circle $x^2 + y^2 = 16$ is

(a) 43 (b) 49 (c) 45 (d) 51

Q 35. The range of values of a for which the point (a, 4) is outside the circles $x^2 + y^2 + 10x = 0$ and $x^2 + y^2 - 12x + 20 = 0$ is

(a) $(-\infty, -8) \cup (-2, 6) \cup (6, +\infty)$ (b) $(-8, -2)$

(c) $(-\infty, -8) \cup (-2, +\infty)$ (d) none of these

Q 36. A region in the x-y plane is bounded by the curve $y = \sqrt{25 - x^2}$ and the line y = 0. If the point (a, a + 1) lies in the interior of the region then

(a) $a \in (-4, 3)$ (b) $a \in (-\infty, -1) \cup (3, +\infty)$ (c) $a \in (-1, 3)$ (d) none of these

Q 37. If (2, 4) is a point interior to the circle $x^2 + y^2 - 6x - 10y + \lambda = 0$ and the circle does not cut the axes at any point then λ belongs to the interval

(a) (25, 32) (b) (9, 32) (c) $(32, +\infty)$ (d) none of these

Q 38. The range of values of $\theta \in [0, 2\pi]$ for which $(1 + \cos\theta, \sin\theta)$ is an interior point of the circle $x^2 + y^2 = 1$ is

(a) $(\pi/6, 5\pi/6)$ (b) $(2\pi/3, 5\pi/3)$ (c) $(\pi/6, 7\pi/6)$ (d) $(2\pi/3, 4\pi/3)$

Q 39. The range of the values of r for which the point $\left(-5 + \frac{r}{\sqrt{2}}, -3 + \frac{r}{\sqrt{2}}\right)$ is an interior point of the major segment of the circle $x^2 + y^2 = 16$, cut off by the line x + y = 2, is

(a) $(-\infty, 5\sqrt{2})$ (b) $(4\sqrt{2} - \sqrt{14}, 5\sqrt{2})$ (c) $(4\sqrt{2} - \sqrt{14}, 4\sqrt{2} + \sqrt{14})$ (d) none of these

Q 40. There are two circles whose equations are $x^2 + y^2 = 9$ and $x^2 + y^2 - 8x - 6y + n^2 = 0$, $n \in \mathbb{Z}$. If the two circles have exactly two common tangents then the number of possible values of n is

(a) 2 (b) 8 (c) 9 (d) none of these

Q 41. The number of common tangents to the circles $x^2 + y^2 = 4$ and $x^2 + y^2 - 6x - 8y = 24$ is

(a) 0 (b) 1 (c) 3 (d) 4

Q 42. The number of common tangents to the circles $x^2 + y^2 + 2x + 8y - 23 = 0$ and $x^2 + y^2 - 4x - 10y + 19 = 0$ is

(a) 1 (b) 2 (c) 3 (d) 4

Q 43. If the circles $x^2 + y^2 + 2ax + c = 0$ and $x^2 + y^2 + 2by + c = 0$ touch each other then

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

Q 44. The number of common tangents to the circles one of the which passes through the origin and cuts off intercepts 2 from each of the axes, and the other circle has the line segment the origin and the point (1, 1) as a diameter, is

(a) 0 (b) 1 (c) 3 (d) 2

Q 45. The range of values of λ for which the circles $x^2 + y^2 = 4$ and $x^2 + y^2 - 4\lambda x + 9 = 0$ have two common tangents, is

(a) $\in \left[-\frac{13}{8}, \frac{13}{8}\right]$ (b) $\lambda > \frac{13}{8}$ or $\lambda < -\frac{13}{8}$ (c) $1 < \lambda < \frac{13}{8}$ (d) none of these

Q 46. The number of common tangents to the circles $x^2 + y^2 - 6x - 14y + 48 = 0$ and $x^2 + y^2 - 6x = 0$ is

(a) 1 (b) 2 (c) 0 (d) 4

Q 47. Two circles have the equations $x^2 + y^2 - 4x - 6y - 8 = 0$ and $x^2 + y^2 - 2x - 3 = 0$. Then

