EXERCISE-I

Equations of circle, Geometrical problems regarding circle

1. The circle $x^2 + y^2 + 4x - 4y + 4 = 0$ touches
(A) *x*-axis (B) *y*-axis
(C) *x*-axis and *y*-axis (D) None of these

2. The equation of the circle which touches both axes and whose centre is (x_1, y_1) is
(A) $x^2 + y^2 + 2x_1(x + y) + x_1^2 = 0$
(B) $x^2 + y^2 - 2x_1(x + y) + x_1^2 = 0$
(C) $x^2 + y^2 = x_1^2 + y_1^2$
(D) $x^2 + y^2 + 2xx_1 + 2yy_1 = 0$

3. The equation of the circle whose radius is 5 and which touches the circle $x^2 + y^2 - 2x - 4y - 20 = 0$ externally at the point (5, 5), is
(A) $x^2 + y^2 - 18x - 16y - 120 = 0$
(B) $x^2 + y^2 - 18x - 16y + 120 = 0$
(C) $x^2 + y^2 + 18x + 16y - 120 = 0$
(D) $x^2 + y^2 + 18x - 16y + 120 = 0$

4. The lines $2x - 3y = 5$ and $3x - 4y = 7$ are the diameters of a circle of area 154 square units. The equation of the circle is
(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. A circle touches the *y*-axis at the point (0, 4) and cuts the *x*-axis in a chord of length 6 units. The radius of the circle is
(A) 3 (B) 4
(C) 5 (D) 6

6. If the vertices of a triangle be $(2, -2)$, $(-1, -1)$ and (5, 2), then the equation of its circumcircle is
(A) $x^2 + y^2 + 3x + 3y + 8 = 0$
(B) $x^2 + y^2 - 3x - 3y - 8 = 0$
(C) $x^2 + y^2 - 3x + 3y + 8 = 0$
(D) None of these

7. The equation of a circle which touches both axes and the line $3x - 4y + 8 = 0$ and whose centre lies in the third quadrant is
(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) $x^2 + y^2 - 4x - 4y - 4 = 0$

8. If one end of a diameter of the circle $x^2 + y^2 - 4x - 6y + 11 = 0$ be (3, 4), then the other end is
(A) (0, 0) (B) (1, 1)
(C) (1, 2) (D) (2, 1)

9. If the equation $px^2 + (2 - q)xy + 3y^2 - 6qx + 30y + 6q = 0$ represents a circle, then the values of *p* and *q* are
(A) 3, 1 (B) 2, 2
(C) 3, 2 (D) 3, 4

10. The equation of the circle passing through the origin and cutting intercepts of length 3 and 4 units from the positive axes, is
(A) $x^2 + y^2 + 6x + 8y + 1 = 0$
(B) $x^2 + y^2 - 6x - 8y = 0$
(C) $x^2 + y^2 + 3x + 4y = 0$
(D) $x^2 + y^2 - 3x - 4y = 0$

11. The equation of the circle which passes through the points (2, 3) and (4, 5) and the centre lies on the straight line $y - 4x + 3 = 0$, is
(A) $x^2 + y^2 + 4x - 10y + 25 = 0$
(B) $x^2 + y^2 - 4x - 10y + 25 = 0$
(C) $x^2 + y^2 - 4x - 10y + 16 = 0$
(D) $x^2 + y^2 - 14y + 8 = 0$

12. The equation of the circle with centre at (1, –2) and passing through the centre of the given circle $x^2 + y^2 + 2y - 3 = 0$, is
(A) $x^2 + y^2 - 2x + 4y + 3 = 0$
(B) $x^2 + y^2 - 2x + 4y - 3 = 0$
(C) $x^2 + y^2 + 2x - 4y - 3 = 0$
(D) $x^2 + y^2 + 2x - 4y + 3 = 0$

13. The equation of the circle concentric with the circle $x^2 + y^2 + 8x + 10y - 7 = 0$ and passing through the centre of the circle $x^2 + y^2 - 4x - 6y = 0$ is

(A) $x^2 + y^2 + 8x + 10y + 59 = 0$

(B) $x^2 + y^2 + 8x + 10y - 59 = 0$

(C) $x^2 + y^2 - 4x - 6y + 87 = 0$

(D) $x^2 + y^2 - 4x - 6y - 87 = 0$

14. The equation of the circle passing through the points (0, 0), (0, *b*) and (*a*, *b*) is

(A) $x^2 + y^2 + ax + by = 0$

(B) $x^2 + y^2 - ax + by = 0$

(C) $x^2 + y^2 - ax - by = 0$

(D) $x^2 + y^2 + ax - by = 0$

15. The equation $ax^2 + by^2 + 2hxy + 2gx + 2fy + c = 0$ will represent a circle, if

(A) $a = b = 0$ and $c = 0$ (B) $f = g$ and $h = 0$

(C) $a = b \neq 0$ and $h = 0$ (D) $f = g$ and $c = 0$

16. If the lines $x + y = 6$ and $x + 2y = 4$ be diameters of the circle whose diameter is 20, then the equation of the circle is

