MATHS

JEE (MAIN AND ADVANCED) MATHEMATICS

CIRCLE

SOLVED EXAMPLES

1. Find the centre and radius of each of the circles whose equations are given below.

$x^2 + y^2 + 2ax - 2by + b^2 = 0$

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2. Find the centre and radius of the circle

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

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3. Find the centre and radius of each of the circles whose equations are given below.

$$\sqrt{1+m^3}\left(x^2+y^2\right)-2cx-2mcy=0$$

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4. Find the equation of the circle with centre (2,3) and passing through the point (2,-1).

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5. Find the equation of the circle passing through (-2,14) and concentric with the circle

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

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6. If $x^2 + y^2 + 2gx + 2fy - 12 = 0$ represents a circle with centre $(2, 3)$, find g, f and its radius.

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7. If $x^2 + y^2 - 4x + 6y + c = 0$ represents a circle with radius 6 then find the value of c.

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8. Find the equations of the circles for which the points given below are the end points of a diameter.

$(1, 2), (4, 6)$

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9. Show that $A(-3, 0)$ lies on $x^2 + y^2 + 8x + 12y + 15 = 0$ and find the other end of

diameter thorugh A.

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10. Find the equation of the circle passing through the points (1,2) (3,-4) and (5,-6).

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11. If (2,0),(0,1),(4,5) and (0,c) are concyclic then find c.

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12. Find the equation of the circle which passes through (6,5) (4,1) and whose centre lies on $4x + y - 16 = 0$

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13. Find the equation of the circumcircle of the triangle formed by the straight lines $x + y = 6$, $2x + y = 4$ and $x + 2y = 5$

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14. Find the equation of circle passing through intersection points of line $ax + by + c = 0$ with coordinate axes and through origin.

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15. From the point A(0,3) on the circle $x^2 + 4x + (y - 3)^2 = 0$, a chord AB is drawn and extended to a point P, such that AP=2AB. The locus of P is

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16. Suppose a point $\left(x_1, y_1\right)$ satisfies $x^2 + y^2 + 2gx + 2fy + c = 0$ then show that it represents a circle whenever g,f and c are real.

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17. Locate the position of the point (2,4) w.r.t the circle $x^2 + y^2 - 5x - 6y + 11 = 0$

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18. Locate the position of the point P with

resect to the circle $S = 0$ when

$P(4, 2)$ and $S \equiv 2x^2 + 2y^2 - 5x - 4y - 3 = 0$

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19. Find the power of the point P with respect

to the circle $S=0$ when

$P=(2,3)$ and SS=x^(2)+y^(2)-2x+8y-23=0`

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20. Find the equation of tangent and normal at

$(3,2)$ of the circle $x^2+y^2-x3y-4=0$.

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21. Show that the line $lx+my+n=0$ is a normal to the circles S=0 iff

$gl+mf=mn$.

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22. Find the equation of the momal to the circle $x^2 + y^2 - 4x - 6y + 11 = 0$ at $(3, 2)$. Also find the other point where the normal meets the circle.

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23. Find the equation of tangents of the circle $x^2 + y^2 - 8x - 22y + 12 = 0$ at the points whose ordinates are 1.

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24. Find the equation of the tangent to $x^2 + y^2 - 2x + 4y = 0 \text{ at}(3, -1)$ Also find the equation of tangent parallel to it.

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25. Show that the tangent at $(-1, 2)$ of the

circle $x^2 + y^2 - 4x - 8y + 7 = 0$

touches

the circle $x^2 + y^2 + 4x + 6y = 0$ and also

find its point of contact.

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26. Find the equation of circle with centre

$(2, 3)$ and touching the line $3x - 4y + 1 = 0$

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27. Find the equations of the

circle $x^2 + y^2 + 2x - 2y + 3 = 0$ which are

perpendicular to $3x - y + 4 = 0$

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28. Find the equation of the tangents to the circle $x^2 + y^2 - 4x - 5y + 3 = 0$ which are inclined at 45° with X axis.

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29. If θ_1, θ_2 are the angles of inclination of tangents through a point P to the circle $x^2 + y^2 = a^2$ then find the locus of P when $\cot\theta_1 + \cot\theta_2 = k$.

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30. Find the equation of the circles which touch $2x - 3y + 1 = 0$ at (1,1) and having radius $\sqrt{13}$.

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31. Find the equations of the circles passing through (1,-1) touching the lines $4c + 3y + 5 = 0$ and $3x - 4y - 10 = 0$

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32. If the length of the tangent from $(2, 5)$ to the circle $x^2 + y^2 - 5x + 4y + k = 0$ is $\sqrt{37}$ then find k.

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33. If a point P is moving such that the lengths of tangents drawn from P to the circles

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

$x^2 + y^2 + 6x + 18y + 26 = 0$ are the ratio 2:3, then find the equation to the locus of P.

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34. Find the length of the chord intercepted

by the circle $x^2 + y^2 - x3y - 22 = 0$ on

the line $y = x - 3$

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35. If $x^2 + y^2 = c^2$ and $\frac{x}{a} + \frac{y}{b} = 1$ intersect at A and B, then find AB. Hence deduce the condition that the line touches the circle.

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36. Find the equation of the circle which touches X-axis at a distance of 3 units from the origin and making an intercepts of length 6 on Y-axis.

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37. Find the angle between the pair of tangents drawn from $(0, 0)$ to the circle $x^2 + y^2 - 14x + 2y + 25 = 0$.

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38. Find the angle between the tangents drawn from $(3, 2)$ to the circle $x^2 + y^2 - 6x + 4y - 2 = 0$

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39. Fing the condition that the tangents drawn from the exterior point (g, f) to $S \equiv x^2 + y^2 + 2gx + 2fy + c = 0$ are perpendicular to each other.

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40. Show that the locus of P where the tangents drawn from P to the circle $x^2 + y^2 = a^2$ include an angle α is $x^2 + y^2 = a^2 \operatorname{cosec}^2 \frac{\alpha}{2}$

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41. Obtain the parametric equation of the

circle represented by

$x^2 + y^2 + 6x + 8y - 96 = 0$

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42. Find the chord of contact of $(0, 5)$ with

respect to the circle

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

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43. Show that the area of the triangle formed by the two tangents through $P\left(x_1, y_1\right)$ to the circle $S = x^2 + y^2 + 2gx + 2fy + c = 0$ and the chord of contact of P w.r.t S=0 is $\dfrac{r\left(S_{11}\right)^{3/2}}{S_n + r^2}$, where r is the radius of the circle.

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44. Show that the points $(4, 2)(3, \ - 5)$ are conjugate points with respect to the circle $x^2 + y^2 - 3x - 5y + 1 = 0$

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45. Find the value of k if the points (1, 3) and (2, k) are conjugated with respect to the circle $x^2 + y^2 = 35$.

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46. Find the value of k if $kx + 3y - 1 = 0$,

$2x + y + 5 = 0$ are conjugate lines with

respect to the circle

$x^2 + y^2 - 2x - 4y - 4 = 0$.

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47. Find the number of possible common

tangents that exist for the following pairs

of circles.

$x^2 + y^2 + 6x + 6y + 14 = 0$

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

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48. Find the number of common tangents of two circles $x^2 + y^2 = 4, x^2 + y^2 - 6x - 8y + 16 = 0,$

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49. Show that the circle

$x^2 + y^{92}\Big) - 6x - 2y + 1 = 0,$

$x^2 + y^2 + 2x - 8y + 13 = 0$ touch each

other. Find the point of contact and the

equation of common tangent at their

point of contact.

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50. Find the transberes common tangents of

the circles $x^2 + y^2 - 4x - 10y + 28 = 0$ and $x^2 + y^2$

$+4x - 6y + 40.$

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51. The centres of similutude of the circles $x^2 + y^2 - 2x - 6y + 6 = 0, x^2 + y^2 = 1$ is

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52. The condition that the circles $x^2 + y^2 + 2ax + c = 0, x^2 + y^2 + 2by + c = 0$ may touch each other is

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ADDITIONAL SOLVED EXAMPLES

1. Find the equation of the circle which passses through (2,0) and whose centre is the point of intersection of the lines $3x + 4y - 5 = 0$ and $4x - 3y - 15 = 0$

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2. Show that the lines $5x + 3y - 9 = 0, 2x + y = 0, x + 3y = 0$ and $x + 4y + 2 = 0$ taken in order form a cyclic quadrilateral.

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3. Find the point of intersection of the circle $x^2 + y^2 + 4x + 6y - 39 = 0$ and the normal at (2,3).

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

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5. A square is inscribed in the circle $x^2 + y^2 + 2x + 4y3 = 0$. Its sides are parallel to the coordinates axes, then find the vertices of a square.

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6. Show that the equation of the circle with centre at origin and passing through the vertices of an equilateral triangle whose median is of length 3a is $x^2 + y^2 = 4a^2$.

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7. If $\left(m_i, \frac{1}{m_i}\right)$, $m_i > 0, i = 1, 2, 3, 4$ are four distinct points on a circle, show that $m_1m_2m_3m_4 = 1$.

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8. A circle is incribed in an equilateral triangle of side a. Show that the area of the square inscribed in the circle is $\frac{a^2}{6}$.

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9. If a circle $C_1, x^2 + y^2 = 16$ intersects another circle C_2 of radius 5 in such a manner that the common chord is maximum length and has slope $\frac{3}{4}$, then show the centres of C_2 are $\left(\frac{9}{5}, \frac{-12}{5}\right), \left(\frac{-9}{5}, \frac{12}{5}\right)$

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10. Consider a family of cirlces which are passing through the point (-1,1) and the tangents to x- axis. If (h,k) is the centre of circle, then show that $K \geq \frac{1}{2}$.

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11. If PQ, PR are tangents from a point $P(x_1, y_1)$ to the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ show that the circumcircle of the triangle PQR is $(x - x_1)(x + g) + (y - y_1)(y + f) = 0$

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12. Show that the lines $3x - y + 3 = 0$ and $x - 3y - 6 = 0$ cut the coordinate axes at concylic points. Show that the equation of the circle passing through these points is $x^2 + y^2 - 5x - y - 6 = 0$

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13. A,B are conjugate points w.r.t circle having centre O radius r then $OA^2 + OB^2 - 2r^2 = AB^2$

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14. If polars of A,B w.r.t to the circle having centre O and radius r intersect at P then $OA^2 - OB^2 = AP^2 - BP^2$

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15. Each side of ΔABC is the polar of the opposite vertex with respect to a circle with centre P. Then P is ortho centre of ΔABC.

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16. Two circles with radii r_1 and $r_2, r_1 > r_2 \geq 2$ touch others externelly. If α is the angle between direct common tangents then $\sin\frac{\alpha}{2} = \frac{r_1 - r_2}{r_1 + r_2}$

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17. The number of common tangents to the circles $x^2 + y^2 - 4x - 2y + k$ =0 and $x^2 + y^2 - 6x - 4y + l$=0 having radii 2 and 3 respectively is

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18. Points (1,0) and (2,0) are taken on the axis of x. On the line joining these two points, an equilateral triangle is described, its vertex being in the positive quadrant . Find the equations of circles described on the side of the triangle as diameter.

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19. In adjacent figure three circles each of radius 1 inscribed in an equilateral triangle then find area of triangle

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20. Find the equation of image circle of the circle $x^2 + y^2 - 2x = 0$ in the line $x + y - 2 = 0$

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EXERCISE 1.1 (VERY SHORT ANSWER QUESTIONS)

1. Find the centre and radius of each of the circles whose equations are given below:

(i) $3x^2 + 3y^2 - 5x - 6y + 4 = 0$

(ii) $3x^2 + 3y^2 + 6x - 12 - 1 = 0$

(iii) $x^2 + y^2 + 6x + 8y - 96 = 0$

(iv) $2x^2 + 2y^2 - 4x + 6y - 3 = 0$

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

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

(vii) $x^2 + y^2 - 4x - 8y - 41 = 0$

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2. (i) Fid the equation of the circle passing through the origin and having the centre at (-4,-3).

(ii) Find the equation of the circle passing through (-2,3) and having centre at (0,0).

(iii) Find the equztion of the circle passsing through (3,4) and having the centre at (-3,4). br> (iv) Find the equation of the circle whose centre is (-1,2) and whcih passes through (5,6).

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3. Find the value of a if

$2x^2 + ay^2 - 2x + 2y - 1 = 0$ represents a circle and also find its radius.

(ii) Find the values of a,b if

$ax^2 + bxy + 3y^2 - 5x + 2y - 3 = 0$ represents a circle. Also find the radius and centre of the circle.

(iii) If $x^2 + y^2 + 2gx + 2fy = 0$ represents a circle with centre (-4,-3) then find g,f and the radius of the circle.

(iv) If the circle $x^2 + y^2 + ax + by - 12 = 0$ has the centre at (2,3) then find a ,b and the raidus of the circle.

(v) If the circle $x^2 + y^2 - 5x + 6y - a = 0$ has radius 4 , find a

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4. Find the equations of the circle for which the points given below are the end points of a diameter.

(i) (-4,3), (3,-4)

(ii) (7,-3), (3,5)

(iii) 1,1), (2,-1)

(iv) (0,0),(8,5)

(v) (3,1),(2,7)

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5. Find the equation of the circle which is concentric with $x^2 + y^2 + 8x + 12y + 15 = 0$ and passing through (2,3).

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6. Find the centre of the circle passing through the points $(0, 0), (2, 0)$ and $(0, 2)$.

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EXERCISE 1.1 (SHORT ANSWER QUESTIONS)

1. (i) Find the other end of the diameter of the circle $x^2 + y^2 - 8x - 8y + 27 = 0$ if one endof it (2,3).

(ii) Snow that $A(3, -1)$ lies on the circle $x^2 + y^2 - 2x + 4y = 0$. Also find the other end of the diameter through A.

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2. If the abscissae of points A, B are the roots

of the equation, $x^2 + 2ax - b^2 = 0$ and ordinates of A, B are roots of $y^2 + 2py - q^2 = 0$, then find the equation of a circle for which $\overline{AB}$ is a diameter.

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3. Show that the locus of the point of inter section of the lines $x\cos\theta + y\sin\theta = a, x\sin\theta - y\cos\theta = b, \theta$ is a parameter is a circle.

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EXERCISE 1.1 (LONG ANSWER QUESTIONS)

1. Show that the following four points in each jof the following are concyclic and find the equation of the circle on which they lie.

$(1, 1), (- 6, 0), (- 2, 2), (- 2 - 8)1$

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2. (i) If (1,2),(3,-4),(5,-6) and (c,8) are concyclic, then find c.

If (2,0),(0,1),(4,5) and (0,c) are concyclic then find c.

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3. If ABCD is a square then show that the points, A,B, C and D are concyclic.

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4. Show that the locus of a point such that the ratio of its distances from two given points is a constant $k(\neq 1)$, is a circle.

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EXERCISE 1.2 (VERY SHORT ANSWER QUESTIONS)

1. Locate the position of the point P with respect to the circle S=0 when

(i) P(1,2) and $S = x^2 + y^2 + 6x + 8y - 96$

(ii) P(3,4) and $S = x^2 + y^2 - 4x - 6y - 12$

(iii) P(2,-1) and $S = x^2 + y^2 - 2x - 4y + 3$

(iv) P(1,5) and $S = x^2 + y^2 - 2x - 4y + 3$

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2. Find the power of the point P w.r.t the circle S=0 when

(i) P(1,2) and $S = x^2 + y^2 + 6x + 8y - 96$

(ii) P(5,-6) and $S = x^2 + y^2 + 8x + 12y + 15$

(iii) P(2,4) and $S = x^2 + y^2 - 4x - 6y - 12$

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3. Find the equation of the tangent at P of the circle S=0 where P and S are given by

(i) $P = (3, 4), S = x^2 + y^2 - 4x - 6y + 11$

(ii) $P = (- 1, 1), S = x^2 + y^2 - 5x + 4y - 12$

(iii) $P = (- 6, - 9), S = x^2 + y^2 + 4x + 6y - 39$

(iv) $P = (7, - 5), S = x^2 + y^2 - 6x + 4y - 12$

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4. Find the equation of the normal at P of the circle S=0 where P and S are given by

(i) $P(3, -4), S = x^2 + y^2 + x + y - 24$

(ii) $P(1, 3), S = 3\left(x^2 + y^2\right) - 19x - 29y + 76$

(iii) $P(3, 5), S = x^2 + y^2 - 10x - 2y + 6$

(iv) $P(1, 2), S = x^2 + y^2 - 22x - 4y + 25$

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5. Find the length of the tangent from P to the circle S=0 when

(i) $P(-2, 5)$ and $S = x^2 + y^2 - 25$

(ii) $P(0, 0)$ and $S = x^2 + y^2 - 14x + 2y + 25$

(iii) $P = (2, 5)$ and $S = x^2 + y^2 - 5x + 4y - 5$

(iv) $P = (12, 17)$ and $S = x^2 + y^2 - 6x - 8y - 25$

(v) $P = (1, 3)$ and $S = x^2 + y^2 - 2x + 4y - 11$

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6. If the length of the tangent from $(5, 4)$ to the circle $x^2 + y^2 + 2ky = 0$ is 1 the n find k.

