Circle

Summary

1. **Equation of a Circle in Various Form:**
(a) Standard form : $x^2 + y^2 = r^2$. (b) General form: $x^2 + y^2 + 2gx + 2fy + c = 0$
(c) Diameter form : $(x - x_1)(x - x_2) + (y - y_1)(y - y_2) = 0$.

2. **Intercepts made by Circle $x^2 + y^2 + 2gx + 2fy + c = 0$ on the Axes:**
(a) $2\sqrt{g^2 - c}$ on x-axis (b) $2\sqrt{f^2 - c}$ on y-axis

3. **Parametric Equations of a Circle:** $x = h + r\cos\theta$; $y = k + r\sin\theta$

4. **Position of a point with respect to a circle:**
The point (x_1, y_1) is inside, on or outside the circle $S \equiv x^2 + y^2 + 2gx + 2fy + c = 0$.
according as $S_1 \equiv x_1^2 + y_1^2 + 2gx_1 + 2fy_1 + c <=$ or > 0.

5. **Line and a Circle:** line is $y = mx + c$ and circle is $x^2 + y^2 = a^2$
(i) $c^2 < a^2(1 + m^2)$ $\Leftrightarrow$ the line is a secant of the circle.
(ii) $c^2 = a^2(1 + m^2)$ $\Leftrightarrow$ the line touches the circle. (It is tangent to the circle)
(iii) $c^2 > a^2(1 + m^2)$ $\Leftrightarrow$ the line does not meet the circle i.e. passes out side the circle.

6. **Tangent** :
(a) Slope form: $y = mx \pm a\sqrt{1+m^2}$ and points of contact are $\left(\mp\frac{a^2 m}{c}, \pm\frac{a^2}{c}\right)$
(b) Point form: Equation of tangent is $T = 0$
(c) Parametric form: Tangent to circle $x^2 + y^2 = a^2$ at $(a\cos\alpha, a\sin\alpha)$ is $x\cos\alpha + y\sin\alpha = a$.

7. **Pair of Tangents from a Point:** $SS_1 = T^2$.

8. **Power of a Point:** Power of a point is S_1

9. **Length of a Tangent:** Length of tangent is $\sqrt{S_1}$

10. **Director Circle:** Director circle of the circle $x^2 + y^2 = a^2$ is $x^2 + y^2 = 2a^2$

11. **Chord of Contact:** Equation of chord of contact is $T = 0$
Length of chord of contact $= \frac{2LR}{\sqrt{R^2 + L^2}}$, where R = radius; L = length of tangent.
Area of the triangle formed by the pair of the tangents & its chord of contact $= \frac{RL^3}{R^2 + L^2}$
(d) Tangent of the angle between the pair of tangents from $(x_1, y_1) = \left(\frac{2RL}{L^2 - R^2}\right)$
(e) Equation of the circle circumscribing the triangle PT_1T_2 is :

$\left(x-x_1\right)\left(x+g\right)+\left(y-y_1\right)\left(y+f\right)=0$

12. **Equation of the Chord with a given Middle Point:** T = S_1
13. **Equation of the chord joining two points of circle :**

$$x\cos\frac{\alpha+\beta}{2}+y\sin\frac{\alpha+\beta}{2}=a\cos\frac{\alpha-\beta}{2}.$$

14. **Common Tangents to two Circles:**

(i) Four common tangents if the two circles are disjoint i.e. $r_1+r_2<c_1\ c_2.$

(ii) 3 common tangents if two circles touch each other externally i.e. $r_1+r_2=c_1\ c_2.$

(iii) 2 common tangents if two circles intersect each other i.e. $\left|r_1-r_2\right|=c_1\ c_2<r_1+r_2$

(iv) 1 common tangent if the circles touch each other internally i.e. $\left|r_1-r_2\right|=c_1\ c_2$

(v) No common tangent if one circles is in the interior of the other i.e. $c_1\ c_2<\left|r_1-r_2\right|$

15. **Condition of orthogonality of Two Circles:** $2g_1g_2+2f_1f_2=c_1+c_2$
16. **Radical Axis :** $S_1-S_2=0$ i.e. $2\left(g_1-g_2\right)x+2\left(f_1-f_2\right)y+\left(c_1+c_2\right)=0$.
17. **Family of Circles:** $S_1+KS_2=0, S+KL=0$