(A) $x^2 + y^2 - 16x + 4y - 32 = 0$

(B) $x^2 + y^2 + 16x + 4y - 32 = 0$

(C) $x^2 + y^2 + 16x + 4y + 32 = 0$

(D) $x^2 + y^2 + 16x - 4y + 32 = 0$

17. The number of circles touching the lines $x = 0$, $y = a$ and $y = b$ is

(A) One (B) Two

(C) Four (D) Infinite

18. The equation of the circle whose diameters have the end points (*a*, 0) (0, *b*) is given by

(A) $x^2 + y^2 - ax - by = 0$

(B) $x^2 + y^2 + ax - by = 0$

(C) $x^2 + y^2 - ax + by = 0$

(D) $x^2 + y^2 + ax + by = 0$

19. The centre and radius of the circle $2x^2 + 2y^2 - x = 0$ are

(A) $\left(\frac{1}{4}, 0\right)$ and $\frac{1}{4}$ (B) $\left(-\frac{1}{2}, 0\right)$ and $\frac{1}{2}$

(C) $\left(\frac{1}{2}, 0\right)$ and $\frac{1}{2}$ (D) $\left(0, -\frac{1}{4}\right)$ and $\frac{1}{4}$

20. Centre of the circle $(x - 3)^2 + (y - 4)^2 = 5$ is

(A) (3, 4) (B) (–3, – 4)

(C) (4, 3) (D) (–4, – 3)

21. The radius of a circle which touches *y*-axis at (0,3) and cuts intercept of 8 units with *x*-axis, is

(A) 3 (B) 2

(C) 5 (D) 8

22. A point *P* moves in such a way that the ratio of its distance from two coplanar points is always a fixed number $(\neq 1)$. Then its locus is

(A) Straight line

(B) Circle

(C) Parabola

(D) A pair of straight lines

23. The equation of the circumcircle of the triangle formed by the lines $y + \sqrt{3}x = 6$, $y - \sqrt{3}x = 6$, and $y = 0$, is

(A) $x^2 + y^2 - 4y = 0$ (B) $x^2 + y^2 + 4x = 0$

(C) $x^2 + y^2 - 4y = 12$ (D) $x^2 + y^2 + 4x = 12$

24. The equation $x^2 + y^2 + 4x + 6y + 13 = 0$ represents

(A) Circle

(B) Pair of coincident straight lines

(C) Pair of concurrent straight lines

(D) Point

25. The equation of a circle with centre (–4, 3) and 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) $x^2 + y^2 + 8x + 6y - 9 = 0$

(D) None of these

26. 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

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

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

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

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

27. The area of a circle whose centre is (*h, k*) and radius *a* is

(A) $\pi(h^2 + k^2 - a^2)$ (B) $\pi a^2 hk$

(C) πa^2 (D) None of these

28. If the equation $\frac{K(x+1)^2}{3} + \frac{(y+2)^2}{4} = 1$ represents a circle, then $K =$

(A) 3/4 (B) 1

(C) 4/3 (D) 12

29. A circle has radius 3 units and its centre lies on the line $y = x - 1$. Then the equation of this circle if it passes through point (7, 3), is

(A) $x^2 + y^2 - 8x - 6y + 16 = 0$

(B) $x^2 + y^2 + 8x + 6y + 16 = 0$

(C) $x^2 + y^2 - 8x - 6y - 16 = 0$

(D) None of these

30. The equation of circle whose diameter is the line joining the points (–4, 3) and (12, –1) is

(A) $x^2 + y^2 + 8x + 2y + 51 = 0$

(B) $x^2 + y^2 + 8x - 2y - 51 = 0$

(C) $x^2 + y^2 + 8x + 2y - 51 = 0$

(D) $x^2 + y^2 - 8x - 2y - 51 = 0$

31. Equations to the circles which touch the lines $3x - 4y + 1 = 0$, $4x + 3y - 7 = 0$ and pass through (2, 3) are

(A) $(x-2)^2 + (y-8)^2 = 25$

(B) $5x^2 + 5y^2 - 12x - 24y + 31 = 0$

(C) Both (A) and (B)