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7. Find the parametric equations of the cirlces

(i) $x^2 + y^2 = 1$

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

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

(iv) $2x^2 + 2y^2 = 7$

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

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8. Find the angle between the pair of tangents drawn from $(1, 3)$ to the circle $x^2 + y^2 - 2x + 4y - 11 = 0$

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9. Find the condition that the tangents drawn from $(0, 0)$ to $S \equiv x^2 + y^2 + 2gx + 2fy + c = 0$ be perpendicular to each lt brgt other.

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EXERCISE 1.2 (SHORT ANSWER QUESTIONS)

1. Find the equation of the tangent and normal at $(1, 1)$ to the circle $2x^2 + 2y^2 - 2x - 5y + 3 = 0$

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2. Find the equation of tangents of the circle $x^2 + y^2 - 10 = 0$ at the points whose abscissae are 1.

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3. Find the area of the triangle formed

by the tangent at $P(x_1, y_1)$ to the circle

$x^2 + y^2 = a^2$ with co-ordinate axes

where $x - (1)y_1 \neq 0$.

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4. Find the area of the triangle formed by

the normal at $(3, -4)$ to the circle

$x^2 + y^2 - 22x - 4y + 25 = 0$ with the co-ordinate axes.

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5. If $S \equiv x^2 + y^2 + 2gx = 2fy + c = 0$ represents a circle then show that the straight line $lx + my = n = 0$

(i) touches the circle S=0 if

$$g^2 + f^2 - c = \frac{(gl + mf - n)^2}{l^2 + m^2}$$

(ii) meets the circle S=0 in two points if

$$g^2 + f^2 - c > \frac{(gl + mf - n)^2}{l^2 + m^2}$$

(iii) will not meet the circle if

$$g^2 + f^2 - c < \frac{(gl + mf - n)^2}{l^2 + m^2}$$

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6. (i) Find the equation of the tangents to the circle $x^2 + y^2 - 4x + 6y - 12 = 0$ which are parallel to $x + y - 8 = 0$

(ii) Find the equations of the tangents to the circle $x^2 + y^2 - 5x + 6y - 12 = 0$ which are paralel to $x + 2y - 8 = 0$

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7. Show that the circle $S \equiv x^2 + y^2 + 2gx +$

$2fy + c = 0$ touches the

(i) X- axis if $g^2 = c$

(ii) Y - axis if $f^2 = c$.

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8. Show that the line $5x + 12y - 4 = 0$

touches the circle

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

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9. Find the equation of the circle with centre

$(-3, 4)$ and touching y - axis.

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10. If the parametric values of two points A and B lying on the circle $x^2 + y^2 - 6x + 4y - 12 = 0$ are 30° and 60° respectively, then find the equation of the chord joining A and B

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11. Find the equation of the tangent at the point 30° (parametric value of θ) of the circle is $x^2 + y^2 + 4x + 6y - 39 = 0$.

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EXERCISE 1.2 (LONG ANSWER QUESTIONS)

1. (i) Find the length of the chord intercepted by the circle $x^2 + y^2 - 8x - 2y - 8 = 0$ on the line $x + y + 1 = 0$

(ii) Find the length of the chord intercepted by the circle $x^2 + y^2 + 8x - 4y - 16 = 0$ on the line $3x - y + 4 = 0$

(iii) Find the length of the chord formed by $x^2 + y^2 = a^2$ on the line $x\cos\alpha + y\sin\alpha = p$

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2. The lilne $y = mx + x$ and the circle $x^2 + y^2 = a^2$ intersect at A and B. If $AB = 2\lambda$, then show that : $c^2 = \left(1 + m^2\right)\left(a^2 - \lambda^2\right)$.

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3. Find the equation of the circle with centre $(-2, 3)$ cutting a chord length 2 units

on $3x + 4y + 4 = 0$

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4. (i) Find the equation of the circle passing through (0,0) and making intercepts 4,3 on X axis and Y-axis respectively.

(ii) Find the equation of the circle passing through (0,0) and making intercepts 6 units on X-axis and intercepts 4 units on Y-axis.

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5. Find the equation of the circle passing through $(-1, 0)$ and touching $x+y-7=0$ at $(3, 4)$

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6. If a point P is moving such that the lengths of the tangents drawn form P to the circles

$x^2 + y^2 + 8x + 12y + 15 = 0$and

$x^2 + y^2 - 4x - 6y - 12 = 0$ are equal

then find the equation of the locus of P

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7. If the lengths of the tangents drawn from P to the circles $x^2 + y^2 - 2x + 4y - 20 = 0$ and $x^2 + y^2 - 2x - 8y + 1 = 0$ are in the ratio 2:1, then the locus P is

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8. Show that the locus of P where the tangents drawn from P to $x^2 + y^2 = a^2$ are perpendicular to each other is $x^2 + y^2 = 2a^2$

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9. From any point on the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ tangents are drawn to the circle $x^2 + y^2 + 2gx + 2fy + c\sin^2\alpha + \left(g^2 + f\right)\cos^2\alpha = 0$. The angle between the tangents is

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EXERCISE 1.3 (VERY SHORT ANSWER QUESTIONS)

1. Find the chord of contact of $(2, 5)$ with

repect ot the circle

$x^2 + y^2 - 5x + 4y - 2 = 0.$

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2. Find the equation of polar of the point

(i) (3,-1) with resect to the cirlce $2x^2 + 2y^2 = 11$

(ii) (2,3) with respect to the circle

$x^2 + y^2 + 6x + 8y - 96 = 0$

(iii) (4,3) with respect to the circle

$x^2 + y^2 - 8x - 6y - 9 = 0$

(iv) (1,2) with respect to the cirlce $x^2 + y^2 = 7$

(v) (1,-2) with respect to the circle

$x^2 + y^2 - 10x - 10y + 25 = 0$

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3. Find the coordinates of the pole of the straight line

(i) $x + y + 2 = 0$ with respect to the circle

$x^2 + y^2 - 4x + 6y + 2 = 0$

(ii) $3x + 4y - 45 = 0$ with respect to the circle

$x^2 + y^2 - 6x - 8y + 5 = 0$

(iii) $x - 2y + 22 = 0$ with respect to the circle $x^2 + y^2 - 5x + 8y + 6 = 0$

(iv) $ax + by + c = 0$ with respect to the circle $x^2 + y^2 = r^2$

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4. Show that the points

(i) (4,-2) and (3,-6) are conjugate with respect to the circle $x^2 + y^2 - 24 = 0$

(ii) $(-6, 1)$ and (2,3) are conjugate with respect to the circle $x^2 + y^2 - 2x + 2y = 1 = 0$

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5. Find the value of K if the points

(i) (4,K) and (2,3) are conjugate with respect to the circle $x^2 + y^2 = 17.$

(ii) (4,2) and (K,-3) are conjugate with respect to the circle $x^2 + y^2 - 5x + 8y + 6 = 0$

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6. Find the value of K if the lines $x + y - 5 = 0$ and $2x + ky - 8 = 0$ are conjugate with respect to the circle $x^2 + y^2 - 2x - 2y - 1 = 0$

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7. Show thet the lines $2x + 3y + 11 = 0$ and $2x - 2y - 1 = 0$ are conjugate with respect to the circle $x^2 + y^2 + 4x + 6y - 12 = 0$

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EXERCISE 1.3 (SHORT ANSWER QUESTIONS)

1. Find the area of the triangle formed by two tangents drawn from (3,5) to the circle $x^2 + y^2 = 16$ and the chord of contact of (3,5)

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2. Find the coordinates of the point of intersection of tangent at the points where $x + 4y - 14 = 0$ meets the circle $x^2 + y^2 - 2x + 3y - 5 = 0$

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3. Find the slope of the polar of $(1, 3)$ with respect to the circle $x^2 + y^2 - 4x - 4y = 0$

Also find the distance from the centre to it.

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4. If $ax + by + c = 0$ is the polar of $(1, 1)$ with respect to the circle $x^2 + y^2 - 2x + 2y$

$+1 = 0$ and H. C. F. of a, b, c is equal to one then find $a^2 + b^2 + c^2$.

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5. Find the locus of the point whose polars with respect to the circles $x^2 + y^2 - 4x - 4y - 8 = 0$ and $x^2 + y^2 - 2x + 6y - 2 = 0$ are mutually perpendicular.

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6. (prove that) If the polar of the points on the circle $x^2 + y^2 = a^2$ with respect to the circle $x^2 + y^2 = b^2$ touches the circle $x^2 + y^2 = c^2$ then prove that a, b, c, are in Geometrical progression.

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7. Find the inverse point of (-2,3) with respect to the circle $x^2 + y^2 - 4x - 6y + 9 = 0$

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8. Find the mid point of the chord intercepted by the circle $x^2 + y^2 - 2x - 10y + 1 = 0$ on the line $x - 2y + 7 = 0$

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9. Find the locus of mid points of the chord of contact of $x^2 + y^2 = a^2$ from the points lying on the line $lx + my + n = 0$

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10. Find the equation of pair of tangents from

(i) (0,0) to the circle $x^2 + y^2 + 10x + 10y + 40 = 0$

(ii) (4,10) to the circle $x^2 + y^2 = 25$

(iii) (3,2) to the circle $x^2 + y^2 - 6x + 4y - 2 = 0$

(iv) (10,4) to the circle $x^2 + y^2 = 25$

(v) (1,3) to the circle $x^2 + y^2 - 2x + 4y - 11 = 0$

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11. Find the pair of tangents form the origin to the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ and hence deduce a condition for these tangents to be perpendicular.

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12. The locus of the foot of the perpendicular drawn from the origin to any chord of the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ which substents a right angle at the origin is

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EXERCISE 1.4 (VERY SHORT ANSWER QUESTIONS)

1. Discuss the relative position of the following pair of circles.

$(x - 2)^2 + (y + 1)^2 = 9, (x + 1)^2 + (y - 3)^2 + (y - 3)^2 = 4$

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2. Find the number of possible common tangents of following pairs of circles

(i) $x^2 + y^2 - 14x + 6y + 33 = 0$

$x^2 + y^2 + 30x - 2y + 1 = 0$

(ii) $x^2 + y^2 + 6x + 6y + 14 = 0$

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

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

$x^2 + y^2 - 6x - 4y + 4 = 0$

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

$x^2 + y^2 + 2x - 6y + 6 = 0$

(v) $x^2 + y^2 + 4x - 6y - 3 = 0$

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

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EXERCISE 1.4 (SHORT ANSWER QUESTIONS)

1. The internal centre of similitude of the two circles $x^2 + y^2 + 6x - 2y + 1 = 0, x^2 + y^2 - 2x - 6y + 9 = 0$ is

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2. Find the number of common tangents of $x^2 + y^2 - 8x - 6y + 21 = 0, x^2 + y^2 - 2y - 16 = 0$ also find point of intersection of tangents.

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3. (i) Find the equation of circle which touches $x^2 + y^2 - 4x + 6y - 12 = 0$ at (-1,1) internally with a radius of 2.

(ii) Find the equation of circle which touches $x^2 + y^2 - 2x - 4y - 20 = 0$ externally at (5,5) with radius of 5.

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4. If two circles $x^2 + y^2 + 2a_1x + 2b_1y = 0$ and $x^2 + y^2 + 2a_2x + 2b_2y = 0$ touches then show that $a_1b_2 = a_2b_1$

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5. Show that the four common tangents can be drawn for the circles given by

$x^2 + y^2 - 14x + 6y + 33 = 0$ ____(1)

and $x^2 + y^2 + 30x - 2y + 1 = 0$ _____(2)

and find the internal and external centres

of similitude.

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EXERCISE 1.4 (LONG ANSWER QUESTIONS)

1. Show that the circles

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

$5\left(x^2 + y^2\right) - 8x - 14y - 32 = 0$ touch each

other and find their point of contact.

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2. Find the direct common tangents of the circles

$x^2 + y^2 + 22x - 4y - 100 = 0$ and $x^2 + y^2 - 22x + 4y + 100 = 0$

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3. Find the equation of all common tangents of the circles

(i) $x^2 + y^2 = 9$ and

$x^2 + y(2) - 16x + 2y + 49 = 0$

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

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

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ADDITIONAL EXERCISE

1. The centre of the circle passing through the points (0,0), (1,0) and touching the circle $x^2 + y^2 = 9$ is

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2. Show that the equation of the circle which touches $x^2 + y^2 - 6x + 6y + 17 = 0$ external and to which the axes are normal is $x^2 + y^2 = \left(3\sqrt{2} - 1\right)^2$.

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3. Let $2x^2 + y^2 - 3xy = 0$ be the equationof a pair of tangents drawn from the orign O to a circlke of radius 3 with centre in the first quadrant. If A is one of the point of contact then show that the length of OA is $3\left(3 + \sqrt{10}\right.$.

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4. Let A be the centre of the circle $x^2 + y^2 - 2x - 4y - 20 = 0$. Suppose that the tangent at the points B(1,7) and D(4,-2) on the circle meet at the point C. The area of the quadrilateral ABCD is

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5. The lines $2x - 3y = 5$ and $3x - 4y = 7$ are diameters of a circle of are 154 sq. units. Taking $\pi = \frac{22}{7}$, show that the equation of the circle is $x^2 + y^2 - 2x + 2y = 47$

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6. A circle passes through the points of intersection of the lines $\lambda x - y + 1 = 0$ and $x - 2y + 3 = 0$ with the coordinates axes. Show that $\lambda = 2.$

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7. Show that the centre of the circle which circumcribes the square formed by $x^2 - 8x + 12 = 0$ and $y^2 - 14y + 45 = 0$ is (4,7)

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8. If one of the diameters of the circle $x^2 + y^2 - 2x - 6y + 6 = 0$ is a chord to the circle with centre at (2,1) show that the radius of the circle is 3.

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9. If the lines $2x + 3y + 1 = 0$ and $3x - y - 4 = 0$ lie along diameter of a circle of circumference 10π, then show that the equation of the circle is $x^2 \_ y^2 - 2x + 2y - 23 = 0$

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10. Show that the equation of the circle which pass through the points (1,-2) and (4,-3) and whose centre lies on the line $3x + 4y = 7$ is $15\left(x^2 + y^2\right) - 94x + 18y + 55 = 0$

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11. The intercept on the line $y = x$ by the circle $x^2 + y^2 - 2x = 0$ is AB. Show that the equation of the circle with AB as diameter is $x^2 + y^2 - x - y = 0.$

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12. If the points (2,0)(3,2)(5,4) and (t,0) are concylic, show that t=2 or 17.

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13. The circle passing through the points (1, t), (t, 1) and (t, t) for all values of t passes through the point

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14. If (2,4) is an interior point to the circle $x^2 + y^2 - 6x - 10y + \lambda = 0$ and the circle does not cut the axes at any point, then show that $\lambda \varepsilon (25, 32)$.

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15. Show that the number of tangents that can be drawn from the point $\left(\frac{5}{2}, 1\right)$ to the circle passing through the points $\left(1, \sqrt{3}\right), \left(1 - \sqrt{3}\right)$
and $\left(3, \ - \sqrt{3}\right)$ is zero.

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16. Show that the equations of the tangents drawn from the origin to the circle $x^2 + y^2 - 2rx - 2hy + h^2 = 0$ are x=0 and $\left(h^2 - r^2\right)x - 2rhy = 0$

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17. The locus of the centre of a circle which touches externally the circle $x^2 + y^2 - 6x - 6y + 14 = 0$ and also touches the y-axis is given by the equation.

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18. If the angle between the tangents drawn from P to the circle $x^2 + y^2 + 4x - 6y + 9\sin^2\alpha + 13\cos^2\alpha = 0$ is 2α, show that the locus of P is $(x + 2)^2 + (y - 3)^2 = 4$

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19. 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 show that PQ=5.

