CIRCLES

SYNOPSIS

- If a point moves such that its distance from the fixed point c is always a constant r then the locus of that point is called a circle. Here c is the centre and the constant distance r is the radius of the circle.
- Diameter : The locus of mid points system of parallel chords of a curve is called as a diameter of that curve

  Some important aspects of a circle :
  - Angle in a semi circle is a right angle.
  - The angle made by a chord of a circle at the centre of the circle is double to the angle made by the chord at any point of the circle.
  - Any three points on the circle are non - collinear
  - Through three non - collinear points only one circle passes through them.
  - The line joining mid point of a chord and centre of the circle is perpendicualr to the chord.
  - Perpendicular bisector of a chord of a circle passes through the centre of the circle.
  - Two tangents can be drawn from an external point of the circle.
  - Only one tangent can be drawn at a given point on the circle.
  - No real tangent can be drawn from an internal point of a circle.
  - A line is tangent to a circle then the length of the perpendicular from centre on to that line is radius.
  - If a quadrilateral is inscribed in a circle, then the opposite angles are supplementary.
  - The chord of a circle with maximum length is diamater.
  - Circles with same centre are called as concentric circles.
- If (x_1, y_1) is the centre and 'r' is the radius of a circle then the equation of that circle is $(x - x_1)^2 + (y - y_1)^2 = r^2$
- If (0,0) is the centre and 'r' is the radius of a circle then the equation of that circle is $x^2 + y^2 = r^2$
- If a = b; h = 0 and $g^2 + f^2 - ac \geq 0$ then the equation $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ represents a circle.
- If $g^2 + f^2 - c \geq 0$ then the equation $x^2 + y^2 + 2gx + 2fy + c = 0$ represents a circle. Its centre is (-g, -f) and radius is $\sqrt{g^2 + f^2 - c}$
- The equation of the circle passing through origin and making intercepts a and b on x-and y - axes respectively is $x^2 + y^2 - ax - by = 0$. The circle passing through (0, 0), (a, 0), (0, b) is $x^2 + y^2 - ax - by = 0$.
- The equation of the circle passing through origin the points of intersection of the line $ax + by + c = 0$ with co-ordinate axes is $ab\left(x^2 + y^2\right) + c\left(bx + ay\right) = 0$.
- The equation of the circle with (x_1, y_1) and (x_2, y_2) as extrimities of a diameter is $(x - x_1)(x - x_2) + (y - y_1)(y - y_2) = 0$ Or $x^2 + y^2 - (x_1 + x_2)x - (y_1 + y_2)y + (x_1x_2 + y_1y_2) = 0$.
- If the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ intersects the x - axis in 2 points A and B thenAB = $2\sqrt{g^2 - c}$
- If the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ intersects the y- axis in 2 points C and D then CD = $2\sqrt{f^2 - c}$.
- If the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ touches the x-axis then $g^2 = c$. If this circle touches the y - axis then $f^2 = c$. If the above circle touches both the coordinate axes then $g^2 = f^2 = c$.
- If the radius of a circle is zero then that circle is called a point circle.
- Equation of the point (x_1, y_1) is $(x-x_1)^2 + (y-y_1)^2 = 0$.
- Let C be the centre of a circle. If the circle touches the x-axis the C_y = radius. If the circle touches the y- axis the C_x = radius.
- Let C be the centre and r be the radius of a circle. Let CM be the perpendicular from C to the line AB.
  If CM < r then the line AB intersects the circle.
  If CM = r then the line AB touches the circle.
  if CM > r then the line AB neither intersects nor touches the circle.
- If the centres of two circles are same then those two circles are called concentric circles.
- $x^2 + y^2 + 2gx + 2fy + c = 0$ and $x^2 + y^2 + 2gx + 2fy + d = 0$ are concentric circles.
- If $s \equiv x^2 + y^2 + 2gx + 2fy + c = 0$ is the equation of a circle and $P(x_1, y_1)$, $Q(x_2, y_2)$ are 2 points then
  $s_1 \equiv xx_1 + yy_1 + g(x + x_1) + f(y + y_1) + c$
  $s_2 \equiv xx_2 + yy_2 + g(x + x_2) + f(y + y_2) + c$
  $s_{12} \equiv x_1x_2 + y_1y_2 + g(x_1 + x_2) + f(y_1 + y_2) + c$
  $s_{11} \equiv x_1^2 + y_1^2 + 2gx_1 + 2fy_1 + c$
- Let Cbe the centre and r be the radius of a circle. If P is a point then $CP^2 - r^2$ is called the power of the point P with respect to the circle.
- The power of the point $P(x_1, y_1)$ with respect to the

circle $s = x^2 + y^2 + 2gx + 2fy + c = 0$ is s_{11}. If $s_{11} < 0$ then P lies inside the circle. $S_{11} > 0$ then P lies out side of the circle. $S_{11} = 0$ then point P lie on the circle.

- The equation of the tangent to the circle $s = x^2 + y^2 + 2gx + 2fy + c = 0$ is at (x_1, y_1) is $s_1 = 0$
- If PA is a tangent from P to the circle $s = 0$ then the distance between P and A is called the length of the tangent from P to the circle. (Here A is on the circle).
- The length of the tangent from P (x_1, y_1) to the circle $s = x^2 + y^2 + 2gx + 2fy + c = 0$ is $\sqrt{s_{11}}$.
- If the line $y = mx + c$ touches the circle $x^2 + y^2 = a^2$ then $c^2 = a^2(1 + m^2)$.
- If the line AB touches a circle then the point of contact is the foot of the perpendicular from the centre of the circle to the line AB.
- The locus of the point of intersection of 2 perpendicular tangents to the circle $x^2 + y^2 = a^2$ is $x^2 + y^2 = 2a^2$
- The sum of the slopes of the tangents from the point (x_1, y_1) to the circle $x^2 + y^2 = a^2$ is and the $\dfrac{2x_1y_1}{x_1^2 - a^2}$.

  Product of the slopes of the tangents is $\dfrac{y_1^2 - a^2}{x_1^2 - a^2}$
- The area of the triangle formed by the tangent to the circle $x^2 + y^2 = a^2$ at (x_1, y_1) and the coordinate axes is $\left|\dfrac{a^4}{2x_1y_1}\right|$
- The locus of the point of intersection of perpendicular tangents drawn one to each to the circles $x^2 + y^2 = a^2$ and $x^2 + y^2 = b^2$ is $x^2 + y^2 = a^2 + b^2$
- The combined equation of the tangents from P (x_1, y_1) to the circle $s = x^2 + y^2 + 2gx + 2fy + c = 0$ is $s_1^2 = ss_{11}$
- The normal at any point to the circle passes through the centre of the circle.
- Let P be a point on the circle whose centre is C, If the line CP makes an angle θ with the positive direction of the x-axis then θ is called the parametric angle of the point P.
- If (x_1, y_1) is the centre and r is the radius of a circle then the parametric equations of the circle are $x = x_1 + r\cos\theta$, $y = y_1 + r\sin\theta$ and any point on the circle is $(\theta) = (x_1 + r\cos\theta, y_1 + r\sin\theta)$. where θ is the parametric angle of the point.
- $x = r\cos\theta$, $y = r\sin\theta \Rightarrow x^2 + y^2 = r^2$ Any point on this circle is $(\theta) = (r\cos\theta, r\sin\theta)$. Where θ is the parametric angle of that point.
- If A (α) and B (β) are 2 points on the circle $x^2 + y^2 = a^2$ then the length of the chord AB is $2a\left|\sin\left(\dfrac{\alpha - \beta}{2}\right)\right|$
- If (x_1, y_1) is the mid point of a chord of the circle $s = x^2 + y^2 + 2gx + 2fy + c = 0$ then the equation of that chord is $s_1 = s_{11}$
- If AB is a chord of a circle then the foot of the perpendicular from the centre of the circle to the chord AB is the mid point of the chord AB.
- If the line $lx + my + n = 0$ intersects the circle $x^2 + y^2 = a^2$ then the mid point of the chord so formed is $\left(\dfrac{-ln}{l^2 + m^2}, \dfrac{-mn}{l^2 + m^2}\right)$
- Let C be the centre and 'a' be the radius of a circle. If the line AB intersects the circle, let d be the perpendicular distance from C to the line AB. Then the length of the chord so formed is $2\sqrt{a^2 - d^2}$
- If a chord of the circle $x^2 + y^2 = a^2$ makes an angle 90^0 at the centre of the circle then the locus of the mid point of that chord is $x^2 + y^2 = \dfrac{a^2}{2}$
- If PA and PB are the tangents from P to a circle then the line AB is called the chord of contact of P with respect to the circle.
- The equation of the chord of contact of P (x_1, y_1) with respect to the circle $s = 0$ is $s_1 = 0$
- The area of the triangle formed by the 2 tangents from P (x_1, y_1) to the circle $x^2 + y^2 = a^2$ and the chord of contact of P with respect to the circle is $\left|\dfrac{a\left(x_1^2 + y_1^2 - a^2\right)^{3/2}}{x_1^2 + y_1^2}\right|$
- If the line $lx + my + n = o$ intersects the circle $x^2 + y^2 = a^2$ at A and B then the point of intersection of thetangents to the circle at A and B is $\left(\dfrac{-a^2 l}{n}, \dfrac{-a^2 m}{n}\right)$
- The polar of the point P with respect to a circle is

the locus of point of intersection of the tangents to the circle at the extermities of a chord passing through P. Here P is called the pole of the locus.

- The polar of the centre of a circle with respect to that circle does not exist.
- The equation of the polar of P (x_1, y_1) with respect to the circles s = 0 is $s_1 = 0$.
- If the point P lies outside the circle s = 0 then the polar of P with respect to the circle s = 0 intersects the circle.
- If the point P lies on the circles s = 0 then the polar of P with respect to the circle s = 0 touches the circle.
- If the point P lies inside the circle s = 0 then the polar of P with respect to that circle neither intersects the circle nor touches the circle.
- The pole of line lx + my + n = 0 with respect to the circle $x^2 + y^2 = a^2$ is $\left(\frac{-a^2 l}{n}, \frac{-a^2 m}{n}\right)$
- If the polar of P with respect to the circle whose centre is 'O' and radius is 'r' intersects the line OP produced at Q then P and Q are called inverse points with respect to the circle. Here OP .OQ = r^2. Here P and Q lie on the same side of 'O'. Among P and Q one point lies inside the circle and the other point lies outside the circle.
- Polar of P with respect to circle if passes through Q the P,Q are called conjugate points with respect to that circle.
- If P (x_1, y_1) and Q (x_2, y_2) are conjugate points with respect to the circle s = 0 then $s_{12} = 0$.
- If the pole of the AB with respect to a circle lies on the line CD then the lines AB and CD are called conjugate lines with rspect to that circle.
- If the lines $l_1 x + m_1 y + n_1 = 0$ and $l_2 x + m_2 y + n_2 = 0$ are conjugate lines with respect to the circle $x^2 + y^2 = a^2$ then $a^2 (l_1 l_2 + m_1 m_2) = n_1 n_2$
- The inverse point of P with respect to the circle s = 0 is the foot of the perpendicular from P to the polar of P with respect to that circle.
- The inverse point of (0,0) with respect to the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ is $\left(\frac{-gc}{g^2+f^2}, \frac{-fc}{g^2+f^2}\right)$

CIRCLE (Conceptual Questions)

1. Number of circles drawn through two points is
   1) One 2) Two 3) Three 4) Infinite
2. If three lines are not concurrent and number no two of them are parallel, number of circles drawn touching all the three lines
   1) 1 2) 4 3) 3 4) Infinite
3. Equation of circle passing through non - collinear points A, B, C is
   1) Equation of the circle on AB as diameter + K (equation of AB) = 0
   2) Equation of the circle on AB as diameter + K (equation of BC) = 0
   3) Equation of the circle on AB as diameter + K (equation of CA) = 0
   4) Equation of the circle on BC as diameter + K (equation of AC) = 0
4. The equation of the chord joining α, β on the circle s = 0 is
   1) $(x+g)\cos\left(\frac{\alpha+\beta}{2}\right)+(y+f)\sin\left(\frac{\alpha+\beta}{2}\right)=\cos\left(\frac{\alpha-\beta}{2}\right)$
   2) $(x+g)\cos\left(\frac{\alpha+\beta}{2}\right)+(y+f)\sin\left(\frac{\alpha+\beta}{2}\right)=r\cos\left(\frac{\alpha-\beta}{2}\right)$@
   3) $(x-g)\cos\left(\frac{\alpha+\beta}{2}\right)+(y-f)\sin\left(\frac{\alpha+\beta}{2}\right)=r\cos\left(\frac{\alpha-\beta}{2}\right)$
   4) $(x+g)\cos\left(\frac{\alpha-\beta}{2}\right)+(y+f)\sin\left(\frac{\alpha-\beta}{2}\right)=r\cos\left(\frac{\alpha-\beta}{2}\right)$
5. If the circle $x^2+y^2+2gx+2fy+c=0$ touches x - axis at $(x_1, 0)$ then $x^2+2gx+c=$
   1) $(x-x_1)^2$ 2) $(x+x_1)^2$
   3) $(y-y_1)^2$ 4) $(y+y_1)^2$
6. If the circle $x^2+y^2+2gx+2fy+c=0$ touches y- axis at $(0, y_1)$ then $(y-y_1)^2=$
   1) $y^2+2fy-c$ 2) $y^2+2fy+c$
   3) $y^2-2fy+c$ 4) $y^2-2fy-c$
7. The locus of the point of intersection of the two tangents drawn to the circle $x^2+y^2=a^2$ which include are angle α is
   1) $x^2+y^2=a^2\operatorname{cosec}^2 \alpha/2$
   2) $x^2+y^2=a^2\cot^2 \alpha/2$
   3) $x^2+y^2=a^2\tan\alpha$
   4) $x^2+y^2=a^2\tan\alpha/2$
8. Equation of tangent to the circle $x^2+y^2+2gx+2fy+c=0$ and having slope m is
   1) $y+f=m(x+g)\pm\sqrt{g^2+f^2-c}\sqrt{1+m^2}$

2) $y = mx \pm \sqrt{g^2+f^2-c}\sqrt{1+m^2}$

3) $y-f = m(x-g) \pm \sqrt{g^2+f^2-c}\sqrt{1+m^2}$

4) $y+f = m(x+g) \pm \sqrt{g^2+f^2-c}$

9. A tangent of at a point on the circle $x^2+y^2=a^2$ intersect a concentric circle s at P and Q. The tan gents of this circle at P, Q meet on the circle $x^2+y^2=b^2$ then the equation of concentre circle is

1) $x^2+y^2=a^2b^2$ 2) $x^2+y^2=ab$

3) $x^2+y^2=a^2+b^2$ 4) $x^2+y^2=\frac{a}{b}$

10. If t_1 and t_2 are the lengths of tangents drawn from two conjugate points A, B then $t_1^2+t_2^2=$

1) AB 2) 2AB 3) AB^2 4) $2AB^2$

11. The locus of middle points of the chords of the circle $x^2+y^2=a^2$ subtending an angle α at the centre is

1) $x^2+y^2=a\cos\alpha/2$

2) $x^2+y^2=a^2\cos\alpha/2$

3) $x^2+y^2=a^2\cos^2\alpha/2$

4) $x^2+y^2=\cos^2\alpha/2$

12. The pole of the line $lx+my+n=0$ w.r. to the circle $x^2+y^2+2gx+2fy+c=0$

1) $\left(\frac{-lr^2}{n}, \frac{-mr^2}{n}\right)$

2) $\left(\frac{lr^2}{\lg+mf-n}, \frac{mr^2}{\lg+mf-n}\right)$

3) $\left(-g+\frac{lr^2}{\lg+mf-n}, -f+\frac{mr^2}{\lg+mf-n}\right)$

4) $\left(g+\frac{lr^2}{\lg+mf-n}, f+\frac{mr^2}{\lg+mf-n}\right)$

13. Pole of diameter of a circle w.r. to the same circle lies

1) Lies inside of the circle

2) Lies outside of the circle

3) Lies on the circle

4) Does not exist

14. The equation of tangent at θ on S = 0

1) $(x+g)\cos\theta+(y+f)\sin\theta=r$

2) $(x+g)\cos\theta+(y+f)\sin\theta=r^2$

3) $(x-g)\cos\theta+(y-f)\sin\theta=r$

4) $(x-g)\cos\theta+(y-f)\sin\theta=r^2$

15. Equation of the circle passing through (0, 0), (a, b) and (b, a) is

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

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

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

4) $(a^2+b^2)(x^2+y^2)+(a+b)(x+y)=0$

16. An equilateral triangle inscribed in the circle $x^2+y^2+2gx+2fy+c=0$ then its side is

1) 3 r 2) $\sqrt{3}\,r$ 3) $\frac{r}{\sqrt{3}}$ 4) 2 r

17. The polars of three points w.r. to a given circle are concurrent then the three points are

1) collinear 2) form an equilateral

3) form a right angled triangle

4) passes through the centre of the circle

18. Ax + By + K = 0 is normal to the circle $x^2+y^2+2gx+2fy+c=0$ thenb K =

1) Ag - Bf 2) Ag + Bf 3) Af - Bg 4) Af + Bg

19. S = 0 is a circle and $P(x_1, y_1)$ is an external point to it $\overline{PA}$ and $\overline{PB}$ are tangents to S = 0 from the point P, A and B are points of contacts of tangents. The centre of circum circle of $\Delta\ PAB$ is

1) (x_1-g, y_1-f) 2) (x_1+g, y_1+f)

3) $\left(\frac{x_1-g}{2}, \frac{y_1-f}{2}\right)$ 4) $\left(\frac{-g}{2}, \frac{-f}{2}\right)$

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

1) $\frac{a^2}{3}$ 2) $\frac{a^2}{6}$ 3) $\frac{2a^2}{3}$ 4) $\frac{a^2}{\sqrt{3}}$

KEY

1-10	4	2	1	2	1	2	1	1	2	3
11-20	3	3	4	1	1	2	1	2	3	2

LEVEL - I

EQUATION TO THE CIRCLE WITH CENTRE AND RADIUS:

1. Equation of the circle with centre (1,2) and passing through (2,1) is
1) $x^2 + y^2 - 6x + 10y + 18 = 0$
2) $x^2 + y^2 + 6x - 10y + 18 = 0$
3) $x^2 + y^2 - 6x + 10y + 25 = 0$
4) $x^2 + y^2 - 2x - 4y + 3 = 0$

2. Equation of the circle which touches the line x+y-8=0 and centre (3,3) is
1) $x^2 + y^2 - 6x - 6y = 0$
2) $x^2 + y^2 - 6x - 6y + 4 = 0$
3) $x^2 + y^2 - 6x - 6y + 36 = 0$
4) $x^2 + y^2 - 6x - 6y + 16 = 0$

3. The equation of the circle which touches x-axis at (0,0) and touches the line $3x + 4y - 5 = 0$ is
1) $x^2 + y^2 - 4y = 0$ 2) $x^2 + y^2 - 10y = 0$
3) $x^2 + y^2 + 10x = 0$ 4) $x^2 + y^2 + 10y = 0$

4. If (-2,5) is the centre of the circle which touches y-axis, then the equation of the circle is
1) $x^2 + y^2 - 4x - 10y + 25 = 0$
2) $x^2 + y^2 - 4x - 10y + 4 = 0$
3) $x^2 + y^2 + 4x + 10y + 2 = 0$
4) $x^2 + y^2 + 4x - 10y + 25 = 0$

5. The equation of the circle whose radius is $\sqrt{13}$ and which touches the line $2x - 3y + 1 = 0$ at (1,1) is
1) $(x-3)^2 + (y-2)^2 = 13$
2) $(x-3)^2 + (y+2)^2 = 13$
3) $(x+4)^2 + (y+2)^2 = 13$
4) $(x-1)^2 + (y+4)^2 = 13$

6. The equation of the circle whose radius is 4, centre lies in the first quadrant and which touches x-axis,line $4x - 3y = 0$ is
1) $x^2 + y^2 - 4x - 16y + 4 = 0$
2) $x^2 + y^2 - 8x - 4y + 16 = 0$
3) $x^2 + y^2 - 16x - 8y + 64 = 0$
4) $x^2 + y^2 - 4x - 8y + 4 = 0$

7. If $2x - 3y = 5$ and $3x - 4y = 7$ are the equations of 2 diameters of a circle whose area is 154 sq.units, then the equation of the circle is
1) $x^2 + y^2 + 2x - 2y - 47 = 0$
2) $x^2 + y^2 - 2x + 2y - 49 = 0$
3) $x^2 + y^2 - 2x + 2y + 47 = 0$
4) $x^2 + y^2 - 2x + 2y - 47 = 0$

8. (0,0) is the centre of the circle passing through the verticies of an equilateral triangle. If the length of the median of the triangle is 9 units then equation of the circle is
1) $x^2 + y^2 = 9$ 2) $x^2 + y^2 = 36$
3) $x^2 + y^2 = 3$ 4) $x^2 + y^2 = 6$

9. Equation of the circle passing through the origin and makes intercepts 4 and 6 on positive x-axis and y-axis respectively is
1) $x^2 + y^2 - 4x - 6y = 0$ 2) $x^2 + y^2 - 8x - 12y = 0$
3) $x^2 + y^2 + 4x + 6y = 0$ 4) $x^2 + y^2 + 8x + 12y = 0$

10. The equation of the incircle of triangle formed by x = 0, y = 0 and $\frac{x}{3} + \frac{y}{4} = 1$ is
1) $x^2 + y^2 - 4x - 4y + 4 = 0$
2) $x^2 + y^2 - 2x - 2y = 0$
3) $x^2 + y^2 - 2x - 2y + 1 = 0$
4) $x^2 + y^2 - 4x - 4y = 0$

11. Equation of the circle which touches the lines $4x + 3y - 5 = 0$, $4x + 3y + 15 = 0$ and having centre on the line $3x + 2y + 4 = 0$ is
1) $x^2 + y^2 + 4x - 2y + 1 = 0$
2) $x^2 + y^2 - 4x + 2y + 1 = 0$
3) $x^2 + y^2 + 4x - 2y - 11 = 0$
4) $x^2 + y^2 - 4x + 2y - 11 = 0$