1. If one of the diameter's of the circle $x^2 + y^2 - 2x - 6y + 6 = 0$ is a chord to the circle with centre (2, 1), then the radius of the circle is

(2004)

(a) $\sqrt{3}$

(b) $\sqrt{2}$

(c) 3

(d) 2

2. The centre of circle inscribed in square formed by the lines $x^2 - 8x + 12 = 0$ and $y^2 - 14y + 45 = 0$, is

(2003)

(a) (4, 7)

(b) (7, 4)

(c) (9, 4)

(d) (4, 9)

3. Let AB be a chord of the circle $x^2 + y^2 = r^2$ subtending a right angle at the centre. Then, the locus of the centroid of the ΔPAB as P moves on the circle, is

(2001)

(a) a parabola

(b) a circle

(c) an ellipse

(d) a pair of straight lines

4. The lines $2x - 3y = 5$ and $3x - 4y = 7$ are diameters of a circle of area 154 sq. units. Then, the equation of this circle is

(1989)

(a) $x^2 + y^2 + 2x - 2y = 62$

(b) $x^2 + y^2 + 2x - 2y = 47$

(c) $x^2 + y^2 - 2x + 2y = 47$

(d) $x^2 + y^2 - 2x + 2y = 62$

5. AB is a diameter of a circle and C is any point on the circumference of the circle. Then (1983)

(a) the area of ΔABC is maximum when it is isosceles
(b) the area of ΔABC is minimum when it is isosceles
(c) the perimeter of ΔABC is minimum when it is isosceles
(d) None of the above

6. The centre of the circle passing through the point (0, 1) and touching the curve $y = x^2$ at (2, 4) is (1983)

(a) $\left(-\frac{16}{5}, \frac{27}{10}\right)$
(b) $\left(-\frac{16}{7}, \frac{53}{10}\right)$
(c) $\left(-\frac{16}{5}, \frac{53}{10}\right)$
(d) None of the above

7. If one of the diameters of the circle, given by the equation, $x^2 + y^2 - 4x + 6y - 12 = 0$, is a chord of a circle S, whose centre is at (–3, 2), then the radius of S is (2016)

(a) $5\sqrt{2}$
(b) $5\sqrt{3}$
(c) 5
(d) 10

8. The number of common tangents to the circles $x^2 + y^2 - 4x - 6y - 12 = 0$ and $x^2 + y^2 + 6x + 18y + 26 = 0$ is (2015)

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

9. Let C be the circle with centre at (1, 1) and radius 1. If T is the circle centred at (0, y) passing through origin and touching the circle C externally, then the radius of T is equal to

(2014)

(a) $\frac{\sqrt{3}}{\sqrt{2}}$

(b) $\frac{\sqrt{3}}{2}$

(c) $\frac{1}{2}$

(d) $\frac{1}{4}$

10. If the circle $x^2 + y^2 + 2x + 2ky + 6 = 0$ and $x^2 + y^2 + 2ky + k = 0$ intersect orthogonally, then k is

(2000)

(a) 2 or –3/2
(b) –2 or –3/2
(c) 2 or 3/2
(d) –2 or 3/2

11. The ΔPQR is inscribed in the circle $x^2 + y^2 = 25$. If Q and R have coordinates (3, 4) and (–4, 3) respectively, then $\angle QPR$ is equal to

(1998)

(a) 0
(b) π
(c) $\frac{\pi}{4}$
(d) $\frac{\pi}{4}$

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

(1998)

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

13. The angle between a pair of tangents drawn from a point P to the circle

$$x^2 + y^2 + 4x - 6y + 9\sin^2\alpha + 13\cos^2\alpha = 0$$

is 2α. The equation of the locus of the point P is

(1996)

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

14. If the two circles $(x - 1)^2 + (y - 3)^2 = r^2$ and $x^2 + y^2 - 8x + 2y + 8 = 0$ intersect in two distinct points, then

(1989)

(a) $2 < r < 8$

(b) $r < 2$

(c) $r = 2$

(d) $r > 2$

15. If a circle passes through the point (a, b) and cuts the circle $x^2 + y^2 = k^2$ orthogonally, then the equation of the locus of its centre is

(1988)