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20. If the straight line y=mx is outside the circle $x^2 + y^2 - 20y + 90 = 0$, then show that $|m| < 3$.

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21. If (-4,3) and (12, -1) are the ends of diameter of a circle which makes an intercept 2λ on the y-axis, then show that $\lambda = 2\sqrt{13}$.

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22. If the chord $y = mx + 1$ of the circle $x^2 + y^2 = 1$ subtends an angle of measure 45° at the major segment of the circle then m=

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23. Tangent to the curve $y = x^2 + 6$ at the point P(1,7) touches the circle

$x^2 + y^2 + 16x + 12y + c = 0$ at a point Q. Show that $Q = (-6, -7)$

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24. If the lines $3x - 4y + 4 = 0$ and $6x - 8y - 7 = 0, x^2 + y^2 + 16x + 12y + c = 0$ are tangents to the same circle, show that the radius of the circle is $\frac{3}{4}$.

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25. The area of the quadrilateral formed by the tangents from the point (4,5) to the circle $x^2 + y^2 - 4x - 2y - 11 = 0$ with a pair of the radii joining the points of contact of these tangents is

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26. The extremities of a diameter of a circle have coordinates A(-4,3) and B(12,-1). Show that the length of its intercept on Y-axis is $4\sqrt{3}$.

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27. Show that the equation of the circles touching the Y-axis at (0,3) and making an intercept of 8 units on X-axis are $x^2 + y^2 = -10x - 6y + 9 = 0$

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28. Show that the point of intersection of the line $4x - 3y - 10 = 0$ and the circle $x^2 + y^2 - 2x + 4y - 20 = 0$ are (-2,-6) & (4,2)

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29. Show that the equation of a line passing through the point (11,-2) and touching the circle $x^2 + y^2 = 25$ is $3x + 4y = 25$.

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30. If $x + 3y = 0$ is a tangent to the circle with centre at (-1,2) then show that the other tangent to the circle from the origin is $3x = y = 0$

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31. Show that the radius of the circle lying in the first quadrant, passing through the point (1) and touchign both th axes is $2 \pm \sqrt{2}$.

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32. A circle touches Y-axis at (0,3) and makes an intercept 2 units on the +ve X-axis. Show that the centre of circleis $\left(\sqrt{10}, 3\right)$

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33. Two circles, each of radius 5 have a common tangent at (1,1), whose equation is $4x + 3y - 7 = 0$, show that the centres are (5,4) and (-3,-2).

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34. Show that the angle between the tangents drawn from (-1,3) to the circle $x^2 + y^2 = 5$ is 90°.

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35. If the circles $(x - 1)^2 + (y - 3)^2 = 4r^2$ and $x^2 + y^2 - 8x + 2y + 8 = 0$ intersect in two distinct points, then show that $1 < r < 4$.

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36. Show that the centre of the circle passing through the points (0,0) and (1,0) and touching the circle $x^2 + y^2 = 9$ is $\left(\frac{1}{2}, \pm\sqrt{2}\right)$

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37. If two distinct chords, drawn from the point (p,q) on the circle $x^2 + y^2 = px + qy$, where $pq \neq 0$ are bisected by x-axis then show that $p^2 > 8q^2$.

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38. A circle touches the X-axis and also touches externally the circle with centre (0,3) and radius 2. Show that the locus of the centre of circle is the parabola $x^2 = 10y - 5$.

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39. Let C be the circle with centre (0,0) and radius 3. Show that he equation of the locus of the mid points of the chord of the circle C that subtend an angle $\frac{2\pi}{3}$ at its centre is $x^2 + y^2 = \frac{9}{4}$.

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40. From the origin chords are drawn to the circle $(x - 1)^2 + y^2 = 1$. Show that the equation of the locus of the mid points of these chords is $x^2 + y^2 = x = 0$

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41. Through a fixed point (h,k) secants are drawn to the circle $x^2 + y^2 = r^2$. Show that the locus of the mid points of the position of the secants intercepted by the circle is $x^2 + y^2 = hx + ky$.

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42. Show that the area of the triangle formed by the tangents from the point (4,3) to the circle $x^2 + y^2 = 9$ and the line joining their points of contact is $\frac{192}{25}$ sq. units.

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43. Tangents are drawn from each point on the line $2x + y = 4$ to the circle $x^2 + y^2 = 4$. Show that the chord of contact pass through a point $\left(\frac{1}{2}, \frac{1}{4}\right)$.

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

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45. Show tha the tangents drawn from the origin in to the circle $x^2 + y^2 - 2ax - 2by + a^2 = 0$ are perpendicular if $a^2 - b^2 = 0$.

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46. Let a circle be given by

$2x(x - a) + y(2y - b) = 0, ab \neq 0$. Show that the condition on a and b if two chords, each bisected by the x-axis can be drawn to the circle from $\left(a, \frac{b}{2}\right)$ is $a^2 > 2b^2$.

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47. Two tangents are drawn from a point P to the circle $x^2 + y^2 + 2gx + 2fy + c = 0$. If these tangents cut the coordinate axes in concyclic points show hat the locus of P is

$(x + y + g + f)(x - y + g - f) = 0$

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EXERCISE -I

1. The circle with centre $\left(\frac{3}{2}, \frac{1}{2}\right)$ and radius $\sqrt{\frac{3}{2}}$ is

A. $x^2 + y^2 - 2x - 2y + 1 = 0$

B. $x^2 + y^2 + 2x + 2y + 1 = 0$

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

D. $x^2 + y^2 + 3x + y - 1 = 0$

Answer: C

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2. The equation of the circle with radius 3 and centre as the point of intersection the lines $2x + 3y = 5$, $2x - y = 1$ is

A. $x^2 + y^2 = 9$

B. $x^2 + y^2 - 2x - 2y - 7 = 0$

C. $x^2 + y^2 - 2x - 2y + 7 = 0$

D. $x^2 + y^2 + 9 = 0$

Answer: B

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3. Circle will centre origin and passing through (-1,2) is

A. $x^2 + y^2 = 5$

B. $x^2 + y^2 = 1$

C. $x^2 + y^2 = 2$

D. $x^2 + y^2 = 4$

Answer: A

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4. The circle concentric with $x^2 + y^2 + 4x + 6y + 3 = 0$ and radius 2 is

A. $x^2 + y^2 + 4x + 6y - 9 = 0$

B. $x^2 + y^2 + 4x + 6y + 9 = 0$

C. $x^2 + y^2 - 4x - 6y + 9 = 0$

D. $x^2 + y^2 = 4$

Answer: B

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5. Equation of circle passing through (-1,-2) and concentric with the circle $x^2 + y^2 + 3x + 4y + 1 = 0$

A. $x^2 + y^2 + 3x + 4y + 6 = 0$

B. $x^2 + y^2 - 3x - 4y + 6 = 0$

C. $x^2 + y^2 + 3x + 4y - 6 = 0$

D. $x^2 + y^2 + 3x - 4y - 6 = 0$

Answer: A

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6. If the centroid of an equilateral triangle is (1,1) and one of its vertices is (-1,2) then, equation of its circum circle is

A. $x^2 + y^2 - 2x - 2y - 3 = 0$

B. $x^2 + y^2 + 2x - 2y - 3 = 0$

C. $x^2 + y^2 - 4x - 6y + 9 = 0$

D. $x^2 + y^2 + x - y + 5 = 0$

Answer: A

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7. For the circle $ax^2 + y^2 + bx + dy + 2 = 0$ centre is (1,2) then $2b + 3d =$

A. -16

B. 16

C. 8

D. -8

Answer: A

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8. The area of the circle $x^2 + y^2 - 4x - 2y + k = 0$ is 25π square units then k=

A. 20

B. -20

C. ± 20

D. 0

Answer: B

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9. If (1,2) (2,a) are extremities of a diameter of the circle $x^2 + y^2 \_ 3x - 4y + 6 = 0$ then a=

A. 1

B. 2

C. 3

D. 4

Answer: B

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10. The circle through the points (2,3), (2,2), (3,2) is

A. $x^2 + y^2 + 2x + 3y = 0$

B. $x^2 + y^2 = 13$

C. $x^2 + y^2 - 5x - 5y + 12 = 0$

D. $x^2 + y^2 + 5x + 5y + 12 = 0$

Answer: C

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11. The equation of the circle passing through (2, 0) and (0, 4) and having the minimum radius is

A. $x^2 + y^2 = 20$

B. $x^2 + y^2 - 2x - 4y = 0$

C. $x^2 + y^2 = 4$

D. $x^2 + y^2 = 16$

Answer: B

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12. If the points (0,0),(2,0),(0,-2) and (k,-2) are concylic then k=

A. 2

B. -2

C. 0

D. 1

Answer: A

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13. If $x - y + 1 = 0$ meets the circle $x^2 + y^2 + y - 1 = 0$ at A and B , then the equation of the circle with AB as diameter is

A. $2\left(x^2 + y^2\right) + 3x - y + 1 = 0$

B. $2\left(x^2 + y^2\right) + 3x - y + 2 = 0$

C. $2\left(x^2 + y^2\right) + 3x - y + 3 = 0$

D. $x^2 + y^2 + 3x - y + 1 = 0$

Answer: A

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14. If the lines $x - 2y + 3 = 0, 3x + ky + 7 = 0$ cut the coordinate axes in concylic points, then k=

A. 1.5

B. 0.5

C. $-3/2$

D. -4

Answer: C

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15. If a circle is inscribed in a square of side 10, so that the circle touches the four sides of the square internally then radius of the circle is

A. 10

B. $5\sqrt{2}$

C. $10\sqrt{2}$

D. 5

Answer: D

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

A. 1

B. 2

C. 3

D. 4

Answer: B

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17. The equation of the circle with centre (3,2) and the power of (1,-2) w.r.t the circle $x^2 + y^2 = 1$, as radius is

A. $x^2 + y^2 - 6x - 4y - 3 = 0$

B. $x^2 + y^2 - 3x - 2y - 3 = 0$

C. $x^2 + y^2 + 6x + 4y - 3 = 0$

D. $x^2 + y^2 - 6x - 4y + 3 = 0$

Answer: A

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18. If a line is drawn through a point A(3,4) to cut the circle $x^2 + y^2 = 4$ at P and Q then AP .AQ=

A. 15

B. 17

C. 21

D. 25

Answer: C

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

A. $PA. PB < PC. PD$

B. $PA. PB = PC. PD$

C. $PA. PC = PB. PD$

D. $PA. PB > PC. PD$

Answer: B

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20. A chord of length 24 units is a distance of 5 units from the centre of a circle then its radius is

A. 5

B. 12

C. 13

D. 10

Answer: C

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

A. $x^2 + y^2 - 8x = 0$

B. $x^2 + y^2 - 8x - 2y + 8 = 0$

C. $x^2 + y^2 - 8x + 2y + 8 = 0$

D. $x^2 + y^2 - 8x + 4 = 0$

Answer: B

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22. The intercept made by the circle $x^2 + y^2 - 4x - 6y - 3 = 0$ on the line $x + y - 3 = 0$ is

A. $\sqrt{14}$

B. $2\sqrt{14}$

C. $6\sqrt{2}$

D. $3\sqrt{2}$

Answer: B

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23. The length of the tangent from (1,1) to the circle $2x^2 + 2y^2 + 5x + 3y + 1 = 0$ is

A. $\sqrt{13/2}$

B. 3

C. 2

D. 1

Answer: A

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

A. (7,-8)

B. (-7,8)

C. (7,8)

D. (-7,-8)

Answer: B

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25. The locus of the point from which the length of the tangent to the circle $x^2 + y^2 - 2x - 4y + 4 = 0$ is 3 units is

A. $x^2 + y^2 - 2x - 4y = 9 = 0$

B. $x^2 + y^2 - 2x - 4y - 4 = 0$

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

D. $x^2 + y^2 - 2x - 4y - 5 = 0$

Answer: D

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26. The equation of the tangent to the circle $x^2 + y^2 - 4x + 4y - 2 = 0$ at (1,1) is

A. $x - 3y + 2 = 0$

B. $x + 3y - 2 = 0$

C. $3x + y - 1 = 0$

D. $x + 3y = 4$

Answer: A

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27. The tangent to the circle $x^2 + y^2 - 4x + 2y + k = 0$ at (1,1) is $x - 2y + 1 = 0$ then k=

A. -1

B. 0

C. 1

D. 2

Answer: B

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28. The equation of the tangents to the circle $x^2 + y^2 = 25$ with slope 2 is

A. $y = 2x \pm \sqrt{5}$

B. $y = 2x \pm 2\sqrt{3}$

C. $y = 2x \pm 3\sqrt{5}$

D. $y = 2x \pm 5\sqrt{5}$

Answer: D

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29. The equation of the tangents to the circle $x^2 + y^2 = 4$ which are parallel to x-axis are

A. $x = \pm 2$

B. $y = \pm 2$

C. $y = \pm 1$

D. $y = \pm 4$

Answer: B

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30. The point of contact of $y = x + 3\sqrt{2}$ with $x^2 + y^2 = 9$ is

A. $\left(\frac{3}{\sqrt{2}}, \frac{3}{\sqrt{2}}\right)$

B. $\left(\frac{3}{\sqrt{2}}, \frac{2}{\sqrt{2}}\right)$

C. $\left(\frac{-3}{\sqrt{2}}, \frac{3}{\sqrt{2}}\right)$

D. $\left(\frac{3}{\sqrt{2}}, \frac{-3}{\sqrt{2}}\right)$

Answer: C

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31. The circle to which two tangents can be drawn from origin is

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

B. $x^2 + y^2 + 4x + 2y + 2 = 0$

C. $x^2 + y^2 - 8x + 6y + 1 = 0$

D. Both 2 and 3

Answer: D

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

A. $y + 1 = 0$

B. $y + 2 = 0$

C. $y + 3 = 0$

D. $y - 2 = 0$

Answer: B

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33. The number of tangents to the circle $x^2 + y^2 = 5$, that can be drawn from (2,3) is

A. 0

B. 1

C. 2

D. infinity

Answer: C

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34. The circle with centre (4,-1) and touching x-axis is

A. $x^2 + y^2 - 8x + 2y + 16 = 0$

B. $x + y^2 + 18x - 2y - 16 = 0$

C. $x^2 + y^2 - 4x + y + 4 = 0$

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

Answer: A

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35. Circle touching both the axes and radius 5 is

A. $x^2 + y^2 - 10x - 10y + 25 = 0$

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

C. $x^2 + y^2 + 10x - 10y + 25 = 0$

D. all the above

Answer: D

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36. The circle $4x^2 + 4y^2 - 12x - 12y + 9 = 0$

A. touches both the axes

B. touches the x-axis only

C. touches the y-axis only

D. does not touche the axes

Answer: A

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37. The equation of the circle of radius 5 and touching the coordinate axes in third quadrant is

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

B. $(x + 5)^2 + (y + 5)^2 = 25$

C. $(x + 4)^2 + (y + 4)^2 = 25$

D. $(x + 6)^2 + (y + 6)^2 = 25$

Answer: B

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38. The circle $x^2 + y^2 - 2ax - 2ay + a^2 = 0$ touches axes of co ordinates at

A. (a,a),(0,0)

B. (a,0),(0,0)

C. (a,0),(0,a)

D. (0,a),(1,a)

Answer: C

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39. If the line x+3y=0 is tangent at (0,0) to the circle of radius 1, then the centre of one such circle is

A. $(3, 0)$

B. $\left(\frac{-1}{\sqrt{10}}, \frac{3}{\sqrt{10}}\right)$

C. $\left(\frac{3}{\sqrt{10}}, \frac{-3}{\sqrt{10}}\right)$

D. $\left(\frac{1}{\sqrt{10}}, \frac{3}{\sqrt{10}}\right)$

Answer: D

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40. The y-intercept of the circle $x^2 + y^2 + 4x + 8y - 5 = 0$ is

A. $2\sqrt{21}$

B. $2\sqrt{19}$

C. 6

D. 12

Answer: A

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41. In intercept made by the circle with centre (2,3) and radius 6 on y-axis is

A. $18\sqrt{2}$

B. $12\sqrt{2}$

C. $8\sqrt{2}$

D. $6\sqrt{2}$

Answer: C

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42. The intercept made by the circle $x^2 + y^2 + 4x - 8y + c = 0$ on x-axis is $2\sqrt{10}$ then c=

A. -6

B. 6

C. ± 6

D. 12

Answer: A

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43. The centre of the circle passing through origin and making intercepts 8 and -4 on x and y-axes respectively is

A. (4,-2)

B. (-2,4)

C. (8,-4)

D. both 1 and 2

Answer: A

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44. If $x^2 + y^2 - 4x - 6y + k = 0$ touches x-axis then k=

A. ± 20

B. $-1, \ -5$

C. ± 2

D. 4

Answer: D

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45. Statement I: The circle with the points of intersectionof the line $3x + 4y = 12$ with axes as extremities of a diameter is $x^2 + y^2 - 4x - 3y = 0$

Statement II: The circle passing through (0,0) and making intercepts 8 and 6 on x,y axes, has its is (-4,2).