(D) None of these

32. The equation of the circle in the first quadrant which touches each axis at a distance 5 from the origin is

(A) $x^2 + y^2 + 5x + 5y + 25 = 0$

(B) $x^2 + y^2 - 10x - 10y + 25 = 0$

(C) $x^2 + y^2 - 5x - 5y + 25 = 0$

(D) $x^2 + y^2 + 10x + 10y + 25 = 0$

33. The equation of the circle which passes through (1, 0) and (0, 1) and has its radius as small as possible, is

(A) $x^2 + y^2 - 2x - 2y + 1 = 0$

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

(C) $2x^2 + 2y^2 - 3x - 3y + 1 = 0$

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

34. The equation of the circumcircle of the triangle formed by the lines $x = 0, y = 0, 2x + 3y = 5$ is

(A) $x^2 + y^2 + 2x + 3y - 5 = 0$

(B) $6(x^2 + y^2) - 5\,(3x + 2y) = 0$

(C) $x^2 + y^2 - 2x - 3y + 5 = 0$

(D) $6(x^2 + y^2) + 5\,(3x + 2y) = 0$

35. If (α, β) is the centre of a circle passing through the origin, then its equation is

(A) $x^2 + y^2 - \alpha x - \beta y = 0$

(B) $x^2 + y^2 + 2\alpha x + 2\beta y = 0$

(C) $x^2 + y^2 - 2\alpha x - 2\beta y = 0$

(D) $x^2 + y^2 + \alpha x + \beta y = 0$

36. If $g^2 + f^2 = c$, then the equation $x^2 + y^2 + 2gx + 2fy + c = 0$ will represent

(A) A circle of radius *g*

(B) A circle of radius *f*

(C) A circle of diameter $\sqrt{c}$

(D) A circle of radius 0

37. The centre of a circle is (2, –3) and the circumference is 10π. Then the equation of the circle is

(A) $x^2 + y^2 + 4x + 6y + 12 = 0$

(B) $x^2 + y^2 - 4x + 6y + 12 = 0$

(C) $x^2 + y^2 - 4x + 6y - 12 = 0$

(D) $x^2 + y^2 - 4x - 6y - 12 = 0$

38. A variable circle passes through the fixed point (2,0) and touches the *y*-axis. Then the locus of its centre is

(A) A circle (B) An Ellipse

(C) A hyperbola (D) A parabola

39. The limit of the perimeter of the regular *n*-gons inscribed in a circle of radius *R* as $n \to \infty$ is

(A) $2\pi R$ (B) πR

(C) $4R$ (D) πR^2

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

(A) (4, 7) (B) (7, 4)

(C) (9, 4) (D) (4, 9)

Tangent and normal to a circle

41. Equation of the pair of tangents drawn from the origin to the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ is

(A) $gx + fy + c(x^2 + y^2)$

(B) $(gx + fy)^2 = x^2 + y^2$

(C) $(gx + fy)^2 = c^2(x^2 + y^2)$

(D) $(gx + fy)^2 = c(x^2 + y^2)$

42. If the line $y = mx + c$ be a tangent to the circle $x^2 + y^2 = a^2$, then the point of contact is

(A) $\left(\frac{-a^2}{c}, a^2\right)$ (B) $\left(\frac{a^2}{c}, \frac{-a^2m}{c}\right)$

(C) $\left(\frac{-a^2m}{c}, \frac{a^2}{c}\right)$ (D) $\left(\frac{-a^2c}{m}, \frac{a^2}{m}\right)$

43. The locus of the centre of a circle which passes through the point (*a*, 0) and touches the line $x + 1 = 0$, is

(A) Circle (B) Ellipse

(C) Parabola (D) Hyperbola

44. A point inside the circle $x^2 + y^2 + 3x - 3y + 2 = 0$ is

(A) (– 1, 3) (B) (– 2, 1)

(C) (2, 1) (D) (– 3, 2)

45. Position of the point (1, 1) with respect to the circle $x^2 + y^2 - x + y - 1 = 0$ is

(A) Outside the circle (B) Upon the circle

(C) Inside the circle (D) None of these

46. The line $(x - a)\cos\alpha + (y - b)\sin\alpha = r$ will be a tangent to the circle $(x - a)^2 + (y - b)^2 = r^2$

(A) If $\alpha = 30^o$ (B) If $\alpha = 60^o$

(C) For all values of α (D) None of these

47. The equations of the tangents drawn from the origin to the circle $x^2 + y^2 - 2rx - 2hy + h^2 = 0$ are

(A) $x = 0, y = 0$

(B) $(h^2 - r^2)x - 2rhy = 0, x = 0$

(C) $y = 0, x = 4$

(D) $(h^2 - r^2)x + 2rhy = 0, x = 0$

48. An infinite number of tangents can be drawn from (1, 2) to the circle $x^2 + y^2 - 2x - 4y + \lambda = 0$, then $\lambda =$

(A) – 20

(B) 0

(C) 5

(D) Cannot be determined

49. If the line $lx + my = 1$ be a tangent to the circle $x^2 + y^2 = a^2$, then the locus of the point (*l*, *m*) is

(A) A straight line (B) A Circle

(C) A parabola (D) An ellipse

50. The equations of the tangents drawn from the point (0, 1) to the circle $x^2 + y^2 - 2x + 4y = 0$ are

(A) $2x - y + 1 = 0,\ x + 2y - 2 = 0$

(B) $2x - y + 1 = 0,\ x + 2y + 2 = 0$

(C) $2x - y - 1 = 0,\ x + 2y - 2 = 0$

(D) $2x - y - 1 = 0,\ x + 2y + 2 = 0$

51. If $c^2 > a^2(1 + m^2)$, then the line $y = mx + c$ will intersect the circle $x^2 + y^2 = a^2$

(A) At one point

(B) At two distinct points

(C) At no point

(D) None of these

52. The straight line $x-y-3=0$ touches the circle $x^2+y^2-4x+6y+11=0$ at the point whose co-ordinates are

(A) $(1,-2)$ (B) $(1,2)$
(C) $(-1,2)$ (D) $(-1,-2)$

53. The line $y=mx+c$ will be a normal to the circle with radius r and centre at (a, b), if

(A) $a=mb+c$ (B) $b=ma+c$
(C) $r=ma-b+c$ (D) $r=ma-b$

54. The point at which the normal to the circle $x^2+y^2+4x+6y-39=0$ at the point (2, 3) will meet the circle again, is

(A) (6, –9) (B) (6, 9)
(C) (–6, –9) (D) (–6, 9)