(a) $2ax + 2by - (a^2 + b^2 + k^2) = 0$

(b) $2ax + 2by - (a^2 - b^2 + k^2) = 0$

(c) $x^2 + y^2 - 3ax - 4by + a^2 + b^2 - k^2 = 0$

(d) $x^2 + y^2 - 2ax - 3by + (a^2 - b^2 - k^2) = 0$

16. Let ABCD be a quadrilateral with area 18, with side AB parallel to the side CD and AB = 2 CD. Let AD be perpendicular to AB and CD. If a circle is drawn inside the quadrilateral ABCD touching all the sides, then its radius is

(2007)

(a) 3

(b) 2

(c) $\frac{3}{2}$

(d) 1

17. If the tangent at the point P on the circle $x^2 + y^2 + 6x + 6y = 2$ meets the straight line $5x - 2y + 6 = 0$ at a point Q on the Y-axis, then the length of PQ is

(2002)

(a) 4

(b) $2\sqrt{5}$

(c) 5

(d) $3\sqrt{5}$

18. Let PQ and RS be tangents at the extremities of the diameter PR of a circle of radius r. If PS and RQ intersect at a point X on the circumference of the circle, then 2r equals

(2001)

(a) $\sqrt{PQ \cdot RS}$

(b) $\dfrac{PQ + RS}{2}$

(c) $\dfrac{2PQ \cdot RS}{PQ + RS}$

(d) $\sqrt{\dfrac{PQ^2 + RS^2}{2}}$

19. The circle passing through (1, –2) and touching the axis of x at (3, 0) also passes through the point

(2013)

(a) (–5, 2)

(b) (2, –5)

(c) (5, –2)

(d) (–2, 5)

20. The circle passing through the point (–1, 0) and touching the Y-axis at (0, 2) also passes through the point

(2011)

(a) $\left(-\frac{3}{2}, 0\right)$

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

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

(d) (–4, 0)

21. The locus of the centre of circle which touches $(y - 1)^2 + x^2 = 1$ externally and also touches X-axis, is

(2005)

(a) $\{x^2 = 4y, y \geq 0\} \cup \{(0, y), y < 0\}$

(b) $x^2 = y$

(c) $y = 4x^2$

(d) $y^2 = 4x \cup (0, y), y \in R$

22. If 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

(1999)

(a) $p^2 = q^2$

(b) $p^2 = 8q^2$

(c) $p^2 < 8q^2$

(d) $p^2 > 8q^2$

23. The locus of the centre of a circle, which touches externally the circle $x^2 + y^2 - 6x - 6y + 14 = 0$ and also touches the Y-axis, is given by the equation

(1993)

(a) $x^2 - 6x - 10y + 14 = 0$

(b) $x^2 - 10x - 6y + 14 = 0$

(c) $y^2 - 6x - 10y + 14 = 0$

(d) $y^2 - 10x - 6y + 14 = 0$

24. The centre of a circle passing through the points (0, 0), (1, 0) and touching the circle $x^2 + y^2 = 9$ is

(1992)

(a) (3/2, 1/2)
(b) (1/2, 3/2)
(c) (1/2, 1/2)
(d) $(1/2, -2^{1/2})$

25. The equation of the circle passing through (1, 1) and the points of intersection of $x^2 + y^2 + 13x - 3y = 0$ and $2x^2 + 2y^2 + 4x - 7y - 25 = 0$ is

(1983)

(a) $4x^2 + 4y^2 - 30x - 10y = 25$
(b) $4x^2 + 4y^2 + 30x - 13y - 25 = 0$
(c) $4x^2 + 4y^2 - 17x - 10y + 25 = 0$
(d) None of the above

26. Two circles $x^2 + y^2 = 6$ and $x^2 + y^2 - 6x + 8 = 0$ are given. Then the equation of the circle through their points of intersection and the point (1, 1) is

(1980)

(a) $x^2 + y^2 - 6x + 4 = 0$
(b) $x^2 + y^2 - 3x + 1 = 0$
(c) $x^2 + y^2 - 4y + 2 = 0$
(d) None of the above

27. The centres of those circles which touch the circle, $x^2 + y^2 - 8x - 8y - 4 = 0$, externally and also touch the X-axis, lie on

(2016)