Which of above statement is false?

A. only I

B. only II

C. both I and II

D. neigther I nor II

Answer: B

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46. Parametric equation of the circle $x^2 + y^2 = 16$ are

A. $x = 4\cos\theta, y = 4\sin\theta$

B. $x = 4\cos\theta, y = 4\tan\theta$

C. $x = 4\cos h\theta, y = 4\sin h\theta$

D. $x = 4\sec\theta, y = 4\tan\theta$

Answer: A

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47. The parametric equations of the circle $x^2 + y^2 + 2x + 4y - 11 = 0$ are

A. $x = 1 + 4\cos\theta, y = 2 + 4\sin\theta$

B. $x = -1 + 4\cos\theta, y = 2 + 4\sin\theta$

C. $x = -1 + 4\cos\theta, y = -2 + 4\sin\theta$

D. $x = 1 - 4\cos\theta, y = 2 - 4\sin\theta$

Answer: C

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48. If $x = 3 + 2\cos\theta, y = 5 + 2\sin\theta$ then the locus of the point (x,y) is a circle with centre and radius

A. (2,5),-2

B. (3,5),2

C. (5,7),6

D. (8,11),4

Answer: B

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49. Locus of the point $(\sec h\theta, \tan h\theta)$ is

A. $x^2 + y^2 = 1$

B. $x^2 - y^2 = 1$

C. $x^2 + y^2 + 1 = 0$

D. $x^2 - y^2 = x + y$

Answer: A

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50. Locus of the point $(\cos\theta + \sin\theta, \cos\theta - \sin\theta)$ where θ is parameter is

A. $x^2 + y^2 = 1$

B. $x^2 + y^2 = 4$

C. $x^2 + y^2 = 2$

D. $y^2 = 4ax$

Answer: C

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51. To the circle $x^2 + y^2 - 8x - 4y + 4 = 0$ tangent at the point $\theta = \frac{\pi}{4}$ is

A. $x + y + 2 - 4\sqrt{2} = 0$

B. $x - y + 2 - 4\sqrt{2} = 0$

C. $x + y + 4 + 4\sqrt{2} = 0$

D. $x - y - 2 - 4\sqrt{2} = 0$

Answer: A

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52. The normal at θ of the circle $x^2 + y^2 = a^2$ is

A. $x\cos\theta + y\sin\theta = 0$

B. $x\cos\theta - y\sin\theta = 0$

C. $x\sin\theta + y\cos\theta = 0$

D. $x\sin\theta - y\cos\theta = 0$

Answer: D

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53. The chord of contact of (2,1) w.r.t to the circle $x^2 + y^2 + 4x + 4y + 1 = 0$ is

A. $2x + y + 7 = 0$

B. $4x + 3y + 7 = 0$

C. $3x + 4y + 1 = 0$

D. not existing

Answer: B

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54. The chord of contact of (1,2) with respect to the circle $x^2 + y^2 - 4x - 6y + 2 = 0$ is

A. $x + y - 6 = 0$

B. $x + 2y - 2 = 0$

C. $2x + y + 6 = 0$

D. not existing

Answer: D

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55. Find the inverse point of (-2,3) with respect to the circle $x^2 + y^2 - 4x - 6y + 9 = 0$

A. $x = y$

B. $x + y = 0$

C. $x = 0$

D. $y = 0$

Answer: C

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56. For all real values of k, the polar of the point (2k, k-4) with respect to $x^2 + y^2 - 4x - 6y + 1 = 0$ passes through the point

A. (1,1)

B. (1,-1)

C. (-3,1)

D. (3,1)

Answer: D

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57. The polar of (2,3) w.r.t the circle $x^2 + y^2 - 4x - 6y + 2 = 0$ is

A. a tangent

B. a diameter

C. a chord of contact

D. not existing

Answer: D

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58. The polar of the line 8x-2y=11 with respect to the circle $2x^2 + 2y^2 = 11$ is

A. (4,1)

B. (4,-1)

C. (3,1)

D. (4,2)

Answer: B

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59. Pole of $3x + 5y + 17 = 0$ w.r.t the circle $x^2 + y^2 + 4x + 6y + 9 = 0$ is

A. (-1,2)

B. (1,2)

C. (1,2)

D. (2,1)

Answer: B

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60. If $ax + by + c = 0$ is the polar of $(1, 1)$ with respect to the circle $x^2 + y^2 - 2x + 2y$

$+1 = 0$ and H. C. F. of a, b, c is equal to

one then find $a^2 + b^2 + c^2$.

A. 0

B. 3

C. 5

D. 15

Answer: C

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61. If (1,4), (-2,3) are conjugate points w.r.t $x^2 + y^2 = k$ then k=

A. 10

B. $\sqrt{10}$

C. 100

D. 4

Answer: A

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62. If (1, a), (b, 2) are conjugate points with renpcet to the circle $x^2 + y^2 = 25$, then 4a+2b=

A. 25

B. 50

C. 100

D. 150

Answer: B

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63. If (1,1), (k,2) are conjugate points with respect to the circle $x^2 + y^2 + 8x + 2y + 3 = 0$, then k=

A. -12

B. $\frac{-12}{7}$

C. $\frac{-12}{5}$

D. -4

Answer: C

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64. If (4,2) and (k,-3) are conjugate points with respect to $x^2 + y^2 - 5x + 8y + 6 = 0$ them k=

A. $\frac{28}{3}$

B. $-\frac{28}{3}$

C. $\frac{3}{28}$

D. $\frac{-3}{28}$

Answer: A

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65. If $3x + 2y = 3$ and $2x + 5y = 1$ are conjugate lines w.r.t the circle $x^2 + y^2 = r^2$ then $r^2 =$

A. $\frac{3}{16}$

B. $\frac{16}{3}$

C. $\frac{4}{\sqrt{3}}$

D. $\frac{\sqrt{3}}{4}$

Answer: A

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66. The condition for the lines $lxk + my + n = 0$ and $l_1x + m_1y + n_1 = 0$ to be conjugate with respect to the circle $x^2 + y^2 = r^2$ is

A. $r^2(ll_1 + mm_1) = \mathrm{nn}_1$

B. $r^2(ll_1 - mm_1) = \mathrm{nn}_1$

C. $r^2 + (ll_1 + mm_1) + \mathrm{nn}_1 = 0$

D. $r^2(lm_1 + ml_1) = \mathrm{nn}_1$

Answer: A

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67. If $kx + 3y = 1, 2x + y + 5 = 0$ are conjugate liens w.r.t the circle $x^2 + y^2 - 2x - 4y - 4 = 0$ then k=

A. 3

B. 4

C. 2

D. 1

Answer: C

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68. If (6,8),(k,2) are inverse points w.r.t the circle $x^2 + y^2 = 25$ then 2k=

A. 1

B. 3

C. 5

D. 7

Answer: B

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69. The inverse point of (1,-1) with respect to the circle $x^2 + y^2 = 4$, is

A. (-1,1)

B. (2,-2)

C. (1,-1)

D. (2,2)

Answer: B

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70. The inverse of the point (1, 2) with respect to the circle $x^2 + y^2 - 4x - 6y + 9 = 0$ is

A. (0,0)

B. (1,0)

C. (0,1)

D. (1,1)

Answer: C

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71. The piont where the line 4x - 3y + 7 = 0 touches the circle $x^2 + y^2 - 6x + 4y - 12 = 0$ is

A. (1,1)

B. (1,-1)

C. (-1,1)

D. (-1,-1)

Answer: C

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72. The equation of the chord of the circle $x^2 + y^2 - 4x + 6y - 3 = 0$ having (1,-2) as it midpoint is

A. $x + y + 1 = 0$

B. $2x + 3y + 4 = 0$

C. $x - y - 3 = 0$

D. not existing

Answer: C

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73. The mid point of the chord $x - 2y + 7 = 0$ w.r.t the circle $x^2 + y^2 - 2x - 10y + 1 = 0$ is

A. $(7, 21)$

B. $\left(\frac{7}{4}, \frac{21}{4}\right)$

C. $\left(\frac{7}{5}, \frac{21}{5}\right)$

D. $\left(\frac{-7}{4}, \frac{-21}{4}\right)$

Answer: C

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74. The pair of tangents from (2,1) to the circle $x^2 + y^2 = 4$ is

A. $3x^2 + 4xy + 16x + 8y + 20 = 0$

B. $3x^2 + 4xy + 16x - 8y + 20 = 0$

C. $3x^2 + 4xy - 16x - 8y + 20 = 0$

D. $3x^2 - 4y - 16x + 8y - 20 = 0$

Answer: C

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75. The angle between the tangents drawn from the origin to the circle $x^2 + y^2 + 4x - 6y + 4 = 0$ is

A. $\tan^{-1}\left(\frac{5}{13}\right)$

B. $\tan^{-1}\left(\frac{5}{12}\right)$

C. $\tan^{-1}\left(\frac{12}{5}\right)$

D. $\tan^{-1}\left(\frac{13}{5}\right)$

Answer: C

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76. The pair of tangents from origin to the circle $x^2 + y^2 + 4x + 2y + 3 = 0$ is

A. $(2x + y)^2 = 3\left(x^2 + y^2\right)$

B. $(4x = 2y)^2 = 3\left(x^2 + y^2\right)$

C. $(2x - y)^2 = 3\left(x^2 + y^2\right)$

D. not existing

Answer: A

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77. The pair of tangents from origin to $x^2 + y^2 + 4x + 2y - 3 = 0$ is

A. $(2x + y)^2 = 3\left(x^2 + y^2\right)$

B. $(2x + y)^2 = 33\left(x^2 + y^2\right)$

C. $(2x - y)^2 = -3\left(x^2 - y^2\right)$

D. not existing

Answer: D

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78. The circles $x^2 + y^2 - 8x + 6y + 21 = 0, x^2 + y^2 + 4x = 10y - 115 = 0$ are

A. intersecting

B. touching externally

C. touching internally

D. one is lying inside the other

Answer: C

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79. The circles $x^2 + y^2 - 12x + 8y + 48 = 0, x^2 + y^2 - 4x + 2y - 4 = 0$ are

A. intersecting

B. touching externally

C. touching internally

D. one is lying inside the other

Answer: B

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80. The circles $x^2 + y^2 - 2x - 4y - 20 = 0, x^2 + y^2 + 4x - 2y + 4 = 0$ are

A. one lies out side the other

B. one lies completely inside the other

C. touch externally

D. touch internally

Answer: A

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81. The number of common tangents to $x^2 + y^2 = 8, x^2 + y^2 = 2$ is

A. one

B. two

C. four

D. zero

Answer: D

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82. The number of common tangents to $x^2 + y^2 = 256, (x - 3)^2 + (y - 4)^2 = 121$ is

A. one

B. two

C. four

D. zero

Answer: A

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83. The number of common tangentss to the circles $x^2 + y^2 - 8x + 2y = 0$ and $x^2 + y^2 - 2x - 16y + 25 = 0$ is

A. 1

B. 2

C. 3

D. 4

Answer: B

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84. The point at which the circles $x^2 + y^2 - 4x - 4y + 7 = 0$ and $x^2 + y^2 - 12x - 10y + 45 = 0$ touch each other is

A. $\left(\frac{13}{5}, \frac{14}{5}\right)$

B. $\left(\frac{2}{5}, \frac{5}{6}\right)$

C. $\left(\frac{14}{5}, \frac{13}{5}\right)$

D. $\left(\frac{12}{5}, 2 + \frac{\sqrt{21}}{4}\right)$

Answer: C

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85. The internal centre of similitude of the circles $x^2 + y^2 - 2x + 4y + 4 = 0, x^2 + y^2 + 4x - 2y + 1 = 0$ divides the segment joining their centres in the ratio

A. 0.0430555555555556

B. 0.0840277777777778

C. $-1:2$

D. $-2:1$

Answer: A

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86. The external centre of similitude of the circle $x^2 + y^2 - 12x + 7y + 48 = 0$ and $x^2 + y^2 - 4x + 2y - 4 = 0$ divides the segment joining centres in the ratio.

A. 0.0854166666666667

B. 0.126388888888889

C. $-2:3$

D. $-3:2$

Answer: C

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87. The internal centre of similitude of two circles $(x - 3)^2 + (y - 2)^2 = 9, (x + 5)^2 + (y + 6)^2 = 9$ is

A. (-1,-2)

B. (-2,-1)

C. (3,2)

D. (-5,-6)

Answer: A

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88. The centre of circle passing through three non collinear points A,B,C is the concurrent point of

A. Angle bisectors of ΔABC

B. Perpendicular bisectors of the sides of ΔABC

C. Altitudles of the ΔABC

D. Medias of the ΔABC

Answer: B

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89. The area (in sq units) of the triangle formed by the tangent, normal at $\left(1, \sqrt{3}\right)$ to the circle $x^2 + y^2 = 4$ and the X-axis, is

A. $4\sqrt{3}$

B. $\frac{7}{2}\sqrt{3}$

C. $2\sqrt{3}$

D. $\frac{1}{2}\sqrt{3}$

Answer: C

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EXERCISE II

1. The radius of the circle passing through (6,2) and the equation of two normals for the circle are $x + y = 6$ and $x + 2y = 4$ is

A. $\sqrt{5}$

B. $2\sqrt{5}$

C. $3\sqrt{5}$

D. $4\sqrt{5}$

Answer: B

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2. The equation of the circle concentric with the circle $x^2 + y^2 - 6x + 12y + 15 = 0$ and of double its area is:

A. $x^2 + y^2 - 6x + 12y - 15 = 0$

B. $x^2 + y^2 - 6x + 12y - 30 = 0$

C. $x^2 + y^2 - 6x + 12y - 25 = 0$

D. $x^2 + y^2 - 6x = 12y - 20 = 0$

Answer: A

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3. If the line 3x-2y + 6=0 meets X-axis and Y-axis respectively at A and B, then the equalion of the circle with radius AB and centre at A. is

A. $x^2 + y^2 + 4x + 9 = 0$

B. $x^2 + y^2 + 4x - 9 = 0$

C. $x^2 + y^2 - 4 + 4 = 0$

D. $x^2 + y^2 + 4x - 4 = 0$

Answer: B

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4. Origin is the centre of a circle passing through the vertices of an equilateral triangie whose median is of length 3a then the equation of the circle is

A. $x^2 + y^2 = a^2$

B. $x^2 + y^2 = 2a^2$

C. $x^2 + y^2 = 3a^2$

D. $x^2 + y^2 = 4a^2$

Answer: D

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5. The lines $2x - 3y + 5$ and $3x - 4y = 7$ are the diameters of a circle of area 154 sq. units. Then equation of circle is

A. `(x+1)^(2)+(y+1)^(2)=49

B. `(x-1)^&(2)+(y-1)^(2)=49

C. `(x-1)^(2)+(y+1)^(2)=49

D. `(x+1)^(2)+(y-1)^(2)=49

Answer: C

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6. The diameters of a circle pre along 2x+y-7=0 and x+3y- 11=0. Then, the equation of this circle, which also passes through (5,7) is:

A. $x^2 + y^2 - 4x - 6y - 16 = 0$

B. $x^2 + y^2 - 4x - 6y - 20 = 0$

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

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

Answer: C

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

A. $x^2 + y^2 = c^2$

B. $x^2 - y^2 = 2c$

C. $x - y^2 = c^2$

D. $x^2 + y^2 = 2c^2$

Answer: B

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8. Centre and radius of the circle with segment of the line $x + y = 1$ cut off by coordinate axes as diameter is

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

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

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

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

Answer: A

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9. The line x+y=1 cuts the coordinate axes at P and Q and a line perpendicular to it meet the axes R and S. The equation to the locus of the intersection of lines PS and QR is