12. The equation of the circles which touches the x-axis at (4,0) and radius 2 units are
1) $x^2 + y^2 + 4x \pm 4y + 4 = 0$
2) $x^2 + y^2 + 8x \pm 2y + 16 = 0$
3) $x^2 + y^2 - 8x \pm 4y + 16 = 0$
4) $x^2 + y^2 + 8x \pm 4y + 16 = 0$

13. The equation of the circle touching the axes at (a,0) and (0,a) is
1) $x^2 + y^2 - 2ax - 2ay + a^2 = 0$
2) $x^2 + y^2 + 2ax + 2ay = 0$
3) $x^2 + y^2 - ax - ay = 0$
4) $x^2 + y^2 + ax - ay = 0$

14. If a circle touches x – axis at (3,0) and passing through the point(2,1) then its equation is
1) $x^2 + y^2 - 6x + 2y + 9 = 0$
2) $x^2 + y^2 - 6x - 2y + 9 = 0$
3) $x^2 + y^2 - 6x - 2y - 9 = 0$
4) $x^2 + y^2 - 6x + 2y - 9 = 0$

15 Circle touching both the axes and the linc $3x + 4y = 12$ is
(1) $x^2 + y^2 + 2x + 2y + 1 = 0$
2) $x^2 + y^2 - 2x - 2y + 1 = 0$
3) $x^2 + y^2 - 4x - 4y + 4 = 0$
4) $x^2 + y^2 + 6x + 6y + 9 = 0$

16. A circle which touches the axes, and whose centre is at distance $2\sqrt{2}$ from the origin, has the equation
(1) $x^2 + y^2 + 4x + 4y = 0$
2) $x^2 + y^2 + 4x + 4y + 2 = 0$
3) $x^2 + y^2 - 2x - 2\sqrt{2}\ y + \sqrt{2} = 0$
4) $x^2 + y^2 + 4x + 4y + 4 = 0$

17. The radius of the largest circle lying in the first quadrant, touching $4x + 3y = 12$ and co-ordinate axes is
(1) 5 (2) 6 (3) 7 (4) 8

18. The radius of circle touching y-axis at origin and touches x= 6 is

(1) 2 (2) 3 (3) 6 (4)4

19. Equation of the circumcircle of the triangle formed by the co-ordinate axes and the line 3x+ 4y= 24 is

1) $x^2 + y^2 - 8x - 6y = 0$ 2) $x^2 + y^2 + 8x - 6y = 0$
3) $x^2 + y^2 + 8x + 6y = 0$ 4) $x^2 + y^2 - 8x + 6y = 0$

20. The equation of the circle circumscribing the triangle formed by the lines x=1,y=1, $x + y = 3$ is

1) $x^2 + y^2 + 3x + 3y + 4 = 0$

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

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

4) $x^2 + y^2 \pm 3x \pm 3y + 4 = 0$

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

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

22. The image of the circle $x^2 + y^2 - 2x = 0$ in the line x+y = 2 is the circle

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

23. Circle with centre (0,4) and passing through the projection of (2,4) on x-axis is

1) $x^2 + y^2 - 8y - 4 = 0$

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

3) $x^2 + y^2 - 8y + 4 = 0$

4) $x^2 + y^2 - 8y + 16 = 0$

24 The circle with radius 1 and centre being foot of the perpendicular from (5,4) on y-axis, is

1) $x^2 + y^2 - 8x - 15 = 0$

2) $x^2 + y^2 - 10x + 24 = 0$

3) $x^2 + y^2 - 8y + 15 = 0$

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

25 A circle of radius 'r' passes through the origin 'O'and cuts the axes at A and B,Locus of the centroid of triangle OAB is

1) $x^2 + y^2 = 4r^2$ 2) $9\left(x^2 + y^2\right) = 4r^2$

3) $x^2 + y^2 = r^2$ 4) $x^2 + y^2 = 3r^2$

CENTRE RADIUS AND DIAMETER OF A CIRCLE:

26. If the centre of the circle $2x^2 + p\,xy + q\,y^2 + 2gx + 2fy + 3 = 0$ is (1,-3) then the radius of the circle is

1) $\frac{17}{2}$ 2) $2\sqrt{7}$ 3) 17 4) $\sqrt{17/2}$

27. The sum of the shortest and longest distances from the point (-3,2) to the circle $x^2+y^2-2x+2y+1= 0$ is

1) 5 2)4 3)10 4) $2\sqrt{5}$

28. The point on the circle $x^2 + y^2 - 6x + 4y - 12 = 0$ which is at maximum distance from the point (-9, 7) is

1) (-1,1) 2) (7,-5) 3) (0,-6) 4) (0,2)

29. The radius of the circle which touches y - axis at (0,0) and passes through the point (b,c) is

1) $\frac{b^2 + c^2}{2b}$ 2) $\frac{b^2 + c^2}{2c}$

3) $\frac{b^2 + c^2}{2}$ 4) $\frac{b}{2\left(b^2 + c^2\right)}$

30. The radius of the circle passing through the vertices of the triangle formed by the lines x+ y = 2, 3x - 4y = 6, x – y = 0

1) 10 2) 5 3)20 4)100

31. Radius of a circle which touch the both axes and the line $\frac{x}{a} + \frac{y}{b} = 1$ being the centre lies in first quadrant

1) $\frac{ab}{a^2 + b^2 + \sqrt{a+b}}$ 2) $\frac{ab}{a + b + \sqrt{a+b}}$

3) $\frac{ab}{a + b + \sqrt{a^2 + b^2}}$ 4) $\frac{ab}{a^2 + b^2 + \sqrt{a^2 + b^2}}$

32. The diameter of the circle $9x^2 + y^2 = 4(x^2 - y^2) - 8x$ is

1) $\frac{4}{5}$ 2) $\frac{8}{5}$ 3) 8 4) does not exit

33. If the line x + y = 1 intersects the co-ordinate axes at A and B then the centre and radius of the circle whose diameter is AB are

1) (1,1) ; $\sqrt{2}$ 2) $\left(\frac{1}{2}, \frac{1}{2}\right), \sqrt{2}$

3) $\left(\frac{1}{2}, \frac{1}{2}\right); \frac{1}{\sqrt{2}}$ 4) (0,0) ; 1

34. The line x+y= $2\sqrt{2}$ touches the circle $x^2 + y^2 = 4$ at

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

3) $\left(3\sqrt{2}, -\sqrt{2}\right)$ 4) $\left(4\sqrt{2}, -2\sqrt{2}\right)$

35. The x- coordinates of the points A and B are the roots of the equation $x^2 - 5x + 6 = 0$ and y-coordinates of A, B are roots of the equation $y^2 - 2y - 3 = 0$. The radius of the circle on AB as diameter is

1) $\frac{\sqrt{29}}{2}$ 2) $\frac{\sqrt{17}}{4}$ 3) $\frac{\sqrt{17}}{2}$ 4) $\sqrt{17}$

36. If A= (0,1), B = (α, β) and the circle on AB as diameter intersects x-axis in 2 points whose x-coordinates are the roots of the equation $x^2 - 5x + 3 = 0$, then (α, β)

1) (5,3) 2) (3,3) 3) (-5,3) 4) (3,-5)

37. $2x + y = 0$ is the equation of a diameter of the circle which touches the lines $4x-3y+10=0$ and $4x-3y-30=0$. The centre and radius of the circle are

1) (-2,1); 4 2) (1,-2); 8 3) (1,-2); 4 4) (1,-2);16

38. The centre of the circle passing through the points (h,0), (k,0), (0,h), (0,k) is

1) $\left(\frac{h}{2}, \frac{h}{2}\right)$ 2) $\left(\frac{k}{2}, \frac{k}{2}\right)$

3) $\left(\frac{h+k}{2}, \frac{h+k}{2}\right)$ 4) $\left(\frac{h}{2}, \frac{h}{2}\right)$

39. The centre and radius of the circle $(1+m^2)(x^2 + y^2) - 2ax - 2amy = 0$ is

1) $\left(\frac{a}{1+m^2}, \frac{am}{1+m^2}\right)$;a

2) $\left(\frac{a}{1+m^2}, \frac{am}{1+m^2}\right); \frac{a}{\sqrt{1+m^2}}$

3) $\left(\frac{a}{1+m^2}, \frac{am}{1+m^2}\right); \frac{a}{1+m^2}$

4) $\left(\frac{-a}{1+m^2}, \frac{am}{1+m}\right); \frac{a}{1+m}$

40. A square is formed by the pair of lines $y^2 - 14y + 45 = 0, x^2 - 8x + 12 = 0$. A circle is inscribed in it. Then the centre of the circle is:

(1) $(7,4)$ 2) $(4,7)$ 3) $(3,7)$ 4) $\left(\frac{3}{8}, 4\right)$

41. The centre of the circumscribing the quandrilateral whose sides are $3x + y = 22, x - 3y = 14$ and $3x + y = 62$ is:

1) $\left(\frac{3}{2}, \frac{27}{2}\right)$ 2) $\left(\frac{27}{2}, \frac{3}{2}\right)$

3) $(27,3)$ 4) $(3,27)$

42. The centres of the circles $x^2 + y^2 = 1, x^2 + y^2 + 6x - 2y - 1 = 0,$ $x^2 + y^2 - 12x + 4y = 1$ are

(1) Vertices of an equilateral triangle
2) Vertices of a Right angled triangle
3) Vertices of an isosceles triangle
4) Collinear

43. If the chord joining the points (2,-1), (1,-2) subtends a right angle at the centre of the circle, then its centre and radius are

1) (2,-2);2 2) (2,-2);1 3) (1,1);1 4) (-2,-1),2

44. If a circle touches the line $3x + 4y + 5 = 0$ at (1,-2) and the centre lies on $2x + 3y - 14 = 0$ then its centre and radius are

1) (4,2); 5 2) (-2,2); 5 3) (7,6); 10 4) (2,2);3

45. If a chord of length $2\sqrt{2}$ subtends a right angle at the centre of the circle then its radius is

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

46. If a circle with radius 2 units touches the x-axis at (1,0) then its centre may be

1) $(\pm 1, 2)$ 2) $(\pm 1, \pm 2)$

3) $(1, \pm 2)$ 4) $(1, \pm \sqrt{5})$

47. A rectangle of sides a and b is inscribed in a circle. Then its radius is

1) $\sqrt{a^2 + b^2}$ 2) $\frac{1}{2}\sqrt{a^2 + b^2}$

3) $\sqrt{\frac{a^2 + b^2}{2}}$ 4) $\sqrt{a^2 - b^2}$

48. The distance between two parallel chords each of length 10 units is 24units. Then the radius of the circle is

1) 5 2) 12 3) 13 4) 30

49. The locus of the centre of the circles which touch the lines $6x - 8y + 5 = 0$ and $6x-8y+13 = 0$ is $6x - 8y + k = 0$ then k =

1) 10 2) 12 3) 18 4)9

50. If (x,3) and (3,5) are the ends of the diameter of a circle with centre at (2,y) then (x,y)

1) (1,4) 2) (4,1) 3) (8,2) 4) (2,8)

51. The centre of the circle whose centre is on the straight line $5x - 2y + 1 = 0$ and cuts the x-axis at two points whose abscissae are –5 and 3 is

1) $\left(\frac{-9}{5}, -4\right)$ 2) $\left(\frac{1}{5}, 1\right)$

3) (-1,-2) 4) (1,3)

52. If the circle for which (3,2), (a,3) are the extremities of a diameter, passes through the origin a =

1) 2 2) –2 3) 3 4) –3

53. The centres of circles which touch $12x-5y-4=0$ at (2,4) and having radius 13 units are given by
1) (9,8), (4,-1) 2) (-1, 9) (14,0)
3) (-10,8) (-14,1) 4) (-10,9) (14,-1)

54. If two circles $x^2 + y^2 + 2gx + c = 0$ and the $x^2 + y^2 - 2fy - c = 0$ have equal radii then locus of (g,f) is
1) $x^2 + y^2 = c^2$ 2) $x^2 - y^2 = 2c$
3) $x^2 - y^2 = c^2$ 4) $x^2 - y = c^2$

55. The centre of the circle $y(x - y + 8)=x(x + y-6)$ is
1) (4,3) 2) (3,4) 3) (-4,-3) 4) (-3,4)

56. The locus of the centres of the circles for which one end of a diameter is (1,1) while the other end is on the line $x + y = 3$ is
1) $x + y =1$ 2) $2(x - y) = 5$
3) $2x + 2y = 5$ 4) $x + y = 5$

EQUATION TO THE CIRCLE PASSING THROUGH GIVEN POINTS:

57. If the equation of the circle passing through the points (2,1), (5,5), (-6,7) is $x^2+y^2+2gx+2fy+c = 0$ then c =
1) -65 2) -5 3) 15 4) 5

58. The equation of the circle passing through the points (4,1), (6,5) and whose centre lies on the line $4x + y - 16 = 0$ is
1) $x^2 + y^2 - 10x - 6y + 29 = 0$
2) $x^2 + y^2 - x - 13 = 0$
3) $x^2 + y^2 - 6x -8y + 15 = 0$
4) $x^2 + y^2 + 4y - 12 = 0$

59. The equation of the circle whose centre lies on the x-axis and which passes through the points (0,1), (1,1) is
1) $x^2+y^2 - y+1 = 0$ 2) $x^2 + y^2 -x=1$
3) $x^2 + y^2 - 2x = 1$ 4) $2x^2 + 2y^2 - x = 3$

60. Equation of the circle passing through the origin and makes intercepts 4 and 6 on negative x-axis & negative y-axis respectively is
1) $x^2 + y^2 - 4x - 6y = 0$ 2) $x^2+y^2 -8x- 12y = 0$
3) $x^2 + y^2+ 4x+ 6y = 0$ 4) $x^2 +y^2+8x +12y = 0$

61. The equation of a circle which passes through (1,2) and (2,1) and whose radius is 1 units is
1) $x^2 + y^2 - 4x - 4y + 7 = 0$
2) $x^2 + y^2 - 2x - 4y + 4 = 0$
3) $x^2 + y^2 - 4x - 2x + 4 = 0$
4) $x^2 + y^2 - x - y + 1 = 0$

62. The equation of the circle circumscribing the triangle formed with coordinate axes and the line with slope - 2 and passing through (2,2) is
1) $x^2 + y^2 - 4x - 4y = 0$ 2) $x^2+y^2 + 4x + 4y = 0$
3) $x^2+y^2 - 3x - 6y = 0$ 4) $x^2 + y^2 - 6x - 12y = 0$

63. If the chord joining the points (1,-3), (-3,1) subtends a right angle at the centre of the circle, then the equation of the circle is
1) $x^2 +y^2 -6x - 6y + 4 = 0$
2) $x^2 + y^2 + 6x + 6y + 2 = 0$
3) $x^2 + y^2 + 6x + 6y + 4 = 0$
4) $x^2 + y^2 - 6x - 6y + 12 = 0$

64. One vertex of a square is the origin and the other two are A(4,0), B(0,4). Then the equation to the circle circumscribing the square OACB is
1) $x^2 + y^2 + 4x + 4y = 0$ 2) $x^2 + y^2 - 4x - 4y = 0$
3) $x^2 + y^2 + 4x - 4y = 0$ 4) $x^2 + y^2 - 4x + 4y = 0$

65. A rod PQ of length 2a slides with its ends on the axes the locus of the circumcentre of Δ OPQ is
1) $x^2 + y^2 = 2a^2$ 2) $x^2 + y^2 = 4a^2$
3) $x^2 + y^2 = 3a^2$ 4) $x^2 + y^2 = a^2$

66. Equation of the circle with centre on y-axis and passing through the points (1,0), (1,1) is
1) $x^2 + y^2 - y - 1 = 0$ 2) $x^2 + y^2 - x -1 = 0$
3) $x^2 + y^2 - x + 1 = 0$ 4) $x^2 + y^2 - y +1 = 0$

67. The points (5,0), (0,12) and (-5,0) are the vertices of an isosceles triangle. Then the equation of its incircle is
1) $3x^2 + 3y^2 - 20y = 0$ 2) $3x^2 + 3y^2 + 20x = 0$
3) $3x^2 + 3y^2 + 20x = 0$ 4) $3x^2 + 3y^2 + 20y = 0$

68. The line $3x + 4y = 12$ cuts x-axis at A and y-axis at B. The equation of the excircle of the triangle formed by this line and coordinate axes, opposite to the vertex B is
1) $x^2 + y^2 - 2x - 2y + 1 = 0$
2) $x^2 + y^2 + 4x - 4y + 4 = 0$
3) $x^2 + y^2 -6x + 6y + 9 =0$
4) $x^2 + y^2 - 12x - 12y + 36 = 0$

69. Equation of the circle passing through A(1,2), B(5,2) such that the angle subtended by AB at points on the circle is $\frac{\pi}{4}$ is
1) $x^2 +y^2 - 6x - 8 = 0$
2) $x^2 + y^2 - 6x - 8y + 17 = 0$
3) $x^2 + y^2 - 6x + 8 = 0$
4) $x^2 + y^2 - 6x + 8y - 25 = 0$

CONCENTRIC CIRCLES:

70. If the circles $x^2 + y^2 - 6x - 8y - 24 = 0$ and $3x^2 + 3y^2 + 2gx + 2fy + c = 0$ are concentric then (g, f) =
1) (-9, -12) 2) (-6, -8) 3) (-3,-4) 4) (9, 12)

71. The equation of the circle concentric with $x^2 + y^2 + 8x + 12y + 15 = 0$ and having y-intercept 8 units is
1) $x^2 + y^2 + 8x + 12y - 16 = 0$
2) $x^2 + y^2 + 8x + 12y - 28 = 0$
3) $x^2 + y^2 + 8x + 12y + 20 =0$
4) $x^2 + y^2 + 8x +12y - 20 = 0$

72. Equation of the circle concentric with $x^2 + y^2 - 8x - 16y + 4 = 0$ and touches y- axis is
1) $x^2 + y^2 - 8x - 16y + 16 = 0$
2) $x^2 + y^2 -8x - 16y + 32 = 0$
3) $x^2 + y^2 - 8x - 16y + 64 = 0$
4) $2x^2 + 2y^2 = 5$

73. The equation of circle concentric with circle $x^2 + y^2 - 6x + 12y + 15 = 0$ and double its area is
1) $x^2 + y^2 - 6x+12y - 15 = 0$
2) $x^2 + y^2 - 6x +12y + 20 = 0$
3) $x^2 + y^2 - 6x + 12y + 45 = 0$
4) $x^2 + y^2 - 6x + 12y - 30 = 0$

74. If (-3,2) lies on the circle $x^2+y^2 +2gx+2fy+ c = 0$ which is concentric with the circle $x^2 + y^2 + 6x+8y - 5 = 0$, then c =
1) 11 2) -11 3) 24 4) -24

CONCYCLIC POINTS:

75. If the points (0,0),(2,0),(0,4),(1,k) are concyclic then $k^2 - 4k =$
1) -1 2) 1 3) 0 4) -3

76. If the points (2,3), (0,2), (4,5), (0,k), ($k \neq 2$) are concyclic then k =
1) -11 2) -17 3) 17 4) 11

77. If the points (1,-6),(5,2),(7,0), (-1,k) ($k \neq 0$) are concyclic then k =
1) 4 2) -4 3) 0 4) 2

78. If the points (a,0), (b,0), (0,c), (0,d) are concyclic then
1) $\frac{a}{b} = \frac{c}{d}$ 2) ab = cd
3) ac = bd 4) a + b = c+ d

79. If the points (0,0), (2,3), (3,2), (k,k),($k \neq 0$) are concyclic then k =
1) $\frac{5}{13}$ 2) $\frac{13}{6}$ 3) $\frac{5}{6}$ 4) $\frac{13}{5}$

80. If the lines x + ky + 3 = 0 and 2x-5y+7=0 intersect the coordinate axes in concyclic points then k=
1) $-\frac{2}{5}$ 2) $\frac{-3}{5}$ 3) $\frac{3}{2}$ 4) $\frac{-5}{3}$

81. If the lines 2x-3y + 1 = 0 and 3x - 2y + 1 = 0 intersect the coordinate axes in concyclic points then the centre of the circle passing through those points is
1) $\left(\frac{-5}{6},\frac{5}{6}\right)$ 2) $\left(\frac{5}{12},\frac{-5}{12}\right)$
3) $\left(\frac{5}{6},\frac{5}{6}\right)$ 4) $\left(\frac{-5}{12},\frac{5}{12}\right)$

82. If the lines 2x + 3y -1 = 0 and kx -y +4 = 0 intersect the coordinate axes in concyclic points then k - 1 =
1) $\frac{3}{2}$ 2) $\frac{-3}{2}$ 3) $\frac{-5}{2}$ 4) $\frac{-1}{2}$

83. If $aa^1 = bb^1 \neq 0$, the points where the coordinate axes cut the lines ax + by + c = 0 and $a^1 x + b^1 y + c^1 = 0$ form
1) cyclic quadrilateral 2) Quadrilateral
3) Square 4) Rectangle

84. If A $\left(2,\frac{1}{2}\right)$, B $\left(3,\frac{1}{3}\right)$, C $\left(4,\frac{1}{4}\right)$, D $\left(k,\frac{1}{k}\right)$ are concyclic $\Rightarrow$ k =
1) $\frac{1}{4}$ 2) $\frac{1}{14}$ 3) $\frac{1}{24}$ 4) $\frac{1}{5}$

POSITION AND POWER OF A POINT W.R.T. A CIRCLE:

85. The circle $x^2 + y^2 - 6x - 10y + k = 0$ neither touch nor intersect the coordinate axes and the point (1,4) lies inside the circle. Then
1) 9 < k < 29 2) 9 < k < 25
3) 25 < k < 29 4) 0 < k < 29

86. The power of the centre of $x^2+y^2-8x+4y-10=0$ with respect to $5x^2+5y^2+4x+2y-1=0$ is
1) 119 2) $\frac{119}{2}$ 3) $\frac{119}{10}$ 4) $\frac{107}{5}$

87. If the power of (2,1) with respect to the circle $2x^2+2y^2-8x-6y+k=0$ is positive if
1) $0<k<12$ 2) $-12<k<12$
3) $k>12$ 4) $k<12$