(a) a circle
(b) an ellipse which is not a circle
(c) a hyperbola
(d) a parabola

28. The locus of the mid-point of the chord of contact of tangents drawn from points lying on the straight line $4x - 5y = 20$ to the circle $x^2 + y^2 = 9$ is
(2012)
(a) $20(x^2 + y^2) - 36x + 45y = 0$
(b) $20(x^2 + y^2) + 36x - 45y = 0$
(c) $36(x^2 + y^2) - 20y + 45y = 0$
(d) $36(x^2 + y^2) + 20x - 45y = 0$

29. Tangents drawn from the point P (1, 8) to the circle $x^2 + y^2 - 6x - 4y - 11 = 0$ touch the circle at the points A and B. The equation of the circumcircle of the ΔPAB is
(2009)
(a) $x^2 + y^2 + 4x - 6y + 19 = 0$
(b) $x^2 + y^2 - 4x - 10y + 19 = 0$
(c) $x^2 + y^2 - 2x + 6y - 29 = 0$
(d) $x^2 + y^2 - 6x - 4y + 19 = 0$

30. The locus of the mid-point of a chord of the circle $x^2 + y^2 = 4$ which subtends a right angle at the origin, is (1984)
(a) $x + y = 2$
(b) $x^2 + y^2 = 1$
(c) $x^2 + y^2 = 2$
(d) $x + y = 1$

31. Equation of chord of minimum length passing through (1, 2) of circle $x^2 + y^2 - 4x - 2y - 4 = 0$ is $ax + by + c = 0$ then $a + b + c =$
(a) 8
(b) –8
(c) ±8
(d) None of these

32. Two circle of radii 8 & 6 intersect at right angle, then the length of common chord is :-
(a) $\frac{48}{\sqrt{5}}$
(b) $\frac{24}{\sqrt{5}}$

(c) $\frac{24}{5}$

(d) $\frac{48}{5}$

33. Consider the circles $x^2 + y^2 = 9$ and $x^2 + y^2 - 10x + 9 = 0$, then find the length of the common chord of circle is

(a) $\frac{6}{5}$

(b) $\frac{12}{5}$

(c) $\frac{24}{5}$

(d) 6

34. If length of the common chord of the circles $x^2 + y^2 + 2x + 3y + I = 0$ and $x^2 + y^2 + 4x + 3y + 2 = 0$ is λ, then the value of $[\lambda]$. (where [.] denotes greatest integer function)

(a) 1

(b) 2

(c) 3

(d) 4

35. The equation of circle which touches the line $x + 3y - 2 = 0$ and $3x + 9y - 2 = 0$, also the point of contact on first line is $(-1, 1)$, is

(a) $x^2 + y^2 - \frac{32x}{15} + \frac{8y}{5} + \frac{26}{15} = 0$

(b) $x^2 + y^2 + \frac{32x}{15} - \frac{8y}{5} + \frac{26}{15} = 0$

(c) $x^2 + y^2 + \frac{32x}{15} - \frac{8y}{5} + \frac{26}{15} = 0$

(d) None of these

36. P is a variable point on a circle with centre at C. CA and CB are perpendiculars from C to x and y-axis respectively. If the locus of the centroid of ΔPAB is a circle with centre (3, 6) and radius equal to 1, then the centre and radius of circle, whose centre is C, is.

(a) $\left(\frac{9}{2}, 9\right) \& 3$

(b) $\left(9, \frac{9}{2}\right) \& 2$

(c) $\left(\frac{9}{2}, \frac{9}{2}\right) \& 3$

(d) $(9, 9), 3$

37. If A(2 + 3 cosα, – 3 + 3 sinα, $B\left(2+3\cos\left(\alpha+\frac{2\pi}{3}\right), -3+3\sin\left(\alpha+\frac{2\pi}{3}\right)\right)$ and $C\left(2+3\cos\left(\alpha+\frac{4\pi}{3}\right), -3+3\sin\left(\alpha+\frac{4\pi}{3}\right)\right)$ be the angular points of a ΔABC then incentre of that triangle is

(a) (3, 2)

(b) (0, 0)

(c) (2, –3)

(d) (–2, –3)

38. The set of values of a for which the point (a – 1, a + 1) lies outside the circle $x^2 + y^2 = 8$ and inside the circle $x^2 + y^2 - 12x + 12y - 62 = 0$ is

