CIRCLE SYSTEM ASSIGNMENT - II

1. Three sides of a triangle have the equations $L_r \equiv y - m_r x - c_r = 0;\ r = 1, 2, 3$. Then $\lambda L_2 L_3 + \mu L_3 L_1 + v L_1 L_2 = 0$, where $\lambda \neq 0,\ \mu \neq 0,\ v \neq 0$, is the equation of the circumcircle of the triangle, if

(a) $\lambda(m_2 + m_3) + \mu(m_3 + m_1) + v(m_1 + m_2) = 0$ (b) $\lambda(m_2 m_3 - 1) + \mu(m_3 m_1 - 1) + v(m_1 m_2 - 1) = 0$

(c) Both (a) and (b) hold together (d) None of these

2. The equation of the circle passing through the point (1, 1) and having two diameters along the pair of 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

3. The equation of a circle which touches *x*-axis and the line $4x - 3y + 4 = 0$, its centre lying in the third quadrant and lies on the line $x - y - 1 = 0$, is

(a) $9(x^2 + y^2) + 6x + 24y + 1 = 0$ (b) $9(x^2 + y^2) - 6x - 24y + 1 = 0$

(c) $9(x^2 + y^2) - 6x + 2y + 1 = 0$ (d) None of these

4. 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

5. 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 circumcircle 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

6. If the centroid of an equilateral triangle is (1, 1) and its one vertex is (– 1, 2) then the equation of its circumcircle 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

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

8. 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

9. 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

10. The circumcircle of the quadrilateral formed by the lines $x = a,\ x = 2a,\ y = -a,\ y = \sqrt{2}a$ is

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

11. Equation of a circle $S(x, y) = 0,\ S(2, 3) = 16$, which touches the line $3x + 4y - 7 = 0$ at (1, 1) is given by

(a) $x^2 + y^2 + x + 2y - 5 = 0$ (b) $x^2 + y^2 + 2x + 2y - 6 = 0$ (c) $x^2 + y^2 + 4x - 6y = 0$ (d) None of these

12. A circle which passes through origin and cuts intercepts on axes *a* and *b*, the equation of circle 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) $x^2 + y^2 + ax - by = 0$

13. 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) $x - 7y = 0$

14. The two lines through (2, 3) from which the circle $x^2 + y^2 = 25$ intercepts chords of length 8 units have equations

(a) $2x + 3y = 13,\ x + 5y = 17$ (b) $y = 3,\ 12x + 5y = 39$

(c) $x = 2,\ 9x - 11y = 51$ (d) None of these

15. Circles are drawn through the point (2, 0) to cut intercepts of length 5 units on the *x*-axis. If their centres lie in the first quadrant, then their equation is

(a) $x^2 + y^2 - 9x + 2ky + 14 = 0$ (b) $3x^2 + 3y^2 + 27x - 2ky + 42 = 0$

(c) $x^2 + y^2 - 9x - 2ky + 14 = 0$ (d) $x^2 + y^2 - 2kx - 9y + 14 = 0$

16. 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) $x^2 + y^2 - 2(\sqrt{2}x + y) + 4 = 0$ (d) None of these

17. 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) $x + y = 0$

18. 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

19. If 2*l* be the length of the intercept made by the circle $x^2 + y^2 = a^2$ on the line $y = mx + c$, then c^2 is equal to

(a) $(1 + m^2)(a^2 + l^2)$ (b) $(1 + m^2)(a^2 - l^2)$ (c) $(1 - m^2)(a^2 + l^2)$ (d) $(1 - m^2)(a^2 - l^2)$

20. For the circle $x^2 + y^2 + 4x - 7y + 12 = 0$ the following statement is true

(a) The length of tangent from (1, 2) is 7 (b) Intercept on *y*-axis is 2

(c) Intercept on *x*-axis is $2 - \sqrt{2}$ (d) None of these

21. 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

22. 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

23. The range of values of *m* for which the line $y = mx + 2$ cuts the circle $x^2 + y^2 = 1$ 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

24. If the circle $(x - h)^2 + (y - k)^2 = r^2$ is a tangent to the curve $y = x^2 + 1$ at a point (1, 2), then the possible location of the points (*h, k*) are given by

(a) $hk = 5/2$ (b) $h + 2k = 5$ (c) $h^2 - 4k^2 = 5$ (d) $k^2 = h^2 + 1$

25. 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) $3\sqrt{5}$

26. The tangents to $x^2 + y^2 = a^2$ having inclinations α and β intersect at *P*. If $\cot \alpha + \cot \beta = 0$, then the locus of *P* is

(a) $x + y = 0$ (b) $x - y = 0$ (c) $xy = 0$ (d) None of these

27. If the points *A* (1, 4) and *B* are symmetrical about the tangent to 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

