Circle

1. If P and Q are the points of intersection of the circles $x^2 + y^2 + 3x + 7y + 2p - 5 = 0$ and $x^2 + y^2 + 2x + 2y - p^2 = 0$, then there is a circle passing through P, Q and (1, 1) for **[AIEEE-2009]**

   (1) All except one value of p

   (2) All except two values of p

   (3) Exactly one value of p

   (4) All values of p

2. The circle $x^2 + y^2 = 4x + 8y + 5$ intersects the line $3x - 4y = m$ at two distinct points if **[AIEEE-2010]**

   (1) $-85 < m < -35$ (2) $-35 < m < 15$

   (3) $15 < m < 65$ (4) $35 < m < 85$

3. The equation of the circle passing through the points (1, 0) and (0, 1) and having the smallest radius is **[AIEEE-2011]**

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

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

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

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

4. The length of the diameter of the circle which touches the x-axis at the point (1, 0) and passes through the point (2, 3) is **[AIEEE-2012]**

   (1) 3/5 (2) 6/5

   (3) 5/3 (4) 10/3

5. The circle passing through (1, – 2) and touching the axis of x at (3, 0) also passes through the point **[JEE (Main)-2013]**

   (1) (–5, 2) (2) (2, –5)

   (3) (5, –2) (4) (–2, 5)

6. The equation of the circle passing through the foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$, and having centre at (0, 3) is **[JEE (Main)-2013]**

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

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

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

   (4) $x^2 + y^2 - 6y + 5 = 0$

7. 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 **[JEE (Main)-2014]**

   (1) $\frac{1}{2}$ (2) $\frac{1}{4}$

   (3) $\frac{\sqrt{3}}{\sqrt{2}}$ (4) $\frac{\sqrt{3}}{2}$

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 **[JEE (Main)-2015]**

   (1) 1 (2) 2

   (3) 3 (4) 4

9. 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 **[JEE (Main)-2016]**

   (1) An ellipse which is not a circle

   (2) A hyperbola

   (3) A parabola

   (4) A circle

10. 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 **[JEE (Main)-2016]**

    (1) $5\sqrt{3}$

    (2) 5

    (3) 10

    (4) $5\sqrt{2}$

11. The radius of a circle, having minimum area, which touches the curve $y = 4 - x^2$ and the lines, $y = |x|$ is **[JEE (Main)-2017]**

    (1) $2\left(\sqrt{2}-1\right)$ (2) $4\left(\sqrt{2}-1\right)$

    (3) $4\left(\sqrt{2}+1\right)$ (4) $2\left(\sqrt{2}+1\right)$

12. Let the orthocentre and centroid of a triangle be $A(-3, 5)$ and $B(3, 3)$ respectively. If C is the circumcentre of this triangle, then the radius of the circle having line segment AC as diameter, is **[JEE (Main)-2018]**

(1) $\sqrt{10}$ (2) $2\sqrt{10}$

(3) $3\sqrt{\frac{5}{2}}$ (4) $\frac{3\sqrt{5}}{2}$

13. If the tangent at (1, 7) to the curve $x^2 = y - 6$ touches the circle $x^2 + y^2 + 16x + 12y + c = 0$ then the value of c is **[JEE (Main)-2018]**

(1) 195 (2) 185

(3) 85 (4) 95

14. Three circles of radii a, b, c $(a < b < c)$ touch each other externally. If they have x-axis as a common tangent, then **[JEE (Main)-2019]**

(1) a, b, c are in A.P.

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

(3) $\sqrt{a}, \sqrt{b}, \sqrt{c}$ are in A.P.

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

15. Equation of a common tangent to the circle, $x^2 + y^2 - 6x = 0$ and the parabola, $y^2 = 4x$, is **[JEE (Main)-2019]**

(1) $\sqrt{3}y = x + 3$ (2) $2\sqrt{3}y = 12x + 1$

(3) $\sqrt{3}y = 3x + 1$ (4) $2\sqrt{3}y = -x - 12$

16. If the circles $x^2 + y^2 - 16x - 20y + 164 = r^2$ and $(x - 4)^2 + (y - 7)^2 = 36$ intersect at two distinct points, then **[JEE (Main)-2019]**