(a) they cut each other (b) they touch each other

(c) one circle lies inside the other (d) one circle lies wholly outside the other

Q 48. The equations of two circles are $x^2 + y^2 - 26y + 25 = 0$ and $x^2 + y^2 = 25$. Then

(a) they touches each other (b) they cut each other orthogonally

(c) one circle is inside the other circle (d) none of these

Q 49. A tangent is drawn to the circle $2(x^2 + y^2) - 3x + 4y = 0$ and it touches the circle at point A. The tangent passes the point P(2, 1). Then PA is equal to

(a) 4 (b) 2 (c) $2\sqrt{2}$ (d) none of these

Q 50. If the points A(1, 4) and B are symmetrical about the tangent to the circles $x^2 + y^2 - x + y = 0$ at the origin then coordinates of B are

(a) (1, 2) (b) ($\sqrt{2}$, 1) (c) (4, 1) (d) none of these

Q 51. The range of values of m for which the line $y = mx + 2$ cuts the circle $x^2 + y^2 - x + y = 0$ at the origin then coordinates of B are

(a) (1, 2) (b) ($\sqrt{2}$, 1) (c) (4, 1) (d) none of these

Q 52. The range of values of m for which the line $y = mx + 2$ cuts the circles $x^2 + y^2 = 1$ at distinct or coincident points is

(a) $(-\infty, -\sqrt{3}] \cup [\sqrt{3}, +\infty)$ (b) $[-\sqrt{3}, \sqrt{3}]$

(c) $[\sqrt{3}, +\infty)$ (d) none of these

Q 53. The equation of any tangent to the circle $x^2 + y^2 - 2x + 4y - 4 = 0$ is

(a) $y = m(x-1) + 3\sqrt{1+m^2} - 2$ (b) $y = mx + 3\sqrt{1+m^2}$

(c) $y = mx + 3\sqrt{1+m^2} - 2$ (d) none of these

Q 54. Two tangents to the circle $x^2 + y^2 = 4$ at the point A and B meet at P(-4, 0). The area of the quadrilateral PAOB, where O is the origin, is

(a) 4 (b) $6\sqrt{2}$ (c) $4\sqrt{3}$ (d) none of these

Q 55. The angle between the pair of tangents from the point (1, 1/2) to the circle $x^2 + y^2 + 4x + 2y - 4 = 0$ is

(a) $\cos^{-1}\frac{4}{5}$ (b) $\sin^{-1}\frac{4}{5}$ (c) $\sin^{-1}\frac{3}{5}$ (d) none of these

Q 56. The chords of contact of the pair of tangents to the circle $x^2 + y^2 = 1$ drawn from any point on the line $2x + y = 4$ pass through the point

(a) (1/2, 1/4) (b) (1/4, 1/2) (c) (1, 1/2) (d) (1/2, 1)

Q 57. A foot of the normal from the point (4, 3) to a circle is (2, 1) and a diameter of the circle has the equation $2x - y = 2$. Then the equation of the circle is

(a) $x^2 + y^2 + 2x - 1 = 0$ (b) $x^2 + y^2 - 2x - 1 = 0$ (c) $x^2 + y^2 - 2y - 1 = 0$ (d) none of these

Q 58. The line $\lambda x + \mu y = 1$ is a normal to the circle $2x^2 + 2y^2 - 5x + 6y - 1 = 0$ if

(a) $5\lambda - 6\mu = 2$ (b) $4 + 5\mu = 6\lambda$ (c) $4 + 6\mu = 5\lambda$ (d) none of these

Q 59. The number of feet of normals from the point (7, -4) to the circle $x^2 + y^2 = 5$ is

(a) 1 (b) 2 (c) 3 (d) 4

Q 60. The equation of a chord of the circle $x^2 + y^2 - 4x = 0$ which is bisected at the point (1, 1) is