88. If the power of (1,-2) with respect to the circle $x^2+y^2=1$ is radius and (3,2) is centre of a circle, then equation is
1) $x^2+y^2-6x-4y-3=0$
2) $x^2+y^2-3x-2y-3=0$
3) $x^2+y^2+6x+4y-3=0$
4) $x^2+y^2-6x-4y+3=0$

89. The power of P(1,2) with respect to the circle $x^2+y^2+4x+2y+3=0$ is double the power of P with respect to $x^2+y^2+2x+y+k=0$ then k=
1) 1 2) 0 3) -1 4) 4

LENGTH OF INTERCEPTS MADE BY A CIRCLE ON THE AXES:

90. The square of the intercept made by the circle $x^2 + y^2 + 2hx \cos\theta + 2ky \sin\theta - h^2 \sin^2\theta = 0$ on the x - axis is
1) $2h^2$ 2) 2h 3) h 4) $4h^2$

91. If the circle $x^2 + y^2 - 7x - 8y + c = 0$ makes an intercept of length 1 unit on x-axis, then the intercept made by the circle on y-axis is
1) 12 2) 2 3) 8 4) 4

92. The circle $x^2 + y^2 - 2x + 5y - 24 = 0$ cuts the x-axis at A and B and y- axis at C and D then AB + CD=
1) $4\sqrt{5}$ 2) 21 3) 12 4) $2\sqrt{5}$

TANGENTS TO THE CIRCLES:

93. If the lines represented by $4x^2 + 12xy + 9y^2 - 6x - 9y = 1$ are 2 tangents to a circle then its area is
1) $\frac{5\pi}{13}$ 2) π 3) $\frac{\pi}{2}$ 4) $\frac{11}{14}$

94. The cosine of the angle between the tangents from the origin to the circle $x^2 + y^2 - 14x + 2y + 25 = 0$ is

1) 90^0 2) 1 3) 0 4) $\frac{1}{\sqrt{2}}$

95. If the angle between the tangents from (0,0) to the circle $x^2+ y^2 + 10x + 10y + 40 = 0$ is $\tan^{-1}(m)$ then m =

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

96. If the line hx + ky = 1/a touches the circle $x^2 + y^2 = a^2$ then the locus of (h,k) is a circle of radius

1) $\frac{1}{a}$ 2) a^2 3) a 4) $\frac{1}{a^2}$

97. If the tangents to the circle $x^2 + y^2 = a^2$ at (p,q) and (r,s) are parallel then

1) pr - qs = 0 2) $p^2 + q^2 = r^2 + s^2$
3) ps - qr = 0 4) p + s = q + r

98. The product of the slopes of the tangents from (3,4) to the circle $x^2 + y^2 = 4$ is

1) $\frac{12}{5}$ 2) $\frac{5}{12}$ 3) 0 4) -1

99. If the angle between the tangents to the circle $x^2 + y^2 = 4$ at A and B is 60^0 then AB =

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

100. The locus of the point of intersection of perpendicular tangents to the circle $x^2 + y^2 = 16$ is a circle whose diameter is

1) $4\sqrt{2}$ 2) $8\sqrt{2}$ 3) $2\sqrt{2}$ 4) 8

101. The locus of the point of intersection of perpendicular tangents drawn to each of circles $x^2 + y^2 = 16$ and $x^2 + y^2 = 9$ is a circle whose diameter is

1) 5 2) $\sqrt{7}$ 3) $2\sqrt{7}$ 4) 10

102. If the tangents from (g,f) to the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ are perpendicular then $g^2 + f^2$=

1) c 2) 2c 3) -c 4) -2c

103. If a tangent to the circle $x^2 + y^2 + 4x - 4y + 4 = 0$ makes equal intercepts on the coordinate axes then the equation of that tangent is

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

104. The point on the line x - y + 1= 0 from which the length of the tangent to the circle $x^2 + y^2 - 3x = 0$ is 2 units is

1) (1,0) 2) (2, 1) 3) (0,1) 4) (-1,0)

105. If the tangent at (1,-2) to the circle $x^2 + y^2 = 5$ touches the circle $x^2 + y^2 -8x + 6y + 20 = 0$ at P. Then P_y =

1) 3 2) 1 3) -1 4) 2

106. The angle made by the tangent to the circle $x^2 + y^2 - 8x + 6y + 20 = 0$ at (3, -1) with the positive direction of the x-axis is

1) $\mathrm{Tan}^{-1}(2)$ 2) $\mathrm{Tan}^{-1}\left(\frac{1}{3}\right)$
3) $\mathrm{Tan}^{-1}\left(\frac{1}{\sqrt{2}}\right)$ 4) $\mathrm{Tan}^{-1}\left(\frac{1}{2}\right)$

$2y^2 - 2x - 5y + 3 = 0$ is

1) x + y -2 = 0 2) 2x - y - 1 = 0
3) 3x+ y - 4 = 0 4) x - y = 0

108. The point at which the tangent to the circle$x^2 + y^2 = 13$ is perpendicular to the line 2x + 3y + 21 = 0 is

1) (2,3) 2) (2, -3) 3) (3, -2) 4) (3,2)

109. If the tangents from (3,4) to the circle $x^2 +y^2 - 3x - 4y + 1 = 0$ are making an angle 'θ' with each other, $\sin\theta$ =

1) $\frac{\sqrt{21}}{24}$ 2) $\frac{2\sqrt{21}}{25}$ 3) $\frac{4\sqrt{21}}{25}$ 4) $\frac{\sqrt{21}}{25}$

110. If the tangents from any point on the circle $x^2 + y^2 = a^2$ to the circle $x^2 + y^2 = b^2$ are perpendicular then

1) b = 2a 2) a = 2b
3) $b^2 = 2a^2$ 4) $a^2 = 2b^2$

111. The sum of the slopes of the tangents to the circle $x^2 + y^2 = 1$ from (2,3) is

1) 4 2) 3 3) 2 4) 2/3

112. The centre of the circle $x^2 + y^2 - 2x - 4y - 20 = 0$ is C. If the tangents to the circle at A (1,7) and B (4,-2) intersect at P then area of the quadrilaterial PACB is ©

1) 25 2) $25\sqrt{3}$ 3) 75 4) 15

113. If the tangents from (1,1) to the circle $x^2 + y^2 - 4x + k = 0$ are perpendicular then k =

1) 0 2) $\sqrt{6}$ 3) $\sqrt{3}$ 4) 3

114. If the tangents to the circle $s = x^2 + y^2 -r^2 = 0$ from (x_1,y_1) are perpendicular then

1) $s_{11} = 0$ 2) $s_{11} - r^2 = 0$
3) $s_{11} + r^2 = 0$ 4) $s_{11} + r = 0$

115. If a tangent to the $x^2 + y^2 = c^2$ makes intercepts a and b on the coordinate axes then

1) $a^2 + b^2 = c^2$ 2) a + b = c
3) $\frac{1}{a^2}+\frac{1}{b^2}=\frac{1}{c^2}$ 4) $\frac{1}{a}+\frac{1}{b}=\frac{1}{c}$

116. Equation of the tangents drawn to the circle $x^2 + y^2 - 4x - 8y - 5 = 0$ which are parallel to x-axis are

1) y = ± 5 2) y = ± 4
3) y =9 or -1 4) y = -9 or 1

117. Equation of the tangents drawn to the circle $x^2 + y^2 - 4x - 8y -5 = 0$ which are parallel to y-axis are

1) x = 7 or -3 2) x = -7 or 3
3) x = ± 3 4) x = ± 7

118. Equation of the tangents which are parallel to x-axis and touches the circle $x^2 + y^2 + 4x + 12y - 9 = 0$ are

1) y = ± 2 2) y = ± 7
3) y = 1 or -13 4) y = -1 or 13

119. If x + y +7 = 0 is a tangent to the circle $x^2 + y^2 - 4x - 6y + k = 0$ then the point of contact is

1) (7,0) 2) (0,7) 3) (-3,-4) 4) (-4,-3)

120. If x + 2y - 5= 0 is a tangent to $x^2 + y^2 - 4x + 2y + c = 0$ then the point
of contact of the parallel tangent is

1) (3,1) 2) (1,3) 3) (-3, 1) 4) (1,-3)

121. If $y = mx + a\sqrt{1+m^2}$ touches the circle $x^2 + y^2 = a^2$ then the point of contact is

1) $\left(\frac{-am}{\sqrt{1+m^2}}, \frac{a}{\sqrt{1+m^2}}\right)$

2) $\left(\frac{am}{\sqrt{1+m^2}}, \frac{a}{\sqrt{1+m^2}}\right)$

3) $\left(\frac{am}{\sqrt{1+m^2}}, \frac{-a}{\sqrt{1+m^2}}\right)$

4) $\left(\frac{m}{\sqrt{1+m}}, -\frac{m}{\sqrt{1+m}}\right)$

122. The equation to the tangents to the circle $x^2 + y^2 - 4x + 4y - 10 = 0$ which make an area of 18 sq. units with the coordinate axes are

1) $x - y = \pm 6$ 2) $x + y = \pm 6$

3) $x + 2y = \pm 6\sqrt{2}$ 4) $x - 2y = \pm 6\sqrt{2}$

123. The slopes of the tangents through the point (7,1) to the circle $x^2 + y^2 = 25$ satisfies the equation.

1) $12m^2 - 7m - 12 = 0$ 2) $12m^2 + 7m + 12 = 0$

3) $12m^2 - 7m + 12 = 0$ 4) $12m^2 + 7m - 12 = 0$

124. The slopes of the tangents from the point (5,0) to the circle $x^2 + y^2 = 9$ are

1) $\frac{3}{4}, -\frac{4}{3}$ 2) $-\frac{3}{4}, \frac{4}{3}$ 3) $\pm\frac{3}{4}$ 4) $\pm\frac{4}{3}$

125. O= (0,0), A = (2,0), B = (0,2) then the centre of the circle with OA, AB and BO are tangents is

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

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

126. The slopes of the lines passing through A(2,0) and making an angle of 45^0 with the tangent at A to the circle $x^2 + y^2 + 4x - 6y - 12 = 0$ is

1) $\frac{1}{3}, -3$ 2) $2, -\frac{1}{2}$

3) $-2, -\frac{1}{2}$ 4) $\frac{1}{7}, -7$

127. If the lines $x + y + 1 = 0$, $3x+4y +1 = 0$ touch the circle, its centre lies on

1) $\frac{x+y+1}{\sqrt{2}} = \pm\frac{3x+4y+1}{5}$

2) $\frac{x+y-1}{\sqrt{2}} = \frac{3x+4y+1}{5}$

3) $\frac{x+y+1}{\sqrt{2}} = \frac{3x+4y-1}{5}$

4) $\frac{x-y-1}{\sqrt{2}} = \pm\frac{3x+4y+1}{5}$

128. If the tangents drawn from the points on x-axis to the circle $x^2 + y^2 - 10x - 8y + 31 = 0$ are perpendicular then the points are

1) (7,0), (-3,0) 2) (7,0), (0,3)

3) (7,0), (3,0) 4) (-7,0), (-3,0)

129. Tangents drawn from the point (-4,2) meet a circle in (-4,9) and (3,2). The centre of the circle is

1) (4,9) 2) (2,2) 3) (3,9) 4) (9,2)

130. The centre of a circle for which $5x + 12y - 10 = 0$ and $5x - 12y - 40 = 0$ are tangents can be

1) (3,4) 2) (5,1) 3) (-2,5) 4) (3,1)

131. The equations of tangents drawn from (0,0) to the circle $x^2 + y^2 - 2hx - 2hy + h^2 = 0$ are

1) $x = 0, y = 0$ 2) $x = h, y = h$

3) $x + y = 0, x - y = 0$ 4) $x+y=h, x-y=h$

132. $x^2 + y^2 - 4x - 6y - 9 = 0$ and $(x+3)^2+(y+2)^2 = 25$ are two circles. Then the line $x = 2$ is a

1) Tangent for both 2) Diameter for both

3) Tangent to the first and diameter of the second

4) Diameter of 1st and tangent to 2nd

133. The tangents drawn from the origin to the circles $x^2 + y^2 - 2ax - 2by + b^2 = 0$ are perpendicular if

1) $a^2 = b^2$ 2) $a = b^2$

3) $a^2 + b = 0$ 4) $a^2 + b^2 = 1$

134. If the tangents at the points (1,-3) and (-3,1) of a circle are perpendicular, then the radius of the circle is

1) 2 2) 4 3) 8 4) 16

135. 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 given by

1) $x + y = 0$ 2) $x - y = 0$

3) $xy = 0$ 4) $xy = a^2$

136. If the angle between the tangents at (a,0) and (b,0) to the circle $x^2 + y^2 - 2x - 2y - 7 = 0$ is 90^0 then $a + b =$

1) 1 2) 2 3) 3 4) 4

137. The value of λ (>0) so that the lines $3x-4y = \lambda$ may touch the circle $x^2 + y^2 - 4x - 8y - 5 = 0$ is

1) 15 2) 25 3) 35 4) 45

138. A tangent to the cricle $x^2 + y^2 = 9$ which is parallel to y-axis and does not lie in the third quadrant touches the circle at the point

1) (3,0) 2) (-3,0) 3) (0,3) 4) (0,-3)

139. The equation of the circle which has both the axes as its tangents and which passes through the point (1,2)

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

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

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

4) $x^2 + y^2 - 2x - 2y - 1 = 0$

140. The line $y = x$ is a tangent at (0,0) to a circle of radius unity. The centre of the circle is

1) (1,0) 2) $\left(\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$

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

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

1) $\frac{625}{12}$ 2) $\frac{625}{48}$ 3) $\frac{625}{24}$ 4) $\frac{25}{24}$

142. The equation of a tangent to the circle $x^2 + y^2 = a^2$ which makes a triangle of area a^2 with the coordinate axes is

1) x + y = a 2) $x + y = a\sqrt{2}$

3) y = x - 2a 4) $x - y = \sqrt{2a}$

NORMAL TO THE CIRCLE:

143. If the line 4x + 3y + k = 0 is a normal to the circle $2x^2 + 2y^2 + 7x + 4y + 8 = 0$ then k =

1) -10 2) 20 3) 10 4) -20

144. The equation of the circle which touch the y-axis and having the pair of normals of $x^2 - y^2 - 8x + 4y + 12 = 0$ is

1) $x^2 + y^2 + 4x + 2y + 1 = 0$
2) $x^2 + y^2 - 8x - 4y + 4 = 0$
3) $x^2 + y^2 - 4x - 2y + 1 = 0$
4) $x^2 + y^2 + 8x + 4y + 4 = 0$

145. Equation of the normal at (2, 1) to the circle $x^2 + y^2 - 8x - 6y + k = 0$ is

1) x + y = 3 2) x - y = 1
3) x + 2y = 4 4) x - 2y = 0

146. The normal to the circle $x^2 + y^2 + 2x - 10y + k = 0$ which is perpendicular to $x - 3y + 2 = 0$ is

1) $x + 3y + 2 = 0$ 2) $3x + y = 0$

3) $3x + y = 2$ 4) $3x + y = 4$

147. The normal at θ to the circle $x^2 + y^2 - 4x - 6y + 5 = 0$ is

1) $(x-2)\sin\theta + y(y-3)\cos\theta = 0$

2) $(x-2)\sin\theta - (y-3)\cos\theta = 0$

3) $(x-2)\sin\theta + (y-3)\cos\theta = 2\sqrt{2}$

4) $(x-2)\sin\theta - (y-3)\cos\theta = 2\sqrt{2}$

148. The length of the intercept made by the normal at (1,6) of the circle $x^2 + y^2 - 4x - 6y + 3 = 0$ between the coordinate axes is

1) $\sqrt{5}$ 2) $2\sqrt{5}$ 3) $3\sqrt{10}$ 4) $\sqrt{\frac{5}{2}}$

149. The area of the triangle formed by the tangent and normal at (x_1, y_1) on the circle $x^2 + y^2 = a^2$ and X-axis is

1) $|x_1y_1|(x_1^2 + y_1^2)$ 2) $\left|\frac{y_1}{x_1}\right|\left(\frac{x_1^2 + y_1^2}{2}\right)$

3) $\left|\frac{x_1y_1}{2}\right|(x_1^2 + y_1^2)$ 4) $\left|\frac{y_1}{x_1}\right|$

150. If normal at (1,1) on $2x^2 + 2y^2 - 2x - 5y + k = 0$ is x + 2y - 3 = 0, k =

1) -3 2) 6 3) -6 4) 3

151. If the normal at two points on a circle coincide then the points are

1) Conjugate points 2) Inverse points
3) Extremities of a diameter
4) Can not be determined

152. The intercept made by $x^2 + y^2 - 4x - 8y + 11 = 0$ on any one of its normals is

1) 3 2) 6 3) 2 4) 1

153. The line ax + by + c = 0 is normal to the circle $x^2 + y^2 = r^2$. The portion of the line ax + by +c = 0 intercepted by this circle is of length.

1) r 2) r^2 3) 2r 4) $\sqrt{r}$

154. The angle between the normals at (1,3), (-3, 1) to the circle $x^2 + y^2 = 10$ is

1) $\frac{\pi}{2}$ 2) $\frac{\pi}{3}$ 3) $\frac{\pi}{4}$ 4) $\frac{\pi}{6}$

155. The normal of the circle $(x - 2)^2 + (y -1)^2 = 16$ which bisects the chord cut off by the line x - 2y - 3 = 0

1) 2x + y + 3 = 0 2) 2x + y - 4 = 0
3) 2x + y - 5 = 0 4) 2x - y - 3 = 0

156. The number of feet of normals from the point (7, -4) to the circle $x^2 + y^2 = 5$ is

1) 1 2) 2 3) 3 4) 4

157. The area of the triangle formed by the tangent and normal at (2,4) on the circle $x^2 + y^2 = 20$ and X-axis is sq. units is

1) 10 2) 40 3) 20 4) 60

LENGTH OF THE TANGENT:

158. If the length of the tangent from (1,1) to the circle $2x^2 + 2y^2 - 4x - 6y + k = 0$ is 5 units then k -1 =

1) 31 2) 30 3) 55 4) 43

159. If a chord through P cut the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ in A and B another chord in C and D then

1) PA.PB<PCPD 2) PA.PB=PC.PD
3) PA.PB>PC.PD 4) $PA.PB \geq PC.PD$

160. A tangent is drawn to the circle $2(x^2 + y^2)$ - 3x+4y=0 and it touches the circle at A. The tangent passes through the point P (2,1). Then PA=

(1) 4 (2) 2 (3) $2\sqrt{2}$ (4) 8

161. The length of the tangent from any point on the circle $x^2 + y^2 - 2x - 4y - 5 = 0$ to the circle $2x^2 + 2y^2 - 4x - 8y - 7 = 0$ is

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

3) $\sqrt{2}$ 4) does not exist

162. If the ratio of the lengths of tangents from a pointp to the circles $x^2 + y^2 + 4x + 3 = 0$, $x^2 + y^2 - 6x + 5 = 0$ is 1 : 2 then the locus of P is a circle whose centre is

1) $\left(\frac{-11}{3}, 0\right)$ 2) $\left(\frac{-22}{3}, 0\right)$

3) $(-11,6)$ 4) $\left(\frac{-11}{5}, 0\right)$

163. If the lengths of the tangents from P to the circles $4x^2 + 4y^2 = 9$ and $9x^2 + 9y^2 = 16$ are in the ratio 3 : 4 then the locus of P is a circle of radius

1) $\sqrt{\frac{20}{7}}$ 2) $\frac{20}{7}$ 3) $\frac{\sqrt{20}}{7}$ 4) $\frac{20}{\sqrt{7}}$.

