CIRCLE

LEVEL-I

1. The equation $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ represents a circle, the condition will be
   (A) $a = b$ and $c = 0$ (B) $f = g$ and $h = 0$
   (C) $a = b$ and $h = 0$ (D) $f = g$ and $c = 0$

2. The equation $x^2 + y^2 + 2gx + 2fy + c = 0$ represents a real circle if
   (A) $g^2 + f^2 - c < 0$ (B) $g^2 + f^2 - c \geq 0$
   (C) always (D) none of these

3. Equation of a circle with centre (4,3) touching the circle $x^2 + y^2 = 1$ is
   (A) $x^2 + y^2 - 8x - 6y - 9 = 0$ (B) $x^2 + y^2 - 8x - 6y + 11 = 0$
   (C) $x^2 + y^2 - 8x - 6y - 11 = 0$ (D) $x^2 + y^2 - 8x - 6y + 9 = 0$

4. A square is inscribed in the circle $x^2 + y^2 - 2x + 4y + 3 = 0$. Its sides are parallel to the axes. Then the one vertex of the square is
   (A) $(1 + \sqrt{2}, -2)$ (B) $(1 - \sqrt{2}, -2)$
   (C) $(1, -2 + \sqrt{2})$ (D) none of these

5. The number of common real tangents that can be drawn to the circle $x^2 + y^2 - 2x - 2y = 0$ and $x^2 + y^2 - 8x - 8y + 14 = 0$ is_____

6. The lines $3x - 4y + 4 = 0$ and $6x - 8y - 7 = 0$ are tangents to the same circle. The radius of the circle is_____

7. The straight line $y = mx + c$ cuts the circle $x^2+y^2 = a^2$ at real points if
   (A) $\sqrt{a^2(1+m^2)} \leq |c|$ (B) $\sqrt{a^2(1-m^2)} \leq |c|$
   (C) $\sqrt{a^2(1+m^2)} \geq |c|$ (D) $\sqrt{a^2(1-m^2)} \geq |c|$

8. A line is drawn through a fixed point P (α,β) to cut the circle $x^2+y^2 = r^2$ at A and B. Then PA.PB is equal to
   (A) $(\alpha+\beta)^2-r^2$ (B) $\alpha^2+\beta^2-r^2$
   (C) $(\alpha-\beta)^2+r^2$ (D) None of these

9. The locus of the centre of a circle of radius 2 units which rolls on the outside of the circle $x^2 + y^2 + 3x - 6y - 9 = 0$ is ……

10. The values of a and b for which the two circles :
    $x^2 + y^2 + 2(1 - a)x + 2(1 + b)y + (2 - c) = 0$ and $x^2 + y^2 + 2(1 + a)x + 2(1 - b)y + (2 + c) = 0$ cut orthogonally are ……

11. A circle of radius 2 lies in the first quadrant and touches both the axes of co-ordinates. Then the equation of the circle with centre (6, 5) and touching the above circle externally is
    (A) $(x - 6)^2 + (y - 5)^2 = 4$ (B) $(x - 6)^2 + (y - 5)^2 = 9$
    (C) $(x - 6)^2 + (y - 5)^2 = 36$ (D) none of these

Quiz Bank-Circle-2

12. Two circles $x^2 + y^2 – 2x – 3 = 0$ and $x^2 + y^2 – 4x – 6y – 8 = 0$ are such that
(A) they touch each other (B) they intersect each other
(C) one lies inside the other (D) each lies outside the other

13. The least distance of point (10, 7) from the circle $x^2 + y^2 – 4x – 2y – 20 = 0$ is
(A) 10 (B) 15
(C) 5 (D) none of these

14. The number of common tangents to the circles $x^2 + y^2 – x = 0$ and $x^2 + y^2 + x=0$ is
(A) 2 (B) 1
(C) 4 (D) 3

15. The radius of the circle passing through the point (2, 6) two of whose diameters are $x + y = 6$ and $x + 2y = 4$ is
(A) 10 (B) $2\sqrt{5}$
(C) 6 (D) 4

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 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