28. 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)

29. The possible values of *p* for which the line $x \cos \alpha + y \sin \alpha = p$ is a tangent to the circle $x^2 + y^2 - 2qx \cos \alpha - 2qy \sin \alpha = 0$ is/are

(a) 0 and *q* (b) *q* and 2*q* (c) 0 and 2*q* (d) *q*

30. A circle passes through (0, 0) and (1, 0) and touches to the circle $x^2 + y^2 = 9$, then the centre of circle 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) $\left(\frac{1}{2}, \pm\sqrt{2}\right)$

31. The angle between the two tangents from the origin to the circle $(x-7)^2+(y+1)^2=25$ is

(a) 0 (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{6}$ (d) $\frac{\pi}{2}$

32. Tangents are drawn from the point (4, 3) to the circle $x^2+y^2=9$. The area of the triangle formed by them and the line joining their points of contact is

(a) $\frac{24}{25}$ (b) $\frac{64}{25}$ (c) $\frac{192}{25}$ (d) $\frac{192}{5}$

33. 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

34. The area of the triangle formed by the tangents from the points (*h, k*) to the circle $x^2+y^2=a^2$ and the line joining their points of contact is

(a) $a\frac{(h^2+k^2-a^2)^{3/2}}{h^2+k^2}$ (b) $a\frac{(h^2+k^2-a^2)^{1/2}}{h^2+k^2}$ (c) $\frac{(h^2+k^2-a^2)^{3/2}}{h^2+k^2}$ (d) $\frac{(h^2+k^2-a^2)^{1/2}}{h^2+k^2}$

35. Two tangents *PQ* and *PR* drawn to the circle $x^2+y^2-2x-4y-20=0$ from point *P* (16, 7). If the centre of the circle is *C* then the area of quadrilateral *PQCR* will be

(a) 75 sq. units (b) 150 sq. units (c) 15 sq. units (d) None of these

36. The tangents are drawn from the point (4, 5) to the circle $x^2+y^2-4x-2y-11=0$. The area of quadrilateral formed by these tangents and radii, is

(a) 15 sq. units (b) 75 sq. units (c) 8 sq. units (d) 4 sq. units

37. 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, is /are

(a) (10, 0) (b) $(10\sqrt{2}, 0)$ (c) (– 10, 0) (d) $(-10\sqrt{2}, 0)$

38. The angle between the tangents from α, β to the circle $x^2+y^2=a^2$ is, (where $S_1=\alpha^2+\beta^2-a^2$)

(a) $\tan^{-1}\left(\frac{a}{\sqrt{S_1}}\right)$ (b) $2\tan^{-1}\left(\frac{a}{\sqrt{S_1}}\right)$ (c) $2\tan^{-1}\left(\frac{\sqrt{S_1}}{a}\right)$ (d) None of these

39. 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

40. $P(\sqrt{2}, \sqrt{2})$ is a point on the circle $x^2+y^2=4$ and *Q* is another point on the circle such that arc $PQ=\frac{1}{4}\times$ 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

41. If a line passing through the point $(-\sqrt{8}, \sqrt{8})$ and making an angle 135° with *x*-axis cuts the circle $x=5\cos\theta, y=5\sin\theta$ at points *A* and *B*, then length of the chord *AB* is

(a) 10 (b) 20 (c) 5 (d) $2\sqrt{5}$

42. Equation of chord *AB* of circle $x^2+y^2=2$ passing through *P* (2, 2) such that *PB/PA* = 3, is given by

(a) $x=3y$ (b) $x=y$ (c) $y-2=\sqrt{3}(x-2)$ (d) None of these

43. If a chord of the circle $x^2+y^2=8$ makes equal intercepts of length *a* on the coordinate axes, then

(a) $|a|<8$ (b) $|a|<4\sqrt{2}$ (c) $|a|<4$ (d) $|a|>4$

44. The locus of the middle points of chords of the circle $x^2+y^2-2x-6y-10=0$ which passes through the origin, is

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

45. 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

46. If the equation of a given circle is $x^2+y^2=36$, then the length of the chord which lies along the line $3x+4y-15=0$ is

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

47. 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) $x + y = 1$

48. 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

49. The locus of the mid-point of chords of length 2*l* of the circle $x^2 + y^2 = a^2$ is

(a) $x^2 + y^2 = l^2 - a^2$ (b) $x^2 + y^2 = l^2 + a^2$ (c) $x^2 + y^2 = a^2 - 2l^2$ (d) $x^2 + y^2 = a^2 - l^2$

50. The circles $x^2 + y^2 - 10x + 16 = 0$ and $x^2 + y^2 = r^2$ intersect each other in two distinct points if

(a) $r < 2$ (b) $r > 8$ (c) $2 < r < 8$ (d) $2 \le r \le 8$