(a) $(\sqrt{3}, 3\sqrt{2}) \cup (-\infty, 0)$

(b) $(-3\sqrt{2}, -\sqrt{3}) \cup (\sqrt{3}, 3\sqrt{2})$

(c) $(-3\sqrt{2}, -\sqrt{3}) \cup (0, \infty)$

(d) None of these

39. The range of parameter 'a' for which the variable line y = 2x + a lies between the circles $x^2 + y^2 - 2x - 2y + 1 = 0$ and $x^2 + y^2 - 16x - 2y + 61 = 0$ without intersecting either circle is

(a) $(-\infty, -15-2\sqrt{5})$

(b) $(-15+2\sqrt{5}, -\sqrt{5}-1)$

(c) $(-15+2\sqrt{5}, \infty)$

(d) (–15, –1)

40. The point on the circle $x^2 + y^2 = a^2$ in first quadrant, so that tangent drawn at this point make a triangle of area a^2 with the coordinate axes, is

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

(b) $\left(\frac{a}{\sqrt{2}}, \frac{a}{\sqrt{2}}\right)$

(c) $\left(\frac{a}{2}, \frac{a}{2}\right)$

(d) None of these

41. The locus of the point from where tangents are drawn to the circle $x^2 + y^2 = 16$ and the product of the slopes of these tangents is 2, is

(a) $x^2 - 2y^2 = 16$

(b) $2x^2 - y^2 = 16$

(c) $x^2 - y^2 = 16$

(d) $2x^2 + y^2 = 16$

42. From a point on the line $4x - 3y = 6$ tangents are drawn to the circle $x^2 + y^2 - 6x - 4y + 4 = 0$ which make an angle of $\tan^{-1}\frac{24}{7}$ between them, then the coordinates of all such points are

(a) $(-2, 0)$, $(6, -6)$

(b) $(2, 0)$, $(6, 6)$

(c) $(0, -2)$ and $(6, 6)$

(d) None of these

43. If the line $4x - 3y = -12$ is tangent at point $(-3, 0)$ and the line $3x + 4y = 16$ is tangent at the point $(4, 1)$ to a circle, then equation of the circle is

(a) $(x - 1)^2 + (y - 3)^2 = 25$

(b) $(x - 1)^2 + (y + 3)^2 = 25$

(c) $(x + 1)^2 + (y - 3)^2 = 25$

(d) $(x - 1)^2 + (y - 2)^2 = 25$

44. If the chord of contact of tangents drawn from a point on the circle $x^2 + y^2 = a^2$ to the circle $x^2 + y^2 = b^2$ touches the circle $x^2 + y^2 = c^2$, then

(a) $2b = a + c$

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

(c) $b^2 = ac$

(d) None of these

45. If the two circles of radii 12 and 9 intersect each other at two distinct point orthogonally, then the distance between their centres is

(a) 15

(b) 16

(c) 18

(d) 13

46. If the polar of a point (α, β) with respect to any one of the circle $x^2 + y^2 - 2kx + 3 = 0$, where k is a variable, always passes through a fixed point, whatever be the value of k, then the fixed point is

(a) $\left(-\alpha, \frac{1}{\beta}(\alpha^2 - 3)\right)$

(b) $\left(\alpha - 3, \frac{\beta - 3}{\alpha - 3}\right)$

(c) $\left(-\alpha, \frac{1}{\beta}\right)$

(d) $\left(\alpha^2 + 3, \beta^2 - 3\right)$

47. The radius of inscribed circle in the quadrilateral formed by tangents drawn from (3, –1) to circle $x^2 + y^2 - 2x - 2y - 2 = 0$ and radius formed by point of contact of these tangents is

(a) 1

(b) 2

(c) 3

(d) 3/2

48. If the locus of the mid-points of the chords of the circle $x^2 + y^2 = 4$ such that the segment intercepted by the chord on the curve $x^2 = a(x + y)$ subtends a right angle at origin is $x^2 + y^2 = 2(x + y)$, then the value of 'a' is