17. Equation of tangent to the circle $x^2 + y^2 + 2x – 2y + 1 = 0$ at (0, 1)
(A) $x = 0$ (B) $y = 0$
(C) $xy = 0$ (D) none of these

18. The equation $x^2 + y^2 – 2x + 4y + 5 = 0$ represents
(A) a point (B) a pair of straight lines
(C) a circle (D) none of these

19. The equation of the 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) $x – y = 0$

20. The line $\lambda x + \mu y = 1$ is a normal to the circle $2x^2 + 2y^2 – 5x + 6y –1 = 0$ if
(A) $5\lambda – 6\mu = 4$ (B) $4 + 5\mu = 6\lambda$
(C) $4 + 6\mu = 5\lambda$ (D) none of these

21. The locus of the point $(3h+2, k)$, where (h, k) lies on the circle $x^2+y^2 = 1$ is
(A) a hyperbola (B) a circle
(C) a parabola (D) an ellipse

LEVEL-II

1. The centre of the circle passing through the points (0, 0), (1, 0) and touching the circle $x^2+y^2= 9$ is
   (A) $\left(\frac{3}{2}, \frac{1}{2}\right)$ (B) $\left(\frac{1}{2}, \frac{3}{2}\right)$
   (C) $\left(\frac{1}{2}, \frac{1}{2}\right)$ (D) $\left(\frac{1}{2}, -\sqrt{2}\right)$

2. The coordinates of mid point of the chord cut off by $2x – 5y + 18 = 0$ by the circle $x^2 + y^2 – 6x + 2y – 54 = 0$ are
   (A) (1, 4) (B) (2, 4)
   (C) (4, 1) (D) (1, 1)

3. Equation of tangent drawn from origin to the circle $x^2 + y^2 – 2rx + 2hy + h^2 = 0$ are
   (A) $x = 0$ (B) $y = 0$
   (C) $(h^2 – r^2)x – 2rhy = 0$ (D) $(h^2 – r^2)x + 2rhy = 0$

4. If 2 circles $(x – 1)^2 + (y – 3)^2 = r^2$ and $x^2 + y^2 – 8x + 2y + 8 = 0$ intersect at 2 distinct points, then
   (A) $2 < r < 8$ (B) $r > 2$
   (C) $r = 2$ (D) $r < 2$

5. The equation of circle passing through (1, –3) and the points common to the two circles $x^2 + y^2 – 6x + 8y – 16 = 0$, $x^2 + y^2 + 4x – 2y – 8 = 0$ is
   (A) $x^2 + y^2 – 4x + 6y + 24 = 0$ (B) $2x^2 + 2y^2 + 3x + y – 20 = 0$
   (C) $3x^2 + 3y^2 – 5x + 7y – 19 = 0$ (D) none of these

6. The common chord of $x^2+ y^2– 4x –4y = 0$ and $x^2 + y^2 = 16$ subtends at the origin an angle equal to
   (A) $\frac{\pi}{6}$ (B) $\frac{\pi}{4}$
   (C) $\frac{\pi}{3}$ (D) $\frac{\pi}{2}$

7. The locus of the centre of the circle which touches externally the circle $x^2+y^2–6x–6y+14=0$ and also touches the y-axis is given by the equations
   (A) $x^2 – 6x – 10y + 14 = 0$ (B) $x^2 – 10x – 6y + 14 = 0$
   (C) $y^2 – 6x – 10y + 14 = 0$ (D) $y^2 – 10x – 6y + 14 = 0$

8. If the tangent at the P on the circle $x^2 + y^2 + 2x + 2y = 7$ meets the straight line $3x – 4y = 15$ at a point Q on the x-axis, then length of PQ is
   (A) $3\sqrt{7}$ (B) $4\sqrt{7}$
   (C) $2\sqrt{7}$ (D) $\sqrt{7}$

9. 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) $\frac{a^3}{\sqrt{3}}$

10. The equation of the circle of radius $\sqrt{2}$ which touches the line x + y = 1 at (2, –1) is
(A) $x^2 + y^2 – 4x + 2y + 3 = 0$ (B) $x^2 + y^2 + 6x + 7 = 0$
(C) $x^2 + y^2 – 2x + 4y + 3 = 0$ (D) none of these