55. The equation of the normal to the circle $x^2+y^2-2x=0$ parallel to the line $x+2y=3$ is

(A) $2x+y-1=0$ (B) $2x+y+1=0$
(C) $x+2y-1=0$ (D) $x+2y+1=0$

56. At which point on y-axis the line $x=0$ is a tangent to circle $x^2+y^2-2x-6y+9=0$

(A) (0, 1) (B) (0, 2)
(C) (0, 3) (D) (0, 4)

57. 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

(A) 1 (B) 2
(C) 3 (D) 4

58. If the straight line $y=mx+c$ touches the circle $x^2+y^2-4y=0$, then the value of c will be

(A) $1+\sqrt{1+m^2}$ (B) $1-\sqrt{m^2+1}$
(C) $2(1+\sqrt{1+m^2})$ (D) $2+\sqrt{1+m^2}$

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

(A) $2\sqrt{3}$ (B) $\sqrt{3}$
(C) $4\sqrt{3}$ (D) None of these

60. Line $y=x+a\sqrt{2}$ is a tangent to the circle $x^2+y^2=a^2$ at

(A) $\left(\frac{a}{\sqrt{2}},\frac{a}{\sqrt{2}}\right)$ (B) $\left(-\frac{a}{\sqrt{2}},-\frac{a}{\sqrt{2}}\right)$
(C) $\left(\frac{a}{\sqrt{2}},-\frac{a}{\sqrt{2}}\right)$ (D) $\left(-\frac{a}{\sqrt{2}},\frac{a}{\sqrt{2}}\right)$

61. The point (0.1, 3.1) with respect to the circle $x^2+y^2-2x-4y+3=0$, is

(A) At the centre of the circle
(B) Inside the circle but not at the centre
(C) On the circle
(D) Outside the circle

62. The points of intersection of the line $4x-3y-10=0$ and the circle $x^2+y^2-2x+4y-20=0$ are

(A) $(-2,-6),(4,2)$ (B) $(2,6),(-4,-2)$
(C) $(-2,6),(-4,2)$ (D) None of these

63. The equation of the tangent to the circle $x^2+y^2=r^2$ at (a,b) is $ax+by-\lambda=0$, where λ is

(A) a^2 (B) b^2
(C) r^2 (D) None of these

64. If the centre of a circle is (–6, 8) and it passes through the origin, then equation to its tangent at the origin, is

(A) $2y=x$ (B) $4y=3x$
(C) $3y=4x$ (D) $3x+4y=0$

65. The line $y=mx+c$ intersects the circle $x^2+y^2=r^2$ at two real distinct points, if

(A) $-r\sqrt{1+m^2}<c\le 0$ (B) $0\le c<r\sqrt{1+m^2}$
(C) (A) and (B) both (D) $-c\sqrt{1-m^2}<r$

66. If the line $3x-4y=\lambda$ touches the circle $x^2+y^2-4x-8y-5=0$, then λ is equal to

(A) – 35, –15 (B) – 35, 15
(C) 35, 15 (D) 35,– 15

67. If a circle passes through the points of intersection of the coordinate axis with the lines $\lambda x-y+1=0$ and $x-2y+3=0$, then the value of λ is

(A) 1 (B) 2
(C) 3 (D) 4

68. Tangents drawn from origin to the circle $x^2 + y^2 - 2ax - 2by + b^2 = 0$ are perpendicular to each other, if

(A) $a - b = 1$ (B) $a + b = 1$

(C) $a^2 = b^2$ (D) $a^2 + b^2 = 1$

69. The line $lx + my + n = 0$ is normal to the circle $x^2 + y^2 + 2gx + 2fy + c = 0$, if

(A) $lg + mf - n = 0$ (B) $lg + mf + n = 0$

(C) $lg = mf - n = 0$ (D) $lg - mf + n = 0$

70. Given the circles $x^2 + y^2 - 4x - 5 = 0$ and $x^2 + y^2 + 6x - 2y + 6 = 0$. Let *P* be a point (α, β) such that the tangents from *P* to both the circles are equal, then

(A) $2\alpha + 10\beta + 11 = 0$ (B) $2\alpha - 10\beta + 11 = 0$

(C) $10\alpha - 2\beta + 11 = 0$ (D) $10\alpha + 2\beta + 11 = 0$

71. If a circle, whose centre is (–1, 1) touches the straight line $x + 2y + 12 = 0$, then the coordinates of the point of contact are