(a) 5

(b) –2

(c) 2

(d) 3

49. If circles $x^2 + y^2 + 2ax + c^2 = 0$ and $x^2 + y^2 + 2by + c^2 = 0$, touch each other then
(a) $\frac{1}{a^2}+\frac{1}{b^2}=c^2$
(b) $\frac{1}{a^2}+\frac{1}{b^2}=\frac{1}{c^2}$
(c) $a^2+b^2=c^2$
(d) None of these

50. If $C_1 : x^2 + y^2 = r_1^2$ and $C_2 : (x - \alpha)^2 + (y - \beta)^2 = r^2$ be two circles with C_2 lying inside C, and touches C_1. Circle C lying inside C, touches C, internally and C_2 externally, then the locus of centre C is,
(a) $\sqrt{x^2+y^2}=\sqrt{(x-\alpha)^2+(y-\beta)^2}$
(b) $(x-\alpha)^2+(y-\beta)^2=x^2+y^2$
(c) $\sqrt{x^2+y^2}+\sqrt{(x-\alpha)^2+(y-\beta)^2}=r_1+r_2$
(d) None of these

51. If two circles pass through two points (0, a) and (0, –a) and touch the straight line $y = mx + c$ will cut orthogonally, then
(a) $c^2 = a^2 (2 + m^2)$
(b) $c^2 = -a^2 (1 + m^2)$
(c) $c^2 = a^2 (1 + m^2)$
(d) $c^2 = a^2 (3 + 2m^2)$

52. The locus of the centre of the circles which cut the circles $x^2 + y^2 + 4x - 6y + 9 = 0$ and $x^2 + y^2 - 4x + 6y + 4 = 0$ orthogonally is
(a) $8x + 12y - 5 = 0$
(b) $8x - 12y + 5 = 0$
(c) $8x + 12y + 61 = 0$
(d) $-8x - 12y + 13 = 0$

53. The locus of the point $(\sqrt{3h+2},\sqrt{3k})$. If (h, k) lies on $x + y = 1$ is
(a) a pair of straight lines
(b) a circle
(c) a parabola
(d) an ellipse

54. The four points of intersection of the lines (2x – y + 1) (x – 2y + 3) = 0 with the axes lie on a circle whose centre is at the point

(a) $\left(-\frac{7}{4}, \frac{5}{4}\right)$

(b) $\left(\frac{3}{4}, \frac{5}{4}\right)$

(c) $\left(\frac{9}{4}, \frac{5}{4}\right)$

(d) $\left(0, \frac{5}{4}\right)$

55. α, β and γ are parametric angles of the points P, Q and R respectively, on the circle $x^2 + y^2 = 1$ and A is the point (–1, 0). If the lengths of the chord AP, AQ and AR are in G.P. then $\cos\frac{\alpha}{2}, \cos\frac{\beta}{2}$ and $\cos\frac{\gamma}{2}$ are in

(a) A.P.
(b) G.P.
(c) H.P.
(d) None of these

56. The radical centre of three circles, described on the three sides 3x – 2y + 10 = 0, x – y + 5 = 0 and 2x + 3y – 3 = 0 of a triangle as diameter, is

(a) $\left(\frac{24}{13}, \frac{29}{13}\right)$

(b) $\left(-\frac{24}{13}, \frac{29}{13}\right)$

(c) $\left(\frac{6}{13}, \frac{-5}{13}\right)$

(d) None of these

57. A circle of constant radius 4 passes through origin O, and cuts the axes at P and Q, then locus of the foot of the perpendicular from O to PQ is

(a) $\frac{1}{x^2} + \frac{1}{y^2} = \frac{64}{(x^2 + y^2)^2}$

(b) $\frac{1}{x^2} + \frac{1}{y^2} = \frac{64}{x^2 + y^2}$

(c) $x^2 + y^2 = \frac{16}{x^{-2} + y^{-2}}$
(d) None of these

58. From the point $P(2+3\sqrt{2}\cos\theta, 3+3\sqrt{2}\sin\theta)$, $0 < \theta < 2\pi$, tangents are drawn to the circle $x^2 + y^2 - 4x - 6y + 4 = 0$, then the angle between them is,
(a) $\frac{\pi}{5}$
(b) $\frac{\pi}{3}$
(c) $\frac{\pi}{4}$
(d) $\frac{\pi}{2}$