11. If the co–ordinates of one end of a diameters of the circle $x^2 + y^2 – 8x – 4y + c = 0$ are (–3, 2), then the co–ordinates of the other end are
(A) (5, 3) (B) (6, 3)
(C) (1, –8) (D) (11, 2)

12. The equation of the locus of the centre of circles touching the y–axis and circle $x^2 + y^2 – 2x = 0$ is
(A) $x^2 = 4y$ (B) $x^2 = – 4y$
(C) $y^2 = 4x$ (S) $y^2 = – 4x$

13. The angle between a pair of tangents drawn from a point P to the circle $x^2 + y^2 + 4x – 6y + 9\sin^2\theta + 13\cos^2\theta = 0$ is 2θ. The equation of 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) $x^2 + y^2 + 4x – 6y + 9 = 0$

14. 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) 3 (D) 4

15. 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

16. A, B, C, D are the points of intersection with the co-ordinate axes of the lines ax + by = ab and bx + ay = ab then
(A) A, B, C, D are concyclic (B) A,B,C,D forms a parallelogram
(C) A, B, C, D forms a rhombus (D) None of these

17. If the lines 2x – 3y – 5 = 0 and 3x-4y = 7 are diameters of a circle of area 154 square units, then the equation of the circle is
(A) $x^2+y^2+2x-2y-62 = 0$ (B) $x^2+y^2+2ax – 2y – 47 = 0$
(C) $x^2+y^2-2x+2y-47 = 0$ (D) $x^2+y^2-2x+2y-62 = 0$

18. The equation of the circle whose diameter is the common chord of the circle $x^2+y^2+3x+2y+1 = 0$ and $x^2+y^2+3x+4y+2 = 0$ is
(A) $x^2+y^2+8x+10y+2 = 0$ (B) $x^2+y^2-5x+4y+7 = 0$
(C) $2x^2+2y^2+6x-2y-1 = 0$ (D) None of these

19. The length of the tangent from any point on the circle $15x^2 + 15y^2 – 48x + 64y = 0$ to the two circles $5x^2 + 5y^2 – 24x + 32y + 75 = 0$ and $5x^2 + 5y^2 – 48x + 64y + 300 = 0$ are in the ratio of
(A) 1 : 2 (B) 2 : 3
(C) 3 : 4 (D) None of these

20. The tangents drawn from the origin to the circle $x^2+y^2-2rx-2hy+h^2 = 0$ are perpendicular if
(A) h = r (B) h = – r
(C) $r^2 + h^2 = 1$ (D) $r^2 = h^2 5$.

21. If a variable circle of radius 4 cuts the circle $x^2 + y^2 = 1$ orthogonally then locus of its centre will be
(A) $x^2 + y^2 = 16$ (B) $x^2 + y^2 = 17$
(C) $x^2 + y^2 - 2x - 4y = 1$ (D) $2x - 4y + 5 = 0$

22. If four points $\left(t_i, \frac{1}{t_i}\right)$ (i = 1, 2, 3, 4) are concyclic then $t_1t_2\, t_3t_4$ =
(A) 1 (B) -1
(C) 4 (D) 1/4

23. The number of common tangents that can be drawn to the circle $x^2+y^2-4x - 6y - 3 = 0$ and $x^2 + y^2 + 2x + 2y + 1 = 0$ is
(A) 1 (B) 2
(C) 3 (D) 4

24. The circle $x^2 + y^2 + 2ax + c = 0$ and $x^2 + y^2 + 2by + c = 0$ touch if
(A) $\frac{1}{a^2}+\frac{1}{b^2}=\frac{1}{c}$ (B) $\frac{1}{a^2}+\frac{1}{b^2}=\frac{1}{c^2}$
(C) $\frac{1}{a}+\frac{1}{b}+\frac{1}{c}=0$ (D) none of these