(a) $x + y = 2$ (b) $3x - y = 2$ (c) $x - 2y + 1 = 0$ (d) $x - y = 0$

Q 61. Lines are drawn through the point P(-2, -3) to meet the circle $x^2 + y^2 - 2x - 10y + 1 = 0$. The length of the line segment PA, A being the point on the circle where the line meets the circle sat coincident points, is

(a) 16 (b) $4\sqrt{3}$ (c) 48 (d) none of these

Q 62. The equations of two circles are $x^2 + y^2 + 2\lambda x + 5 = 0$ and $x^2 + y^2 + 2\lambda y + 5 = 0$. P is any point on the line $x - y = 0$. If PA and PB are then lengths of the tangents from P to the two circles and PA = 3 then PB is equal to

(a) 1.5 (b) 6 (c) 3 (d) none of these

Q 63. The common chord of the circle $x^2 + y^2 + 6x + 8y - 7 = 0$ and a circle passing through the origin, the touching the line y= x, always passes through the point

(a) (-1/2, 1/2) (b) (1, 1) (c) (1/2, 1/2) (d) none of these

Q 64. A tangent to the circle $x^2 + y^2 = 1$ through the point (0, 5) cuts the circle $x^2 + y^2 = 4$ at A and B. The tangents to the circle $x^2 + y^2 = 4$ at A and B meet at C. The coordinates of C are

(a) $\left(\frac{8}{5}\sqrt{6}, \frac{4}{5}\right)$ (b) $\left(\frac{8}{5}\sqrt{6}, -\frac{4}{5}\right)$ (c) $\left(-\frac{8}{5}\sqrt{6}, -\frac{4}{5}\right)$ (d) none of these

Q 65. If the common chord of the circles $x^2 + (y - \lambda)^2 = 16$ and $x^2 + y^2 = 16$ subtend a right angle at the origin then λ is equal to

(a) 4 (b) $4\sqrt{2}$ (c) $\pm 4\sqrt{2}$ (d) 8

Q 66. The equation of the smallest circle passing through the intersection of the line x + y = 1 and the circle $x^2 + y^2 = 9$ is

(a) $x^2 + y^2 + x + y - 8 = 0$ (b) $x^2 + y^2 - x - y - 8 = 0$ (c) $x^2 + y^2 - x + y - 8 = 0$ (d) none of these

Q 67. The equation of a circle is $x^2 + y^2 = 4$. The centre of the smallest circle touching this circle and the line $x + y = 5\sqrt{2}$ has the coordinates

(a) $\left(\frac{7}{2\sqrt{2}}, \frac{7}{2\sqrt{2}}\right)$ (b) $\left(\frac{3}{2}, \frac{3}{2}\right)$ (c) $\left(-\frac{7}{2\sqrt{2}}, -\frac{7}{2\sqrt{2}}\right)$ (d) none of these

Q 68. The members of a family of circles are given by the equation $2(x^2 + y^2) + \lambda x - (1 + \lambda^2)y - 10 = 0$. The number of circles belonging to the family that are cut orthogonally by the fixed circle $x^2 + y^2 + 4x + 6y + 3 = 0$ is

(a) 2 (b) 1 (c) 0 (d) none of these

Q 69. The equation of the circle with the chord y = 2x of the circle $x^2 + y^2 - 10x = 0$ as its diameter is

(a) $x^2 + y^2 - 2x - 4y - 5 = 0$ (b) $x^2 + y^2 = 2x + 4y$

(c) $x^2 + y^2 = 4x + 2y$ (d) none of these

Q 70. A circle of radius 2 touches the coordinate axes in the first quadrant. If the circle makes a complete rotation on the x-axis along the positive direction of the x-axis then the equation of the circle in the new position is

(a) $x^2 + y^2 - 4(x + y) - 8\pi x + (2 + 4\pi)^2 = 0$ (b) $x^2 + y^2 - 4x - 4y + (2 + 4\pi)^2 = 0$

(c) $x^2 + y^2 - 8\pi x - 4y + (2 + 4\pi)^2 = 0$ (d) none of these

Q 71. A ray of light incident at the point (-2, -1) gets reflected from the tangent at (0, -1) to the circle $x^2 + y^2 = 1$. The reflected ray touches the circle. The equation of the line along which the incident ray moved is