(1) $1 < r < 11$

(2) $r > 11$

(3) $r = 11$

(4) $0 < r < 1$

17. If a circle C passing through the point (4, 0) touches the circle $x^2 + y^2 + 4x - 6y = 12$ externally at the point (1, –1), then the radius of C is **[JEE (Main)-2019]**

(1) 5 (2) $2\sqrt{5}$

(3) $\sqrt{57}$ (4) 4

18. If the area of an equilateral triangle inscribed in the circle, $x^2 + y^2 + 10x + 12y + c = 0$ is $27\sqrt{3}$ sq. units **[JEE (Main)-2019]**

(1) 13 (2) 25

(3) – 25 (4) 20

19. Two circles with equal radii are intersecting at the points (0, 1) and (0, –1). The tangent at the point (0, 1) to one of the circles passes through the centre of the other circle. Then the distance between the centres of these circles is **[JEE (Main)-2019]**

(1) 1 (2) $\sqrt{2}$

(3) $2\sqrt{2}$ (4) 2

20. A square is inscribed in the circle $x^2 + y^2 - 6x + 8y - 103 = 0$ with its sides parallel to the coordinate axes. Then the distance of the vertex of this square which is nearest to the origin is **[JEE (Main)-2019]**

(1) 6 (2) $\sqrt{41}$

(3) 13 (4) $\sqrt{137}$

21. A circle cuts a chord of length $4a$ on the x-axis and passes through a point on the y-axis, distant $2b$ from the origin. Then the locus of the centre of this circle, is **[JEE (Main)-2019]**

(1) A hyperbola

(2) A parabola

(3) An ellipse

(4) A straight line

22. If a variable line, $3x + 4y - \lambda = 0$ is such that the two circles $x^2 + y^2 - 2x - 2y + 1 = 0$ and $x^2 + y^2 - 18x - 2y + 78 = 0$ are on its opposite sides, then the set of all values of λ is the interval **[JEE (Main)-2019]**

(1) (2, 17) (2) (12, 21)

(3) (13, 23) (4) (23, 31)

23. If a circle of radius R pases through the origin O and intersects the coordinate axes at A and B, then the locus of the foot of perpendicular from O on AB is **[JEE (Main)-2019]**

(1) $(x^2 + y^2)^2 = 4Rx^2y^2$

(2) $(x^2 + y^2)^2 = 4R^2x^2y^2$

(3) $(x^2 + y^2)^3 = 4R^2x^2y^2$

(4) $(x^2 + y^2)(x + y) = R^2xy$

24. The sum of the squares of the lengths of the chords intercepted on the circle, $x^2 + y^2 = 16$, by the lines, $x + y = n$, $n \in N$, where N is the set of all natural numbers, is **[JEE (Main)-2019]**

(1) 105 (2) 160

(3) 320 (4) 210

25. The tangent and the normal lines at the point $\left(\sqrt{3}, 1\right)$ to the circle $x^2 + y^2 = 4$ and the x-axis form a triangle. The area of this triangle (in square units) is **[JEE (Main)-2019]**

(1) $\frac{2}{\sqrt{3}}$ (2) $\frac{4}{\sqrt{3}}$

(3) $\frac{1}{3}$ (4) $\frac{1}{\sqrt{3}}$

26. If a tangent to the circle $x^2 + y^2 = 1$ intersects the coordinate axes at distinct points P and Q, then the locus of the mid-point of PQ is **[JEE (Main)-2019]**

(1) $x^2 + y^2 - 16x^2y^2 = 0$

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

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

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

27. The common tangent to the circles $x^2 + y^2 = 4$ and $x^2 + y^2 + 6x + 8y - 24 = 0$ also passes through the point **[JEE (Main)-2019]**

(1) (–6, 4) (2) (–4, 6)

(3) (4, –2) (4) (6, –2)

28. The line $x = y$ touches a circle at the point (1, 1). If the circle also passes through the point (1, –3), then its radius is **[JEE (Main)-2019]**

(1) $3\sqrt{2}$ (2) 2

(3) $2\sqrt{2}$ (4) 3

29. If the circles $x^2 + y^2 + 5Kx + 2y + K = 0$ and $2(x^2 + y^2) + 2Kx + 3y - 1 = 0$, $(K \in R)$, intersect at the points P and Q, then the line $4x + 5y - K = 0$ passes through P and Q, for **[JEE (Main)-2019]**