25. The equation $(x^2 -a^2)^2 + (y^2 -b^2)^2 = 0$ represents points
(A) which are collinear (B) which lie on a circle centred (0, 0)
(C) which lie on a circle centre (a, b) (D) none of these

26. The equations of the circle which touch both the axes and the line x = a are
(A) $x^2+y^2 \pm ax \pm ay+\frac{a^2}{4}=0$ (B) $x^2+y^2 + ax \pm ay+\frac{a^2}{4}=0$
(C) $x^2+y^2 -ax \pm ay+\frac{a^2}{4}=0$ (D) None of these

27. If the abscissae and ordinates of two points P and Q are the roots of the equation $x^2+2ax-b^2 = 0$ and $x^2+2px-q^2 = 0$ respectively, then the equation of the circle with PQ as diameter is
(A) $x^2+y^2+2ax+2py-b^2-q^2 = 0$ (B) $x^2+y^2-2ax-2py+b^2+q^2 = 0$
(C) $x^2+y^2-2ax-2py-b^2-q^2 = 0$ (D) $x^2+y^2+2ax+2py+b^2+q^2 = 0$

28. If the distances from the origin of the centre of three circles $x^2+y^2 +2\lambda_i x -c^2=0$ (i= 1, 2, 3) are in G.P. then the length of the tangent drawn to them from any point on the circle $x^2+y^2 = c^2$ are in
(A) A.P. (B) G.P.
(C) H.P. (D) None of these

29. 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 $x^2 + y^2 =c^2$, a, b, c> 0, then a, b, c are related as ……

30. The triangle PQR is inscribed in the circle $x^2 + y^2 = 25$. If Q and R have co-ordinates (3, 4) and (–4, 3) respectively, then $\angle$QPR is equal to
(A) $\pi/2$ (B) $\pi/3$
(C) $\pi/4$ (D) $\pi/6$

Quiz Bank-Circle-6

31. If the circle $x^2 + y^2 + 2x + 2ky + 6 = 0$ and $x^2 + y^2 + 2ky + k = 0$ intersect ortohgonally, then k is
(A) 2 or 3/2 (B) –2 or –3/2
(C) 2 or –3/2 (D) none of these

32. If the tangent to the circle $x^2 + y^2 = 5$ at the point (1, -2) also touches the circle $x^2 + y^2 - 8x + 6y + 20 = 0$, then its point of contact is
(A) (3, 1) (B) (-3, 1)
(C) (3, -1) (D) (-3, -1)

33. The equation of the circle having its centre on the line $x + 2y – 3 = 0$ and passing through the point of intersection of the circles $x^2 + y^2 – 2x – 4y + 1 = 0$ and $x^2 + y^2 – 4x – 2y + 1 = 0$ is
(A) $x^2 + y^2 – 6x + 1 = 0$ (B) $x^2 + y^2 – 3x + 4 = 0$
(C) $x^2 + y^2 – 2x – 2y + 1 = 0$ (D) $x^2 + y^2 + 2x – 4y + 4 = 0$

34. 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 point of intersection and the point (1, 1) is
(A) $x^2 + y^2 + x – y = 0$ (B) $x^2 + y^2 – 3x + 1 = 0$
(C) $x^2 + y^2 – 4y + 2 = 0$ (D) none of these

35. Given that the circles $x^2 + y^2 – 2x + 6y + 6 = 0$ and $x^2 + y^2 – 5x + 6y + 15 = 0$ touch, the equation to their common tangents is
(A) x = 3 (B) y = 6
(C) 7x – 12y – 21 = 0 (D) 7x + 12y + 21 = 0

36. If an equilateral triangle is inscribed in the circle $x^2 + y^2 = k^2$, the length of each side is equal to
(A) $k/\sqrt{3}$ (B) $k\sqrt{3}$
(C) k (D) 2k

37. The equation of the circle through the origin and cutting intercepts of length 2 and 3 from the positive sides of x and y is _____

38. If the circle $x^2+y^2+4x+22y + c = 0$ bisects the circumference of the circle $x^2 + y^2 – 2x + 8y + d = 0$ then c – d is equal to
(A) 60 (B) 50
(C) 40 (D) 56