164. The angle between the tangents drawn from a point P to a circle is 60^0 and the length of the tangent from the circle is $2\sqrt{3}$ units. Then the radius of the circle is

1) 6 2) 2 3) 3 4) 1

165. A point P is at a distance of 10 units from the centre of a circle. If the angle between the tangents at P is 60^0 then the radius of the circle is

1) 5 2) 10 3) 15 4) 20

166. If the line $y = x$ touches the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ at P. Where OP = $4\sqrt{2}$ then c=

1) 8 2) 16 3) 32 4) 64

167. The angle between the tangents from the point $p(x_1,y_1)$ to the circle whose radius is $2\sqrt{3}$ units is 60^0 then the length of the tangent from p to the circle

1) 2 2) $2\sqrt{3}$ 3) 6 4) $6\sqrt{3}$

168. The points on the line $x - y + 1 = 0$ from which the lengths of the tangents to the circle $x^2 + y^2 - 3x = 0$ are of lengths 2 are

1) (2,3), (0,1) 2) $\left(-\frac{1}{2},\frac{1}{2}\right),\left(\frac{1}{2},\frac{1}{2}\right)$

3) $\left(\frac{3}{2},\frac{5}{2}\right),(-1,0)$ 4) $(3,4)$, $\left(\frac{3}{2},\frac{5}{2}\right)$

169. If length of tangent from a point P on $x - y + 1 = 0$ to the circle $x^2 + y^2 - 4x = 0$ is of length $\sqrt{5}$, P can be

1) (3,4) 2) (-2,1) 3) (1,2) 4) (2,3)

170. Length of the tangent to the circle $x^2 + y^2 = 4$ drawn from the image of origin with respect to $3x + 4y + 25 = 0$ is

1) 96 2) $\sqrt{96}$ 3) $9\sqrt{6}$ 4) $6\sqrt{8}$

171. The point on the line $5x - y - 9 = 0$, the length of the tangent from which to the circle $x^2 + y^2 + 6x - 4y + 12 = 0$ is minimum, is

1(3,6) 2) (2,1) 3) (1,2) 4) (2, -1)

172. If the lengths of the tangents from the point (1,2) to the circles $x^2 + y^2 + x + y - 4 = 0$ and $3x^2 + 3y^2 - x - y - \lambda = 0$ are in the ratio 4 : 3 the λ =

1) $\frac{23}{4}$ 2) $\frac{21}{4}$ 3) $\frac{17}{4}$ 4) $\frac{19}{4}$

PARAMETRIC EQUATIONS OF A CIRCLE:

173. The locus of the point of intersection of the lines $x \sin\theta + y\cos\theta = a$ and $x\cos\theta - y\sin\theta = b$ (for various values of θ) is a circle of radius

1) $a^2 + b^2$ 2) $\sqrt{a+b}$

3) $2\sqrt{a^2+b^2}$ 4) $\sqrt{a^2+b^2}$

174. If the equation of the tangent to the circle $x = 3 + 5\cos\theta$, $y = -1 + 5\sin\theta$ at the point (0,3) is $px + qy + r = 0$ and $p > 0$ then p + q =

1) 1 2) -1 3) 2 4) 0

175. A straight line passes through the point $(-\sqrt{8}, \sqrt{8})$ and makes an angle 135^0 with the positive direction of the x -axis intersects the circle $x = 5\cos\theta$, $y = 5\sin\theta$ at A and B. Then the length of AB =

1) 5 2) $\frac{5}{2}$ 3) $\sqrt{5}$ 4) 10

176. The locus of the point of intersection of the tangents to the circle $x = a\cos\theta$, $y = a\sin\theta$ at the points whose parametric angles differ by $\frac{\pi}{2}$ is a circle of area

1) $\sqrt{2}\pi a^2$ 2) πa^2 3) $2\pi a^2$ 4) $\frac{\pi a^2}{2}$

177. The parametric equations of the circle passing through the points (2,5), (2,3), (4,3) are

1) $x = 3 + \left(\sqrt{8}\right)\cos\theta$, $y = 4 + \left(\sqrt{8}\right)\sin\theta$

2) $x = 3 + 8\cos\theta$, $y = 4 + 8\sin\theta$

3) $x = 3 + \sqrt{2}\cos\theta$, $y = 4 + \sqrt{2}\sin\theta$

4) $x = 4 + 2\cos\theta$, $y = 3 + 2\sin\theta$

178. The locus of the point of intersection of the tangents to the circle $x^2 + y^2 = a^2$ at the points whose parametric angles differ by 60^0 is a circle of radius

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

179. The length of the chord joining the points ($4\cos\theta$, $4\sin\theta$) and [$4\cos(\theta+60^0)$, $4\sin(\theta+60^0)$] on the circle $x^2 + y^2 = 16$ is
1) 16 2) 2 3) 8 4) 4

180. The centre and radius of the circle represented by the equation $x = 4 + 5\cos\theta$ and $y = 2 + 5\sin\theta$ are
1) (-4, -2), 5 2) (2, 4),5
3) (4, 2), 5 4) (-2, -4), 5

181. The equation of the tangents to the circle $x = 4 + 5\cos\theta$, $y = 2 + 5\sin\theta$ at the parametric point $\frac{\pi}{3}$ is
1) $(x-4)\cos\frac{\pi}{6} + (y-2)\sin\frac{\pi}{6} = 5$
2) $(x+4)\cos\frac{\pi}{6} + (y+2)\sin\left(\frac{\pi}{6}\right) = 5$
3) $(x-4)\cos\frac{\pi}{3} + (y-2)\sin\frac{\pi}{3} = 5$
4) $(x-4)\cos\frac{\pi}{3} + (y+2)\sin\frac{\pi}{3} = 5$

182. The length of the chord joining the parametric points $\frac{5\pi}{6}$ and $\frac{\pi}{3}$ on the circle $x^2 + y^2 - 2x - 4y - 3 = 0$ is
1) 20 2) $2\sqrt{2}$ 3) 4 4) $4\sqrt{2}$

183. Length of the chord joining the points 'θ', 'ϕ' on the circle $x^2 + y^2 = a^2$ is
1) $2a\left|\sin\left(\frac{\theta-\phi}{2}\right)\right|$ 2) $2a\left|\cos\left(\frac{\theta-\phi}{2}\right)\right|$
3) $2a\left|\sin\left(\frac{\theta+\phi}{2}\right)\right|$ 4) $2a\left|\cos\left(\frac{\theta+\phi}{2}\right)\right|$

184. $\theta = \frac{3\pi}{4}$ is a point on the circle $(x+2)^2 + (y-3)^2 = 8$. Then the coordinates of the point are
1) (0,1) 2) (-4, 1) 3) (0,5) 4) (-4, 5)

CHORD, LENGTH OF THE CHORD, CHORD OF CONTACT:

185. The line $x\cos\alpha + y\sin\alpha = p$ intersects the circle $x^2 + y^2 = 4$ at A and B. If the chord AB makes an angle 30^0 at a point on the circumference of the circle, then
1) $p^2 = 3$ 2) $p^2 = 4\cos^2 15^0$
3) $p^2 = 2$ 4) $p^2 = 6$

186. If the line $x = 3y + 13$ intersects the circle $x^2 + y^2 - 4x + 4y + 3 = 0$ then the square of length of the chord is
1) $\sqrt{10}$ 2) 10 3) $\sqrt{\frac{5}{2}}$ 4) $\frac{5}{2}$

187. If the line $y = mx + c$ intersects the circle $x^2 + y^2 = a^2$ then the length of the chord so formed is 2b. Then c^2 =
1) $(a^2 + b^2)(m^2+1)$ 2) $(b^2 + a^2)(m^2-1)$
3) $(a^2 - b^2)(m^2 + 1)$ 4) $(a^2+b^2)(m^2 - 1)$

188. If $c^2 = a^2(1+m^2)$ and the line $y = mx + c$ intersects the circle $x^2 + y^2 = 4a^2$ then the length of the chord so formed is
1) 2a 2) $(\sqrt{3})a$ 3) $2\sqrt{3}$ 4) $2(\sqrt{3})a$

189. The length of the minor Arc formed by a chord of the circle $x^2 + y^2 - 2x - 4y - 4 = 0$ is π. Then the length of the chord is
1) 2 2) 3 3) 2π 4) 3π

190. Length of the chord PQ of the circle $x^2 + y^2 - 6x + 8y - 13 = 0$ whose midpoint is (2, -3) is
1) 10 2) 11 3) 12 4) 13

191. The square of the distance between points (x_1, y_1) and (x_2, y_2) on the circle $x^2 + y^2 = a^2$ is
1) $2(a^2 - x_1x_2 - y_1y_2)$ 2) $2(a^2 + x_1x_1 + y_1y_2)$
3) $2(x_1x_2 + y_1y_2 - a^2)$ 4) $(a^2 - x_1x_2 - y_1y_2)$

192. The straight line $y = mx + c$ cuts the circle $x^2 + y^2 = a^2$ in real points if
1) $\sqrt{a^2(1+m^2)} < c$ 2) $\sqrt{a^2(1-m^2)} < c$
3) $\sqrt{a^2(1+m^2)} > c$ 4) $\sqrt{a^2(1-m^2)} > c$

193. If the length of the intercept made by the circle $x^2 + y^2 + 4x - 6y + c = 0$ on the line $x - 3y + 1 = 0$ is $2\sqrt{6}$, then c =
1) -3 2) 3 3) -21 4) 21

194. The length of the chord of contact of the point (3,6) with respect to the circle $x^2 + y^2 = 9$ is
1) $\frac{3}{\sqrt{5}}$ 2) $6\sqrt{5}$ 3) $\sqrt{5}$ 4) $\frac{12}{\sqrt{5}}$

195. AB is a chord of the circle $x^2 + y^2 = a^2$. If AB passes through (h,k) then the locus of the centre of the circle whose one diameter is AB is
1) $x^2 + y^2 = h^2 + k^2$ 2) $x^2 + y^2 + hx + ky = 0$
3) $x^2 + y^2 - hx - ky = 0$
4) $x^2 + y^2 - hx - ky + hk = 0$

196. If a chord of the circle $x^2 + y^2 - 2ax = 0$ passes through the origin then the locus of the foot of the perpendicular from the centre of the circle to that chord is
1) $x^2 + y^2 = a^2$ 2) $x^2 + y^2 + ax = 0$
3) $x^2 + y^2 - ay = 0$ 4) $x^2 + y^2 - ax = 0$

197. The line $3x - 4y - 10 = 0$ intersects the circle whose centre is (5,-5). If the length of the intercept is 24 and the equation of the circle is $x^2 + y^2 + 2gx + 2fy + c = 0$ then c =
1) 119 2) -119 3) 169 4) -169

198. If the line $x - 7y - 8 = 0$ intersects the circle $x^2 + y^2 - 8x - 6y = 0$ at A,B and O = (0,0) then the area of the Δ OAB is
1) 8 2) 1 3) 2 4) 4

199. The line $\frac{x}{a}+\frac{y}{b}=1$ intersects the coordinate axes at A and B. A line perpendicular to the line AB intersects the axes at P and Q. The locus of the point of intersection of the lines AQ and BP is
1) (x + a) x + (y+b) y = 0
2) (x - a) a + (y - b) b = 0
3) x (x -a) + y (y - b) = 0
4) x (x - a) + y(y + b) = 0

200. Area of the triangle formed by the pair of tangents drawn form the origin to $x^2 + y^2 - 8x - 8y + 16 = 0$ and the chord of contact of the origin in sq. units is
1) 2 2) 4 3) 8 4) 16

201. If the chord of contact of the tangents drawn from (h,k) to the circle $x^2 + y^2 = a^2$ subtends a right angle at the centre then
1) $h^2 + k^2 = a^2$ 2) $2 (h^2 + k^2) = a^2$
3) $h^2 - k^2 = a^2$ 4) $h^2 + k^2 = 2a^2$

202. If the equations of the two circles are $x^2 + y^2 = 1, x^2 + y^2 - 2x - 6y + 6 = 0$, then the line $4x - 3y - 5 = 0$ is
1) a tangent to both the circles
2) a chord of both the circles
3) a normal to both the circles
4) a normal to the first circle and a tangent to the second circle

203. The angle between the straight lines joining the origin to the points of intersection of the line 4x+3y=24 and the circle $(x-3)^2+(y-4)^2=24$ is
(1) $\pi/3$ (2) $\pi/4$ (3) $\pi/6$ (4) $\pi/2$

204. The chords of contact of the pair of tangents to the circle $x^2 + y^2 = 1$ drawn from any point on the line 2x + y = 4 pass through the point
1) $\left(\frac{1}{2},\frac{1}{4}\right)$ 2) $\left(\frac{1}{4},\frac{1}{2}\right)$ 3) $\left(1,\frac{1}{2}\right)$ 4) $\left(\frac{1}{2},1\right)$

205. The distance between the chords of contact of the points (0,0) and (g,f) with respect to the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ is
1) $\frac{g^2+f^2+c}{2\sqrt{g^2+f^2}}$ 2) $\frac{g^2+f^2-c}{\sqrt{g^2+f^2}}$
3) $\frac{g^2+f^2-c}{2(g^2+f^2)}$ 4) $\frac{g^2+f^2-c}{2\sqrt{g^2+f^2}}$

206. The points of contact of the tangents from (4, -2) to the circle $x^2 + y^2 = 10$ are
1) (1,3), (3,1) 2) (1,-3), (-3,1)
3) (1, -3), (3, 1) 4) (3, -1) (1,3)

MID POINT OF THE CHORD:

207. If a chord of the circle $x^2 + y^2 = 16$ makes an angle 90^0 at the centre of the circle then the locus of the mid point of that chord is a circle whose radius is
1) $4\sqrt{2}$ 2) 4 3) $2\sqrt{2}$ 4) 8

208. AB is a chord of the circle $x^2 + y^2 - 7x - 4 =0$. If (1,-1) is the mid point of the chord AB then the area of the triangle formed by AB and the coordinate axes is
1) $\frac{9}{20}$ 2) $\frac{9}{10}$ 3) $\frac{3}{20}$ 4) $\frac{1}{5}$

209. If a tangent to the circle $x^2 + y^2 = a^2$ intersects the coordinate axes at A and B then the locus of the mid point of the portion AB is
1) $a(x^2 + y^2) = 4xy$ 2) $a^2 (x^2 + y^2) = 4x^2y^2$
3) $a^2 (x + y) = 4x^2 y^2$ 4) $a^2 (x^2+ y^2)= x^2 y^2$

210. If the locus of the mid points of the chords of the circle $x^2 + y^2 - 2x + 2y - 2 = 0$ which are parallel to the line y = x + 5 is ax + by + c = 0 (a > 0) then $\frac{a+c}{b}$ =
1) 1 2) -1 3) 3 4) 2

211. If AB is a chord of the circle $x^2 + y^2 + 8x - 4y - 16= 0$ and (-1, 1) is the mid point of the chord AB then AB passes through the point
1) (2,2) 2) (2,10) 3) 1, -1) 4) (-2,1)

212. If the length of a chord of the circle $x^2 + y^2 = a^2$ is 2k then the locus of the mid point of that chord is a circle of radius
1) $a^2 - k^2$ 2) $\sqrt{k^2-a^2}$
3) $\sqrt{a^2+k^2}$ 4) $\sqrt{a^2-k^2}$

213. The locus of the mid points of the chords of the circle $x^2 + y^2 - 2x+ 2y -2 = 0$ parallel to the line y = x + 5 is the line which passes through the point
1) (-1,-1) 2) (1,1) 3) (0,0) 4) (2,-1)

214. If (1,2) is the mid point of a chord of the circle $(x-2)^2 + (y - 4)^2 = 10$) and the equation of that chord is ax + by + c = 0 (a > 0) then a - b + c =
1) 6 2) -6 3) -2 4) 2

215. If (2,3) is the mid point of a chord of the circle $x^2 + y^2 = 25$ then the sum of the intercepts of that chord is
1) $\frac{-65}{6}$ 2) $\frac{169}{6}$ 3) 13 4) $\frac{65}{6}$

216. The locus of the middle points of the chords of the circle $x^2 + y^2 = 8$ which are at a distance of $\sqrt{2}$ units from the centre of the circle is
1) $x^2 + y^2 = 2$ 2) $x^2 + y^2 = 1$
3) $x^2 + y^2 = 4$ 4) $x^2 + y^2 = \frac{1}{2}$

217. The locus of the middle points of chords of length 4 on the circle $x^2+y^2=16$
1) A straight line 2) A circle of radius
3) A circle of radius $2\sqrt{3}$
4) An ellipse

218. A line through the origin cuts the circle $x^2 + y^2 - 2x - 2y = 0$ at A. The locus of the mid-point of the chord OA is
1) $x^2 + y^2 + 2x + 2y = 0$ 2) $x^2 + y^2 + x + y = 0$
3) $x^2 + y^2 - 2x - 2y = 0$ 4) $x^2 + y^2 - x - y = 0$

219. The locus of the mid point of the chord of the circle $x^2 + y^2 = 25$ which subtends a right angle at (2, -3) is
1) $x^2 + y^2 + 2x + 3y - 24 = 0$
2) $x^2 + y^2 - 2x + 3y - 6 = 0$
3) $x^2 + y^2 - 2x - 3y - 12 = 0$
4) $x^2 + y^2 + 2x - 3y - 6 = 0$

220. The locus of mid points of chords of $x^2 + y^2 = a^2$ which subtend a angle 120^0 at the centre is
(1) $x^2 + y^2 = a^2$ (a) $2x^2 + 2y^2 = a^2$
(3) $3x^2 + 3y^2 = a^2$ (4) $4x^2 + 4y^2 = a^2$

221. The locus of the mid point of the chord of the circle $x^2 + y^2 = 25$ which passes through the fixed point (4,6) is a circle. The radius of that circle is
1) $\sqrt{52}$ 2) $\sqrt{2}$ 3) $\sqrt{13}$ 4) $\sqrt{10}$

POLE AND POLAR:

222. The locus of the poles of the tangents to the circle $x^2 + y^2 = a^2$ with respect to the circle $x^2 + y^2 + 2ax - a^2 = 0$ is
1) $y^2 + 2ax = 0$ 2) $x^2 + 4ay = 0$
3) $y^2 = 4ax$ 4) $y^2 + 4ax = 0$

223. If the polar of P with respect ot the circle $x^2 + y^2 = a$ touches the circle $x^2 + y^2 = b$ and P lies on the circle $x^2 + y^2 = c$ then c =
1) $\frac{b^2}{a}$ 2) $\sqrt{ab}$ 3) $\frac{a^2}{b}$ 4) ab^2

224. If (x_1,y_1) is the pole of the line lx + my + n = 0 with respect to the circle $(x-h)^2 + (y-k)^2 = r^2$ then $\frac{x_1 - h}{l} = \frac{y_1 - k}{m} =$
1) $\frac{-r}{lh+mk}$ 2) $\frac{lh+mk+n}{-r^2}$
3) $-r^2$ 4) $\frac{-r^2}{lh+mk+n}$

225. The locus of the poles of the line ax + by + c = 0 with respect to the system of circles $x^2 + y^2 = \lambda$ (λ is a variable) is a straight line whose slope is
1) 1 2) $\frac{a}{b}$ 3) $\frac{-b}{a}$ 4) $\frac{b}{a}$

226. If the polars of the points which are on the line 2x + 3y - 4 = 0 with respect to the circle $x^2 + y^2 = 3$ are concurrent at Q then Q_x =
1) $\frac{2}{3}$ 2) $\frac{-3}{2}$ 3) $\frac{3}{2}$ 4) $\frac{9}{4}$

227. If the polar of P(-1,2) w.r.t $(x-3)^2 + (y-4)^2 = 16$ meets the circle at Q and R then the circumcentre of triangle PQR is
1) (1,3) 2) (3,4) 3) (-1,3) 4) (1,-3)

228. The pole of the line $ax + by + 3(a^2 + b^2) = 0$ w.r.t. the circle $x^2 + y^2 + 2ax + 2by - (a^2 + b^2) = 0$ is
1) (a, b) 2) (-a, -b) 3) (2a, 2b) 4) (-2a, -2b)

229. If the polar of P (3,1) w.r.t. a circle meet the circle at A and B whose middle point is (4,3) then equation of AB is
1) 4x + 3y = 25 2) 3x + y = 15
3) x + 2y = 10 4) x + y = 7

230. The polars of the points (3,4), (-5, 12) and (6,t) w.r.t. a circle are concurrent. Then t =
1) 1 2) 2 3) 3 4) 4

231. The polars of (x_1, y_1) w.r.t $x^2 + y^2 - 2kx + c^2 = 0$ where k is a variable are concurrent at
1) $\left(-x_1, \frac{x_1^2 + c}{y_1}\right)$ 2) $\left(-x_1, \frac{x_1^2 - c^2}{y_1}\right)$
3) $\left(-x_1, \frac{x_1^2 + c^2}{y_1}\right)$ 4) $\left(x_1, \frac{x_1^2 - c^2}{y_1}\right)$

232. The pole of the line 8x - 2y - 11 = 0 w.r.t. $2x^2 + 2y^2 = 11$ is
1) (4,1) 2) (-4,1) 3) (-4,-1) 4) (4, -1)

233. The poles of tangents of the circle $(x-p)^2 + y^2 = b^2$ w.r.t circle $x^2 + y^2 = a^2$ lie on the curve
1) $(px - a^2)^2 = x^2 + y^2$
2) $(px - a^2)^2 = b^2 (x^2 + y^2)$
3) $(bx - a^2)^2 = p^2 (x^2 + y^2)$
4) $(px - a^2)^2 = b^2 (x^2 - y^2)$

234. If polar of a point P w.r.t the circle S = 0 has no intersection with the circle, then P
1) lies out side the circle 2) lies on the circle
3) lies inside the circle
4) this data is not sufficient

235. The locus of poles of lx + my + n = 0 with respect to a variable circle passing through the points (a,0) and (-a, 0) is
1) $lx^2 - mxy + ny + a^2 l = 0$
2) $ly^2 - mxy + nx + a^2 l = 0$
3) $mx^2 - lxy + nx + a^2 l = 0$
4) $my^2 - lxy + ny + a^2 l = 0$

236. The polar of the origin with respect to the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ touches the circle $x^2 + y^2 = a^2$ if c^2 =
1) $a^2 (f^2 - g^2)$ 2) $a^2 (f^2 + g^2)$
3) $a (f^2 - g^2)$ 4) $a (f^2 + g^2)$

237. The locus of poles of concurrent lines with respect to a circle is
1) a straight line passing through the centre
2) a straight line not passing through the centre
3) a circle concentric with the given circle
4) Circle

238. The locus of the point whose polars w.r.t the circles $x^2 + y^2 - 4x - 4y - 8 = 0$ and $x^2 + y^2 - 2x + 6y - 2 = 0$ are mutually perpendicualr is
1) $x^2 + y^2 - 5x - 3y + 5 = 0$
2) $x^2 + y^2 - 3x + y - 4 = 0$
3) $x^2 + y^2 - 2x - y - 4 = 0$
4) $x^2 + y^2 - 3x + 2y - 4 = 0$

239. The polar of the point (2, -4) with respect to the circle $3x^2 + 3y^2 = 2$ divides the line segment joining (-1, 2) and (5,4) in the ratio
1) 5 : 8 2) -5 : 8 3) 8 : 5 4) -8 : 5

240. If the polar of the point (3,6) with respect to the circle $x^2 + y^2 - 2x - 8y + c = 0$ is $x + y = 15$, then the radius of the circle is
1) $\sqrt{14}$ 2) 20 3) $2\sqrt{5}$ 4) $\sqrt{71}$

241. If the chord of contact of tangents drawn from the point (h,k) to the circle $x^2 + y^2 = a^2$ subtends a right angle at the center.
(1) $h^2 + k^2 = a^2$ (2) $2(h^2 + k^2) = a^2$
(3) $h^2 - k^2 = a^2$ (4) $h^2 + k^2 = 2a^2$

242. L = 2x + 2y - 25 = 0 and P = (3,4). With respect to the circle $x^2 + y^2 - 2x - 4y - 14 = 0$
1) L is a tangent at of P
2) L is chord of contact of P
3) L is polar of P 4) chord

243. The polar of the point (t - 1, 2t) w.r.t. the circle $x^2 + y^2 - 4x + 6y + 4 = 0$ passes through the point of intersection of the lines
1) x - y - 2 = 0, x + 2y + 4 = 0
2) 3x + 3y + 2 = 0, x + 2y + 4 = 0
3) x - y - 2 = 0, x + 2y - 4 = 0
4) -3x + 3y + 2 = 0, x - 2y + 4 = 0