(a) $4x - 3y + 11 = 0$ (b) $4x + 3y + 11 = 0$ (c) $3x + 4y + 11 = 0$ (d) none of these

Q 72. The locus of the centres of the circles for which one end of a diameter is (1, 1) while the other end is on the line x + y = 3 is

(a) $x + y = 1$ (b) $2(x - y) = 5$ (c) $2x + 2y = 5$ (d) none of these

Q 73. The angle between a pair of tangents drawn from a point P to the curve $x^2 + y^2 + 4x - 6y + 9\sin^2 \alpha + 13\cos^2 \alpha = 0$ is 2α. The locus of P is

(a) $x^2 + y^2 + 4x - 6y + 4 = 0$ (b) $x^2 + y^2 + 4x - 6y - 9 = 0$

(c) $x^2 + y^2 + 4x - 6y - 4 = 0$ (d) $x^2 + y^2 + 4x - 6y + 9 = 0$

Q 74. The point P moves in the plane of a regular hexagon such that the sum of the squares of its distances from the vertices of the hexagon is $6a^2$. If the radius of the circumcircles of the hexagon is r(< a) then the locus of P is

(a) a pair of straight lines (b) an ellipse

(c) a circle of radius $\sqrt{a^2 - r^2}$ (d) an ellipse of major axis a and minor axis r

Q 75. The locus of the middle points of chords of length 4 of the circle $x^2 + y^2 = 16$ is

(a) a straight line (b) a circle of radius 2 (c) a circle of radius $2\sqrt{3}$ (d) an ellipse

Q 76. The equation of the locus of the middle point of a chord of the circle $x^2 + y^2 = 2(x + y)$ such that the pair of lines joining the origin to the point of intersection of the chord and the circle are equally inclined to the x-axis is

(a) $x + y = 2$ (b) $x - y = 2$ (c) $2x - y = 1$ (d) none of these

Q 77. The locus of the centres of circles passing through the origin and intersecting the fixed circle $x^2 + y^2 - 5x + 3y - 1 = 0$ orthogonally is

(a) a straight line of the slope $\frac{3}{5}$ (b) a circle

(c) a pair of straight lines (d) none of these

Q 78. The equation of a circle C_1 is $x^2 + y^2 - 4x - 2y - 11 = 0$. A circle C_2 of radius 1 rolls on the outside of the circle C_1. The locus of the centre of C_2 has the equation

(a) $x^2 + y^2 - 4x - 2y - 20 = 0$ (b) $x^2 + y^2 + 4x + 2y - 20 = 0$

(c) $x^2 + y^2 - 3x - y - 11 = 0$ (d) none of these

Q 79. Circles are drawn through the point (3, 0) to cut an intercept of length 6 units on the negative direction of the x-axis. The equation of the locus of their centres is

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

Q 80. The locus of the centre of a circle touching the line $x + 2y = 0$ and $x - 2y = 0$ is

(a) $xy = 0$ (b) $x = 0$ (c) $y = 0$ (d) none of these

Q 81. The locus of a point from which the lengths of the tangents to the circles $x^2 + y^2 = 4$ and $2(x^2 + y^2) - 10x + 3y - 2 = 0$ are equal to

(a) a straight line inclined at $\pi/4$ with the line joining the centres of the circles

(b) a circles (c) an ellipse

(d) a straight line perpendicular to the line joining the centes of the circles

Q 82. The locus of the centres of the circles passing through the intersection of the circles $x^2 + y^2 = 1$ and $x^2 + y^2 - 2x + y = 0$ is

(a) a line whose equation is $x + 2y = 0$ (b) a line whose equation is $2x - y = 1$

(c) a circle (d) a pair of lines

Choose the correct options. One or more options may be correct.

