

Section (A) : Equation of circle, parametric equation, position of a point

- A-1. Find the equation of the circle that passes through the points (1, 0), (-1, 0) and (0, 1). [15JM110309]
- A-2. ABCD is a square in first quadrant whose side is a, taking AB and AD as axes, prove that the equation to the circle circumscribing the square is $x^2 + y^2 = a(x + y)$. [16JM110491]
- A-3. Find the equation to the circle which passes through the origin and cuts off intercepts equal to 3 and 4 from the positive axes. [15JM110310]
- A-4. Find equation of circle which touches x & y axis & perpendicular distance of centre of circle from $3x + 4y + 11 = 0$ is 5. Given that circle lies in 1st quadrant. [16JM110492]
- A-5. Find the equation to the circle which touches the axis of x at a distance 3 from the origin and intercepts a distance 6 on the axis of y. [15JM110311]
- A-6. Find equation of circle whose cartesian equation are $x = -3 + 2 \sin \theta$, $y = 4 + 2 \cos \theta$ [15JM110312]
- A-7. Find the values of p for which the power of a point (2, 5) is negative with respect to a circle $x^2 + y^2 - 8x - 12y + p = 0$ which neither touches the axes nor cuts them.

Section (B) : Line and circle, tangent, pair of tangent

- B-1. Find the points of intersection of the line $x - y + 2 = 0$ and the circle $3x^2 + 3y^2 - 29x - 19y + 56 = 0$. Also determine the length of the chord intercepted.
- B-2. Show that the line $7y - x = 5$ touches the circle $x^2 + y^2 - 5x + 5y = 0$ and find the equation of the other parallel tangent. [15JM110313]

B-3. Find the equation of the tangents to the circle $x^2 + y^2 = 4$ which make an angle of 60° with the positive x-axis in anticlockwise direction . [15JM110314]

B-4. Show that two tangents can be drawn from the point $(9, 0)$ to the circle $x^2 + y^2 = 16$; also find the equation of the pair of tangents and the angle between them. [16JM110493]

B-5. If the length of the tangent from (f, g) to the circle $x^2 + y^2 = 6$ be twice the length of the tangent from (f, g) to the circle $x^2 + y^2 + 3x + 3y = 0$, then will $f^2 + g^2 + 4f + 4g + 2 = 0$?

Section (C) : Normal, Director circle, chord of contact, chord with mid point

C-1. Find the equation of the normal to the circle $x^2 + y^2 = 5$ at the point $(1, 2)$

C-2. Find the equation of the normal to the circle $x^2 + y^2 = 2x$, which is parallel to the line $x + 2y = 3$. [15JM110315]

C-3. Find the equation of director circle of the circle $(x + 4)^2 + y^2 = 8$ [15JM110316]

C-4. Tangents are drawn to the circle $x^2 + y^2 = 12$ at the points where it is met by the circle $x^2 + y^2 - 5x + 3y - 2 = 0$; find the point of intersection of these tangents. [16JM110494]

C-5. Tangents are drawn from the point (h, k) to the circle $x^2 + y^2 = a^2$; prove that the area of the triangle formed by them and the straight line joining their points of contact is $\frac{a(h^2 + k^2 - a^2)^{3/2}}{h^2 + k^2}$.

C-6. Find the equation of the chord of the circle $x^2 + y^2 + 6x + 8y + 9 = 0$ whose middle point is $(-2, -3)$. [16JM110495]

Section (D) : Position of two circle, Orthogonality, Radical axis and radical centre

D-1. Find the equations to the common tangents of the circles $x^2 + y^2 - 2x - 6y + 9 = 0$ and $x^2 + y^2 + 6x - 2y + 1 = 0$ [15JM110317]

D-2. Show that the circles $x^2 + y^2 - 2x - 6y - 12 = 0$ and $x^2 + y^2 + 6x + 4y - 6 = 0$ cut each other orthogonally. [16JM110496]

D-3. Find the equation of the circle passing through the origin and cutting the circles $x^2 + y^2 - 4x + 6y + 10 = 0$ and $x^2 + y^2 + 12y + 6 = 0$ at right angles. [15JM110318]

D-4. Given the three circles $x^2 + y^2 - 16x + 60 = 0$, $3x^2 + 3y^2 - 36x + 81 = 0$ and $x^2 + y^2 - 16x - 12y + 84 = 0$, find (1) the point from which the tangents to them are equal in length and (2) this length. [16JM110497]

Section (E) : Family of circles , Locus, Miscellaneous

E-1. Find the equation of the circle circumscribing the triangle formed by the lines $x + y = 6$, $2x + y = 4$ and $x + 2y = 5$. [15JM110319]

E-2. If $y = 2x$ is a chord of the circle $x^2 + y^2 - 10x = 0$, find the equation of a circle with this chord as diameter. [16JM110498]