244. For all values of λ, the polar of the point $(2\lambda, \lambda - 4)$ with respect to the circle $x^2 + y^2 - 4x - 6y + 1 = 0$ passes through the fixed point.
(1) $(2,-3)$ (2) $(3,1)$
(3) $(-3,-1)$ (4) $(1,-3)$

CONJUGATES AND INVERSE POINTS:

245. If the points (2,3) and (k, -l) are conjugate points with respect to the circle $x^2 + y^2 - 2x + 2y - 1 = 0$ then k^2 =
1) 4 2) 8 3) 16 4) 6

246. If (1,4),(-2,3) are conjugate points with respect to $x^2 + y^2 = k$ then k=
(1) 10 (2) $\sqrt{10}$ (3) 100 (4)2

247. The inverse point of (2, -3) with respect to the circle $x^2 + y^2 + 6x - 4y - 12 = 0$ is
1) $\left(\frac{-1}{2}, \frac{-1}{2}\right)$ 2) $\left(\frac{5}{2}, \frac{-5}{2}\right)$
3) $\left(\frac{1}{2}, \frac{1}{2}\right)$ 4) $\left(\frac{-11}{2}, \frac{9}{2}\right)$

248. If the lines 2x + 3y - 4 = 0 and kx + 4y - 2 = 0 are conjugate with respect to the circle $x^2 + y^2 = 4$ then k - 1 =
1) -5 2) -6 3) -4 4) 5

249. If the inverse point of (2,-1) with respect to the circle $x^2 + y^2 = 9$ is (p,q) then q =
1) $\frac{18}{5}$ 2) $\frac{-9}{5}$ 3) -9 4) $\frac{-3}{5}$

250. If the inverse point of (0,0) with respect to the circle $x^2 + y^2 + gx + fy + c = 0$ is (p,q) the q =
1) $\frac{-fc}{g^2 + f^2}$ 2) $\frac{-fc}{2(g^2 + f^2)}$
3) $\frac{-2fc}{g + f}$ 4) $\frac{-2fc}{g^2 + f^2}$

251. If the inverse point of (x_1, y_1) with respect to the circle $x^2 + y^2 = a^2$ is $\left(\frac{x_1}{k}, \frac{y_1}{k}\right)$ then k =
1) $\frac{a^2}{x_1^2 + y_1^2}$ 2) $\frac{a}{x_1 + y_1}$
3) $\frac{x_1^2 + y_1^2}{a^2}$ 4) $\frac{x_1 + y_1}{a^2}$

252. If the inverse point of (1, -1) with respect to the circle $x^2 + y^2 = \frac{1}{4}$ is C then $C_x + C_y$ =
1) $\frac{1}{4}$ 2) $\left(\frac{1}{4}, \frac{-1}{8}\right)$ 3) 0 4) 2

253. P (2,1) and Q (8,4) are 2 points and $x^2 + y^2 = 20$ is the equation of a circle. Then
1) P and Q are extremities of a diameter of the circle
2) P and Q are conjugate points with respect to the circle
3) P and Q are extremities of a chord which makes an angle 90^0 at the centre of the circle
4) P and Q are inverse points with respect to the circle

254. The conjugate point of (-4, 3) w.r.t. the circl $x^2 + y^2 + 2x - 4y - 3 = 0$ is
1) (3, -4) 2) (-4, 3) 3) (-3,4) 4) (-3, -4)

255. If the lines 3x + y = 10 and x + 2y = 4 are conjugate with respect to a circle whose centre is origin, then its radius is
1) 2 2) $2\sqrt{2}$ 3) 8 4) 4

256. The inverse point of (x_1, y_1) w.r.t. $x^2 + y^2 = a^2$ is $(kx_1, ky_1) \Rightarrow k$ =
1) $\frac{a^2}{x_1^2 - y_1^2}$ 2) $\frac{a^2}{x_1^2 + y_1^2}$
3) $\frac{x^2}{x_1^2 + y_1^2}$ 4) $\frac{y^2}{x_1^2 + y_1^2}$

PAIR OF TANGENTS:

257. If the combined equation of the tangents from (11,3) to the circle $x^2 + y^2 = 65$ is $(11x + 3y - 65)^2 + k(x^2 + y^2 - 65) = 0$ then k =
1) - 65 2) 65 3) 130 4) 14

258. The equation of the tangents from the origin to $x^2 + y^2 - 6x - 2y + 8 = 0$ are
1) x + y = 0, 7x + y = 0
2) x - y = 0, x + 7y = 0
3) x + y = 0, x + 7y = 0
4) x = 0, y = 0

MISCELLENEOUS PROBLEMS:

259. Number of circles with a given radius and touching both the coordinate axes is
1) 1 2) 2 3) 4 4) α

260. A right angled isosceles triangle is inscribed in a circle $x^2 + y^2 - 4x - 2y - 11 = 0$ then the length of the side of the triangle is
1) 4 2) $4\sqrt{2}$ 3) 6 4) $2\sqrt{2}$

261. The area of the circle $2x^2 + 2y^2 - 4x + 6y - 3 = 0$ is
1) $\frac{19\pi}{2}$ 2) $\frac{209}{41}$ 3) $\frac{209}{14}$ 4) $\frac{19}{4}$

262. The number of circles which touch the coordinate axes and the line x = 2 is
1) 0 2) 3 3) 4 4) 2

263. If 3x+y = 0 is a tangent to the circle its centre is (2,-1) taken then equation of theanother tangent is
1) x-3y=0 2)x+3y=0 3) 3x-y=0 4) 2x+y=0

264. The number of circles which touch all the 3 lines x + y = 1, x - y = 1 and 2x + 3y + 4 = 0 is
1) 2 2) 1 3) 3 4) 4

265. The number of tangents from the point of intersection of the lines $x+3y=4, 4x-y=3$ to the circle $x^2+y^2-4x-6y+1=0$ is
(1) 0 (2) 1 (3) 2 (4) 3

266. The locus of the mid point of a chord of the circle $x^2 + y^2 - 2x - 2y - 4 = 0$ which makes an angle 90^0 at the centre of the circle is $x^2+ y^2+ gx+fy+2c = 0$ then c =
1) -1 2) $\frac{-1}{2}$ 3) $\frac{1}{2}$ 4) 1

267. If the line $3x - 4y = \lambda$ intersects the circle $x^2 + y^2 - 4x - 8y = 5$ then the range of λ is
1) (15, 35) 2) (-15, 35)
3) [-35, 15] 4) (-35, 15)

268. The number of the common points of the line 5x + 12y = 4 and the circle $x^2 + y^2 - 6x + 4y + 12 = 0$ is
1) 0 2) 2 3) 1 4) 3

269. If the two circles passing through (0, a), (0,- a) and touching the st. line y = mx + c cut at right angles then c^2 =
1) $a^2 (1+m^2)$ 2) $a^2 (2 + m^2)$
3) $a^2 (1 + 2m^2)$ 4) $2a^2 (1 + m^2)$

270. A straight line $\frac{x}{a}+\frac{y}{b}=1$ moves such that $\frac{1}{a^2}+\frac{1}{b^2}=\frac{1}{c^2}$ (c is const). Then the Locus of the foot of the
perpendicular drawn from (0,0) to the given line is
1) $x^2 + y^2 = c^2$ 2) $x^2 + y^2 = \frac{1}{c^2}$
3) $x^2 + y^2 = 2c^2$ 4) $x^2 + y^2 = 4c^2$

271. A line of symmetry to the circle is a
1) tangent 2) polar
3) chord 4) diameter

272. If the lines $a_1x + b_1 y + c_1 = 0$, $a_2x + b_2y+ c_2 = 0$ cut the co-ordinate axes is concyclic points then $\frac{a_1a_2}{b_1b_2}$ =
1) 2 2) 1 3) -1 4) c_2/ c_1

273. The circles represented by $x^2 + y^2 + 2gx + c = 0$ (c < 0) and y-axis intersect in points whose coordinates are
1) (0,0) 2) (0, $\sqrt{c}$)
3) $(0,\pm\sqrt{-c})$ 4) $(\sqrt{-c},0)$

274. A regular polygon of 9 sides where length of each side is '2' is inscribed in a circle. The radius of the circle is
1) sec $\frac{\pi}{9}$ 2) cosec $\frac{\pi}{9}$ 3) cot $\frac{\pi}{9}$ 4) tan $\frac{\pi}{9}$

275. The locus of the point which divides the join of A(-1,1), and a variable point P on the circle $x^2 + y^2 = 4$ in ratio 3 : 2 is
1) $(5x + 2)^2 + (5y - 2)^2 = 36$
2) $(5x + 6)^2 + (5y - 3)^2 = 16$
3) $(5x -2)^2 + (5y - 2)^2 = 36$
4) $(5x + 2)^2 + (5y + 2)^2 = 36$

276. A (1,5) and B(3,1) are the ends of diameter of a circle the ends of the perpendicular diameter to the above are
1) (4,4), (0,2) 2) (5,1), (-1,5)
3) (-6, 1), (10,7) 4) (2,2), (3,3)

277. If the line y = mx passes outside the circle $x^2 + y^2 - 10x + 16 = 0$, then the value of m is given by
1) m = $\frac{3}{4}$ 2) $|m|<\frac{3}{4}$ 3) $|m|>\frac{3}{4}$ 4) $|m|<\frac{4}{3}$

278. If $x^2 + y^2 + 8x + 6y + k = 0$ represents a circle, then the range of k =
1) $(-\infty , 25]$ 2) $(\infty , -25)$
3) $[25, \infty)$ 4) $(-\infty , 5]$

279. Perpendiculars PL and PM are drawn from $P(x_1,y_1)$ to the pair of lines $ax^2 + 2hxy + by^2 = 0$. The equation to the circum circle of Δ OLM is
1) $x^2 + y^2 = a^2$, where a is the distance from P to LM

2) $(x - x_1)^2 + (y - y_1)^2 = a^2$, where a is the distance from P to LM
3) $x^2 + y^2 - xx_1 - yy_1 = 0$
4) $x^2 + y^2 = x_1^2 + y_1^2$

280. The equation $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ represents a circle if
1) $ab = h^2$
2) $a = b, h = 0, g^2 + f^2 \geq ac$
3) $a = b, g^2 = f^2$
4) $a = b, h = 0, g^2 + f^2 \leq ac$

281. If p and q be the longest distance and the shortest distance respectively of the point (-7,2) from any point (α, β) on the curve whose equation is $x^2 + y^2 - 10x - 14y - 51 = 0$ then GM of p and q =
1) $2\sqrt{11}$ 2) $5\sqrt{5}$ 3) 13 4) $4\sqrt{5}$

282. The center of the circle
$(x\cos\alpha + y\sin\alpha - a)^2 + (x\sin\alpha - y\cos\alpha - b)^2 = k^2$
(if α varies) is
1) $(a\cos\alpha + b\sin\alpha, a\sin\alpha + b\cos\alpha)$
2) $(a\cos\alpha - b\sin\alpha, a\sin\alpha + b\cos\alpha)$
3) $(a\cos\alpha + b\sin\alpha, a\sin\alpha - b\cos\alpha)$
4) $(a\cos\alpha - b\sin\alpha, a\sin\alpha - b\cos\alpha)$

283. The area bounded by the circles $x^2 + y^2 = 1$ and $x^2 + y^2 = 2$, and the pair of lines $2x^2 - 3xy - 2y^2 = 0$ ($y > 0$) is
1) $\frac{\pi}{4}$ 2) $\frac{\pi}{2}$ 3) $\frac{3\pi}{4}$ 4) π

KEY

01.4	02.4	03.4	04.4	05.2
06.3	07.4	08.2	09.1	10.3
11.1	12.3	13.1	14.2	15.2
16. 4	17. 2	18. 2	19. 1	20.2
21.1	22.1	23. 1	24.3	25.2
26.4	27.3	28.2	29.1	30.2
31.3	32.2	33.3	34.1	35.3
36.1	37.3	38.3	39.2	40.2
41.2	42.4	43.2	44.1	45.2
46.3	47.2	48.3	49.4	50.1
51.3	52.2	53.4	54.2	55.2
56.3	57.4	58.3	59.2	60.3
61.1	62.3	63.2	64.2	65.4
66.1	67.1	68.3	69.2	70.1
71.3	72.3	73.1	74.2	75.2
76.3	77.2	78.2	79.4	80.1
81.4	82.3	83.1	84.3	85.3
86.4	87.3	88.1	89.3	90.4
91.4	92.2	93.4	94.3	95.4
96.4	97.3	98.1	99.4	100.2
101.4	102.3	103.3	104.4	105.3
106.4	107.2	108.3	109.3	110.4
111.1	112.3	113.4	114.2	115.3
116.3	117.1	118.3	119.4	120.4
121.1	122.2	123.1	124.3	125.2
126.4	127.1	128.3	129.3	130.2
131.1	132.4	133.1	134.2	135.3
136.2	137.1	138.1	139.3	140.3
141.3	142.2	143.3	144.2	145.2
146.3	147.2	148.3	149.2	150.4
151.3	152.2	153.3	154.1	155.3
156.2	157.3	158.3	159.2	160.1
161.1	162.1	163.1	164.2	165.1
166.3	167.3	168.3	169.4	170.2
171.2	172.2	173.4	174.2	175.4
176.3	177.3	178.4	179.4	180.3
181.3	182.3	183.1	184.4	185.1
186.2	187.3	188.4	189.2	190.3
191.1	192.3	193.1	194.4	195.3
196.4	197.2	198.4	199.3	200.3
201.4	202.1	203.4	204.1	205.4
206.3	207.3	208.1	209.2	210.1
211.2	212.4	213.3	214.2	215.4
216.1	217.3	218.4	219.2	220.4
221.3	222.4	223.1	224.4	225.4
226.3	227.1	228.4	229.3	230.1
231.2	232.4	233.2	234.3	235.2
236.2	237.2	238.2	239.4	240.3
241.4	242.3	243.1	244.2	245.3
246.1	247.1	248.2	249.2	250.4
251.3	252.3	253.4	254.3	255.2
256.2	257.1	258.2	259.3	260.2
261.3	262.4	263.1	264.4	265.1
266.2	267.3	268.1	269.2	270.1
271.4	272.2	273.3	274.2	275.1
276.1	277.3	278.1	279.3	280.2
281.1	282.3	283.1		

HINTS

4. Verify the given answers
5. Verify the given answers
7. Centre is the point of intersection of the given two line and $\pi r^2 = 154 \Rightarrow r = 7$.
13. Centre is (a,a) and radius is 'a'
21. Centre is (1,1) and radius is the distance between(1,1)and (-1,2)
22. Centre of the required circle is the image of (1,0) with respect to x + y = 2 and radius is '1'
27. shortest distance = $|CP - r|$
longest distance = $|CP + r|$ where 'c' is the centre and 'p' is the given point

28. P = (-9,7) C = centre = (3,-2) ; PC = d the required point divides PC in the ratio -(d+r) : r.

33. A = (1,0) B = (0,1) . here centre = mid point of AB and radius = $\frac{\overline{AB}}{2}$

49. Equation. of the required locus is $6x-8y+\frac{(5+13)}{2}=0$.

52. (x_1,y_1) = (3,2) (x_2,y_2) = (a,3)

$x_1x_2+y_1y_2=0$.

57. A = (2,1) ,B =(5,5),C = (-6,7)
AB and AC are perpendicular

60. a = -4; b = -6 $\therefore$ equation of the circle is $x^2+y^2-ax-by=0$.

63. verify the given answers

65. let mid point of PA be (x_1y_1) then intercepts of the line pa are $2x_1$ and $2y_1$.

73. verify the given answers

79. equation. of the circle passing through (0,0),(a,b),(b,a) is

$(a+b)(x^2+y^2)=(a^2+b^2)(x+y)$

82. $a_1a_2=b_1b_2$

83. of the points $\left(mi,\frac{1}{mi}\right)$(i =1,2,3,4)are concyclic then $m_1m_2m_3m_4$ = 1

93. The distance between the pair of parallel lines = diameter.

100. Required locus is the director circle of the given circle i.e. $x^2+y^2=2a^2$

104. verify the given answers.

106. $(x_1,y_1)=(3,-1)$

slope of the tangent = $-\frac{(x_1+g)}{(y_1+f)}$.

108. Verify the given answers.

127. Centre lies on anguler bisector of the given lines.

134. A = (1,3), B = (-3,1), $\overline{AB}=4\sqrt{2}$

AB = $2r\cos\left(\frac{\theta}{2}\right)$

139. Verify the given answers.

143. Centre lies on the given line

158. $\sqrt{S_{11}}$ =5

165 $S=x^2+y^2-\frac{9}{4}=0;\ S^1=x^2+y^2-\frac{16}{9}=0$

l : m = 3:4

Locus of ‘P’ is $l^2s^1=m^2s$

166. OP= $\sqrt{S_{11}}$ $OC^2+CP^2=OP^2$

169. Verify the given answers.

175. AB = diameter

185. $\cos\frac{\theta}{2}=\frac{d}{r}$ where ‘θ’ is the angle made by the chord AB at center i.e. $\theta=60^0$.

192. d < r

195. (0,0), (h,k) are ends of the diameter.

199. (a,0) (0,b) are ends of the diameter.

201. r = $\sqrt{S_{11}}$

202. Verify the given answers.

210. Required locus is the line passing through the center of the circle and perpendicular to the given line.

219. The locus of the midpoints of the chords of the circle $x^2+y^2=a^2$ which subtend a right angle at (h,k) is $2x^2+2y^2-2hx-2ky+h^2+k^2-a^2=0$

Substitute (h,k) = (2,3), $a^2=25$.

226. Q is the pole of the given line w.r.t. the given circle. Find pole.

254. Verify the given answers.

257. K = - S_{11}

264. Check whether the given lines are concurrent are not. Also, check whether any two of the given lines are parallel or not.

274. The side of the polygon of ‘n’ sides makes an angle at center = $\frac{2\pi}{n}=\theta$. length of the chord (side) = $2r\sin\frac{\theta}{2}$.

$\Rightarrow r=\left(\frac{AB}{2}\right)\operatorname{cosec}\left(\frac{\pi}{n}\right)$.

278. $g^2+f^2-c\geq 0$

279. required circle is the circle on OP as diameter.

283. $\frac{\pi r_2^2-\pi r_1^2}{4}$

LEVEL - II

EQUATION TO THE CIRCLE WITH CENTRE AND RADIUS:

1. Equations of the circles which touch both the axes and $x = c$ are

   1) $x^2 + y^2 \pm cx - cy + \frac{c^2}{4} = 0$

   2) $x^2 + y^2 - cx \pm cy + \frac{c^2}{4} = 0$

   3) $x^2 + y^2 \pm cx + cy + \frac{c^2}{4} = 0$

   4) $x^2 + y^2 - cx - cy - c^2 = 0$

2. ABCD is a square of area 4 sq. units. Taking AB and AD as axes of co-ordinates, the equation of the circle which touches the sides of the square is
   1) $x^2 + y^2 - 2x - 2y - 1 = 0$
   2) $x^2 + y^2 - 2x - 2y + 1 = 0$
   3) $x^2 + y^2 - 4x - 4y + 1 = 0$
   4) $x^2 + y^2 - 4x - 6y - 6 = 0$

3. The equation of the circle touching both negative axes and having radius '3' is given by
   1) $x^2 + y^2 - 6x - 6y + 9 = 0$
   2) $x^2 + y^2 + 6x - 6y + 9 = 0$
   3) $x^2 + y^2 + 6x + 6y + 9 = 0$
   4) $x^2 + y^2 + 6x + 6y + 4 = 0$

4. A circle having radius 7 touches both the axes and lies in 1st quadrant. If the circle is rolled along the positive x- axis and completes one rotation. Then equation of circle in final position is
   1) $(x - 51)^2 + (y - 7)^2 = 49$
   2) $(x - 7)^2+(y - 5)^2 = 49$
   3) $(x - 7)^2 + (y - 2)^2 = 49$
   4) $(x - 7)^2+(y - 9)^2 = 49$

CENTRE RADIUS AND DIAMETER OF A CIRCLE:

5. A Circle of constant radius 3 k passes through the origin and intersects the axes at A and B. The locus of the centroid of the triangle OAB where O = (0,0) is a circle of radius
   1) 2k 2) $4k^2$ 3) 4k 4) 3k

6. The locus of the point of intersection of the lines $x=\frac{1-t^2}{1+t^2}$ $y = \frac{2t}{1+t^2}$ where t is a parameter is a circle whose radius is
   1) 2 2) 1 3) 4 4) $\frac{1}{2}$

7. An equilateral triangle is inscribed in the circle $x^2 + y^2 - 12x - 8y + 4 = 0$ then the length of the side is
   1) 2 2) 6 3) $4\sqrt{3}$ 4) 12

EQUATION TO THE CIRCLE PASSING THROUGH GIVEN POINTS:

8. The circle passing through (t,1), (1,t) and (t,t) for all values of t passes through ....
   1) (1,1) 2) (-1,-1) 3) (1,-1) 4) (-1,1)

CONCYCLIC POINTS:

9. If the lines $(2x-y + 1)(x-2y + 3) = 0$ intersect the coordinate axes in concyclic points then the centre of the circle is

   1) $\left(\frac{-7}{4}, \frac{5}{4}\right)$ 2) $\left(\frac{-7}{2}, \frac{5}{2}\right)$

   3) $\left(\frac{7}{4}, \frac{5}{4}\right)$ 4) $\left(\frac{7}{4}, \frac{-5}{4}\right)$

10. If the lines $2x + 3y - 1 = 0$ and $3x+2y+2 = 0$ intersect the coordinate axes at A,B,C,D then the equation of the circle passing through these points is
    1) $x^2 + y^2 + x+4y - 2 = 0$
    2) $6x^2 + 6y^2 + x + 4y - 2 = 0$
    3) $6x^2 + 6y^2 + x - 4y - 2 = 0$
    4) $6x^2 + 6y^2 - x - 4y - 2 = 0$

11. If the points $\left(m_k, \frac{1}{m_k}\right)$ where k = 1,2,3,4 are concyclic then $m_1 m_2 m_3 m_4$ =
    1) 0 2) 1 3) -1 4) ± 1