39. If an equilateral triangle is inscribed in the circle $x^2 + y^2 = 25$ then length of its each side is
(A) $5\sqrt{2}$ (B) $\frac{5\sqrt{3}}{2}$
(C) $5\sqrt{3}$ (D) none of these

40. If the co–ordinates at one end of a diameter of the circle $x^2 + y^2 – 8x – 4y + c = 0$ are (11, 2) then the co–ordinates at the other end are
(A) (3, 2) (B) (–3, –2)
(C) (–3, 2) (D) (3, –2)

41. $S_1 = x^2 + y^2 = 9$, $S_2 = x^2 + y^2 – 8x – 6y + n^2 = 0$, $n \in Z$. If the two circle have exactly two common tangent then the number of possible value of n is
(A) 7 (B) 8
(C) 9 (D) 10

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

(A) 4 (B) $4\sqrt{2}$

(C) $\pm 4\sqrt{2}$ (D) 8

43. The locus of the middle point of chord 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 of radius $2\sqrt{3}$ (D) an ellipse

44. 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

45. If equation of 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

46. The shortest distance between the circles $x^2 + y^2 = 1$ and $x^2 + y^2 - 10x - 10y + 41 = 0$ is

(A) $\sqrt{41}$-1 (B) 0

(C) $\sqrt{41}$ (D) $5\sqrt{2} - 4$

47. Two circles $x^2 + y^2 + 2ax + c = 0$ and $x^2 + y^2 + 2by = 0$ touch if

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

(C) $\frac{1}{c^2} = \frac{1}{a^2} + \frac{1}{b^2}$ (D) $c^2 = 4b^2(a^2 - c)$

48. If $y = 2x$ be the equation of a chord of the circle $x^2 + y^2 = 2ax$, then the equation of the circle, of which this chord is a diameter, is

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

(C) $5(x^2+y^2) - 2a(x + 2y) = 0$ (D) none of these.

49. PA is tangent to $x^2 + y^2 = a^2$ and PB is tangent to $x^2 + y^2 = b^2$ $(b > a)$. If $\angle APB = \frac{\pi}{2}$, then locus of point 'P' is

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

(C) $x^2 + y^2 = a^2 + b^2$ (D) none of these

50. $f(x, y) = x^2 + y^2 + 2ax + 2by + c = 0$ represents a circle. If $f(x, 0) = 0$ has equal roots, each being 2 and $f(0, y) = 0$ has 2 and 3 as its roots, then centre of circle is

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

(C) data are not sufficient (D) data are inconsistent

51. Tangents PA and PB are drawn to $x^2+y^2=4$ from the point P(3, 0). Area of triangle PAB is equal to

(A) $\frac{5}{9}\sqrt{5}$ sq. units (B) $\frac{1}{3}\sqrt{5}$ sq. units

(C) $\frac{10}{9}\sqrt{5}$ sq. units (D) $\frac{20}{3}\sqrt{5}$ sq. units

52. Radius of bigger circle touching the circle $x^2+y^2 - 4x - 4y + 4 = 0$ and both the co-ordinate axes is

(A) $3 + 2\sqrt{2}$ (B) $2\left(3 + 2\sqrt{2}\right)$

(C) $6 + 2\sqrt{2}$ (D) $2\left(6 + 2\sqrt{2}\right)$

53. The lines $3x - 4y + \lambda = 0$ and $6x - 8y + \mu = 0$ are tangents to the same circle. The radius of the circle is

(A) $\left|\frac{2\lambda - \mu}{20}\right|$ (B) $\left|\frac{2\mu - \lambda}{20}\right|$

(C) $\left|\frac{2\lambda + \mu}{20}\right|$ (D) none of these.