Q 83. The equation of a circle is $x^2 + y^2 = 4$. A regular hexagon is inscribed in the circle whose one vertex is (2, 0). Then a consecutive vertex has the coordinates

(a) $\left(\sqrt{3},1\right)$ (b) $\left(1,-\sqrt{3}\right)$ (c) $\left(\sqrt{3},-1\right)$ (d) $\left(1,\sqrt{3}\right)$

Q 84. P($\sqrt{2},\sqrt{2}$) is a point on the circle $x^2 + y^2 = 4$ and Q is another point on the circle such that are $PQ = \frac{1}{4}$ × circumference. The coordinates of Q are

(a) $(-\sqrt{2},-\sqrt{2})$ (b) $(\sqrt{2},-\sqrt{2})$ (c) $(-\sqrt{2},\sqrt{2})$ (d) none of these

Q 85. Circles $x^2 + y^2 = 1$ and $x^2 + y^2 - 8x + 11 = 0$ cut off equal intercepts on a line through the point $\left(-2,\frac{1}{2}\right)$. The slope of the line is

(a) $\frac{-1+\sqrt{29}}{14}$ (b) $\frac{1+\sqrt{7}}{4}$ (c) $\frac{-1-\sqrt{29}}{14}$ (d) none of these

Q 86. Let L_1 be a straight line passing through the origin and L_2 be the straight line $x + y = 1$. If the intercepts made by the circle $x^2 + y^2 - x + 3y = 0$ on L_1 and L_2 are equal then which of the following equations can represent L_1?

(a) $x + y = 0$ (b) $x - y = 0$ (c) $x + 7y = 0$ (d) $x - 7y = 0$

Q 87. The parametric equation of a circle is given by $x = 3 \cos \phi + 2$, $y = 3 \sin \phi$. Then is

(a) centre = (-2, 0) (b) radius = 3 (c) centre = (2, 0) (d) radius = 1

Q 88. If A and B are two points on the circle $x^2 + y^2 - 4x + 6y - 3 = 0$ which are farthest and nearest respectively from the point (7, 2) then

(a) $A = (2 - 2\sqrt{2}, -3 - 2\sqrt{2})$ (b) $B = (2 + 2\sqrt{2}, -3 + 2\sqrt{2})$

(c) $A = (2 + 2\sqrt{2}, -3 + 2\sqrt{2})$ (d) $B = (2 - 2\sqrt{2}, -3 + 2\sqrt{2})$

Q 89. A point $P(\sqrt{3}, 1)$ moves on the circle $x^2 + y^2 = 4$ and after covering a quarter of the circle leaves it tangentially. The equation of a line along which the point moves after leaving the circle is

(a) $y = \sqrt{3}x + 4$ (b) $\sqrt{3}y = x + 4$ (c) $\sqrt{3}y = x - 4$ (d) $y = \sqrt{3}x - 4$

Q 90. The equation of a circle of radius 1 touching the circles $x^2 + y^2 - 2|x| = 0$ is

(a) $x^2 + y^2 + 2\sqrt{3}x - 2 = 0$ (b) $x^2 + y^2 - 2\sqrt{3}y + 2 = 0$

(c) $x^2 + y^2 + 2\sqrt{3}y + 2 = 0$ (d) $x^2 + y^2 + 2\sqrt{3}x + 2 = 0$

Q 91. The line $4y - 3x + \lambda = 0$ touches the circle $x^2 + y^2 - 4x - 8y - 5 = 0$. The value of λ is

(a) 29 (b) 10 (c) -35 (d) none of these

Q 92. A circle which touches the axes, and whose centre is at distance $2\sqrt{2}$ from the origin, has the equation

(a) $x^2 + y^2 - 4x + 4y + 4 = 0$ (b) $x^2 + y^2 + 4x - 4y + 4 = 0$

(c) $x^2 + y^2 + 4x + 4y + 4 = 0$ (d) none of these

Q 93. Let the equation of a circle be $x^2 + y^2 = a^2$. If $h^2 + k^2 - a^2 < 0$ then the line $hx = ky = a^2$ is the

(a) polar line of the point (h, k) with respect to the circle

(b) real chord of contact of the tangents from (h, k) to the circle

(c) equation of a tangent to the circle from the point (h, k)

(d) none of these

Q 94. For the equation $x^2 + y^2 + 2\lambda x + 4 = 0$ which of the following can be true ?