59. A circle passes through the intersection points of $x^2 + y^2 - 8x = 0$ and $x^2 + y^2 = 9$ and the common chord of above circles is diameter of that circle then equation of circle is
(a) $x^2 + y^2 - 3x - 5 = 0$
(b) $16x^2 + 16y^2 - 36x - 207 = 0$
(c) $32x^2 + 32y^2 - 72x - 207 = 0$
(d) None of these

60. If $A\left(a, \frac{1}{a}\right)$, $B\left(b, \frac{1}{b}\right)$, $C\left(c, \frac{1}{c}\right)$ and $D\left(d, \frac{1}{d}\right)$ are 4 distinct points on a unit circle then abcd equals.
(a) 2
(b) 4
(c) 1
(d) 8

61. Let x, y be the real number satisfying the equation $x^2 + y^2 - 4x + 3 = 0$ Let maximum value of $x^2 + y^2$ be M and minimum value be m then M + m equals:
(a) 8
(b) 12
(c) 10
(d) 13

62. Two thin rods AB and CD of length 2a and 2b move along OX and OY respectively where O is the origin. The equation of locus of centre of circle passing through the extrimities of the two rods is:
(a) $x^2 - y^2 = a^2 - b^2$
(b) $x^2 + y^2 = a^2 - b^2$
(c) $x^2 + y^2 = a^2 + b^2$
(d) $x^2 - y^2 = a^2 + b^2$

63. The value of c for which the set $\{(x, y) \mid x^2 + y^2 + 2x - 1 \le 0\}$ and $\{(x, y)\ l\ x - y + c \ge 0\}$ contains only one point in common is:

(a) $(-\infty, -1) \cup [3, \infty]$
(b) $\{-1, 3\}$
(c) $\{-3\}$
(d) $\{-1\}$

64. If a circles $x^2 + y^2 + 2g_1x + 2f_1y = 0$ and $x^2 + y^2 + 2g_2x + 2f_2y = 0$ touch each other, then

(a) $f_1g_1 = f_2g_2$
(b) $\frac{f_1}{g_1} = \frac{f_2}{g_2}$
(c) $f_1f_2 = g_1g_2$
(d) None of these

65. Two circle whose radii are equal to 4 and 8 intersect at right angles. Length of their common chord is:

(a) $\frac{16}{\sqrt{5}}$
(b) $\frac{8}{\sqrt{5}}$
(c) $4\sqrt{6}$
(d) 8

66. If from any point P on the circle $x^2 + y^2 + 1gx + 2fy + c = 0$ tangents are drawn to the circle $x^2 + y^2 + 2gx + 2fy + c \sin^2\alpha + (g^2 + f^2) \cos^2\alpha$ then the angle between the tangents is:

(a) α
(b) 2α
(c) $\frac{\alpha}{2}$
(d) $\frac{\pi}{2}-\alpha$

67. The circle $x^2 + y^2 - 2x - 3ky - 2 = 0$ passes through some fixed point. One of them may be:

(a) $(1+\sqrt{3},1)$
(b) $(1+\sqrt{3},0)$
(c) $(1-\sqrt{3},-1)$
(d) $(1+\sqrt{3},2)$

68. A circle whose centre lies in first quadrant passes through (3, 0) and cut off equal chords of length 4 units along the lines $x + y - 3 = 0$ and $x - y - 3 = 0$

(a) $x^2 + y^2 - 6y + 7 = 0$
(b) $x^2 + y^2 + 6y - 7 = 0$
(c) $x^2 + y^2 - 6x - 7 = 0$
(d) $x^2 + y^2 + 6x - 7 = 0$

69. Line $(x - 3) \cos\theta + (y - 3) \sin\theta = 1$ touches a circle $(x - 3)^2 + (y - 3)^2 = 1$, then find the number of values of θ

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

70. If a circle having centre at (α, β) radius r completely lies with in two lines $x + y = 2$ and $x + y = -2$, then min $(|\alpha + \beta + 2|, |\alpha + \beta - 2|)$ is

(a) greater than $\sqrt{2}r$

(b) less than $\sqrt{2}r$

(c) greater than 2r

(d) less than 2r

71. The sum of the square of the length of the chord intercepted by the line $x + y = n$, $n \in N$ on the circle $x^2 + y^2 - 4$ is