A. $x^2 + y^2 = 1$

B. $x^2 + y^2 - 2x - 2y = 0$

C. $x^2 + y^2 - x - y = 0$

D. $x^2 + y^2 + x + y = 0$

Answer: C

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10. The equation of the circle passing through (2, 0) and (0, 4) and having the minimum radius is

A. $x^2 + y^2 = 4$

B. $x^2 + y^2 - 2x + 4y = 0$

C. $x^2 + y^2 - x - 2y = 0$

D. $x^2 + y^2 - 2x - 4y = 0$

Answer: D

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11. The abscissae of two points A and B are the roots of the equation $x^2 + 2ax - b^2 = 0$ and their ordinate are the roots fo the equations $y^2 + 2py - q^2 = 0$ then the radius of the circle with AB as diameter is

A. $\sqrt{a^2 + b^2 + p^2 + q^2}$

B. $\sqrt{a^2 + p^2}$

C. $\sqrt{b^2 + q^2}$

D. $\sqrt{a^2 + b^2 - p^2 - q^2}$

Answer: A

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12. If the circles described on the line joining the points (0,1) and (α, β) as diameter cuts the axis of the points whose abscissae are the roots of the equation $x^2 - 5x + 3 = 0$ then $(\alpha, \beta) =$

A. (5,3)

B. (3,5)

C. (-5,3)

D. (-5,-3)

Answer: A

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13. A rod AB of length 4 units moves horizontally with its left end A always on the circle $x^2 + y^2 - 4x - 18y - 29 = 0$ then the locus of the other end B is

A. $x^2 + y^2 - 12x - 8y + 3 = 0$

B. $x^2 + y^2 - 12x - 18y + 3 = 0$

C. $x^2 + y^2 + 4x - 7y - 29 = 0$

D. $x^2 + y^2 - 4x - 16y + 19 = 0$

Answer: B

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14. A line segment AM=a moves in the XOY plane such that AM is parallel to the X-axis. If A moves along the circle $x^2 + y^2 = a^2$, then the locus of M is

A. $x^2 + y^2 = 4a^2$

B. $x^2 + y^2 = 2ax$

C. $x^2 + y^2 = 2ay$

D. $x^2 + y^2 = 2ax + 2ay$

Answer: B

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15. 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

A. $(3x + 1)^2 + (3y)^2 = a^2 - b^2$

B. $(3x - 1)^2 + (3y)^2 = a^2 - b^2$

C. $(3x - 1)^2 + (3y)^2 = a^2 + b^2$

D. $(3x + 1)^2 + (3y)^2 = a^2 + b^2$

Answer: C

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16. A circle of constant radius 3k passes through (0,0) and cuts the axes in A and B then the locus of centroid of triangle OAB is

A. $x^2 + y^2 = k^2$

B. $x^2 + y^2 = 2k^2$

C. $x^2 + y^2 = 3k^2$

D. $x^2 + y^2 = 4k^2$

Answer: D

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17. A circle passes through origin and meets the axes at A and B so that (2,3) lies on $\overline{AB}$ then the locus of centroid of ΔOAB is

A. $2x - 3y = 6xy$

B. $2x + 3y = 6xy$

C. $3x - 2y = 3xy$

D. $3x + 2y = 3xy$

Answer: D

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18. A rod PQ of length 2a sides with its ends on the axes the locus of the circumcentre of $\triangle OPQ$ is

A. $x^2 + y^2 = 2a^2$

B. $x^2 + y^2 = 4a^2$

C. $x^2 + y^2 = 3a^2$

D. $x^2 + y^2 = a^2$

Answer: D

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19. A line is at a distance c from origin and meets axes in A an dB. The locus of the centre of the circle passing through O,A,B ais

A. $x^{-2} + y^{-2} = c^{-2}$

B. $x^{-2} + y^{-2} = 2x^{-2}$

C. $x^{-2} + y^{-2} = 3c^{-2}$

D. $x^{-2} + y^{-2} = 4c^{-2}$

Answer: D

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20. A right angled isosceles triangle is inscribed in the circle $x^2 + y^2 - 4x - 2y \equiv 0$ then length of the side of the triangle is

A. $\sqrt{2}$

B. $2\sqrt{2}$

C. $3\sqrt{2}$

D. $5\sqrt{2}$

Answer: C

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21. If an equilateral triangle is inscribed in the circle $x^2 + y^2 - 6x - 4y + 5 = 0$ then its side is

A. $\sqrt{6}$

B. $2\sqrt{6}$

C. $3\sqrt{6}$

D. $4\sqrt{6}$

Answer: B

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22. The locus of the foot of the perpendicular drawn from orign to a variable line passing through fixed point (2,3) is a circle whose diameter is

A. $\sqrt{13}$

B. $\frac{\sqrt{13}}{2}$

C. $2\sqrt{13}$

D. $\sqrt{26}$

Answer: A

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23. A square is inscribed in the circle$x^2 + y^2 - 4x + 6y - 5 = 0$ whose sides are parallel to co-ordinate axes then vetices of square are

A. (5,0),(5,-6),(-1,0),(-1,-6)

B. (5,1),(5,-6),(-,1),(-1,-6)

C. (5,-1),(5,6),(-1,0),(1,-6)

D. (0,5),(-6,5),(0,-1),(6,1)

Answer: A

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24. A square is inscribed in the circel $x^2 + y^2 - 2x + 7y - 8 = 0$ whose diagonals are parallel to axes and a vertex in the first quadrant is A then OA is

A. 2

B. $\sqrt{2}$

C. $2\sqrt{2}$

D. 3

Answer: B

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25. The length of the tangent drawn to the circle $x^2 + y^2 - 2x + 4y - 11 = 0$ from the point (1,3) is

A. 1

B. 2

C. 3

D. 4

Answer: C

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26. If $\left(m_1, 1/m_1\right), i = 1, 2, 3, 4$ are concyclic points, then the value of $m_1 m_2 m_3 m_4$ is

A. 1

B. -1

C. 0

D. ∞

Answer: A

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27. The equation of the image of the circle $x^2 + y^2 - 6x - 4y + 12 = 0$ by the line mirror x+y-1=0 is

A. $x^2 + y^2 + 2x + 4y + 4 = 0$

B. $x^2 + y^2 - 2x + 4y + 4 = 0$

C. $x^2 + y^2 + 2x + 4y - 4 = 0$

D. $x^2 + y^2 + 2x - 4y + 4 = 0$

Answer: A

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28. The area bounded by circles $x^2 + y^2 = r^2, r = 1, 2$ and rays given by $2x^2 - 3xy - 2y^2 = 0(h > 0)$ is

A. π

B. $\frac{3\pi}{4}$

C. $\frac{\pi}{2}$

D. $\frac{\pi}{4}$

Answer: B

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29. The shortest distance from (-2,14) to the circle $x^2 + y^2 - 6x - 4y - 12 = 0$ is

A. 4

B. 6

C. 8

D. 10

Answer: C

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30. The longest distance from (-3,2) to the circle

A. 8

B. 4

C. 18

D. 6

Answer: D

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31. If the line $y = 2x + c$ is a tangent to the circle $x^2 + y^2 = 5$ then a value of c is

A. 3

B. 2

C. 5

D. 4

Answer: C

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32. The sum of the minimum and maximum distances of the point (4,-3) to the circlex^2 +y^2+4x-10y-7=0

A. 10

B. 12

C. 16

D. 20

Answer: D

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33. If the lines $3x - 4y + 4 = 0$ and $6x - 8y - 7 = 0$ are tangents to a circle, then the radius of the circle is

A. $\frac{3}{4}$

B. $\frac{1}{2}$

C. $\frac{7}{8}$

D. $\frac{11}{10}$

Answer: A

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34. The nearest point on the circle $x^2 + y^2 - 6x + 4y - 12 = 0$ from (-5,4) is

A. (1,1)

B. (-1,1)

C. (-1,2)

D. (-2,2)

Answer: B

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35. The least distance of the line 8x-4y+73=0 from the circle $16x^2 + 16y^2 + 48x - 8y - 43 = 0$

A. $\sqrt{5}/2$

B. $2\sqrt{5}$

C. $3\sqrt{5}$

D. $4\sqrt{5}$

Answer: B

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36. If d_1 and d_2 are the longest the shortest distance of (-7,2) from any point (α, β) on the curve whose equation is $x^2 + y^2 - 10x - 14y = 51$ then G.M. of d_1 and d_2 is

A. $\sqrt{11}$

B. 7

C. 2

D. $2\sqrt{11}$

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37. Equation of circle passing through $\left(1, \sqrt{3}\right), \left(1, -\sqrt{3}\right)$ and $\left(3, -\sqrt{3}\right)$ is

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

B. $(x+2)^2 + y^2 = 4$

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

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

Answer: A

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38. The equation of the circle of radius 3 that lies in 4th quadrant and touching the lines $x = 0, y = 0$ is

A. $x^2 + y^2 - 6x + 6y + 9 = 0$

B. $x^2 + y^2 - 6x - 6y + 9 = 0$

C. $x^2 + y^2 + 6x - 6y + 9 = 0$

D. $x^2 + y^2 + 6x + 6y + 9 = 0$

Answer: A

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39. If the points (2,0) (0,1), (4,0) and (0,a) are concylic then a=

A. 2

B. 4

C. 6

D. 8

Answer: D

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40. If $O = (0, 0), A = (1, 0)$ and $B = \left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$ then centre of circle for which the lines OA, OB and AB are tangents is

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

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

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

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

Answer: A

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41. The circle passing through (5,-5),(1,7),(-7,1) is

A. $x^2 + y^2 = 50$

B. $x^2 + y^2 - 5x + 5y = 0$

C. $x^2 + y^2 - 6x - 8y = 0$

D. $x^2 + y(2) = 5$

Answer: A

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42. ABCD is a square with side a. If AB and AD are taken as positive coordinate axes then equation of circle circumscribing the square is

A. $x^2 + y^2 - ax - ay = 0$

B. $x^2 + y^2 + ax + ay = 0$

C. $x^2 + y^2 - ax + ay = 0$

D. $x^2 + y^2 + ax - ay = 0$

Answer: A

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43. Centre of circle passing through A(0,1), B(2,3), C(-2,5) is

A. (-1,10)

B. $\left(\frac{-1}{3}, \frac{10}{3}\right)$

C. $\left(\frac{10}{3}, \frac{-2}{3}\right)$

D. $\left(\frac{1}{3}, \frac{10}{3}\right)$

Answer: B

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44. Centre of the circle circumscribed in a rectangle formed by the lines $x^2 - 8x + 12 = 0$ and $y^2 - 14y + 40 = 0$ is

A. (4,7)

B. (7,4)

C. (9,4)

D. (4,9)

Answer: A

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45. If the lines $2x + 3y + 1 = 0$, $6x + 4y + 1 = 0$ intersect the co-ordinate axes in 4 points, then the circle passing through the points is

A. $12x^2 + 12y^2 + 8x + 7y + 1 = 0$

B. $6x^2 + 6y^2 + 3x + y = 0$

C. $12x^2 + 12y^2 + 8x + 7y + 3 = 0$

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

Answer: A

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46. Two rods of legths a and b slide along coordinate axes. Such that their ends are concylic. Locus of the centre of the circle is

A. $4\left(x^2 + y^2\right) = a^2 + b^2$

B. $4\left(x^2 + y^2\right) = a^2 - b^2$

C. $4\left(x^2 - y^2\right) = a^2 - b^2$

D. $xy = ab$

Answer: C

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47. If a line through P(-2,3) meets the circle $x^2 + y^2 - 4x + 2y + k = 0$ at A and B such that PA.PB=31 then the radius of the circles is

A. 1

B. 2

C. 3

D. 4

Answer: A

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48. The locus of centre of a circle which passes through the origin and cuts off a length of 4 units from the line $x = 3$ is

A. $y^2 + 6x = 0$

B. $y^2 + 6x = 13$

C. $y^2 + 6x = 10$

D. $x^2 + 6y = 13$

Answer: B

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49. Equation of circle with centre (3,-1) and which cuts off a chord of length 6 on the line $2x - 5y + 18 = 0$ is

A. $x^2 + y^2 + 6x + 2y + 28 = 0$

B. $x^2 + y^2 - 6x + 2y - 28 = 0$

C. $x^2 + y^2 + 2y - 28 = 0$

D. $x^2 + y^2 - 6x + 2y + 28 = 0$

Answer: B

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50. If the line $3x - 4y = \lambda$ cuts the circle $x^2 + y^2 - 4x - 8y - 5 = 0$ in two points then limits of λ are

A. $[-35, 15]$

B. $(-35, 15)$

C. $(-35, 10)$

D. $(-35, 15]$

Answer: B

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

A. 2

B. 4

C. $\sqrt{2}$

D. 8

Answer: B

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52. If the chord $y = mx + 1$ of the circle $x^2 + y^2 = 1$ subtends an angle of measure $45°$ at the major segment of the circle then m=

A. 0.02

B. -1

C. -2

D. 3

Answer: B

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53. The triangle PQR is incribed in the circle $x^2 + y^2 = 25$.If $Q = (3, 4)$ and R=(-4,3) then $\angle QPR =$

A. $\frac{\pi}{2}$

B. $\frac{\pi}{3}$

C. $\frac{\pi}{4}$

D. $\frac{\pi}{6}$

Answer: C

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54. The radius of circle having centre at (2,1) and whose on of the chord is diameter of the circle $x^2 + y^2 - 2x - 6y + 6 = 0$ is

A. 1

B. 2

C. 3

D. 4

Answer: C

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55. The locus of th point (l,m). If the line lx+my=1 touches the circle $x^2 + y^2 = a^2$ is

A. $x^2 + y^2 = 2a^2$

B. $2x^2 + 2y^2 = a^2$

C. $a^2\left(x^2 + y^2\right) = 1$

D. $a^2\left(x^2 + y^2\right) = 2$

Answer: C

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56. Equation of the tangent to the circle $x^2 + y^2 - 2x + 4y - 4 = 0$ which is parallel to the line $3x + 4y - 1 = 0$ is

A. $3x + 4y = 5$

B. $3x + 4y = 15$

C. $3x + 4y = 10$

D. $3x - 4y = 10$

Answer: C

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57. Locus of point of intersection of tangents to the circle $x^2 + y^2 = a^2$ which makes complimentary angle with X axis is

A. $x^2 - y^2 = 0$

B. $x^2 + y^2 = 0$

C. $xy = 0$

D. $x^2 = y^2 = 2a^2$

Answer: A

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58. The slope m of a tangent through the point (7,1) to the circle $x^2 + y^2 = 25$ satisfies the equation.