LEVEL-III

1. A circle of radius 5 units touches both the axes and lies in the first quadrant. If the circle makes one complete roll on x-axis along the positive direction of x-axis, then its equation in the new position is
(A) $x^2 + y^2 + 20\pi x - 10y + 100\pi^2 = 0$ (B) $x^2 + y^2 + 20\pi x + 10y + 100\pi^2 = 0$
(C) $x^2 + y^2 - 20\pi x - 10y + 100\pi^2 = 0$ (D) none of these

2. Let AB be a chord of circle $x^2 + y^2 = 3$ which subtends 45^0 angle at P where P is any moving point on the circle. The locus of centroid of ΔPAB is
(A) $\left(x-\frac{1}{3}\right)^2+\left(y-\frac{1}{3}\right)^2=\frac{1}{3}$ (B) $\left(x+\frac{1}{\sqrt{3}}\right)^2+\left(y+\frac{1}{\sqrt{3}}\right)^2=\frac{1}{3}$
(C) $\left(x-\frac{1}{\sqrt{3}}\right)^2+\left(y-\frac{1}{\sqrt{3}}\right)^2=\frac{1}{3}$ (D) none of these

3. Two circles, each radius 5, have a common tangent at (1, 1) whose equation is $3x + 4y - 7 = 0$ then their centre are
(A) (4, –5), (–2,3) (B) (4, –3), (–2, 5)
(C) (4, 5), (–2, –3) (D) none of these

4. 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 co–ordinates satisfy the inequality $x + y > 4$ is
(A) $x^2 + y^2 - 8x - 8y + 24 = 0$ (B) $x^2 + y^2 = 8$
(C) $x^2 + y^2 - 8x + 8y + 24 = 0$ (D) $x^2 + y^2 + 8x + 8y + 24 = 0$

5. The circle passing through distinct point (1, t), (t, 1) and (t, t) for all values of t , passes through the point
(A) (-1, -1) (B) (1, 1)
(C) (1, -1) (D) (-1, 1)

6. The equation of the locus of the midpoints of the chords of the circle $4x^2 + 4y^2 - 12x + 4y + 1 = 0$ that subtends an angle $\frac{2\pi}{3}$ at its centre is _____

7. The area of the triangle formed by the positive x-axis and the normal and tangent to the circle $x^2 + y^2 = 4$ at the point $(1, \sqrt{3})$ is _____

8. A circle is inscribed in an equilateral triangle of side a. the area of any square inscribed in this circle is _____

9. Tangents OP and OQ are drawn from the origin 'O' to the circle $x^2+y^2+2gx+2fy+c=0$. Then the equation of the circumcircle of the triangle OPQ is
(A) $x^2+y^2+2gx+2fy = 0$ (B) $x^2+y^2+gx+fy = 0$
(C) $x^2+y^2-gx-fy=0$ (D) $x^2+y^2-2gx-2fy = 0$

10. The locus of the mid points of the chords of the circle $x^2+y^2+4x-6y-12 = 0$ which subtends an angle of $\frac{\pi}{3}$ radians at its centre is
(A) $(x+2)^2+(y-3)^2 = 6.25$ (B) $(x-2)^2+(y+3)^2 = 6.25$
(C) $(x+2)^2+(y-3)^2 = 18.75$ (D) $(x+2)^2+(y+3)^2 = 18.75$

11. The locus of the mid-points of a chord of the circle $x^2 + y^2 = 4$, which subtends a right angle at the origin is
(A) $x + y = 2$ (B) $x^2 + y^2 = 1$
(C) $x^2 + y^2 = 2$ (D) $x + y = 1$

12. If two distinct chords, drawn from the point (p, q) on the circle $x^2 + y^2 = px + qy$ (where $p, q \neq 0$) are bisected by the x-axis, then
(A) $p^2 = q^2$ (B) $p^2 = 8q^2$
(C) $p^2 < 8q^2$ (D) $p^2 > 8q^2$

13. The locus of the centre of a circle which touches a given line and passes through a given point, not lying on the given line, is
(A) a parabola (B) a circle
(C) a pair of straight line (D) none of these .