(A) $\left(\frac{-7}{2}, -4\right)$ (B) $\left(\frac{-18}{5}, \frac{-21}{5}\right)$

(C) (2,–7) (D) (–2, –5)

72. If the tangent at a point $P(x, y)$ of a curve is perpendicular to the line that joins origin with the point *P*, then the curve is

(A) Circle (B) Parabola

(C) Ellipse (D) Straight line

73. The slope of the tangent at the point (h, h) of the circle $x^2 + y^2 = a^2$ is

(A) 0 (B) 1

(C) –1 (D) Depends on *h*

74. If the straight line $4x + 3y + \lambda = 0$ touches the circle $2(x^2 + y^2) = 5$, then λ is

(A) $\frac{5\sqrt{5}}{2}$ (B) $5\sqrt{2}$

(C) $\frac{5\sqrt{5}}{4}$ (D) $\frac{5\sqrt{10}}{2}$

75. The gradient of the normal at the point (–2,–3) on the circle $x^2 + y^2 + 2x + 4y + 3 = 0$ is

(A) 1 (B) –1

(C) $\frac{3}{2}$ (D) $\frac{1}{2}$

76. The area of the triangle formed by the tangent at (3, 4) to the circle $x^2 + y^2 = 25$ and the co-ordinate axes is

(A) $\frac{24}{25}$ (B) 0

(C) $\frac{625}{24}$ (D) $-\left(\frac{24}{25}\right)$

77. The value of *c*, for which the line $y = 2x + c$ is a tangent to the circle $x^2 + y^2 = 16$, is

(A) $-16\sqrt{5}$ (B) 20

(C) $4\sqrt{5}$ (D) $16\sqrt{5}$

78. The equations of the tangents to circle $5x^2 + 5y^2 = 1$, parallel to line $3x + 4y = 1$ are

(A) $3x + 4y = \pm 2\sqrt{5}$ (B) $6x + 8y = \pm\sqrt{5}$

(C) $3x + 4y = \pm\sqrt{5}$ (D) None of these

79. Consider the following statements :

Assertion (A) : The circle $x^2 + y^2 = 1$ has exactly two tangents parallel to the *x*-axis

Reason (*R*) : $\frac{dy}{dx} = 0$ on the circle exactly at the point $(0, \pm 1)$. Of these statements

(A) Both *A* and *R* are true and *R* is the correct explanation of *A*

(B) Both *A* and *R* are true but *R* is not the correct explanation of *A*

(C) *A* is true but *R* is false

(D) *A* is false but *R* is true

80. If $\frac{x}{\alpha} + \frac{y}{\beta} = 1$ touches the circle $x^2 + y^2 = a^2$, then point $(1/\alpha, 1/\beta)$ lies on a/an

(A) Straight line (B) Circle

(C) Parabola (D) Ellipse

Chord of contact of tangent, Pole and Polar

81. Locus of the middle points of the chords of the circle $x^2 + y^2 = a^2$ which are parallel to $y = 2x$ will be

(A) A circle with radius *a*

(B) A straight line with slope $-\frac{1}{2}$

(C) A circle will centre (0, 0)

(D) A straight line with slope – 2

82. The length of the chord intercepted by the circle $x^2+y^2=r^2$ on the line $\frac{x}{a}+\frac{y}{b}=1$ is

(A) $\sqrt{\frac{r^2(a^2+b^2)-a^2b^2}{a^2+b^2}}$

(B) $2\sqrt{\frac{r^2(a^2+b^2)-a^2b^2}{a^2+b^2}}$

(C) $2\frac{\sqrt{r^2(a^2+b^2)-a^2b^2}}{a^2+b^2}$

(D) None of these

83. Middle point of the chord of the circle $x^2+y^2=25$ intercepted on the line $x-2y=2$ is

(A) $\left(\frac{3}{5},\frac{4}{5}\right)$ (B) $(-2,-2)$

(C) $\left(\frac{2}{5},-\frac{4}{5}\right)$ (D) $\left(\frac{8}{3},\frac{1}{3}\right)$

84. If the line $x-2y=k$ cuts off a chord of length 2 from the circle $x^2+y^2=3$, then $k=$

(A) 0 (B) ±1

(C) $\pm\sqrt{10}$ (D) None of these

85. From the origin chords are drawn to the circle $(x-1)^2+y^2=1$. The equation of the locus of the middle points of these chords is

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

(C) $x^2+y^2-x=0$ (D) $x^2+y^2-y=0$

86. The polars drawn from (–1, 2) to the circles $S_1\equiv x^2+y^2+6y+7=0$ and $S_2\equiv x^2+y^2+6x+1=0$, are

(A) Parallel

(B) Equal

(C) Perpendicular

(D) Intersect at a point

87. The equation of the diameter of the circle $x^2+y^2+2x-4y-11=0$ which bisects the chords intercepted on the line $2x-y+3=0$ is

(A) $x+y-7=0$ (B) $2x-y-5=0$

(C) $x+2y-3=0$ (D) None of these

88. If the lengths of the chords intercepted by the circle $x^2+y^2+2gx+2fy=0$ from the co-ordinate axes be 10 and 24 respectively, then the radius of the circle is