12. The pair of straight lines $ax^2 + 2hxy + ay^2 + 2gx + 2fy + c = 0$ meet the coordinate axes in concyclic points. The equation of the circle through those concyclic points is
    1) $ax^2 + ay^2 + 2gx + 2fy + c = 0$
    2) $x^2 + y^2 + 2gx - 2fy + c = 0$
    3) $x^2 + y^2 - 2gx - 2fy - c = 0$
    4) $ax^2 + ay^2 - 2gx - 2fy - c = 0$

13. PA and PB are tangents drawn from P(2,3) to the circle $x^2 + y^2 + 4x + 2y + 1 = 0$. If C is the centre of the circle and PACB is a cyclic quadrilateral then the circum centre of the ΔPAB is
    1) (0,1) 2) (0,-1) 3) (-2,1) 4) (2,1)

LENGTH OF INTERCEPTS MADE BY A CIRCLE ON THE AXES:

14. If the least circle passing through the points (-1, 2) and (3, -4) intersects the x-axis then the length of the intercept so formed is
    1) $4\sqrt{3}$ 2) $2\sqrt{3}$ 3) $2\sqrt{10}$ 4) $2\sqrt{13}$

TANGENTS TO THE CIRCLES:

15. A tangent to the circle $x^2 + y^2 = a^2$ intersects the coordinate axes at A and B. The locus of the point of intersection of the lines passing through A,B and parellel to the coordinate axes is

    1) $\frac{1}{x^2} + \frac{1}{y^2} = \frac{1}{a^2}$ 2) $\frac{1}{x} + \frac{1}{y} = \frac{1}{a}$

    3) $\frac{1}{x^2} + \frac{1}{y^2} = a^2$ 4) $\frac{1}{x^2} + \frac{1}{y^2} = \frac{1}{a}$

16. Tangents OA and OB are drawn to the circle $x^2 + y^2 + gx + fy + c = 0$ from O (0,0). The equation of the circum circle of the Δ OAB is
1) $x^2 + y^2 - gx - fy = 0$ 2) $x^2 + y^2 + gx + fy = 0$
3) $2x^2 + 2y^2 - gx - fy = 0$ 4) $2x^2 + 2y^2 + gx + fy=0$

17. The angle between the tangents from any point on the circle $x^2 + y^2 = r^2$ to the circle $x^2 + y^2 = r^2 \sin^2 \alpha$ is
1) α 2) 2α 3) $\frac{\alpha}{2}$ 4) 4α

18. If the tangents from P to the circle $x^2 + y^2 = a^2$ make angles α and β with the positive direction of the x-axis such that $\cot\alpha + \cot\beta = k$ then the locus of P is
1) $ky^2 - 2xy = a^2$ 2) $k(y^2 - a^2) = 2xy$
3) $k(y^2 - a^2) = x^2 - a^2$ 4) $k(x^2 - a^2) = 2xy$

19. Tangents are drawn from any point on the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ to the circle $x^2 + y^2 + 2gx + 2fy + c \sin^2 \alpha + (g^2 + f^2) \cos^2 \alpha = 0$. Then the angle between the tangents is
1) α 2) 2α 3) $\frac{\alpha}{2}$ 4) $\frac{3\alpha}{2}$

20. Tangents are drawn from any point on the circle $x^2 + y^2 = R^2$ to the circle $x^2 + y^2 = r^2$. If the line joining the points of intersection of these tangents with the first circle also touches the second circle then R =
1) $\frac{3r}{2}$ 2) 2r 3) 3r 4) 4r

21. The locus of the feet of perpendiculars drawn from the point (a,0) on tangents to the circle $x^2+ y^2 = a^2$ is
1) $a^2 (x^2 + y^2 + ax)^2 = a^2 (y^2 + (x + a)^2)$
2) $a^2 (x^2 + y^2-ax)^2 = y^2 + (x-a)^2$
3) $(x^2 + y^2 - ax)^2 = a^2 (y^2 + (x - a)^2)$
4) $a^2 [(x^2 + y^2) - a^2x^2] = (y^2 + (x-a)^2)$

22. A tangent at a point on the circle $x^2 + y^2 = a^2$ intersect a concentric circle S at P and Q. The tangents of this circle at, P,Q meet on the circle $x^2 + y^2 = b^2$. The equation of the concentric circle S is
1) $x^2 + y^2 = a^2 + b^2$ 2) $x^2 + y^2 = a^2b^2$
3) $x^2 + y^2 = a^2 - b^2$ 4) $x^2 + y^2 = ab$

23. The locus of the mid point of the portion of the line intercepted between the coordinate axes and which touches the circle $x^2 + y^2 = a^2$ is
1) $\frac{1}{x^2} + \frac{1}{y^2} = \frac{1}{a^2}$ 2) $\frac{1}{x^2} + \frac{1}{y^2} = \frac{2}{a^2}$
3) $\frac{1}{x^2} + \frac{1}{y^2} = \frac{4}{a^2}$ 4) $x^2 + y^2 = 4a^2$

24. Let Q = (a,b) be a point. P is a point on the circle centred at the origin and of radius r. Let α be the angle which the line joining P to the centre makes with the positive x-axis. If the line PQ is a tangent to the circle, then $a\cos\alpha + b\sin\alpha$ =
1) r 2) r^2 3) 1/r 4) $1/r^2$

25. The tangents to the circle $x^2 + y^2 - 2x = 0$ at A (1,1) and B (0,0) intersect at C. If D is the centre of the circle then the area of the quadrilateral ADBC is
1) $\frac{1}{2}$ 2) 2 3) 1 4) $\sqrt{2}$

26. If θ is the angle between the tangents from (0,0) to the circle $x^2 + y^2 - 14x + 2y + 25 = 0$ then $\sin\left(\frac{\theta}{2}\right) + \cos\left(\frac{\theta}{2}\right)$ =
1) $2\sqrt{2}$ 2) $\frac{1}{2\sqrt{2}}$ 3) $\frac{1}{\sqrt{2}}$ 4) $\sqrt{2}$

NORMAL TO THE CIRCLE:

27. The condition for the line $lx + my + n = 0$ to be a normal to the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ is
1) $lg + mf = n$ 2) $lg + mf + n = 0$
3) $lg + mf = 0$ 4) $lg = mf$

28. The equation of the circle for which $xy+2y+2x+ 4 = 0$ are normals and is passing through the point (-1,1) is
1) $x^2 + y^2 + x - y = 0$
2) $x^2 + y^2 + 2x - 2y + 2 = 0$
3) $x^2 + y^2 + 4x + 4y - 2 = 0$
4) $x^2 + y^2 - 5x - 3y = 0$

LENGTH OF THE TANGENT:

29. The area of the quadrilaterial formed by the 2 tangents from (4,5) to the circle $x^2 + y^2 - 4x - 2y - 11 = 0$ and a pair of radii is
1) 2 2) 4 3) 8 4) 16

30. The lengths of the tangents from (1,0), (2,0), (3,2) to a circle are $1, \sqrt{7}, \sqrt{2}$. Then the equation of the circle is
1) $x^2 + y^2 + 6x + 17y + 6 = 0$
2) $2x^2 + 2y^2 + 6x - 17y - 6 = 0$
3) $2x^2 + 2y^2 - 6x - 17y - 6 = 0$
4) $2x^2 + 2y^2 - 6x - 17y - 6 = 0$

31. If the distances from the origin to the centres of three circles $x^2+y^2-2k_i x=c^2$(i=1,23) are in G.P. then the lengths of the tangents drawn from any point on the circle $x^2+y^2=c^2$ to given circles are in
1) A.P. 2) G.P 3) H.P 4) H.GP

PARAMETRIC EQUATIONS OF A CIRCLE:

32. The maximum area of the rectangle that can be inscribed in the circle given by $x = 3 + 5\cos\theta$, $y = 1+ 5\sin\theta$ in sq. units is
1) 25 2) 50 3) 100 4) $50\sqrt{2}$

LENGTH OF THE CHORD:

33. If the line $\frac{x}{a}+\frac{y}{b}=1$ intersects the circle $x^2 + y^2 = c^2$ then the length of the chord so formed is ($\sqrt{2}$) c. Then
1) a^2 , b^2 , c^2 are in H.P. 2) a, b, c are in H.P.
3) c^2 , a^2, b^2 are in H.P. 4) a^2, c^2, b^2 are in H.P.

34. The length of the least chord which passes through the point (2,1) of the circle $x^2 + y^2 - 2x - 4y - 13 = 0$ is
1) 2 2) $\sqrt{2}$ 3) $3\sqrt{2}$ 4) 8

35. The point of intersection of the tangents drawn at the ends of the chord joining the points α and β on the circle
$x^2 + y^2 = a^2$ is

1) $\left(\frac{a\sin\frac{\alpha+\beta}{2}}{\sin\frac{\alpha-\beta}{2}},\frac{a\cos\frac{\alpha+\beta}{2}}{\cos\frac{\alpha-\beta}{2}}\right)$

2) $\left(\frac{a\cos\frac{\alpha+\beta}{2}}{\cos\frac{\alpha-\beta}{2}},\frac{a\sin\frac{\alpha+\beta}{2}}{\cos\frac{\alpha-\beta}{2}}\right)$

3) $\left(\frac{a\cos\frac{\alpha-\beta}{2}}{\cos\frac{\alpha+\beta}{2}},\frac{a\cos\frac{\alpha-\beta}{2}}{\sin\frac{\alpha+\beta}{2}}\right)$

4) $\left(\frac{a\cos\frac{\alpha-\beta}{2}}{\cos\frac{\alpha+\beta}{2}},\frac{a\sin\frac{\alpha-\beta}{2}}{\sin\frac{\alpha+\beta}{2}}\right)$

36. The locus of the point of intersection of the tangents at the ends of a chord of a circle $x^2 + y^2 = a^2$ which touches the circle $x^2 + y^2 - 2ax = 0$ is
1) $y^2 = a(a - 2x)$ 2) $x^2 = a(a - 2y)$
3) $x^2 + y^2 = (x - a)^2$ 4) $x^2 + y^2 = (y - a)^2$

MID POINT OF THE CHORD:

37. If a chord of the $x^2+y^2 = a^2$ makes an angle 90^0 at (h,k) then the locus of the mid point of that chord is $x^2 + y^2 + px + qy + r = 0$. Then r =
1) $h^2 + k^2 - a^2$ 2) $\frac{h^2+k^2+a^2}{2}$
3) $h^2 + k^2 + a^2$ 4) $\frac{h^2+k^2-a^2}{2}$

38. The locus of the middle points of the chords of the circle $x^2 + y^2 - 4x - 2y - 40 = 0$ which make an angle $\tan^{-1}\frac{4}{3}$ with the x-axis is
1) 4x - 3y = 5 2) 3x + 4y = 10
3) 4x + 3y = 11 4) 3X - 4Y = 1

39. The equation of the locus of the mid points of the chord of the circle $4x^2+4y^2-12x+4y+1=0$ that subtend an angle of $\frac{2\pi}{3}$ at its centre is
1) $x^2+y^2-3x+y+\frac{16}{31}=0$
2) $x^2+y^2-3x+y-\frac{31}{16}=0$
3) $x^2+y^2+3x+y+\frac{31}{16}=0$
4) $x^2+y^2-3x+y+\frac{31}{16}=0$

POLE AND POLAR:

40. If a chord of the circle $x^2 + y^2 = a^2$ makes an angle 2α at the origin then the locus of the pole of that chord with respect to the circle $x^2 + y^2 = a^2$ is the circle whose radius is
1) $a\sec\alpha$ 2) $a^2\sec^2\alpha$
3) $a\tan\alpha$ 4) $a\,\mathrm{cosec}\,\alpha$

41. The area of the triangle formed by the polar of (1,2) with respect to the circle $2x^2 + 2y^2 - 3x = 0$ and the coordinate axes is
1) $\frac{3}{16}$ sq. units 2) $\frac{9}{16}$ sq.units
3) $\frac{3}{8}$ sq. units 4) $\frac{9}{112}$ sq.units

42. If the polars of the points on the circle $x^2 + y^2 = a^2$ with respect to the circle $x^2 + y^2 = c^2$ touches the circle $x^2 + y^2 = b^2$ then
1) a, b, c are in G.P 2) b,a,c are in A.P
3) $c = \sqrt{ab}$ 4) $c=\frac{2ab}{a+b}$

43. If the polars of the points which are on the line AB with respect to the circle $x^2 + y^2 = a^2$ are concurrent at the point (x_1, y_1) then the area of the triangle formed by the line AB and the coordinate axes is
1) $\left|\frac{a^4}{2x_1y_1}\right|$ 2) $\left|\frac{a^2}{2x_1y_1}\right|$ 3) $\left|\frac{a^4}{x_1y_1}\right|$ 4) $\left|\frac{a}{2x_1y_1}\right|$

44. The polars of two points A (1,3) and B(2,1) with respect to the circle $x^2 + y^2 +2gx+2fy+c=0$ intersect at C then the polar of C w.r. to the circle is
1) x + 3y = 9 2) 2x − y = 9
3) 2x + y − 5 = 0 4) 4x − 4y + 7 = 0

45. The locus of poles of chords of the circle $x^2 + y^2 = a^2$ subtending a right angle at the centre of the circle is a circle of radius equal to
1) 2a 2) $a\sqrt{2}$ 3) $\frac{a}{2}$ 4) $\frac{a}{\sqrt{2}}$

46. The polar of (-3,5) w.r.t $x^2+y^2-2x-4y+3=0$ cuts the circle, its mid point is

(1) $\left(\frac{-17}{25},\frac{56}{25}\right)$ (2) $\left(\frac{17}{25},\frac{-56}{25}\right)$

(3) $\left(\frac{17}{25},\frac{56}{25}\right)$ (4) $\left(\frac{17}{25},\frac{-56}{25}\right)$

47. The pole of the chord of the circle $x^2+y^2=81$, the chord being bisected at (-2,3) is :

(1) $\left(\frac{-162}{13},\frac{243}{13}\right)$ (2) $\left(\frac{162}{13},\frac{-243}{13}\right)$

(3) $\left(\frac{-162}{13},\frac{-243}{13}\right)$ (4) $\left(\frac{162}{13},\frac{243}{13}\right)$

48. Let the equation of a circle be $x^2+y^2=a^2$. If $h^2+k^2-a^2<0$ then the line $hx+ky=a^2$ is the

1) Polar line of the point (h.k)w.r.t. the circle.

2) Real chord of contact of the tangents from (h,k) to the circle

3) Equation of a tangent to the circle from the point (h,k)

4) Mid-point chord of the circle which is bisected at (h,k)

49. Tangents TP and TQ are drawn from a point T to the circle $x^2+y^2=a^2$. If the point T lies on the line px+qy=r, then the locus of centre of the circumcircle of Δ TPQ is

1) px+qy=$\frac{r}{3}$ 2) px + qy=$\frac{r}{2}$

3) $px+qy=2r$ 4) $px+qy=r$

CONJUGATE AND INVERSE POINTS:

50. If C is the centre of the circle and r is the radius and polar of P w.r.t this circle meets $\overleftrightarrow{CP}$ in Q then CP. CQ =

1) CP^2-r^2 2) r^2 3) CP^2 4) PQ^2-r^2

51. P is a point on the line lx + my + n = 0 (n $\neq$ 0). If the locus of the inverse point of P with respect to the circle $x^2+y^2=r^2$ is $h(x^2+y^2)-k(lx+my)=0$ then (h,k) =

1) (n, r^2) 2) (r^2, n) 3) (n, - r) 4) (n, $-r^2$)

52. If the lines $l_1x+m_1y+n_1=0$ and $l_2x+m_2y+n_2=0$ are conjugate lines with respect the circle $x^2+y^2+2gx+2fy+c=0$ then $l_1l_2+m_1m_2$ =

1) $(gl_1+fm_1+n_1)(gl_2+fm_2+n_2)$

2) $\frac{n_1n_2}{g^2+f^2-c}$

3) $\frac{n_1n_2}{\sqrt{g^2+f^2-c}}$

4) $\frac{(gl_1+fm_1-n_1)(gl_2+fm_2-n_2)}{g^2+f^2-c}$

53. The conjugate line of 3x + 4y - 45 = 0 with respect to $x^2+y^2-6x-8y+5=0$ which is perpendicular of x + y = 0 is

1) x - y = 8 2) x - y = 2

3) x - y + 2 = 0 4) x - y + 8 = 0

54. The lengths of the tangents from A, B to a circle are 6, 7 respectively. If A and B are conjugate points then AB =

1) $\sqrt{\frac{85}{2}}$ 2) $2\sqrt{85}$ 3) $\sqrt{85}$ 4) $\sqrt{\frac{85}{4}}$

PAIR OF TANGENTS:

55. The combined equation of the tangents from the origin to the circle $x^2+y^2+2gx+2fy+c=0$ is

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

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

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

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

56. If the tangent at P on the circle $x^2+y^2=a^2$ cuts two parallel tangents of the circle at A and B then PA. PB =

1) a 2) a^2 2) 2a 3) $2a^2$

MISCELLENEOUS PROBLEMS:

57. A point P moves such that the sum of the squares of the distances of P from the sides of a square of side 1 unit is 9. If the locus of P is a circle then its radius is

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

58. A = ($\cos\theta$, $\sin\theta$), b = ($\sin\theta$, $-\cos\theta$), O = (0,0) are 3 points. The centroid of the triangle OAB lies on the circle whose radius is

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

59. If $g^2<c<f^2$ then the circle $x^2+y^2+2gx+2fy+c=0$ intersects

1) the coordinate axes

2) the x - axis but not the y - axis

3) the y - axis but not the x- axis

4) None of these

60. The equation of the locus of the feet of the perpendiculars from the origin to the lines which are passing through a fixed point (2, 2)
1) $x^2 + y^2 - 2x - 2y = 0$ 2) $x^2 + y^2 - 4x - 4y = 0$
3) $x^2 + y^2 - x - y = 0$ 4) $x^2 + y^2 + 4x + 4y = 0$

61. Two rods of lengths a and b slide along the coordinate axes which are rectangular in such a maner that their ends are concycic. Then the locus of the centre of the circle is
1) $x^2 + y^2 = a^2 + b^2$ 2) $x^2 - y^2 = 4(a^2 - b^2)$
3) $4(x^2 - y^2) = a^2 - b^2$ 4) $x^2 - y^2 = a^2 - b^2$

62. The line $lx + my + n = 0$ intersects the curve $ax^2 + 2hxy + by^2 = 1$ at P and Q. The circle with PQ as diameter passes through the origin then $\frac{l^2+m^2}{n^2} =$
1) $a + b$ 2) $(a + b)^2$ 3) $a^2 + b^2$ 4) $a^2 - b^2$

63. AB is a diameter of a circle and P is a variable point on the circumference of the circle. Then which of the following is true if Δ ABP is issoceles
1) The perimeter of Δ ABP is minimum
2) The area of Δ ABP is minimum
3) The area of Δ ABP is maximum
4) The perimeter of Δ ABP is maximum

64. A square is inscribed in the circle $x^2 + y^2 - 2x + 4y - 93 = 0$ with it sides parallel to the coordinate axes. The coordinates of its vertices are
1) $(-6,-9),(-6,5),(8,-9),(8,5)$
2) $(-6,9),(-6,-5),(8,-9),(8,5)$
3) $(-6,-9),(-6,5),(8,9),(8,5)$
4) $(-6,-9),(-6,5),(8,-9),(8,-5)$

65. The area of the circle touching y- axis and the line x = c is ....sq. units.
1) πc^2 2) $\frac{\pi c^2}{4}$ 3) $\frac{\pi\ c}{2}$ 4) $\frac{\pi}{4c^2}$

66. A variable circle passes through the fixed point (2,0) and touches y-axis. Then the locus of its centre is
1) a parabola 2) a circle
3) an ellipse 4) a hyperbola

67. The equation of a circle is $x^2 + y^2 - 4x + 2y - 4 = 0$. With respect to the circle
1) The polar of the point (1,1) is x-2y+5=0
2) The chord of the contact of real tangents from (1,1) is the line x-2y+5=0
3) The mid point chord of (1,1) is x-2y+5=0
4) Equation of tangent at (1,1) is x-2y+5=0

KEY

01. 2	02. 2	03. 3	04. 1
05. 1	06. 2	07. 4	08. 1
09. 1	10. 2	11. 2	12. 1
13. 1	14. 1	15. 1	16. 2
17. 2	18. 2	19. 2	20. 2
21. 3	22. 4	23. 3	24. 1
25. 3	26. 4	27. 1	28. 3
29. 3	30. 2	31. 2	32. 2
33. 4	34. 4	35. 2	36. 3
37. 4	38. 2	39. 3	40. 1
41. 2	42. 3	43. 2	44. 3
45. 2	46. 3	47. 1	48. 1
49. 2	50. 2	51. 4	52. 4
53. 3	54. 3	55. 4	56. 2
57. 3	58. 3	59. 3	60. 1
61. 3	62. 1	63. 3	64. 1
65. 2	66. 1	67. 1	

HINTS

1. Centre = (c/2,c/2) or (c/2,-c/2) , radius = c/2

4. Centre= $(2\pi\,r + r, r)$ radius =r when r=7

9. Equation to the circle is (2x-y+1)(x-2y+3)=0 leaving xy term, centre= $\left[-\frac{1}{2}\frac{\text{coeff.of x}}{\text{coeff.of x}^2}, \frac{-1}{2}\frac{\text{coeff.of y}}{\text{coeff.of y}^2}\right]$

16. O(0,0) and the centre of he given circle are the ends of a diameter of the required circle

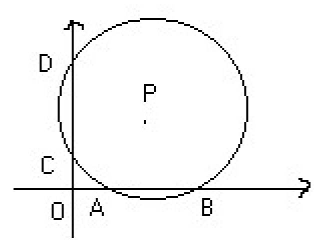
41. Find the polar of (1,2) w.r.t the given circle and then apply $\frac{c^2}{2|ab|}$ for the required area of the triangle

43. Polar of (x_1, y_1) is the line AB

45. Locus is $x^2 + y^2 = \frac{a^2}{2}$

54. K= $-S_{11}$

58. If P=(x,y) then $x^2 + y^2 + (1-x)^2 + (1-y)^2 = 9$

62. 