(a) It represents a real circle for all $\lambda \in R$. (b) It represents a real circle for $|\lambda| > 2$

(c) The radical axis of any two circles of the family is the y-axis

(d) The radical axis of any two circles of the family is the x-axis.

Q 95. The point of contact of tangent from the point (1, 2) to the circle $x^2 + y^2 = 1$ has the coordinates

(a) $\left(\frac{1-2\sqrt{19}}{5}, \frac{2+\sqrt{19}}{5}\right)$ (b) $\left(\frac{1-2\sqrt{19}}{5}, \frac{2-\sqrt{19}}{5}\right)$ (c) $\left(\frac{1+2\sqrt{19}}{5}, \frac{2+\sqrt{19}}{5}\right)$ (d) $\left(\frac{1+2\sqrt{19}}{5}, \frac{2-\sqrt{19}}{5}\right)$

Q 96. The equation of a circle C_1 is $x^2 + y^2 = 4$. The locus of the intersection of orthogonal tangents to the circles is the curve C_2 and the locus of the intersection of perpendicular tangents to the curve C_2 is the curve C_3. Then

(a) C_3 is a circle

(b) the area enclosed by the curve C_3 is 8π

(c) C_2 and C_3 are circles with the same centre

(d) none of these

Q 97. A line parallel to the line $x - 3y = 2$ touches the circle $x^2 + y^2 - 4x + 2y - 5 = 0$ at the point

(a) (1, -4) (b) (1, 2) (c) (3, -4) (d) (3, 2)

Q 98. A point on the line x = 3 from which the tangents drawn to the circle $x^2 + y^2 = 8$ are at right angles is

(a) $(3, -\sqrt{7})$ (b) $(3, \sqrt{23})$ (c) $(3, \sqrt{7})$ (d) $(3, -\sqrt{23})$

Q 99. Tangents drawn from (2, 0) to the circle $x^2 + y^2 = 1$ touches the circle at A and B. Then

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

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

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

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

Q 100. The equations of four circles are $(x \pm a)^2 + (y \pm a)^2 = a^2$. The radius of a circle touching all the four circles is

(a) $(\sqrt{2}-1)a$ (b) $2\sqrt{2}a$ (c) $(\sqrt{2}+1)a$ (d) $(2+\sqrt{2})a$

Q 101. Let a line through the point P(5, 10) cut the line l whose equation is x + 2y = 5, at Q and the circle C whose equation is $x^2 + y^2 = 25$, at A and B. Then

(a) P is the pole of the line l with respect to the circle C

(b) l is the polar of the point P with respect to the circle C

(c) PA, PQ, PB are in AP

(d) PQ is the HM of PA and PB

Q 102. The equation of a circle is $x^2 + y^2 - 4x + 2y - 4 = 0$. With respect to the circle

(a) the pole of the line $x - 2y + 5 = 0$ is (1, 1)

(b) the chord of contact of real tangents from (1, 1) is the line $x - 2y + 5 = 0$

(c) the polar of the point (1, 1) is $x - 2y + 5 = 0$

(d) none of these

Answers

1b	2d	3a	4c	5c	6a	7d	8a	9c	10b
11a	12c	13b	14a	15b	16b	17c	18a	19b	20a
21b	22b	23a	24d	25a	26c	27b	28b	29a	30c
31a	32b	33b	34c	35a	36c	37a	38d	39b	40c
41b	42c	43a	44b	45b	46d	47a	48b	49b	50c
51a	52b	53a	54c	55b	56a	57b	58c	59b	60d
61b	62c	63c	64a	65c	66b	67a	68a	69b	70a
71b	72c	73d	74c	75c	76a	77d	78a	79c	80a
81d	82a	83bd	84bc	85ac	86bd	87bc	88ab	89bc	90bc
91ac	92bc	93a	94bc	95ad	96ac	97bc	98ac	99cd	100ac
101abd	102ac								