A. $12m^2 + 7m + 12 = 0$

B. $12m^2 - 7m + 12 = 0$

C. $12m^2 + 7m - 12 = 0$

D. $12m^2 - 7m - 12 = 0$

Answer: D

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59. The tangents at (5,12) and (12,-5) to the circle $x^2 + y^2 = 169$ are

A. coincident

B. perpendicular

C. parallel

D. at an angle of 45°

Answer: B

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60. Tangents AB and AC are drawn to the circle $x^2 + y^2 - 2x + 4y + 1 = 0$ from A(0,1) then equation of circle passing through A,B and C is

A. $x^2 + y^2 + x + y + 2 = 0$

B. $x^2 + y^2 - x + y - 2 = 0$

C. $x^2 + y^2 - x - y - 2 = 0$

D. $x^2 + y^2 - x - y + 2 = 0$

Answer: B

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61. The angle between the tangents to the circle with centre (4,5) drawn from P(-2,-3) is 120° then length of the tagent to the circle from P is

A. 4

B. 3

C. 2

D. 5

Answer: D

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62. Angle between tangents drawn from a points P to circle $x^2 + y^2 - 4x - 8y + 8 = 0$ is 60° then length of chord of contact of P is

A. 6

B. 4

C. 2

D. 3

Answer: A

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63. Locus of the point of intersection of tangents to the circle $x^2 + y^2 + 2x + 4y - 1 = 0$ which include an angle of 60^2 is

A. $x^2 + y^2 + 2x + 4y - 19 = 0$

B. $x^2 + y^2 + 2x + 4y + 19 = 0$

C. $x^2 + y^2 - 2x - 4y - 19 = 0$

D. $x^2 + y^2 - 2x - 4y + 19 = 0$

Answer: A

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64. The angle between a pair of tangents drawn from a point P to the circle $x^2 + y^2 + 4x - 6y + 9\sin^2\alpha + 13\cos^2\alpha = 0$ is 2α. The equation of the locus of the point P is

A. $x^2 + y^2 + 4x - 6y + 9 = 0$

B. $x^2 + y^2 - 4x - 6y + 9 = 0$

C. $x^2 + y^2 - 4x + 6y - 9 = 0$

D. Does not exists

Answer: A

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65. Locus of the point of intersection of perpendicular tangents to the circles $x^2 + y^2 = 10$ is

A. $x^2 + y^2 = 5$

B. $x^2 + y^2 = 20$

C. $x^2 + y^2 = 10$

D. $x^2 + y^2 = 100$

Answer: B

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66. Locus of point of intersection of perpendicular tangents to the circle $x^2 + y^2 - 4x - 6y - 1 = 0$ is

A. $x^2 + y^2 - 4x - 6y - 15 = 0$

B. $x^2 + y^2 - 4x - 6y + 15 = 0$

C. $x^2 + y^2 - 4x - 3y - 15 = 0$

D. $x^2 + y^2 + 4x + 6y - 15 = 0$

Answer: A

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67. Locus of the point of intersection of perpendicular tangents drawn one of each of the circles $x^2 + y^2 = 8$ and $x^2 + y^2 = 12$ is

A. $x^2 + y^2 = 4$

B. $x^2 + y^2 = 20$

C. $x^2 + y^2 = 208$

D. $x^2 + y^2 = 16$

Answer: B

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68. Locus of the points of intersection of perpendicular tangents drawn one to each of the circles $x^2 + y^2 - 4x + 6y - 37 = 0, x^2 + y^2 - 4x + 6y - 37 = 0, x^2 + y^2 - 4x + 6y - 20 = 0$ is

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

B. $x^2 + y^2 - 4x + 6y - 50 = 0$

C. $x^2 + y^2 - 4x + 6y - 57 = 0$

D. $x^2 + y^2 - 4x + 6y - 70 = 0$

Answer: D

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69. The condition that the pair of tangents drawn from origin to circle $x^2 + y^2 + 2gx + 2fy + c = 0$ may be at right angles is

A. $g^2 + f^2 = c$

B. $g^2 + f^2 = 2c$

C. $g^2 + f^2 + 2c = 0$

D. $g^2 - f^2 = 2c$

Answer: B

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70. If two tangents are drawn from a point on $x^2 + y^2 = 16$ to the circle $x^2 + y^2 = 8$ then the angle between the tangents is

A. $\frac{\pi}{2}$

B. $\frac{\pi}{4}$

C. $\frac{2\pi}{3}$

D. (π)

Answer: A

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71. From any point on the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ tangents are drawn to the circle $x^2 + y^2 + 2gx + 2fy + c\sin^2\alpha + \left(g^2 + f\right)\cos^2\alpha = 0.$ The angle between the tangents is

A. α

B. 2α

C. $\frac{\pi}{2}$

D. 0°

Answer: B

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72. Assertion (A): The director circle of $x^2 + y^{20=4}$ is $x^2 + y^2 =$

Reason(R): The angle between the tangents from any point on

$x^2 + y^2 = 8$ to $x^2 + y^2 = 4$ is $\frac{\pi}{2}$

The correct answer is

A. Both A and R are true and R si the correct explanation of A

B. Both A and R are true and R is not the correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: D

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73. The equation of the circle withcentre at (4,3) and touching the line

$5x - 12y - 10 = 0$ is

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

B. $x^2 + y^2 + 6x - 8y + 16 = 0$

C. $x^2 + y^2 - 8x - 6y + 21 = 0$

D. $x^2 + y^2 - 24x - 10y + 144 = 0$

Answer: C

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74. Numebr of circles touching all the lines $x + y - 1 = 0, x - y = 1 = 0$ and $y + 1 = 0$ are

A. 0

B. 2

C. 4

D. infinite

Answer: C

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75. The number of circles that touch all the straight lines $x + y = 4$, $x - y = -2$ and $y = 2$, is

A. 1

B. 2

C. 3

D. 4

Answer: D

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76. The number of circles that touches all the three lines $x+y-1=0$, $x-y-1=0$ and $y+1=0$ is

A. 2

B. 3

C. 4

D. 1

Answer: C

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77. The number of circles that touch all the 3 lines $2x+y=3$, $4x-y=3$, $x+y=2$ is

A. 0

B. 2

C. 4

D. infinite

Answer: A

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78. Number of circles touching all the lines $x + 4h + 1 = 0, 2x + 3y + 3 = 0$ and $x - 6y + 3 = 0$ is

A. 0

B. 2

C. 4

D. infinite

Answer: B

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79. The line y=x is a tangent at (0,0) to a circle of radius is 1, then centre of the circle is

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

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

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

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

Answer: C

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80. 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

A. $3y = x$

B. $y = -3x$

C. $y = 2x$

D. $3y = -2x$

Answer: A

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81. If the tangent at the point P on the circle $x^2 + y^2 + 6x + 6y = 2$ meet the line $5x - 2y + 6 = 0$ at a point Q on y-axis then PQ=

A. 10

B. 15

C. 25

D. 5

Answer: D

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82. If theline y=x touches the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ at P where $OP = 6\sqrt{2}$ then c=

A. 36

B. 72

C. 18

D. 144

Answer: B

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83. The length of the tangent from a point on the circle $x^2 + y^2 + 4x - 6y - 12 = 0$ to the circle $x^2 + y^2 + 4x - 6y + 4 = 0$ is

A. 2

B. 16

C. 8

D. 4

Answer: D

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84. If the length of the tangent from (h,k) to the circle $x^2 + y^2 = 16$ is twice the length of the tangent from the same point to the circle $x^2 + y^2 + 2x + 2y = 0$, then

A. $h^2 + k^2 \_ 4h + 4k + 16 = 0$

B. $h^2 + k^2 + 3h + 3k = 0$

C. $3h^2 + 3k^2 + 8y + 8k + 16 = 0$

D. $3h^2 + 3k^2 + 4h + 4k + 16 = 0$

Answer: C

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

A. (6,0)

B. (-6,0)

C. (0,6)

D. (0,-6)

Answer: B

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86. The tangent at any point to the circle $x^2 + y^2 = r^2$ meets the coordinate axes at A and B. If the lines drawn parallel to axes through

A and B meet at P then locus of P is

A. $\frac{1}{x^2} + \frac{1}{y^2} = \frac{1}{r^2}$

B. $\frac{1}{x^2} + \frac{1}{y^2} = r^2$

C. $\frac{1}{x^2} - \frac{1}{y^2} = r^2$

D. $x^2 + y^2 = 2r^2$

Answer: A

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

A. $x + y = 0$

B. $x - y = 0$

C. $xy = 0$

D. $xy = a^2$

Answer: C

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88. The locus of the middle points of portions of the tangents to the circle $x^2 + y^2 = a^2$ terminated by the axes is

A. $x^2 + y^2 = 2a^2$

B. $x^2 + y^2 = 4a^2$

C. $x^{-2} + y^{-2} = 4a^{-2}$

D. $x^{-2} + y^{-2} = a^{-2}$

Answer: C

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89. Observe the lists:

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

The correct match is :

A. $\begin{matrix} A & B & C & D \\ 2 & 1 & 4 & 3 \end{matrix}$

B. $\begin{matrix} A & B & C & D \\ 1 & 2 & 4 & 3 \end{matrix}$

C. $\begin{matrix} A & B & C & D \\ 3 & 2 & 1 & 4 \end{matrix}$

D. $\begin{matrix} A & B & C & D \\ 3 & 2 & 4 & 1 \end{matrix}$

Answer: C

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90. If a circle of radius 2 touches X-axis at (1,0) then its centre may be

A. (1,2) an (1,-2)

B. (1,2) and (2,1)

C. (-1,2)(1,-2)

D. (-1,2)(-1,-2)

Answer: A

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91. The circle passing through (1,-2) and touching the axis of x at (3,0) also passes through the point:

A. (-5,2)

B. (2,-5)

C. (5,-2)

D. (-2,5)

Answer: C

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92. Equation of the tangents to the circle at the point (1,-1) whose centre is the point of intersection of the straight lines x-y=1 and 2x+y=3 is

A. $x + 4y + 3 = 0$

B. $3x - y - 4 = 0$

C. $x - 3y - 4 = 0$

D. $4x + y - 3 = 0$

Answer: A

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93. Equation of circles which touch both the axes and also the line $x = k(k > 0)$ is

A. $x^2 + y^2 - kx \pm ky + \frac{k^2}{4} = 0$

B. $x^2 + y^2 + kx \pm ky + \frac{k^2}{4} = 0$

C. $x^2 + y^2 \pm kx + ky + \frac{k^2}{4} = 0$

D. $x^2 + y^2 \pm kx - ky + \frac{k^2}{4} = 0$

Answer: A

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94. Centres of circles touching both the axes and also the line $3x + 4y - 12 = 0$ is

A. (1,1), (6,6), (-2,2) and (3,-3)

B. (1,-1) and (6,-6)

C. (-1,1) and (-6,6)

D. (-1,-1) and (-6,-6)

Answer: A

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95. The radius of the larger circle lying in the first quadrant and touching the line $4x + 3y - 12 = 0$ and the coordinate axes is

A. 5

B. 6

C. 7

D. 8

Answer: B

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96. The equation of the circles which touch the x-axis at the origin and the line $4x-3y+24=0$

A. $x^2 + y^2 + 6y = 0, x^2 + y^2 - 24y = 0$

B. $x^2 + y^2 + 2y = 0, x^2 + y^2 - 18y = 0$

C. $x^2 + y^2 + 18x = 0, x^2 + y^2 - 8x = 0$

D. $x^2 + y^2 + 4x = 0, x^2 + y^2 - 16x = 0$

Answer: A

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97. If two circles touching both the axes are passing through (2,3) then length of their common chord is

A. $\sqrt{2}$

B. $2\sqrt{2}$

C. $3\sqrt{2}$

D. $4\sqrt{2}$

Answer: A

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98. The radius of the circle having maximum size passing through (2,4) and touching both the coordinate axes is

A. 5

B. 8

C. 10

D. 12

Answer: C

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99. Consider a family of circles which are passing through the point (-1,1) and are tangent to x-axis. If (h,k) are the co-ordinates of the centre of the circles, then the set of values of k is given by the internal.

A. $-\frac{1}{2} \leq k \leq 1$

B. $k \leq \frac{1}{2}$

C. $0 < k < \frac{1}{2}$

D. $k \leq \frac{1}{2}$

Answer: D

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100. The locus of centre of the circle touching x-axis nad the line $y = x$ is

A. $y = \left(\sqrt{2} - 1\right)x$

B. $y - \left(\sqrt{2} + 1\right)x$

C. $y = 2x$

D. $y = -x$

Answer: A

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101. The centre of the circle touching the y-axis at (0,3) and making an intercept 2 unit on positive x-axis is

A. $\left(\sqrt{10}, 3\right)$

B. $\left(3, \sqrt{10}\right)$

C. $\left(-\sqrt{10}, 3\right)$

D. $\left(\sqrt{10}, -3\right)$

Answer: A

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

A. Circle

B. Parabola

C. Ellipse

D. Straight line

Answer: B

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103. A circle passes thorugh A(2,1) and touches y-axis then the locus of its centre is

A. $(y+1)^2 = 4(x+1)$

B. $(x+1)^2 = 4(y+1)$

C. $(y - 1)^2 = 4(x - 1)$

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

Answer: C

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104. A circle passes through A(1,1) and touches x-axis then the locus of the other end of the diameter through A is

A. $(x + 1)^2 = 4y$

B. $(y - 1)^2 i = 4x$

C. $(x - 1)^2 = 4y$

D. $(y + 1)^2 = 4x$

Answer: C

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105. A circle touches x-axis and cuts off constant length 2p from y-axis then the locus of its centre is

A. $x^2 + y^2 = p^2$

B. $x^2 - y^2 = p^2$

C. $y^2 - x^2 = p^2$

D. $x^2 + y^2 = 4p^2$

Answer: C

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106. The equation of the circles which pass through the origin and makes intercepts of lengths 4 and 8 on the x and y-axis respectively are

A. $x^2 + y^2 \pm 4x \pm 8y = 0$

B. $x^2 + y^2 \pm 2x \pm 4y = 0$

C. $x^2 + y^2 \pm 8x \pm 16y = 0$

D. $x^2 + y^2 \pm x \pm y = 0$

Answer: A

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107. Equations of circles which touch both the axes and whose centres are at a distance of $2\sqrt{2}$ units from origin are

A. $x^2 + y^2 \pm 4x \pm 4y + 4 = 0$

B. $x^2 + y^2 \pm 2x \pm 2y + 4 = 0$

C. $x^2 + y^2 \pm x \pm y + 4 = 0$

D. None

Answer: A

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108. The equation of the circle whose radius is 5 and which passes through the points on x-axis at a distance 3 from the origin is

A. $x^2 + y^2 + 8y - 9 = 0$

B. $x^2 + y^2 + 8y + 9 = 0$

C. $x^2 + y^2 - 8x + 9 = 0$

D. $x^2 + y^2 + 8x - 9 = 0$

Answer: A

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109. The length of chord of contact of the point (3,6) with respect to the circle $x^2 + y^2 = 10$ is

A. $\frac{2\sqrt{70}}{3}$

B. $6\sqrt{5}$

C. $\sqrt{5}$

D. $\dfrac{12}{\sqrt{5}}$

Answer: A

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110. The distance between chord of contact of the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ from origin and the point (g,f) is

A. $\dfrac{g^2 + f^2 - c}{\sqrt{g^2 + f^2}}$

B. $\sqrt{g^2 + f^2 - c}$

C. $\dfrac{g^2 + f^2 - c}{2\sqrt{g^2 + f^2}}$

D. $\dfrac{|C|}{\sqrt{g^2 + f^2}}$

Answer: C

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111. Locus of the point of intersection of tangents at the extremeties of a chord of a circle$x^2 + y^2 = a^2$ which touch the circle $x^2 + y^2 - 2ax = 0$ is

A. $y^2 = a - 2x$

B. $y^2 = a(a + 2x)$

C. $y^2 = a + 2x$

D. $y^2 = a(a - 2x)$

Answer: D

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112. The locus of the point, whose chord of contact w.r.t the circle $x^2 + y^2 = a^2$ makes an angle 2α at the centre of the circle is

A. $x^2 + y^2 = 2r^2$

B. $x^2 + y^2 = r^2\cos^2\theta$

C. $x^2 + y^2 = \frac{r^2}{2}$

D. $x^2 + y^2 = r^2\sec^2\theta$

Answer: D

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113. The straight line x-2y+1=0 intersects the circle $x^2 + y^2 = 25$ in points P and Q the coordinates of the point of intersection of tangents drawn at P and Q to the circle is

A. (25,50)

B. (-25,50)

C. (25, -50)

D. (-25,-50)

Answer: B

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114. Tangents are drawn to the circle $x^2 + y^2 = 9$ at the points where it is cut by the line $4x + 3y - 9 = 0$ then the point of intersection of tangents is

A. (3,4)

B. (4,3)

C. (-3,4)

D. (4,-3)

Answer: B

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115. If O is the origin and OP, OQ are the tangents to the circle $x^2 + y^2 + 2x + 4y + 1 = 0$, the pole of the line PQ is

A. (0,0)

B. (-1,-2)

C. (1,2)

D. Does not exists

Answer: A

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116. The polar of a given point which respect to any one of the circles $x^2 + y^2 - 2kx + c^2 = 0$, (k is a varaible) always passes through a fixed point whatever to be the value of k is

A. $\left(x_1, \dfrac{x^2 - c^2}{y_1}\right)$

B. $\left(x_1, x^2 - c^2\right)$

C. $\left(\frac{x_1^2 - c^2}{y_1}, -x_1\right)$

D. $\left(-x_1, \frac{x_1^2 - c^2}{y_1}\right)$

Answer: D

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117. The polars of two points A(1,3), B(2,-1) w.r.t to circle $x^2 + y^2 = 9$ intersect at C then polar of C w.r.t to the circle is

A. $4x + y - 7 = 0$

B. $4x + y + 7 = 0$

C. $x + y - 7 = 0$

D. $4x - y + 7 = 0$

Answer: A

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118. The polars of points (1,7) (2,6) and (t,5) with respect to a circle concurrent then t=

A. 1

B. 2

C. 3

D. 4

Answer: C

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119. Each side of ΔABC is the polarof the opposite vertex with respect to a circle with centre P. For the ΔABC the point P is

A. centroid

B. circum centre

C. incentre

D. ortho centre

Answer: D

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120. The pole of a straight line with respect to the circle $x^2 + y^2 = a^2$ lies on the circle $x^2 + y^2 = 9a^2$. If the straight line touches the circle $x^2 + y^2 = r^2$, then

A. $9a^2 = r^2$

B. $9r^2 = a^2$

C. $r^2 = a^2$

D. $3r^2 = a^2$

Answer: B

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121. Assertion (A): The polar of centre of circle w.r.t same circle does not exist.