(A) 17 (B) 9

(C) 14 (D) 13

89. The equation of the common chord of the circles $(x-a)^2+(y-b)^2=c^2$ and $(x-b)^2+(y-a)^2=c^2$ is

(A) $x-y=0$ (B) $x+y=0$

(C) $x+y=a^2+b^2$ (D) $x-y=a^2-b^2$

90. The length of common chord of the circles $(x-a)^2+y^2=a^2$ and $x^2+(y-b)^2=b^2$ is

(A) $2\sqrt{a^2+b^2}$ (B) $\frac{ab}{\sqrt{a^2+b^2}}$

(C) $\frac{2ab}{\sqrt{a^2+b^2}}$ (D) None of these

91. The locus of mid point of the chords of the circle $x^2+y^2-2x-2y-2=0$ which makes an angle of $120°$ at the centre is

(A) $x^2+y^2-2x-2y+1=0$

(B) $x^2+y^2+x+y-1=0$

(C) $x^2+y^2-2x-2y-1=0$

(D) None of these

92. If the circle $x^2+y^2=a^2$ cuts off a chord of length $2b$ from the line $y=mx+c$, then

(A) $(1-m^2)(a^2+b^2)=c^2$

(B) $(1+m^2)(a^2-b^2)=c^2$

(C) $(1-m^2)(a^2-b^2)=c^2$

(D) None of these

93. The pole of the straight line $9x+y-28=0$ with respect to circle $2x^2+2y^2-3x+5y-7=0$, is

(A) (3, 1) (B) (1, 3)

(C) (3, –1) (D) (–3, 1)

94. If polar of a circle $x^2+y^2=a^2$ with respect to (x', y') is $Ax+By+C=0$, then its pole will be

(A) $\left(\frac{a^2A}{-C},\frac{a^2B}{-C}\right)$ (B) $\left(\frac{a^2A}{C},\frac{a^2B}{C}\right)$

(C) $\left(\frac{a^2C}{A},\frac{a^2C}{B}\right)$ (D) $\left(\frac{a^2C}{-A},\frac{a^2C}{-B}\right)$

95. The polar of the point (5, –1/2) *w.r.t* circle $(x-2)^2+y^2=4$ is

(A) $5x-10y+2=0$ (B) $6x-y-20=0$

(C) $10x-y-10=0$ (D) $x-10y-2=0$

96. The pole of the line $2x+3y=4$ *w.r.t* circle $x^2+y^2=64$ is

(A) (32, 48) (B) (48, 32)

(C) (– 32, 48) (D) (48, –32)

97. The length of the common chord of the circles $x^2+y^2+2x+3y+1=0$ and $x^2+y^2+4x+3y+2=0$ is

(A) $9/2$ (B) $2\sqrt{2}$

(C) $3\sqrt{2}$ (D) $3/2$

98. The length of the chord joining the points in which the straight line $\frac{x}{3}+\frac{y}{4}=1$ cuts the circle $x^2+y^2=\frac{169}{25}$ is

(A) 1 (B) 2

(C) 4 (D) 8

99. Which of the following is a point on the common chord of the circles $x^2+y^2+2x-3y+6=0$ and $x^2+y^2+x-8y-13=0$

(A) (1, –2) (B) (1, 4)

(C) (1, 2) (D) (1, –4)

100. If the circle $x^2+y^2=4$ bisects the circumference of the circle $x^2+y^2-2x+6y+a=0$, then *a* equals

(A) 4 (B) –4

(C) 16 (D) –16

System of circles

101. From three non- collinear points we can draw

(A) Only one circle (B) Three circle

(C) Infinite circles (D) No circle

102. The point (2, 3) is a limiting point of a coaxial system of circles of which $x^2+y^2=9$ is a member. The co-ordinates of the other limiting point is given by

(A) $\left(\frac{18}{13},\frac{27}{13}\right)$ (B) $\left(\frac{9}{13},\frac{6}{13}\right)$

(C) $\left(\frac{18}{13},-\frac{27}{13}\right)$ (D) $\left(-\frac{18}{13},-\frac{9}{13}\right)$

103. The equation of the circle having its centre on the line $x+2y-3=0$ and passing through the points of intersection of the circles $x^2+y^2-2x-4y+1=0$ and $x^2+y^2-4x-2y+4=0$, is

(A) $x^2+y^2-6x+7=0$

(B) $x^2+y^2-3y+4=0$

(C) $x^2+y^2-2x-2y+1=0$

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

104. If a circle passes through the point (1, 2) and cuts the circle $x^2+y^2=4$ orthogonally, then the equation of the locus of its centre is