Centre= (-g,-f) , AB= $2\sqrt{g^2 - c} = a$

CD= $2\sqrt{f^2 - c} = b$

64. Verification method.
Centres of the given two circles and the required circle are collinear

65. Diameter is equal to the distance between the given two parallel lines

LEVEL III

1. The equation of the circumcircle of the quadrilateral formed by the four lines $x+y \pm 1 = 0$ and $x-y \pm 1 = 0$ is
   1) $x^2 + y^2 = 4$ 2) $x^2 + y^2 = 2$
   3) $x^2 + y^2 = 1$ 4) $x^2 + y^2 = 3$

2. A circle of radius 5 units passes through the points (7,1),(9,5). If the ordinate of the centre is less than 2, then the equation of the circle is
   1) $x^2 + y^2 + 8x - 10y + 16 = 0$
   2) $x^2 + y^2 + 8x - 10y + 16 = 0$
   3) $x^2 + y^2 - 24x - 2y + 120 = 0$
   4) $x^2 + y^2 + 24x - 2y - 120 = 0$

3. Given A = (0,6), B = (4,0), C = (-3,0) and D = (0,-2) are concylic points, the orthocentre of ΔABC is
   1) (2,0) 2) (0, -2) 3) (0,2) 4) (2,2)

4. The circle $ax^2 + ay^2 + 2gx + 2fy + c = 0$ meets the x-axis in two points on opposite sides of the origin if
   1) ac < 0 2) ac > 0 3) a > 0 4) c > 0

5. A circle passes through the origin and intersects the coordinate axes at A and B. If l,m are the lengths of the perpendiculars from A,B respectively to the tangent to the circle at the origin then the diameter of the circle is
   1) $1^2 + m^2$ 2) l - m 3) l + m 4) lm

6. If the squares of the lengths of the tangents from a point P to the circles $x^2 + y^2 = a^2$, $x^2 + y^2 = b^2$ and $x^2 + y^2 = c^2$ are in A.P then a^2, b^2, c^2 are in
   1) A.P. 2) G.P. 3) H.P. 4) A.G.P

7. If the tangent at (θ) to the circle $x^2 + y^2 = 4$ touches the circle $x^2 + y^2 - 6\sqrt{3}x - 6y+20 = 0$ then one of the values of θ is
   1) $\frac{\pi}{3}$ 2) $\frac{\pi}{6}$ 3) $\frac{\pi}{4}$ 4) $\frac{\pi}{2}$

8. A chord of the circle $x^2 + y^2 = 8$ makes equal intercepts on the coordinate axes. If the length of each intercept is 'a' then the range of 'a' is
   1) (-2, 2) 2) (-4, 4)
   3) $(-2\sqrt{2}, 2\sqrt{2})$ 4) (-1, 1)

9. The equation of the circle which passes through origin and cuts off chords of length 2 on the lines x = y and x = -y is
   1) $x^2 + y^2 \pm 2\sqrt{2}\,y = 0$, $x^2 + y^2 \pm 2\sqrt{2}\,x = 0$
   2) $x^2 + y^2 \pm 3\sqrt{3}\,x = 0$, $x^2 + y^2 \pm 3\sqrt{3}\,y = 0$
   3) $x^2 + y^2 \pm 4\sqrt{2}\,x = 0$, $x^2 + y^2 \pm 4\sqrt{2}\,y = 0$
   4) $x^2 + y^2 \pm 4\sqrt{3}\,x = 0$, $x^2 + y^2 \pm 4\sqrt{3}\,y = 0$

10. The locus of the centre of a circle which passes through the point (h,k) and cuts off a chord of length 2d on the line lx + my + n = 0 is
   1) $(lx + my + n)^2 = (l^2 + m^2)\left[(x-h)^2 + (y-k)^2 - d^2\right]$
   2) $(lx + my + n)^2 = (l^2 + m^2)\left[(y-h)^2 + (x-k)^2 - d^2\right]$
   3) $(lx + my + n)^2 = d(l^3 + m^3)\left[(2x-2h)^2 + (2y-10k)^2 - d^2\right]$
   4) $(lx + my + n)^2 = (l^3 + m^3)\left[(2x-2h)^2 + (2y-10k)^2 - d^2\right]$

11. Chords of the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ subtends a right angle at the origin. The locus of the feet of the perpendiculars from the origin to these chords is
   1) $x^2 + y^2 + gx + fy + c = 0$
   2) $2(x^2 + y^2) + gx + fy + c = 0$
   3) $2(x^2 + y^2 + gx + fy) + c = 0$
   4) $x^2 + y^2 + 2(gx + fy + c) = 0$

12. 'O' is the origin and A_k (x_k, y_k) where k = 1,2 are two points. If the circles are described on OA_1 and OA_2 as diameters, then the length of their common chord is equal to
   1) $|x_1 y_2 - x_2 y_1|$ 2) $\frac{1}{2}|x_1y_2 - x_2y_1|$
   3) $\frac{1}{2}A_1A_2$ 4) $\frac{|x_1y_2 - x_2y_1|}{A_1A_2}$

13. The locus of poles of chords of $x^2 + y^2 = a^2$ which make a right angle at (h,k) is
   1) $h^2 + k^2 - a^2)(x^2 + y^2)=2a^2(hx+ky - a^2)$
   2) $h^2 + k^2 - a^2)(x^2 + y^2)=2a^2(hx+ky) - a^2$
   3) $h^2 + k^2 - a^2)(x^2 + y^2)=a^2(hx+ky - a^2)$
   4) $h^2 + k^2 - a^2)(x^2 + y^2)=2a^2(hx+ky)$

14. If λ is a parameter, then the locus of the poles of the line 2x + 3y + 4 = 0 with respect to the circle $x^2 + y^2 + 2\lambda x - 16 = 0$ is
   1) $3x^2 - 2xy + 4y + 48 = 0$
   2) $3y^2 - 2xy - 4x + 48 = 0$
   3) $3x^2 - 2xy + 4y - 48 = 0$
   4) $3x^2 + 2xy - 4y + 48 = 0$

15. Let A and B be two fixed points. If a perpendicular p is drawn from A to the polar of B with respect to the circle $x^2 + y^2 = a^2$ and a perpendicular q is drawn from B to the polar of A then
   1) p = q 2) p OA = qOB
   3) p OB = q OA 4) $p^2 = q^2$

16. If $h^2 + k^2 > a$ then the number of solutions of the equation $hx + ky = a^2$ and $x^2 + y^2 = a^2$ is
   1) 1 2) 2 3) 4 4) 0

17. A square is inscribed in the circle $x^2 + y^2 - 6x - 2y - 8$=0. If its sides are perpendicular to the coordinate axes, then one vertex of the square is
   1) $\left(3+3\sqrt{2},1\right)$ 2) $\left(3-2\sqrt{2},1\right)$
   3) (6,-2) 4) (6,-4)

18. A point P is at a distance of $\sqrt{48}$ units from the centre C. If the angle between the tangents at P is 60^0. Then the area of the quadilateral formed by the pair of tangents drawn from P and the radii at the points of contact is
   1) 4 2) $4\sqrt{3}$ 3) $12\sqrt{3}$ 4) $16\sqrt{3}$

19. P and Q are points on the line y = mx + c. Then the polars of P and Q w.r.t the circle $x^2 + y^2 = a^2$ meet at the point.

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

3) $\left(\frac{-a^2m}{c}, \frac{a^2}{c}\right)$ 4) $\left(\frac{-a^2m}{c}, \frac{-a^2}{c}\right)$

20. (x_1, y_1) is the mid point of the chord AB of the circle $x^2 + y^2 = r^2$. If the pole of AB is C is then the area of the quadrilateral OACB is

1) $\frac{r(-S_{11})^{3/2}}{x_1^2 + y_1^2}$ 2) $\frac{r^2\sqrt{-S_{11}}}{\sqrt{S_{11}+r^2}}$

3) $\frac{r\sqrt{S_4}}{S_{11}+r_2}$ 4) $\frac{r\sqrt{-S_{11}}}{S_{11}+r^2}$

21. The locus of the centre of the circle $(x\cos\alpha + y\sin\alpha - a)^2 + (x\sin\alpha - y\cos\alpha - b)^2 = k^2$ if α varies, is

1) $x^2 + y^2 = a^2$ 2) $x^2 + y^2 = b^2$

3) $x^2 + y^2 = a^2 + b^2$ 4) $x^2 + y^2 = a^2 b^2$

KEY

01. 3	02. 3	03. 3	04. 1
05. 3	06. 1	07.2	08.2
09. 1	10. 1	11. 3	12. 4
13. 1	14. 1	15. 3	16. 2
17. 3	18. 3	19. 3	20. 2
21. 3			

HINTS

3. Orthocentre of the Δ ABC lies on positive axis

4. On x - axis y = 0 then $ax^2 + 2gx + c = 0 \to 1$ the roots of (1) are in opposite in sign

7. Equation of the tangent to $x^2 + y^2 = 4$ at θ is $x\cos\theta + y\sin\theta = 2$. it touches $x^2 + y^2 - 6\sqrt{3}x - 6y + 20 = 0 \Rightarrow r = d$ verify the answers

8. Equation of the chord is x + y=a .Here d< r

11. Let $p(x_1, y_1)$ be the mid point of a chord. OP is Perpenducular to the chord. Equation of the chord is $xx_1 + yy_1 = x_1^2 + y_1^2 \to (1)$ Homogenising the circle equation with the help of (1). Then use sum of the coefficients of x^2 and y^2 is equal to zero

15. Salmon's theorem

17. Four vertices are $\left(h \pm \frac{r}{\sqrt{2}}, k \pm \frac{r}{\sqrt{2}}\right)$ where (h,k) is centre and r is radius.

20. C is the inverse point of (x_1, y_1)

21. Eliminate 'α' from x cos α + y sin α = a and x sin α - y cos α = b

NP-QUESTIONS

1. i) If a square of side 10 is inscribed in a circle, then the radius of the circle is $5\sqrt{2}$

ii) If a circle is inscribed in a square of side 10 so that the circle touches the 4 sides internally, then radius is 5.

Which of above statement true:

1) Only i 2) Only ii

3) both i. & ii (4)neither i nor ii

2. i. The circle with the points of intersection of the line 3x+4y=12 with axes as extremities of a diameter is $x^2 + y^2 - 4x - 3y = 0$

ii. The circle passing through (0,0) and making intercepts 8 and 6 on x,y axes, has its center is (-4,2), which of above statement false.

1) Only i 2) Only ii

3)Both i & ii 4)neither i nor ii

3. i) If the points (0,0),(2,0),(0,-2),(k,-2) are concyclic, then k = 2

ii) If the lines x-2y+3= 0,3x+ky+7= 0 cut the coordinate axes in concyclic pts, then k=3/2.

1) Only i 2) Only ii

3) both i & ii 4) Neither i nor ii

4. For the circle $x^2 + y^2 + 4x + 2y + 4 = 0$,

i. The shortest distance from (1,-5) to the above circle is 4.

ii. The farthest distance from (1,-5) to the above circle is 6.

which of the statement true:

1) Only i 2) Only ii

3) Both i & ii 4) Neither i nor ii

5. i.The no.of circles touching all the lines $x + y - 4 = 0, x - y + 2 = 0, x + y = 4$ is 4

ii. The no.of circles touching all the lines $2x + 3y - 7 = 0, 4x + 6y - 1 = 0, x + y + 1 = 0$ is 3

which of above statement is correct.

1) Only i 2) Only ii

3) Both i & ii 4) Neither i nor ii

6. Observe the following statements:

(1) The circle on A(-4,3) and B(12,-1) as the extremities of a diameter, intercepts a length equal to 2 on the y-axis.

II. If two circles cut a third circle orthogonally, the radical axis of the two circles passes through the center of the third circle.
II.There is only one point such that the tangents from it to three given circles are equal in length.
1) Only i 2) Only ii
3) Both i & ii 4) Neither i nor ii

7. Choose the correct formula among the following:
If S= $x^2+y^2+2gx+2fy+c=0$ represents the equation of a circle, then
I. Length of the tangent drawn from
II. the equation of a circle with center (r, y_1) and radius r is $(x-r)^2+(y-y_1)=r^2$, then it touches y-axis at $(0, y_1)$
III. Length of the intercept made by the circle on y-axis is $\sqrt{f^2-c}$
1)Only I,II 2) Only II,III
3) Only I,III 4) I,II,III

8. If P_1, P_2, P_3 are the perimeters of the circles
$4x^2+4y^2-4x-12y-186=0$, and
$x^2+y^2-6x+6y-9=0$, respectively, then:
1) $P_1<P_2<P_1$ 2) $P_1<P_3<P_2$
3) $P_4<P_2<P_1$ 4) $P_2<P_3<P_1$

9. If I_1, I_2, I_3 ,are the intercepts of
$x^2+y^2-14x-10y+24=0$ on x-axis , y- axis and y= x, then
1) $I_2>I_3>I_1$ 2) $I_3>I_1>I_2$
3) $I_1>I_2>I_3$ 4) $I_3>I_2>I_1$

10. I) Equation of the normal to the circle $x^2+y^2=25$ at $(3,4)$ is $4x-3y=0$
II)Area of the triangle formed by the tangent and the normal at (2,4) to the circle $x^2+y^2=20$ with the x-axis is 20 sq.units.
Which of the above statements is correct?
1) Only I 2) Only II
3) Both I & II 4) Neither I nor II

11. I) The lines $3x+y=10, x+2y=4$ are conjugate lines w.r.t circle $x^2+y^2=8$.
II) If the tangents drawn at (5,12) and (12,-5) of a circle are $\perp^{lar}$ then the radius of the circle is $\sqrt{13}$.
1) Only I 2) Only II
3) Both I and II 4) Neither I nor II

12. I. If the points (a,0), (b,0), (0,c), (0,d) are concyclic then ab = cd
II. If the points (1,-6), (5,2), (7,0), (-1,k) are concyclic then k = -3
1) Only I is true 2) Only II is true
3) I & II are true
(4) Neither I & II are true

KEY

1) 3 2) 2 3) 3 4) 3 5) 4
6) 2 7) 1 8) 2 9) 2 10) 1
11) 2 12) 1

Match the following :

1. Observe the following :
For the circle S $\equiv (x-2)^2+(y+1)^2=1$

List I	**List II**
a) a tangent is	1) 3x+4y-2=0
b) a diameter is	2) x = 0
c) a line perpendicular to a tangent is	3) y = 0
d) a chord is	4) y-2 = 0

Then the correct match of the list - I from the List-II

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

2. Observe the following :
For the circle S $\equiv x^2+y^2-14x-10y+24=0$ the intercept

List I	**List II**
a) on x axis is	1) 0
b) on y axis is	2) 2
c) on y = x is	3) $8\sqrt{3}$
d) on 7x + y - 4 = 0 is	4) 10

The correct match is

	a	b	c	d
1)	1	2	3	4
2)	2	1	4	3
3)	3	4	1	2
4)	4	2	3	1

3. The line $\frac{x}{a}+\frac{y}{b}=1$ meets the x- axis and the y-axis at A and B respectively, C is middle point of AB, then

List I	List II
A) Circle on OA as diameter	1) $x^2+y^2-ax-by=0$
B) Circle on OB as diameter	2) $x^2+y^2-ax=0$
C) Circle on AB as diameter	3) $2x^2+2y^2-ax-by=0$
D) Circle on OC as diameter	4) $x^2+y^2-by=0$

The correct match is

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

4. Observe the following :

For the circle $S \equiv x^2+y^2+x-y-2=0$, the point

List I	List II
A) (-2, 1) lies	1) on the circle
B) (2, -1) lies	2) out side the circle
C) $(0,1)$ lies	3) on the tangent at (1,0) to S
D) $(2,3)$ lies	4) inside the circle S.

The correct match of list - I from list- II is

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

5. Observe the following lists :

List I	List II
A) An equation of the circle touching the x- axis is	1) $x^2+y^2+2ax+2ay+a^2=0$
B) An equation of the circle touching the y- axis is	2) $x^2+y^2-2ax+2by+b^2=0$
C) An equation of the circle touching both the axes is	3) $x^2+y^2+2ax-2by+a^2=0$
D) An equation of the circle passing through (a, b) is	4) $x^2+y^2+ax-by-2a^2=0$

Then the correct match of list - I from the list - II is

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

6. Observe the following :

For the circle

List I	List II
A) length of the tangent from (6,4) is	1) $\frac{72\sqrt{226}}{113}$
B) length of the chord of contact from (6,4) is	2) $\sqrt{113}$
C) distance of (6,4) from the center of the circle is	3) $\sqrt{113}-\sqrt{32}$
D) the shortest distance of (6,4) from the circle is	4) 9

The correct match of list - I from list - II is

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

7. Observe the following : For the circle $S \equiv x^2+y^2=a^2$

List I	List II
A) the pole of the line lx+my+n=0 is	1. $S_1=S_{11}$
B) The inverse point of (x_1, y_1) is	2. $\left(\frac{a^2x_1}{x_1^2+y_1^2}, \frac{a^2y_1}{x_1^2+y_1^2}\right)$
C) The mid point of chord lx+my+n=0 is	3. $\left(\frac{-\ln}{l^2+m^2}, \frac{-mn}{l^2+m^2}\right)$
D) Equation of the chord of the circle with (x_1, y_1) as the mid-point is	4. $\left(\frac{-a^2l}{n}, \frac{-a^2m}{n}\right)$
	5. $S_1=0$

The correct match of list -I from the list - II is

	A	B	C	D
1.	4	1	2	5
2.	4	2	5	1
3.	4	2	3	1
4.	1	2	3	4

8. Observer the following lists :

List- I	List- II
A. The locus of the point of intersection of the tangents $\perp^{lar}$ $x^2+y^2=a^2$ is	1. $x^2+y^2=5$ of
B. The locus of the mid-point of the chord of the circle	2. $x^2+y^2=a^2\sec^2\alpha$ $x^2+y^2=8$ which is at the distance of $\sqrt{2}$ units is
C. The locus of the point of intersection of the lines	3. $x^2+y^2=2a^2$ $x=\frac{1-t^2}{1+t^2}$ and $y=\frac{2t}{1+t^2}$ ('t' is a parameter) is
D. The locus of the point whose chord of contact	4. $x^2+y^2=2$ w.r.t $x^2+y^2=a^2$ making an angle '2α' at the centre is
	5. $x^2+y^2=1$

	A	B	C	D
1)	3	4	5	2
2)	3	5	4	1
3)	2	4	1	3
4)	2	4	5	3

KEY

1) 1	**2) 4**	**3) 1**	**4) 4**
5) 4	**6) 1**	**7) 3**	**8) 1**

Assertion and Reasoning

1. Assertion (A): $x+3y=0$ is a normal to the circle $x^2+y^2-12x+4y+6=0$.
Reason (R): Every normal of a circle passes through the center of the circle.
Then the correct answer is
1) Both A and R are true and R is the correct explanation of A
2) Both A and R are true and R is not the correct explanation of A
3) A is true but R is false
4) A is false but R is true

2. Assertion (A): The circle passing through (0,0), (a,0),(0,b) is $x^2+y^2-ax-by=0$.
Reason (R) : Angle in a semi circle is a right angle.
The correct answer is
1) Both A and R are true and R is the correct explanation of A
2) Both A and R are true and R is not the correct explanation of A
3) A is true but R is false
4) A is false but R is true

3. Assertion(A): $x+2y-3=0$ is a tangent to the circle $x^2+y^2-4x-6y+8=0$.
Reason (R) : The perpendicular distance of a line from the center of a circle is the radius of the circle.
Then the correct answer is
1) Both A and R are true and R is the correct explanation of A
2) Both A and R are true and R is not the correct explanation of A
3) A is true but R is false
4) A is false but R is true

4. Assertion(A): The points (-6,2),(-3,1) are a pair of inverse points w.r.t.the circle x^2+y^2=20.
Reason (R): The polar of (-6,2) w.r.t. x^2+y^2=20 passes through (-3,1)
The correct answer is
1) Both A and R are true and R is the correct explanation of A
2) Both A and R are true and R is not the correct explanation of A
3) A is true but R is false
4) A is false but R is true

5. Assertion (A): The polar of centre of circle w.r.t. same circle does not exist.
Reason (R): Distance between any two parallel tangents to a circle is the diameter of the circle.
The correct answer is :
1) Both A and R are true and R is the correct explanation of A.
2) Both A and R are true and R is not the correct explanation of A.
3) A is true but R is false
4) A is false but R is true.

6. Assertion (A): A line through the point P (5,10) cuts the line $x+2y=5$ at 'Q' and the circle $x^2+y^2=25$ at A and B then PA, PQ, PB are in H.P.