14. The tangents drawn from the origin to the circle $x^2+y^2 + 2gx + 2fy + f^2 = 0$ are perpendicular if
(A) $g = f$ (B) $g = -f$
(C) $g = 2f$ (D) $2g = f$

15. Two circles with radii 'r_1' and 'r_2', $r_1 > r_2 \geq 2$, touch each other externally. If 'θ' be the angle between the direct common tangents, then
(A) $\theta = \sin^{-1}\left(\frac{r_1 + r_2}{r_1 - r_2}\right)$ (B) $\theta = 2\sin^{-1}\left(\frac{r_1 - r_2}{r_1 + r_2}\right)$
(C) $\theta = \sin^{-1}\left(\frac{r_1 - r_2}{r_1 + r_2}\right)$ (D) none of these.

16. Tangents are drawn to the circle $x^2 + y^2 = 50$ from a point 'P' lying on the x-axis. These tangents meet the y-axis at points 'P_1' and 'P_2'. Possible coordinates of 'P' so that area of triangle PP_1P_2 is minimum, are
(A) (10, 0) (B) $(10\sqrt{2}, 0)$
(C) (-10, 0) (D) $(-10\sqrt{2}, 0)$

17. Two distinct chords of the circle $x^2 + y^2 - 2x - 4y = 0$ drawn from the point P(a, b) gets bisected by the y-axis, then
(A) $(b + 2)^2 > 4a$ (B) $(b - 2)^2 > 4a$
(C) $(b - 2)^2 > 2a$ (D) none of these

18. A circle S of radius 'a' is the director circle of another circle S_1. S_1 is the director circle of circle S_2 and so on. If the sum of the radii of all these circles is 2, then the value of a is
(A) $2 + \sqrt{2}$ (B) $2 - \sqrt{2}$
(C) $2 - \frac{1}{\sqrt{2}}$ (D) $2 + \frac{1}{\sqrt{2}}$

19. Circles are drawn having the sides of triangle ABC as their diameters. Radical centre of these circles is the
(A) circumcentre of triangle (B) Incentre of triangle ABC
(C) orthcentre of triangle ABC (D) centroid of ΔABC

20. The circle $x^2 + y^2 + 2a_1x + c = 0$ lies completely inside the circle $x^2 + y^2 + 2a_2x + c = 0$, then
(A) $a_1a_2 > 0,\ c < 0$ (B) $a_1a_2 > 0,\ c > 0$
(C) $a_1a_2 < 0,\ c < 0$ (D) $a_1a_2 < 0,\ c > 0$

ANSWERS

LEVEL −I

1.	C	2.	B	3.	D	4.	D
5.	3	6.	3/4	7.	A	8.	B
9.	$\left(x+\frac{3}{2}\right)^2+(y-3)^2=\frac{169}{4}$			10.	a = b = 0	11.	B
12.	B						
13.	C	14.	D	15.	A	16.	B
17.	A	18.	C	19.	D	20.	A
21.	D						

LEVEL −II

1.	D	2.	A	3.	A	4.	A
5.	D	6.	D	7.	D	8.	C
9.	A	10.	C	11.	D	12.	C
13.	D	14.	D	15.	B	16.	A
17.	C	18.	C	19.	A	20.	A
21.	B	22.	A	23.	C	24.	A
25.	B	26.	C	27.	A	28.	B
29.	G.P.	30.	C	31.	D	32.	B
33.	A	34.	B	35.	A	36.	B
37.	$(x-1)^2+\left(y-\frac{3}{2}\right)^2=\frac{13}{4}$			38.	B	39.	C
40.	C						
41.	C	42.	C	43.	C	44.	C
45.	B	46.	D	47.	D	48.	C
49.	C	50.	D	51.	C		
52.	B	53.	A				

LEVEL −III

1.	D	2.	C	3.	C	4.	A
5.	B	6.	$\left(x-\frac{3}{2}\right)^2+\left(y+\frac{1}{2}\right)^2=\frac{9}{4}$				
7.	$2\sqrt{3}$ units						
8.	$\left(\frac{1}{6}\right)a^2$						
9.	B	10.	c	11.	C	12.	D
13.	A	14.	A	15.	B	16.	A, C
17.	B	18.	B	19.	C	20.	B