(a) 11

(b) 22

(c) 33

(d) none of these

72. If the tangent at the point p on the circle $x^2 + y^2 + 6x + 6y = 2$ meets the straight line $5x - 2y + 6 = 0$ at a point Q on the y-axis, then the length of PQ is

(a) 4

(b) $2\sqrt{5}$

(c) 5

(d) $3\sqrt{5}$

73. The number of points (x, y) having integral coordinates satisfying the condition $x^2 + y^2 < 25$ is

(a) 69

(b) 80

(c) 81

(d) 77

74. If $\lambda x^2 + \mu y^2 + (\lambda + \mu - 4) xy - \lambda x - \mu y - 20 = 0$ represents a circle, the radius of the circle is

(a) $\sqrt{21} / 2$

(b) $\sqrt{42} / 2$

(c) $2\sqrt{21}$

(d) $\sqrt{22}$

75. A point P lies inside the circles $x^2 + y^2 - 4 = 0$ and $x^2 + y^2 - 8x + 7 = 0$. The point P starts moving under the conditions that its path encloses greatest possible area and it is at a fixed distance from any arbitrarily chosen fixed point in its region. The locus of p is

(a) $4x^2 + 4y^2 - 12x + 1 = 0$

(b) $4x^2 + 4y^2 + 12x - 1 = 0$

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

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

76. If (α, β) is a point on the circle whose centre is on the x-axis and which touches the line $x + y = 0$ at $(2, -2)$, then the greatest value of α is

(a) $4-\sqrt{2}$

(b) 6

(c) $4+2\sqrt{2}$

(d) $4+\sqrt{2}$

77. The set of values of 'c' so that the equations $y = |x| + c$ and $x^2 + y^2 - 8|x| - 9 = 0$ have no solution is

(a) $(-\infty,-3)\cup(3,\infty)$

(b) $(-3, 3)$

(c) $(-\infty,-5\sqrt{2})\cup(5\sqrt{2},\infty)$

(d) $(5\sqrt{2}-4,\infty)$

78. The lines $2x - 3y = 5$ and $3x - 4y = 7$ are the diameters of a circle of area 154 sq unit. The equation of this circle $(\pi = 22/7)$

(a) $x^2 + y^2 + 2x - 2y = 62$

(b) $x^2 + y^2 + 2x - 2y = 47$

(c) $x^2 + y^2 - 2x + 2y = 47$

(d) $x^2 + y^2 - 2x + 2y = 62$

79. $(-6, 0)$, $(0, 6)$ and $(-7, 7)$ are the vertices of ΔABC. The incircle of the triangle has the equation

(a) $x^2 + y^2 - 9x - 9y + 36 = 0$

(b) $x^2 + y^2 + 9x - 9y + 36 = 0$

(c) $x^2 + y^2 + 9x + 9y - 36 = 0$

(d) $x^2 + y^2 + 18x - 18y + 36 = 0$

80. Let $0 < \alpha < \dfrac{\pi}{2}$ be a 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) anti-clockwise 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 $\tan \alpha/2$

Answer:

1. (c)	2. (a)	3. (b)	4. (c)	5. (a)	6. (c)	7. (b)	8. (c)	9. (d)	10. (a)
11. (c)	12. (b)	13. (d)	14. (a)	15. (a)	16. (b)	17. (c)	18. (a)	19. (c)	20. (d)
21. (a)	22. (d)	23. (d)	24. (d)	25. (b)	26. (b)	27. (d)	28. (a)	29. (b)	30. (c)
31. (c)	32. (d)	33. (c)	34. (b)	35. (c)	36. (a)	37. (c)	38. (b)	39. (b)	40. (b)
41. (b)	42. (c)	43. (b)	44. (c)	45. (a)	46. (a)	47. (a)	48. (c)	49. (b)	50. (c)
51. (a)	52. (b)	53. (b)	54. (a)	55. (b)	56. (b)	57. (a)	58. (d)	59. (c)	60. (c)
61. (c)	62. (a)	63. (d)	64. (b)	65. (a)	66. (b)	67. (b)	68. (c)	69. (a)	70. (a)
71. (b)	72. (c)	73. (a)	74. (b)	75. (d)	76. (c)	77. (d)	78. (c)	79. (b)	80. (d)

“Detail solutions are mentioned in the content library”