(A) $x^2+y^2-3x-8y+1=0$

(B) $x^2+y^2-2x-6y-7=0$

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

(D) $2x+4y-1=0$

105. Circles $x^2+y^2-2x-4y=0$ and $x^2+y^2-8y-4=0$

(A) Touch each other internally

(B) Touch each other externally

(C) Cuts each other at two points

(D) None of these

106. The two circles $x^2+y^2-4y=0$ and $x^2+y^2-8y=0$

(A) Touch each other internally

(B) Touch each other externally

(C) Do not touch each other

(D) None of these

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

(A) $4x^2+4y^2-30x-10y-25=0$

(B) $4x^2+4y^2+30x-13y-25=0$

(C) $4x^2+4y^2-17x-10y+25=0$

(D) None of these

108. The locus of centre of a circle passing through (*a*, *b*) and cuts orthogonally to circle $x^2+y^2=p^2$, is

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

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

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

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

109. The equation of the circle which intersects circles $x^2+y^2+x+2y+3=0$, $x^2+y^2+2x+4y+5=0$ and $x^2+y^2-7x-8y-9=0$ at right angle, will be

(A) $x^2+y^2-4x-4y-3=0$

(B) $3(x^2+y^2)+4x-4y-3=0$

(C) $x^2+y^2+4x+4y-3=0$

(D) $3(x^2+y^2)+4(x+y)-3=0$

110. The equation of the circle through the points of intersection of $x^2+y^2-1=0$, $x^2+y^2-2x-4y+1=0$ and touching the line $x+2y=0$, is

(A) $x^2+y^2+x+2y=0$

(B) $x^2+y^2-x+20=0$

(C) $x^2+y^2-x-2y=0$

(D) $2(x^2+y^2)-x-2y=0$

111. The locus of the centres of the circles which touch externally the circles $x^2+y^2=a^2$ and $x^2+y^2=4ax$, will be

(A) $12x^2-4y^2-24ax+9a^2=0$

(B) $12x^2+4y^2-24ax+9a^2=0$

(C) $12x^2-4y^2+24ax+9a^2=0$

(D) $12x^2+4y^2+24ax+9a^2=0$

112. If the circles of same radius *a* and centers at (2, 3) and (5, 6) cut orthogonally, then *a* =

(A) 1 (B) 2

(C) 3 (d) 4

113. The equation of a circle passing through origin and co-axial to circles $x^2+y^2=a^2$ and $x^2+y^2+2ax=2a^2$, is

(A) $x^2+y^2=1$ (B) $x^2+y^2+2ax=0$

(C) $x^2+y^2-2ax=0$ (D) $x^2+y^2=2a^2$

114. The equation of the circle which passes through the point of intersection of circles $x^2+y^2-8x-2y+7=0$ and $x^2+y^2-4x+10y+8=0$ and having its centre on y-axis, will be

(A) $x^2+y^2+22x+9=0$

(B) $x^2+y^2+22x-9=0$

(C) $x^2+y^2+22y+9=0$

(D) $x^2+y^2+22y-9=0$

115. The equation of line passing through the points of intersection of the circles $3x^2+3y^2-2x+12y-9=0$ and $x^2+y^2+6x+2y-15=0$, is

(A) $10x-3y-18=0$ (B) $10x+3y-18=0$

(C) $10x+3y+18=0$ (D) None of these

116. The 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) None of these

117. One of the limit point of the coaxial system of circles containing $x^2+y^2-6x-6y+4=0$, $x^2+y^2-2x-4y+3=0$ is

(A) $(-1,1)$ (B) $(-1,2)$

(C) $(-2,1)$ (D) $(-2,2)$

118. The equation of the circle having the lines $x^2 + 2xy + 3x + 6y = 0$ as its normals and having size just sufficient to contain the circle $x(x-4) + y(y-3) = 0$ is

(A) $x^2 + y^2 + 3x - 6y - 40 = 0$

(B) $x^2 + y^2 + 6x - 3y - 45 = 0$

(C) $x^2 + y^2 + 8x + 4y - 20 = 0$

(D) $x^2 + y^2 + 4x + 8y + 20 = 0$

119. Locus of the point, the difference of the squares of lengths of tangents drawn from which to two given circles is constant, is

(A) Circle (B) Parabola

(C) Straight line (D) None of these

120. Consider the circles $x^2 + (y-1)^2 = 9, (x-1)^2 + y^2 = 25$. They are such that

(A) These circles touch each other

(B) One of these circles lies entirely inside the other

(C) Each of these circles lies outside the other

(D) They intersect in two points

121. The circle $x^2 + y^2 + 2gx + 2fy + c = 0$ bisects the circumference of the circle $x^2 + y^2 + 2g'x + 2f'y + c' = 0$, if

(A) $2g'(g-g') + 2f'(f-f') = c - c'$

(B) $g'(g-g') + f'(f-f') = c - c'$

(C) $f(g-g') + g(f-f') = c - c'$

(D) None of these

122. Circles $(x+a)^2 + (y+b)^2 = a^2$ and $(x+\alpha)^2 + (y+\beta)^2 = \beta^2$ cut orthogonally, if

(A) $a\alpha + b\beta = b^2 + \alpha^2$ (B) $2(a\alpha + b\beta) = b^2 + \alpha^2$