Reason (R), Distance between parallel tangents of circle is diameter of circle.

The correct answer is

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true and R is not the correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: B

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

Reason (R): A line through the point P cuts the polar of P w.r.t circle S=0 at Q and the circle S=0 at A and B then PA, PQ, PB are in H.P.

The correct statement among the following is

A. A is true, R is false

B. A is false, R is true

C. A is true, R is true, $R \rightarrow A$

D. A is false, R is false

Answer: C

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123. The polar of a point P w.r.t. a circle of radius a touching both x and y axis and lying in the first quadrant is x+2y=4a. The coordinate of P are

A. (a,2a)

B. (a,3a)

C. (2a,3a)

D. (3a,4a)

Answer: C

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124. If the length of the tangent from two points A,B to a circle are 6,7 respectively. If A,B are conjugate points then AB=

A. 85

B. 42

C. $\sqrt{85}$

D. $\sqrt{13}$

Answer: C

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125. For the circle $x^2 + y^2 - 2x - 4y - 4 = 0$, then lines 2x+3y-1=0, 2x+y+5=0 are

A. perpendicular tangents

B. conjugate

C. parallel tangents

D. perpendicular chords

Answer: B

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

A. $x + y + 2 = 0$

B. $x + y - 2 = 0$

C. $x - y + 2 = 0$

D. $x - y - 2 = 0$

Answer: C

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127. The locus of the poles of the line $ax + by + c = 0$ w.r.t a system of circles $x^2 + y^2 = \lambda$ where λ is parameter is

A. $ax + by = \lambda$

B. $bx + ay = \lambda$

C. $ax - by = 0$

D. $bx - ay = 0$

Answer: D

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128. The locus of poles of tangents to the circle $x^2 + y^2 = a^2$ w.r.t the circle $x^2 + y^2 + 2ax - a^2 = 0$ is

A. $y^2 = 4ax$

B. $y^2 = 2ax$

C. $y^2 + 2ax = 0$

D. $y^2 + 4ax = 0$

Answer: D

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129. A point P is taken on the circle $x^2 + y^2 = a^2$ and PN, PM are draw, perpendicular to the axes. The locus of the pole of the line MN is

A. $x^2 + y^2 = a^2$

B. $x^{-2} + y^{-2} = 2x^{-2}$

C. $x^{-2} - y^{-2} = a^{-2}$

D. $x^{-2} + y^{-2} = a^{-4}$

Answer: B

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130. The inverse point of (2,-3) w.r.t to circle $x^2 + y^2 + 6x - 4y - 12 = 0$ is

A. $\left(\frac{1}{2}, \frac{1}{2}\right)$

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

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

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

Answer: D

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131. If the inverse of P(-3,5) w.r.t to a circle is (1,3) then polar of P w.r.t to the circle is

A. $x + 2y = 7$

B. $2x - 2y + 11 = 0$

C. $2x - y + 1 = 0$

D. $2x - y - 1 = 0$

Answer: C

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132. The inverse point of (1,2) origin w.r.t. the circle $x^2 + y^2 - 4x - 6y + 9 = 0$ is

A. 2

B. $\sqrt{2}$

C. 3

D. 4

Answer: B

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133. If the tangent at (3,-4) to the circle $x^2 + y^2 - 4x + 2y - 5 = 0$ cuts the circle $x^2 + y^2 + 16x + 2y + 10 = 0$ in A and B then the midpoint of AB is

A. $(-6, -7)$

B. $(2-1)$

C. $(2, 1)$

D. $(5, 4)$

Answer: A

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134. The least length of chord passing through (2,1) of the circle $x^2 + y^2 - 2x - 4y - 13 = 0$ is

A. 2

B. 6

C. 8

D. 4

Answer: C

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135. The locus of midpoints of the chord of the circle $x^2 + y^2 = 25$ which pass through a fixed point (4,6) is a circle. The radius of that circle is

A. $\sqrt{52}$

B. $\sqrt{2}$

C. $\sqrt{13}$

D. $\sqrt{10}$

Answer: C

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136. The locus of the mid points of the chords of $x^2 + y^2 = a^2$ which are at a distance $d(< a)$ from centre is

A. $x^2 + y^2 = d^2$

B. $x^2 + y^2 = a^2 - d^2$

C. $x^2 + y^2 = d^2 - a^2$

D. not possible

Answer: A

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137. Locus of mid points of chords to the circle $x^2 + y^2 - 8x + 6y + 20 = 0$ which are paralel to the line $3x + 4y + 5 = 0$ is

A. $3x + 4y - 25 = 0$

B. $4x + 3y + 5 = 0$

C. $4x - 3y - 25 = 0$

D. $4x - 3y + 25 = 0$

Answer: C

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138. From origin chords are drawn to the cirlce $x^2 - y^2 - 2px = 0$ then locus of midpoints of all such chords is

A. $x^2 + y^2 - px = 0$

B. $x^2 + y^2 + 2px = 0$

C. $x^2 + y^2 + px = 0$

D. Does not exists

Answer: A

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139. The equation to the locus of the midpoints of chords of the circle $x^2 + y^2 = r^2$ having a constant length 2l is

A. $x^2 + y^2 - l^2 - r^2$

B. $x^2 + y^2 = r^2 - l^2$

C. $x^2 + y^2 = 4l^2$

D. $x^2 + y^2 = l^2 + r^2$

Answer: B

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140. The locus of the midpoint of the chord of the circle $x^2 + y^2 - 2x - 2y - 2 = 0$ which makes an angle of 120° at the centre is

A. $x^2 + y^2 - 2x - 2y - 1 = 0$

B. $x^2 + y^2 - 2x - 2y = 0$

C. $x^2 + y^2 + 2x - 2y + 1 = 0$

D. $x^2 + y^2 - 2x - 2y + 1 = 0$

Answer: D

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141. Let C be the circle with centre (0,0) and radius 3 units. The equation of the locus of the midpoint of the chords of the circle C that substend an angle of $2\pi/3$ at its centre is

A. $x^2 + y^2 = \frac{3}{2}$

B. $x^2 + y^2 = 1$

C. $x^2 + y^2 = \frac{27}{4}$

D. $x^2 + y^2 = \frac{9}{4}$

Answer: D

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142. From the point A(0,3) on the circle $x^2 + 4x + (y - 3)^2 = 0$, a chord AB is drawn and extended to a point P, such that AP=2AB. The locus of P is

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

B. $x^2 + 8x + (y - 3)^2 = 0$

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

D. $x^2 + 8x - (y - 3)^2 = 0$

Answer: B

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143. The parametric equations $x = \frac{2a\left(1 - t^2\right)}{1 + t^2}$ and $y = \frac{4at}{1 + t^2}$ represents a circle whose radius is

A. a

B. 2a

C. 3a

D. 4a

Answer: B

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144. If $\frac{\pi}{6}$ and $\frac{\pi}{2}$ are the ends of chord of the circle $x^2 + y^2 = 16$ then its length is

A. 2

B. 4

C. 6

D. 8

Answer: B

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145. If a straight line through $C\left(-\sqrt{8}, \sqrt{8}\right)$ making an asngle $135°$ with the x-axis and cuts the circle $x = 5\cos\theta, y = 5\sin\theta$ in points A and B AB=

A. 5

B. 10

C. 25

D. 16

Answer: B

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146. The loucs of the point of intersection of the tangents to the circle $x = 4\cos\theta, y = 4\sin\theta$ at the points whose parametric angles differ by $\frac{\pi}{3}$ is

A. $x^2 + y^2 = r^2$

B. $x^2 + y^2 = 2r^2$

C. $3\left(x^2 + y^2\right) = 2r^2$

D. $3\left(x^2 + y^2\right) = 4r^2$

Answer: D

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

A. $25(x^2 + y^2) + 20(x + y) + 28 = 0$

B. $25(x^2 + y^2) - 20(x + y) + 28 = 0$

C. $25(x^2 + y^2) + 20(x - y) + 28 = 0$

D. $25(x^2 + y^2) + 20(x - y) - 28 = 0$

Answer: D

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148. If the two circles $(x - 1)^2 + (y - 3)^2 = r^2$ and $x^2 + y^2 - 8x + 2y + 8 = 0$ intersect in two distinct points, then

A. $r > 2$

B. $2 < r < 8$

C. $r < 2$

D. $r = 2$

Answer: B

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149. Ilf the circle $x^2 + y^2 = 2$ and $x^2 + y^2 \_ 4x - 4y + \lambda = 0$ have exactly three real common tangents then $\lambda =$

A. -10

B. 6

C. -6

D. 10

Answer: B

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150. If the circles $(x - a)^2 + (y - b)^2 = r^2, (x - b)^2 + (y - a)^2 = r^2$ touch each other then the point of contact is

A. $\left(\frac{a+b}{2}, \frac{a+b}{2}\right)$

B. $\left(\frac{a-b}{2}, \frac{a-b}{2}\right)$

C. $\left(\frac{b-a}{2}, \frac{b-a}{2}\right)$

D. (0,0)

Answer: A

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151. The common tangents to the circles $x^2 + y^2 - 6x = 0, x^2 + y^2 + 2x = 0$ from

A. Right angled triangle

B. Isosceles triangle

C. equilateral triangle

D. Isosceles right angled triangle

Answer: C

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152. If the two circles $x^2 + y^2 + 2gz + 2fy = 0$ and $x^2 + y^2 + 2g' x + 2f' y = 0$ touch each other then show that $f' g = fg'$

A. $fg = f^1 g^1$

B. $fg^1 = f^1 g$

C. $f + g = f^1 + g^1$

D. $f + f^1 = g + g^1$

Answer: B

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153. The point of contact of the circle $x^2 + y^2 + 2x + 2y + 1 = 0$ and $x^2 + y^2 - 2x + 2y + 1 = 0$

A. (0,1)

B. (0,-1)

C. (1,0)

D. (-1,0)

Answer: B

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154. The two circles $x^2 + y^2 = ax, x^2 + y^2 = c^2 (c > 0)$ touch each other if

A. a=2c

B. $|a| = 2c$

C. $2|a| = c$

D. $|a| = c$

Answer: D

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155. If the distance between the centres of two circles of radio 3,4 is 25 then the length of the tranverse common tangent is

A. 24

B. 12

C. 26

D. 13

Answer: A

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156. Lengths of common tangents of the circles $x^2 + y^2 = 6x, x^2 + y^2 + 2x = 0$ are

A. $\left(\sqrt{3}\right)$

B. $\sqrt{3}, 3\sqrt{3}$

C. $2\sqrt{3}$

D. $2\sqrt{3}, 3\sqrt{3}$

Answer: C

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157. If $\left(-\frac{1}{3}-1\right)$ is a centre of similitude for the circles $x^2+y^2=1$ and $x^2+y^2 - 2x-6y-6=0$ then the length of common tangent of the circles is

A. $\frac{1}{3}$

B. $\frac{4}{3}$

C. 1

D. cannot be determined

Answer: C

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158. The equation of the circle radius is 5 and which touches the circle $x^2+y^2-2x-4y-20=0$ at this point (5,5) is

A. $(x-9)^2+(y-8)^2=5$

B. $(x - 9)^2 + (y + 8)^2 = 25$

C. $x^2 + y^2 = 25$

D. $(x - 9)^2 + (y - 8)^2 = 25$

Answer: D

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159. Locus of the centre of circle of radius 2 which rolls on out side the rim of the circle $x^2 + y^2 - 4x - 6y - 12 = 0$ is

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

B. $x^2 + y^2 - 4x - 6y - 36 = 0$

C. $x^2 + y^2 - 4x - 6y + 3 = 0$

D. $x^2 + y^2 - 4x - 6y - 25 = 0$

Answer: B

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160. The locus of the centre of a circle which touches externally the circle $x^2 + y^2 - 6x - 6y + 14 = 0$ and also touches the y-axis is given by the equation.

A. $y^2 - 6x - 10y - 14 = 0$

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

C. $y^2 + 6x + 10y + 14 = 0$

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

Answer: D

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161. The centre of the circle passing through the points (0,0), (1,0) and touching the circle $x^2 + y^2 = 9$ is

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

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

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

D. $\left(\frac{1}{2}, \pm\sqrt{2}\right)$

Answer: D

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162. A rectangle ABCD is inscribed in a circle with a diameter lying along the line 3y=x+10. If A=(-6,7), B=(4,7) then the area of the rectangle is

A. 80 sq. units

B. 40 sq. units

C. 160 sq. units

D. 20 sq. units

Answer: A

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163. Find the area of the triangle formed by two tangents drawn from (3,5) to the circle $x^2 + y^2 = 16$ and the chord of contact of (3,5)

A. $\frac{192}{5}$

B. $\frac{192}{15}$

C. $\frac{192}{25}$

D. $\frac{92}{25}$

Answer: C

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164. The area of the triangle formed by the tangent drawn at the point (-12,5) on the circle $x^2 + y^2 = 169$ with the coordinate axes is

A. $\dfrac{625}{24}$

B. $\dfrac{28561}{120}$

C. $\dfrac{225}{23}$

D. $\dfrac{8561}{20}$

Answer: B

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165. If OA and OB are the tangent from the origin to the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ and C is the centre of the circle then the area of the quadrilateral OCAB is

A. $\sqrt{g^2 + f^2 - c}$

B. $\sqrt{c\left(g^2 + f^2 - c\right)}$

C. $\dfrac{\sqrt{g^2 + f^2 - c}}{c}$

D. $\dfrac{\sqrt{g^2 + f^2 - c}}{2}$

Answer: B

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166. Let AB be the chord 4x-3y+5=0 with respect to the circle $x^2 + y^2 - 2x + 4y - 20 = 0$ If C=(7,1) then the area of the triangle ABC is

A. 15 sq. units

B. 20 sq. unit

C. 24 sq. unit

D. 45 sq. unit

Answer: C

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167. Consider the circle $x^2 + y^2 - 4x - 2y + c = 0$ whose centre is A(2, 1) If the point P (10, 7) is such that the line segment PA meets the circle in Q With PQ=5, then c=

A. -15

B. 20

C. 30

D. 20

Answer: D

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168. For the circle C with the equation $x^2 + y^2 - 16x - 12y + 64 = 0$ match the List I with the List II given below,

	List I		List II
(*i*)	The equation of the polar of (-5, 1) with respect to C	(*A*)	$y = 0$
(*ii*)	The equation of the tangent at (8, 0) to C	(*B*)	$y = 6$
(*iii*)	The equation of the normal at (2, 6) to C	(*C*)	$x + y = 7$
(*iv*)	The equation of the diameter of C through (8, 12)	(*D*)	$13x + 5y = 98$
		(*E*)	$x = 8$

The correct match is

A. i-d,ii-b,iii-a,iv-e

B. i-d,ii-a,iii-b,iv-e

C. i-c,ii-d,iii-a,iv-b

D. i-c,ii-e,iii-b,iv-a

Answer: B

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169. Find the length of the common chord of the circle $x^2 + y^2 + 2hx + a^2 = 0$ and $x^2 + y^2 - 2ky - a^2 = 0$.