Reason (R): In the above problem if 'AB' is a polar, then PQ is the H.M of PA and PB .
The correct statement is:
1) A is true, R is false
2) A is false, R is true
3) A is true, R is true and $R \Rightarrow A$
4) A is false, R is false

7. Assertion (A) : The angle between the pair of tangents from the point $\left(1,\frac{1}{2}\right)$ to the circle $x^2+y^2+4x+2y-4=0$ is $Sin^{-1}\left(\frac{4}{5}\right)$.
Reason (R): If θ is the angle between the pair of tangents from an external point (x_1, y_1) to the circle of radius r, length of tangents $\sqrt{S_{11}}$ then θ is given by $Tan\left(\frac{\theta}{2}\right)=\frac{r}{\sqrt{S_{11}}}$.
1) A is true, R is false
2) A is false, R is true
3) A is true, R is true and $R \Rightarrow A$
4) A is false, R is false

8. Assertion (A) : Two tangents of the circle at A and B meet at P(-4,0), then the area of the quadrilateral
PAOB ('O' is the origin) is 8 sq.units.
Reason (R): Area of quadrilateral formed by the tangents from an external point with length of tangent with radii 'r' is 2r
1) A is true, R is false
2) A is false, R is true
3) A is true, R is true RA
4) A is false, R is false

9. Assertion (A): The line 3x+4y-12=0 meets the circle $x^2+y^2=24$ at A and B. If the tangents at A and B to the circle intersect at P, then P is (6,4).
Reason (R): The pole of the line $lx+my+n=0$ w.r.t.the circle $x^2+y^2=r^2$ is $\left(\frac{-r^2l}{n},\frac{-r^2m}{n}\right)$
1) A is true, R is false.
2) A is false.R is true
3) A is true, R is true, RA.
4) A is false, R is false

10. Assertion(A): The inverse point of (1,-1) with respect to the circle $x^2+y^2=4$ is(-2,2)
Reason (R): (1,-1), (-2,2) lie on either side of the centre.
1. Both A and R are true, R is the correct explanation of A.
2. Both A and R are True, R is not the correct explanation of A.
3. A is true, R is false
4. A is false, R is true

KEY

1 - 5	**1**	**1**	**3**	**2**	**2**
6 - 10	**3**	**3**	**4**	**4**	**4**

PREVIOUS EAMCET QUESTIONS

2005

1. If y = 3x is a tangent to a circle with centre (1, 1), then the other tangent drawn through (0, 0) to the circle is :
1) 3y = x 2) y = -3x 3) y= 2x 4) y = - 2x

2004

2. If the line 3x-2y+6=0 meets x-axis, y -axis respectively at A and B. then the equation of the circle with radius AB and Centre at A is......
1) $x^2+y^2+4x+9=0$
2) $x^2+y^2+4x-9=0$
3) $x^2+y^2+4x+4=0$
4) $x^2+y^2+4x-4=0$

3. If p_1, p_2, p_3 are the perimeters of the three circles $x^2+y^2+8x-6y=0, 4x^2+4y^2-4x-12y-186=0$ and $x^2+y^2-6x+6y-9=0$ respectively.
1) $P_1<P_2<P_3$ 2) $P_1<P_3<P_2$
3) $P_3<P_2<P_1$ 4) $P_2<P_3<P_1$

2003

4. If 5x-12y+10=0 and 12y-5x+16=0 are two tangents to a circles then radius of the circle is
1) 1 (2) 2 (3) 4 (4) 6

2002:

5. Equation of the circle of the radius 5, and touching the co-ordinate axes in the third quadrant is
1) $(x - 5)^2 + (y + 5)^2 = 25$
2) $(x + 5)^2 + (y + 5)^2 = 25$
3) $(x + 4)^2 + (y + 4)^2 = 25$
4) $(x + 6)^2 + (y + 6)^2 = 25$

6. The radius of the larger circle in the first quadrant and touching the line $4x + 3y - 12 = 0$ and the co-ordinate axes is
1) 5 2) 6 3) 7 4) 8

7. The four distinct points (0, 0), (2, 0), (0, -2) and (k, -2) are concyclic if k =
1) 2 2) -2 3) 0 4) 1

8. A line is at a constant distance c from the origin and meets the co-ordinate axes in A and B. The locus of the circle passing through O, A, B is
1) $x^{-3}+y^{-3}=c^{-3}$ 2) $x^{-3}+y^{-3}=2c^{-3}$
3) $x^{-2}+y^{-2}=3c^{-2}$ 4) $x^{-2}+y^{-2}=4c^{-2}$

2001

9. The equation of the normal to the circle $x^2 + y^2 + 6x + 4y - 3 = 0$ at (1, -2) is
1) $y + 1 = 0$ 2) $y + 2 = 0$
3) $y + 3 = 0$ 4) $y - 2 = 0$

10. The polar of the point on the circle $x^2 + y^2 = p^2$ with respect to the circle $x^2 + y^2 = q^2$ touches the circle $x^2 + y^2 = r^2$, their p, q, r are in .... progression
1) Arithmetic 2) Geometric
3) Harmonic 4) Arithmetic, Geometric

2000

11. The centre of the circle touching the y-axis at (0, 3) and making an intercept of 2 units on the positive x-axis
1) $(10, \sqrt{3})$ 2) $(\sqrt{3}, 10)$
3) $(\sqrt{10}, 3)$ 4) $(3, \sqrt{10})$

12. The slope m of a tangent through the point (7, 1) to the circle $x^2 + y^2 = 25$ satisfies the equation
1) $12m^2 + 7m - 12 = 0$ 2) $16m^2 - 24m + 9 = 0$
3) $12m^2 - 7m - 12 = 0$ 4) $9m^2 + 24m + 16 = 0$

13. The number of common tangents that can be drawn to the circles $x^2 + y^2 = 1$ and $x^2 + y^2 - 2x - 6y + 6 = 0$ is
1) 1 2) 2 3) 3 4) 4

1999

14. The parametric equations $x = \dfrac{2a(1-t^2)}{1+t^2}$ and $y = \dfrac{4at}{1+t^2}$ represent a circle of radius
1) 2) a 3) 2a 4) 4a

15. The inverse point of (1, -1) w.r.t. the circle $x^2 + y^2 = 4$ is
1) (-1, 1) 2) (-2, 2) 3) (1, -1) 4) (2, -2)

16. The equation of the polar of (-2, 3) w.r.t. $x^2 + y^2 - 4x - 6y + 5 = 0$
1) $x = y$ 2) $x + y = 0$ 3) $x = 0$ 4) $y = 0$

1998 :

17. The equation of a circle with centre (4, 1) and having $3x + 4y - 1 = 0$ as tangent is
1) $x^2 + y^2 - 8x - 2y - 8 = 0$
2) $x^2 + y^2 - 8x - 2y + 8 = 0$
3) $x^2 + y^2 - 8x + 2y + 8 = 0$
4) $x^2 + y^2 - 8x - 2y + 4 = 0$

18. The locus of point of intersection of perpendicular tangents to the circle $x^2 + y^2 = a^2$
1) $x^2 + y^2 = 2a^2$ 2) $x^2 + y^2 = 4a^2$
3) $x^2 + y^2 = 6a^2$ 4) $x^2 + y^2 = 8a^2$

19. The pole of the line $8x - 2y = 11$ w.r.t. the circle $2x^2 + 2y^2 = 11$ is
1) (4, 1) 2) (4, -1) 3) (3, 1) 4) (4, 2)

1997

20. Given that for the circle $x^2 + y^2 - 4x + 6y + 1 = 0$, the line with equation $3x - y = 1$ is a chord. The middle point of the chord is
1) $\left(\frac{2}{5}, \frac{11}{5}\right)$ 2) $\left(\frac{-2}{5}, \frac{11}{5}\right)$
3) $\left(\frac{-2}{5}, \frac{-11}{5}\right)$ 4) $\left(\frac{2}{5}, \frac{-11}{5}\right)$

1996 :

21. From the origin, chords are drawn to the circle $x^2 + y^2 - 2y = 0$. The locus of the middle point of these chords is
1) $x^2 + y^2 - y = 0$ 2) $x^2 + y^2 - x = 0$
3) $x^2 + y^2 - 2x = 0$ 4) $x^2 + y^2 - x - y = 0$

22. The radius of the circle which has the lines $x + y - 1 = 0$ and $x + y - 9 = 0$ as tangents is
1) $\sqrt{2}$ 2) $2\sqrt{2}$ 3) $3\sqrt{2}$ 4) $4\sqrt{2}$

1995 :

23. The centre and the radius of the circle with the segment of the line $x + y = 1$ cut off by the co-ordinate axes as a diameter
1) (1, 1) $\sqrt{2}$ 2) $\left(\frac{1}{2}, \frac{1}{2}\right), \sqrt{2}$
3) $\left(\frac{1}{2}, \frac{1}{2}\right), \frac{1}{\sqrt{2}}$ 4) (0, 0), 1

24. The equation of the circle which touches the lines $x = 0$, $y = 0$ and $x = c$ is
1) $x^2 + y^2 - cx - cy + c^2 = 0$
2) $x^2 + y^2 - 2cx - 2cy + c^2 = 0$
3) $x^2 + y^2 + cx + cy + \frac{c^2}{4} = 0$
4) $x^2 + y^2 - cx - cy + \frac{c^2}{4} = 0$

25. The points (4,-2) (3,b) are conjugate with respect to the circle $x^2 + y^2 = 24$, if b =

1) 6 2) –6 3) 12 4) –4

1994:

26. The length of the tangent from (0,0) to the circle $2(x^2 + y^2) + x - y + 5 = 0$ is

1) $\sqrt{5}$ 2) $\frac{\sqrt{5}}{2}$ 3) $\sqrt{2}$ 4) $\sqrt{5/2}$

27. The number of common tangents to the circles $x^2 + y^2 - x = 0$, $x^2 + y^2 + x = 0$ is

1) 2 2) 1 3) 4 4) 3

28. Consider the circles $x^2 + (y-1)^2 = 9$, $(x-1)^2 + y^2 = 25$

1) These circles touch each other
2) One of the circles lies entirely inside the other
3) Each of these circles lies outside the other
4) They intersect in two points

1993:

29. The locus of points from which the lengths of the tangents to the two circles $x^2 + y^2 + 4x + 3 = 0$ and $x^2 + y^2 - 6x + 5 = 0$ are in the ratio 2 : 3 is a circle with centre

1) (-6,0) 2) (6,0) 3) (0,6) 4) (0,-6)

1992:

30. The radius of any circle touching the lines $3x-4y+5=0$ and $6x - 8y - 9 = 0$ is

1) $\frac{19}{10}$ 2) $\frac{19}{20}$ 3) $\frac{9}{20}$ 4) $\frac{90}{20}$

1991:

31. Circles $x^2 + y^2 - 4x - 6y - 12 = 0$ and $x^2 + y^2 + 4x + 6y + 4 = 0$

1) Touch externally 2) Internally 3) Intersect at two points 4) Do not intersect

32. The locus of the middle point of the chord of the circle $x^2 + y^2 - 2x = 0$ passing through the origin is

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

1990 :

33. The number of common tangents to the circles $x^2+y^2 = 4$ and $x^2 + y^2 - 8x + 12 = 0$ is

1) 1 2) 2 3) 3 4) 4

1989 :

34. The equations of the circles which touch the lines $3x - 4y + 1 = 0$ and $4x + 3y - 7 = 0$ and pass through (2,3) are

1. $\left(x-\frac{6}{5}\right)^2+\left(y-\frac{12}{6}\right)^2=1,\ (x-2)^2+(y-8)^2=25$

2. $\left(x+\frac{6}{5}\right)^2+\left(y+\frac{12}{6}\right)^2=1,\ (x-2)^2+(y-8)^2=25$

3). $\left(x+\frac{6}{5}\right)^2+\left(y+\frac{12}{6}\right)^2=1,\ (x+2)^2+(y+8)^2=25$

4). $\left(x-\frac{6}{5}\right)^2+\left(y-\frac{12}{6}\right)^2=1,\ (x+2)^2+(y+8)^2=25$

1987 :

35. The number of common tangents to the circles $x^2 + y^2 + 2x + 8y - 23 = 0$ and $x^2 + y^2 - 4x - 10y + 19 = 0$ are

1) 1 2) 2 3) 3 4) 4

1986 :

36. The equation to the locus of the point of intersection of any two perpendicular tangents to $x^2 + y^2 = 4$ is

1) $x^2 + y^2 = 8$ 2) $x^2 + y^2 = 12$
3) $x^2 + y^2 = 16$ 4) $x^2 + y^2 = 4\sqrt{3}$

37. The centre of the circle passing through $(1,\sqrt{3})$, $(1,-\sqrt{3})$, $(3,-\sqrt{3})$ is

1) (2,0) 2) (-2,0) 3) (-2,2) 4) (2,-2)

1985 :

38. Equation of the circle passing through (0,0), (0,a) and (a,0) is

1) $x^2 + y^2 + ax + ay = 0$
2) $x^2 + y^2 - ax - ay = 0$
3) $x^2 + y^2 - ax + ay = 0$
4) $x^2 + y^2 + ax - ay = 0$

39. The length of the diameter of the circle $x^2 + y^2 - 6x - 8y = 0$ is

1) 100 2) 10 3) 20 4) 5

40. If the circles $x^2 + y^2 = a^2$ and $x^2 + y^2 - 6x - 8y + 9 = 0$ touch externally, then a =

1) 1 2) –1 3) 21 4) 16

1984 :

41. The centre and radius of the circle passing through the points (1,0), (3,-2) and (-1,-2) are given by

1) (1, -2) ; 2 2) (1,2) ; 2 3) (1,2) ; 1 4) (1,2) ; 1

KEY

1. 1	2. 2	3. 4	4. 1	5. 2
6. 2	7. 1	8. 4	9. 2	10. 2
11.3	12. 3	13. 4	14. 3	15. 4
16. 3	17. 2	18. 1	19. 2	20. 3
21. 1	22. 2	23. 3	24. 4	25. 2
26. 4	27. 4	28. 2	29. 1	30. 2
31. 4	32. 3	33. 3	34. 1	35. 3
36. 1	37. 1	38. 2	39. 2	40. 1
41. 1				

Previous Examination Questions

01. The radius of the circle having centre at (2,1) whose one of the chord is a diameter of the circle $x^2+y^2-2x-6y+6=0$

(IST - 2003)

(1) 1 (2) 2 (3) 3 (4) 4

02. A square is formed by following two pairs of straight lines $y^2-14y+45=0$ and $x^2-8x+12=0$. A circle is inscribed in it. Then the centre of the circle is

(IST - 2003)

(1) (7,4) (2) (4,7) (3) (3,7) (4) $\left(\frac{3}{8},4\right)$

03. 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
(IST - 2003)
(1) 4 (2) $2\sqrt{5}$ (3) 5 (4) $3\sqrt{5}$

04. If $a>2b>0$ then the positive value of 'm' for which y=mx-b$\sqrt{1-m^2}$ is a common tangents to $x^2+y^2=b^2$ and $(x-a)^2+y^2=b^2$ is
(IST - 2002)
1) $\frac{2b}{\sqrt{a^2-4b^2}}$ 2) $\frac{\sqrt{a^2-4b^2}}{\sqrt{a-2b}}$
3) $\frac{2b}{a-2b}$ 4) $\frac{b}{a-2b}$

05. Let PQ and RS be tangents at the extremities of the diameter 'PR' of a circle of radius 'r'. If PS and RQ intersecxt at a point 'X' on the circumference of the circle, then 2r equals:
(IST - 2001)
1) $\sqrt{PQ.RS}$ 2) $\frac{PQ+RS}{2}$
3) $\frac{2PQ+RS}{PQ+RS}$ 4) $\frac{PQ^2+RS^2}{2}$

06. Let AB be a chord of the circle $x^2+y^2=r^2$ subtending a right angle at the centre. Then,the locus of the centroid of the triangle PAB as P moves on the circle is
(IST - 2001)
1) A parabola 2) A circle
3) An ellipse4) A pair of straight line

07. The equation of the common tangents touching the circle $(x-3)^2+y^2=9$ and the parabola $y^2=1x$ above the x-axis is:
(IST - 2001)
(1) $\sqrt{3y}$=3x+1 (2) $\sqrt{3y}$=- $(x+3)$
(3) $\sqrt{3y}=(x+3)$ (4) $\sqrt{3y}=-(3x+1)$

08. The triangle PQR is inscribed in the circle $x^2+y^2=25$. If Q and R have coordinates (3,4) and (-4,3) respectively, then $\angle QPR$ is equal to
(IST - 2000)
(1) $\frac{\pi}{2}$ (2) $\frac{\pi}{3}$ (3) $\frac{\pi}{4}$ (4) $\frac{\pi}{6}$

09. The radius 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:
(IST - 1999)
(1) 6 (2) 8 (3) 2 (4) 4

10. Consider a circle with its centre lying on the focus of the parabola y^2=2px such that it touches the directrix of the parabola. The points of intersection of the circle and the parabola are **(IST - 1999)**
1) $\left(\frac{p}{2},p\right)\left(\frac{p}{2}-p\right)$ 2) $\left(\frac{p}{2},p\right)(2p,3p)$
3) $(2p,-2p)(p-p)$ 4) $\left(\frac{p}{2},0\right)\left(0,\frac{p}{2}\right)$

11. The equation os tangents to the circle $x^2+y^2-6x-6y+9=0$ drawn from the origin are: **(REE - 1990)**
1) $x=y$ 2) $x=0$ 3) $y=2$ 4) $x+y=0$

12. The equation of a circle which has a tangent $3x+4y=6$ and two normals given by $(x-1)(y-2)=0$ is
1) $(x-3)^2+(y-4)^2=52$
2) $x^2+y^2-4x-2y+4=0$
3) $x^2+y^2-2x-4y+4=0$
4) $x^2+y^2-2x-4y+5=0$

13. The radius of the circle passing through the points (1, 2), (5, 2) & (5, -2) is
1) $2\sqrt{2}$ 2) $2\sqrt{5}$ 3) $3\sqrt{2}$ 4) $5\sqrt{2}$

14. If one end of the diameter of the circle $x^2+y^2-8x-14y+c=0$ is the point (-3,2),then its other end is the point :
(REE-1995)
(1) (11,9) (2) (12,11) (3) 11,10 (4) (11,12)

15. The radius of the circle touching the straight lines $x-2y-1=0$ and $3x-6y+7=0$ is
(REE-1995)
(1) $\frac{3}{\sqrt{5}}$ (2) $\frac{\sqrt{5}}{3}$ (3) $\sqrt{5}$ (4) $\frac{1}{\sqrt{2}}$

16. The equation of a tangent to the circle $x^2+y^2=25$ passing through (-2,11) is:
(REE-1994)
(1) $4x+3y=25$ (2) $7x-24y=320$
(3) $3x+4y=38$ (4) $24x+7y+125=0$

17. If a circle having the point (-1,1) as to centre touches the straight line $x+2y+9=0$, then the coordinate of the point (s) of contact are:
(REE-1994)
1) (-3,3) 2) (-3,-3) 3)(0,0) 4) $\left(\frac{7}{3},\frac{-7}{3}\right)$

18. The lines 3x-4y+4=0 and 6x-8y-7=0 are tangent to the same circle. The radius of the circle is :
(REE-1992)
1) $\frac{1}{2}$ 2) $\frac{3}{4}$ 3) $\frac{3}{2}$ 4) 2

19. The equation of a circle is $x^2+y^2=25$, The equation of its chord whose middle point is(1,-2) is given by:
(REE-1989)
(1) $x+2y+5=0$ (2) $2x+y+5=0$
(3) $x-2y+5=0$ (4) $2x+y+5=0$

20. If $(\alpha,3)$ and $(3,5)$ are the extremities of the diameter of a circle with centre at $(2,\beta)$. Then the values of α and β are:
(REE - 1988)
1) $\alpha=1,\beta=4$ 2) $\alpha=4,\beta-2$
3) $\alpha=4,\beta=1$ 4) None of these

21. The area of the portion of the circle $x^2+y^2-4y=0$ lying below the x-axis is
(REE - 1988)
1) 0 2) 48 π 3) 82π 4) none of these

22. Locus of centroid of the triangle whose vertices are (a cos t, a sin t), (b sin t - b cos t) and (1,0) Where t is a parameter is
(AIEEE - 2003)
1) $(3x+1)^2+(3y)^2=a^2-b^2$
2) $(3x-1)^2+(3y)^2=a^2-b^2$
3) $(3x-1)^2+(3y)^2=a^2+b^2$
4) $(3x+1)^2+(3y)^2=a^2+b^2$

23. The sum of the radii of inscribed and circumscribed circles for an n sided regular polygon of side 'a' is
(AIEEE - 2003)
(1) $\frac{a}{4}\cot\left(\frac{\pi}{2\pi}\right)$ (2) $a\cot\left(\frac{\pi}{2\pi}\right)$
(3) $\frac{a}{2}\cot\left(\frac{\pi}{2\pi}\right)$ (4) $a\cot\left(\frac{\pi}{2\pi}\right)$

24. The lines 2x - 3y = 5 and 3x - 4y = 7 diameters of a circle having area as 154 units. Then the equation of the circle is:
(AIEEE - 2003)
1) $x^2+y^2-2x+2y=62$
2) $x^2+y^2-2x+2y=62$
3) $x^2+y^2+2x-2y=47$
4) $x^2+y^2-2x+2y=47$

25. The greatest distance of the point P(10,7) to the circle $x^2+y^2-4x-2y-20=0$ is:
(AIEEE - 2003)
1) 10 2) 15 3) 5 4) 12

26. The equation of the tangent to the circle $x^2+y^2+4x-4y+4=0$ which makes equal in ercepts on the positive coordinate axes is
(AIEEE - 2002)
(1) $x+y=2$ (2) $x+y=2\sqrt{2}$
(3) $x+y=4$ (4) $x+y=8$

27. The radius of the circle passing through the foci of the ellipse $\frac{x}{10}+\frac{y}{9}=1$ and having the centre at (0,3) is:
(AIEEE - 2002)
(1) 4 (2) 4 (3) $\sqrt{12}$ (4) $\frac{7}{2}$

28. A variable circle passes through the fixed pieces A(p,q) and touches x-axis,. The locus of the other end of the diameter through 'A' is
(1) $(x-p)^2=4qy$ (2) $(x-q)^2=4py$
(3) $(y-p)^2=4qx$ (4) $(y-q)^2=4px$

29. If the lines $2x+3y+1=0$ and $3x-y-4=0$ lie along diameters of a circle of circumference 10π, then the equation of the circle is:
(AIEEE - 2004)
1) $x^2+y^2-2x+2y-23=0$
2) $x^2+y^2-2x-2y-23=0$
3) $x^2+y^2+2x+2y-23=0$
4) $x^2+y^2+2x-2y-23=0$

Eamcet-2007

30. The equation of the circle of radius 3 that lies in the fourth quadrant and touching the lines x = 0 and y = 0 is **(E-2007)**
1) $x^2+y^2-6x+6y+9=0$
2) $x^2+y^2-6x-6y+9=0$
3) $x^2+y^2+6x-6y+9=0$
4) $x^2+y^2+6x+6y+9=0$

31. The inverse point of (1, 2) with respect to the circle $x^2+y^2-4x-6y+9=0$ is **(E-2007)**
1) (0, 0) 2) (1, 0) 3) (0, 1) 4) (1, 1)

KEY

1.3	2.2	3.3	4.1	5.1
6.2	7.3	8.1	9.4	10.1
11.2	12.3	13.1	14.4	15.2
16.1	17.2	18.2	19.3	20.1
21.1	22.3	23.3	24.4	25.2
26.2	27.1	28.1	29.1	30.1
31.3				