(C) $a\alpha + b\beta = a^2 + b^2$ (D) None of these

123. The circles $x^2 + y^2 + 4x + 6y + 3 = 0$ and $2(x^2 + y^2) + 6x + 4y + C = 0$ will cut orthogonally, if C equals

(A) 4 (B) 18

(C) 12 (D) 16

124. Any circle through the point of intersection of the lines $x + \sqrt{3}y = 1$ and $\sqrt{3}x - y = 2$ if intersects these lines at points P and Q, then the angle subtended by the arc PQ at its centre is

(A) 180^o

(B) 90^o

(C) 120^o

(D) Depends on centre and radius

125. The equation of a circle that intersects the circle $x^2 + y^2 + 14x + 6y + 2 = 0$ orthogonally and whose centre is (0, 2) is

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

(B) $x^2 + y^2 + 4y - 14 = 0$

(C) $x^2 + y^2 + 4y + 14 = 0$

(D) $x^2 + y^2 - 4y - 14 = 0$

126. The radical centre of the circles $x^2 + y^2 - 16x + 60 = 0, x^2 + y^2 - 12x + 27 = 0, x^2 + y^2 - 12y + 8 = 0$ is

(A) (13, 33/4) (B) (33/4, –13)

(C) (33/4, 13) (D) None of these

127. The radical axis of two circles and the line joining their centres are

(A) Parallel

(B) Perpendicular

(C) Neither parallel, nor perpendicular

(D) Intersecting, but not fully perpendicular

128. The two circles $x^2 + y^2 - 2x + 6y + 6 = 0$ and $x^2 + y^2 - 5x + 6y + 15 = 0$

(A) Intersect (B) Are concentric

(C) Touch internally (D) Touch externally

129. The locus of the centre of a circle which cuts orthogonally the circle $x^2 + y^2 - 20x + 4 = 0$ and which touches $x = 2$ is

(A) $y^2 = 16x + 4$ (B) $x^2 = 16y$

(C) $x^2 = 16y + 4$ (D) $y^2 = 16x$

130. The locus of the centre of circle which cuts the circles $x^2 + y^2 + 4x - 6y + 9 = 0$ and $x^2 + y^2 - 4x + 6y + 4 = 0$ orthogonally is

(A) $12x + 8y + 5 = 0$ (B) $8x + 12y + 5 = 0$

(C) $8x - 12y + 5 = 0$ (D) None of these

131. If the circle $x^2 + y^2 + 6x - 2y + k = 0$ bisects the circumference of the circle $x^2 + y^2 + 2x - 6y - 15 = 0$, then $k =$

(A) 21 (B) – 21

(C) 23 (D) – 23

132. If *P* is a point such that the ratio of the squares of the lengths of the tangents from *P* to the circles $x^2 + y^2 + 2x - 4y - 20 = 0$ and $x^2 + y^2 - 4x + 2y - 44 = 0$ is 2 : 3, then the locus of *P* is a circle with centre

(A) (7, – 8) (B) (– 7, 8)

(C) (7, 8) (D) (– 7, – 8)

133. If 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

(A) $2 < r < 8$ (B) $r = 2$

(C) $r < 2$ (D) $r > 2$

134. The points of intersection of the circles $x^2 + y^2 = 25$ and $x^2 + y^2 - 8x + 7 = 0$ are

(A) (4, 3) and (4, –3) (B) (4, –3) and (–4, –3)

(C) (–4, 3)and (4, 3) (D) (4, 3) and (3, 4)

135. If circles $x^2 + y^2 + 2ax + c = 0$ and $x^2 + y^2 + 2by + c = 0$ touch each other, then

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

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

136. If the circles $x^2 + y^2 - 2ax + c = 0$ and $x^2 + y^2 + 2by + 2\lambda = 0$ intersect orthogonally, then the value of λ is

(A) *c* (B) – *c*

(C) 0 (D) None of these

137. The radical axis of the pair of circle $x^2 + y^2 = 144$ and $x^2 + y^2 - 15x + 12y = 0$ is

(A) $15x - 12y = 0$ (B) $3x - 2y = 12$

(C) $5x - 4y = 48$ (D) None of these

138. The condition that the circle $(x - 3)^2 + (y - 4)^2 = r^2$ lies entirely within the circle $x^2 + y^2 = R^2$, is

(A) $R + r \le 7$ (B) $R^2 + r^2 < 49$

(C) $R^2 - r^2 < 25$ (D) $R - r > 5$

139. The value of λ, for which the circle $x^2 + y^2 + 2\lambda x + 6y + 1 = 0$, intersects the circle $x^2 + y^2 + 4x + 2y = 0$ orthogonally is

(A) $\frac{-5}{2}$ (B) -1

(C) $\frac{-11}{8}$ (D) $\frac{-5}{4}$

140. The value of *k* so that $x^2 + y^2 + kx + 4y + 2 = 0$ and $2(x^2 + y^2) - 4x - 3y + k = 0$ cut orthogonally is

(A) $\frac{10}{3}$ (B) $\frac{-8}{3}$

(C) $\frac{-10}{3}$ (D) $\frac{8}{3}$