(1) Exactly one value of K

(2) Infinitely many values of K

(3) Exactly two values of K

(4) No value of K

30. The locus of the centres of the circles, which touch the circle, $x^2 + y^2 = 1$ externally, also touch the y-axis and lie in the first quadrant, is **[JEE (Main)-2019]**

(1) $y = \sqrt{1+2x},\ x \geq 0$ (2) $x = \sqrt{1+4y},\ y \geq 0$

(3) $x = \sqrt{1+2y},\ y \geq 0$ (4) $y = \sqrt{1+4x},\ x \geq 0$

31. A circle touching the x-axis at (3, 0) and making an intercept of length 8 on the y-axis passes through the point **[JEE (Main)-2019]**

(1) (2, 3) (2) (1, 5)

(3) (3, 5) (4) (3, 10)

32. Let the tangents drawn from the origin to the circle, $x^2 + y^2 - 8x - 4y + 16 = 0$ touch it at the points A and B. The $(AB)^2$ is equal to **[JEE (Main)-2020]**

(1) $\frac{64}{5}$ (2) $\frac{52}{5}$

(3) $\frac{56}{5}$ (4) $\frac{32}{5}$

33. If a line, $y = mx + c$ is a tangent to the circle, $(x - 3)^2 + y^2 = 1$ and it is perpendicular to a line L_1, where L_1 is the tangent to the circle, $x^2 + y^2 = 1$ at the point $\left(\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$; then **[JEE (Main)-2020]**

(1) $c^2 + 6c + 7 = 0$ (2) $c^2 - 7c + 6 = 0$

(3) $c^2 + 7c + 6 = 0$ (4) $c^2 - 6c + 7 = 0$

34. A circle touches the y-axis at the point (0, 4) and passes through the point (2, 0). Which of the following lines is not a tangent to this circle? **[JEE (Main)-2020]**

(1) $3x - 4y - 24 = 0$ (2) $4x - 3y + 17 = 0$

(3) $4x + 3y - 8 = 0$ (4) $3x + 4y - 6 = 0$

35. Let the latus rectum of the parabola $y^2 = 4x$ be the common chord to the circles C_1 and C_2 each of them having radius $2\sqrt{5}$. Then, the distance between the centres of the circles C_1 and C_2 is **[JEE (Main)-2020]**

(1) 8 (2) 12

(3) $8\sqrt{5}$ (4) $4\sqrt{5}$

36. The circle passing through the intersection of the circles, $x^2 + y^2 - 6x = 0$ and $x^2 + y^2 - 4y = 0$, having its centre on the line, $2x - 3y + 12 = 0$, also passes through the point **[JEE (Main)-2020]**

(1) (–3, 6) (2) (–1, 3)

(3) (–3, 1) (4) (1, –3)

37. If the co-ordinates of two points A and B are $(\sqrt{7}, 0)$ and $(-\sqrt{7}, 0)$ respectively and P is any point on the conic, $9x^2 + 16y^2 = 144$, then $PA + PB$ is equal to **[JEE (Main)-2020]**

(1) 9 (2) 16

(3) 6 (4) 8

38. If the length of the chord of the circle, $x^2 + y^2 = r^2$ ($r > 0$) along the line, $y - 2x = 3$ is r, then r^2 is equal to **[JEE (Main)-2020]**

(1) $\frac{9}{5}$ (2) $\frac{24}{5}$

(3) $\frac{12}{5}$ (4) 12

39. The centre of the circle passing through the point (0, 1) and touching the parabola $y = x^2$ at the point (2, 4) is **[JEE (Main)-2020]**

(1) $\left(\frac{-53}{10}, \frac{16}{5}\right)$ (2) $\left(\frac{6}{5}, \frac{53}{10}\right)$

(3) $\left(\frac{-16}{5}, \frac{53}{10}\right)$ (4) $\left(\frac{3}{10}, \frac{16}{5}\right)$

40. The number of integral values of k for which the line, $3x + 4y = k$ intersects the circle, $x^2 + y^2 - 2x - 4y + 4 = 0$ at two distinct points is _____. **[JEE (Main)-2020]**

41. The diameter of the circle, whose centre lies on the line $x + y = 2$ in the first quadrant and which touches both the lines $x = 3$ and $y = 2$, is _____. **[JEE (Main)-2020]**

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