A. $\frac{\sqrt{145}}{4}$

B. $\frac{\sqrt{11}}{2}$

C. $\sqrt{135}$

D. $\frac{\sqrt{135}}{4}$

Answer: D

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PRACTICE EXERCISE

1. The circle with centre (1,1) and radius 1 is

A. $x^2 + y^2 - 2x - 2y + 1 = 0$

B. $x^2 + y^2 + 2x + 2y + 1 = 0$

C. $x^2 + y^2 - x - y + 1 = 0$

D. $x^2 + y^2 + x + y + 1 = 0$

Answer: A

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2. For a circle two diameter are $x + y = 3, x - y = 1$ then centre is

A. (-1,4)

B. (3,0)

C. (1,2)

D. (2,1)

Answer: D

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3. Circle with centre (-1,2) and passing through origin is

A. $x^2 + y^2 + 2x + 4y = 0$

B. $x^2 + y^2 - 2x + 4y = 0$

C. $x^2 + y^2 - 2x - 4y = 0$

D. $x^2 + y^2 + 2x - 4y = 0$

Answer: D

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4. The equation of the circle concentric with $x^2 + y^2 - 6x + 4y - 3 = 0$ and having radius 5 is

A. $x^2 + y^2 - 6x + 4y - 12 = 0$

B. $x^2 + y^2 - 2x + 8y - 33 = 0$

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

D. $x^2 + y^2 + x + 8y + 33 = 0$

Answer: A

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5. The equation of the circle concentric with $x^2 + y^2 - 2x + 8y - 23 = 0$ and passing through (2, 3) is

A. $x^2 + y^2 - 6x + 4y - 12 = 0$

B. $x^2 + y^2 - 2x + 8y - 33 = 0$

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

D. $x^2 + y^2 + x + 8y + 33 = 0$

Answer: B

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6. For the circle $x^2 + y^2 - 4x + 2y + c = 0$ radius is 4 then c=

A. -11

B. 11

C. 4

D. -4

Answer: A

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7. If A_1, A_2, A_3 be the areas of circles $x^2 + y^2 + 4x + 6y - 19 = 0, x^2 + y^2 = 9, x^2 + y^2 - 4x - 6y - 12 = 0$ respectively then $A_1 : A_2 : A_3$=

A. $A_1 > A_2 A_3$

B. $A_2 > A_3 > A_1$

C. $A_1 > A_3 > A_2$

D. $A_2 > A_1 > A_3$

Answer: C

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8. The equation of the circle with centre (2,3) and distance between (0,0) and (3,4) as radius is

A. $x^2 + y^2 - 4x - 6y - 12 = 0$

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

C. $x^2 + y^2 - 4x - 6y - 1 = 0$

D. $x^2 + y^2 - 2x - 3y - 12 = 0$

Answer: A

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9. The equation of the circle with radius 4 and centres as the midpoint of (1,4), (-3,2) is

A. $x^2 + y^2 - 2x + 6y - 6 = 0$

B. $x^2 + y^2 + 6x - 4y - 3 = 0$

C. $x^2 + y^2 + 2x - 6y - 6 = 0$

D. $x^2 + y^2 - 2x - 8y + 1 = 0$

Answer: C

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10. The circle with centre (1,-3) and radius being the distance between the parallel lines $3x - 4y - 2 = 0, 3x - 4y + 8 = 0$ is

A. $x^2 + y^2 - 2x + 6y + 6 = 0$

B. $x^2 + y^2 - 2x + 6y + 8 = 0$

C. $x^2 + y^2 - 2x + 6y - 90 = 0$

D. $x^2 + y^2 + 2x - 6y + 6 = 0$

Answer: A

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11. If the area of the circle $x^2 + y^2 + 4x + 2y + k = 0$ is 5π square cms then k=

A. -20

B. 20

C. ± 20

D. 0

Answer: D

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12. If (2,3) is an extremity of a diameter of the circle $x^2 + y^2 - 5x - 8y + 21 = 0$, then the other extremity of the diameter is

A. (3,5)

B. (-3,-5)

C. (4,1)

D. (3,2)

Answer: A

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13. The line $\frac{x}{a} + \frac{y}{b} = 1$ meets the axis of and y at A and B respectively and 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. $\begin{matrix} A & B & C & D \\ 2 & 4 & 1 & 3 \end{matrix}$

B. $\begin{matrix} A & B & C & D \\ 1 & 2 & 3 & 4 \end{matrix}$

C. $\begin{matrix} A & B & C & D \\ 1 & 2 & 4 & 3 \end{matrix}$

D. $\begin{matrix} A & B & C & D \\ 4 & 1 & 3 & 2 \end{matrix}$

Answer: A

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14. Equation of circle with centre (-1,2) and passing through the centroid of triangle formed by (3,1),(2,-1) and (1,3) is

A. $x^2 + y^2 - x + 2y - 5 = 0$

B. $x^2 + y^2 + x - 2y - 5 = 0$

C. $x^2 + y^2 - 2x + 4y - 5 = 0$

D. $x^2 + y^2 + 2x - 4y - 5 = 0$

Answer: D

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15. The centroid of an equilateral triangle is (0, 0) and the length of the altitude is 6. The equation of the circumcirele of the triangle is

A. $x^2 + y^2 = 6$

B. $x^2 + y^2 = 16$

C. $x^2 + y^2 = 9$

D. $x^2 + y^2 = 36$

Answer: B

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16. Equation of the circle with radius 10 and whose two diameters are $x + y = 6$ and $x + 2y = 4$ is

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

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

C. $x^2 + y^2 + 16x - 4y + 32 = 0$

D. None

Answer: B

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17. If a circle is inscribed in a square of side 10, so that the circle touches the four sides of the square internally then radius of the circle is

A. only I

B. only II

C. both I and II

D. neither I nor II

Answer: C

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18. Show that the equation of the circle which pass through the points (1,-2) and (4,-3) and whose centre lies on the line $3x + 4y = 7$ is $15\left(x^2 + y^2\right) - 94x + 18y + 55 = 0$

A. $x^2 + y^2 - 6x + 2y + 5 = 0$

B. $x^2 + y^2 + 6x + 2y + 5 = 0$

C. $x^2 + y^2 + 6x + 2y + 5 = 0$

D. $x^2 + y^2 - 6x - 2y + 5 = 0$

Answer: A

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19. If the abscissae of points A, B are the roots of the equation $x^2 + 2ax - b^2 = 0$ and ordinates of A, B are roots of $y^2 + 2py - q^2 = 0$, then find the equation of the circle for which AB is a diameter.

A. (2,7/2)

B. (-2,7/2)

C. (2,-7/2)

D. (-2,-7/2)

Answer: B

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20. The abscissae of two points A and B are the roots of the equation $x^2 + 2ax - b^2 = 0$ and their ordinate are the roots fo the equations $y^2 + 2py - q^2 = 0$ then the radius of the circle with AB as diameter is

A. $x^2 + y^2 + 2ax + 2py - b^2 - q^2 = 0$

B. $x^2 + y^2 + 2ax + 2py + b^2 - q^2 = 0$

C. $x^2 + y^2 - 2qx - 2py + b^2 + q^2 = 0$

D. $x^2 + y^2 + 2ax - 2py + b^2 - q^2 = 0$

Answer: A

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21. The circle described on the line joining the points (0,1), (a,b) as diameter cuts the X-axis in points whose abscissae are roots of the equation

A. $x^2 + ax + b = 0$

B. $x^2 - ax + b = 0$

C. $x^2 + ax - b = 0$

D. $x^2 - ax - b = 0$

Answer: B

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22. The equation of the circle passing through (3,0) and (0,4) and having the minimum radius is

A. $x^2 + y^2 = 4$

B. $x^2 + y^2 - 2x + 4y = 0$

C. $x^2 + y^2 - 2x - 2y + 2 = 0$

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

Answer: D

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23. The line $\frac{x}{a} + \frac{y}{b} = 1$ cuts the coordinate axes at a and B a line perpendicular to AB meets the axes in P and Q. The equation of the locus of the point of intersection of the lines AQ and BP is

A. $x^2 + y^2 = a^2 + b^2$

B. $x^2 + y^2 = a^2$

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

D. $x^2 + y^2 + ax + by = 0$

Answer: C

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24. $A(\cos\theta, \sin\theta), B(\sin\theta, -\cos\theta)$ are two points then centroid of triangle formed by A,B and origin lies on a circle whose centre and radius are

A. $(1, 1), \sqrt{2/3}$

B. $(0, 0), \sqrt{2/3}$

C. $(0, 0), \dfrac{\sqrt{2}}{3}$

D. $(0, 0), 3/\sqrt{2}$

Answer: C

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25. A circle of radius r passes through the origin and meets the axes at A and B. The locus of the centroid of $\triangle OAB$ is

A. $x^2 + y^2 = 4r^2$

B. $x^2 + y^2 = 3r^2$

C. $3\left(x^2 + y^2\right) = r^2$

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

Answer: D

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26. A rod AB of length 3 units moves vertically with its bottom B always an the circle $x^2+y^2=25$ then the equation of the locus of A is

A. $x^2+(y+3)^2=25$

B. $(x-3)^2+y^2=25$

C. $(x+3)^2+y^2=25$

D. $x^2+(y-3)^2=25$

Answer: D

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27. A square is inscribed in the circle $x^2 + y^2 - 2x + 4y - 93 = 0$ with its sides are parallel to coordinate axes then vertices of square are

A. (-6,-9)(-6,5)(8,5)(8,-9)

B. (-6,-9)(-6,5)(8,-6)(-8,9)

C. (6,9)(6,5)(8,5)(8,9)

D. None

Answer: A

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28. An equilateral triangle is inscribed in the circle $x^2 + y^2 = a^2$. The length of the side of the triangle is

A. $a\sqrt{2}$

B. $a\sqrt{3}$

C. $2a$

D. $4a$

Answer: B

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29. Find the equation of image circle of the circle $x^2 + y^2 - 2x = 0$ in the line $x + y - 2 = 0$

A. $(x + 2)^2 + (y + 1)^2 = 1$

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

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

D. $(x - 2)^2 + (y - 1)^2 = 1$

Answer: D

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30. The shortest distance of (-5,4) to the circle $x^2 + y^2 - 6x + 4y - 12 = 0$ is

A. 10

B. 3

C. 5

D. 4

Answer: C

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31. The circle passing through (0,0),(a,0), (0,b) is

A. $x^2 + y^2 + a^2 + b^2 = 0$

B. $x^2 + y^2 = ax + by$

C. $x^2 + y^2 = a^2 + b^2$

D. $x^2 + y^2 ax + by = 0$

Answer: B

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32. The radius of the circle passing through the points (0,0),(0,3),(4,0) is

A. 5

B. $\frac{5}{2}$

C. 3

D. $\frac{3}{2}$

Answer: B

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33. If a square of side 10 is inscribed in a circle then radius of the circle is

A. 10

B. $5\sqrt{2}$

C. $10\sqrt{2}$

D. 5

Answer: B

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34. If the lines $lx + 2y + 3 = 0$ and $2y + mx + 4 = 0$ cut the co-ordinate axes in concylic points then lm=

A. 4

B. -4

C. 2

D. 8

Answer: A

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35. If the lines $2x - 3y + 7 = 0, 3x + ky + 5 = 0$ cut the coordinate axes in concyclie points then k=

A. 2

B. 3

C. -2

D. -3

Answer: C

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36. The lines 2x+3y+19=0 and 9x+6y-17=0 cuts the coordinate axes in

A. concylic points

B. conjugate points

C. same points

D. can not be said

Answer: A

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37. If the points (3,0),(0,4),(0,0) and (k,4) are concylic then k=

A. 4

B. 3

C. -1

D. -3

Answer: B

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38. If the lines $x - 2y + 3 = 0, 3x + ky + 7 = 0$ cut the coordinate axes in concylic points, then k=

A. only I

B. only II

C. both I and II

D. neither I nor II

Answer: A

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39. ABCD is a rectangle wih sides AB=p, BC=q,. If AB and AD are taken negative directions of coordinate axes. then the equaton of the circumscribing the rectangle is

A. $x^2 + y^2 + px + qy = 0$

B. $x^2 + y^2 - px - qy = 0$

C. $x^2 + y^2 + 2px + 2qy = 0$

D. $x^2 + y^2 - 2px - 2qy = 0$

Answer: A

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40. Find the equation of the circle passing through the points

$(3, 4)(3, 2), (1, 4)$

A. $x^2 + y^2 - 4x - 6y + 11 = 0$

B. $x^2 + y^2 - 21x + 17y + 20 = 0$

C. $x^2 + y^2 + x - 12y + 5 = 0$

D. $x^2 + y^2 - 22x - 4y + 25 = 0$

Answer: A

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41. The sides of a square are $x = 4, x = 7, y = 1, y = 4$. Then the equation of the circumcircle of the square is

A. $x^2 + y^2 - 11x - 5y + 32 = 0$

B. $x^2 + y^2 - 11x - 5y + 7 = 0$

C. $x^2 + y^2 - 6x - 5y + 7 = 0$

D. $x^2 + y^2 - 5x - 2y + 15 = 0$

Answer: A

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42. The points (2k, 3k), (1, 0), (0, 1) and (0, 0) lie on a circle for

A. All values of k

B. $0 \leq k \leq 1$

C. $k < 0$

D. $k = 5/13$

Answer: D

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43. If the 4 points made by intersection of lines $2x - y + 1 = 0, x - 2y + 3 = 0$ with the coordinate axes are concylic then centre of circle is

A. (7/4,5/4)

B. (7/4,-5/4)

C. (-7/4,5/4)

D. (-7/4,-5/4)

Answer: C

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44. The lines $2x - 5y + 1 = 0$ and $10x - 4y - 3 = 0$ meets the coordinate axes in concylic points, then equation to the circle is

A. $20x^2 + 20y^2 - 4x - 11y = 0$

B. $20x^2 + 20y^2 + 4x - 11y - 3 = 0$

C. $20x^2 + 20y^2 + 4x + 11y - 3 = 0$

D. None

Answer: C

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

A. 2

B. 3

C. $\sqrt{7}$

D. 7

Answer: D

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46. If the line passing through P=(8,3) meets the circle $S \equiv x^2 + y^2 - 8x - 10y + 26 = 0$ at A,B then PA.PB=

A. 5

B. 10

C. 15

D. 25

Answer: A

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47. A chord of length 8 units is at a distance of 4 uits from the centre of a circle then its radius is

A. $4\sqrt{2}$

B. $3\sqrt{2}$

C. $2\sqrt{2}$

D. $\sqrt{2}$

Answer: A

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48. The intercept made by the circle $x^2 + y^2 - 4x - 6y - 3 = 0$ on the line $x + y - 3 = 0$ is

A. 3

B. 4

C. 6

D. 2

Answer: C

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49. If a line is drawn through a point A(3,4) to cut the circle $x^2 + y^2 = 4$ at P and Q then AP .AQ=

A. 15

B. 17

C. 21

D. 25

Answer: C

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50. The condition that the chord a $x\cos\alpha + y\sin\alpha - p = 0$ of $x^2 + y^2 - a^2 = 0$ subtend a right angle at the centre of the circle is

A. $a^2 = 2p^2$

B. $p^2 = 2a^2$

C. $a = 2p$

D. $p = 2a$

Answer: A

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51. The equation of the cirlce with centre (0,0) and which cuts off a chord of length 4 units on $x + 2y = 5$ is

A. $x^2 + y^2 = 9$

B. $x^2 + y^2 = 3$

C. $x^2 + y^2 = 5$

D. $x^2 + y^2 = 4$

Answer: A

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52. The line $y = mx + c$ intersects the circle $x^2 + y^2 = r^2$ in two distinct points if

A. 6

B. 10

C. 11

D. 13

Answer: D

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53. If a chord of the circle $x^2 + y^2 = 16$ makes equal intercepts of length a on the co ordinates axes then $|a| <$

A. $\sqrt{2}$

B. $2\sqrt{2}$

C. 4

D. $4\sqrt{2}$

Answer: D

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54. The pair of tangents from (2,1) to the circle $x^2 + y^2 = 4$ is

A. 2

B. 3

C. 1

D. 9

Answer: B

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55. The equation of the tangent to the circle $x^2 + y^2 - 4x + 4y - 2 = 0$ at (1,1) is

A. $2x + 3y = 13$

B. $3x + 2y = 13$

C. $2x + 3y = \sqrt{13}$

D. $3x + 2y = \sqrt{13}$

Answer: A

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56. The line $y = mx + c$ touches $x^2 + y^2 = a^2 \Leftrightarrow$

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

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

C. $c^2 + a^2 = a^2m^2$

D. $c^2 + m^2 = a^2(1 + m^2)$

Answer: B

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57. The radius of the circle which has the lines $x + y - 1 = 0, x + y - 9 = 0$ as tangents is

A. $\sqrt{2}$

B. $2\sqrt{2}$

C. $3\sqrt{2}$

D. $4\sqrt{2}$

Answer: B

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58. Equation of the tangent to the circle $x^2 + y^2 = 3$, which is inclined at 60° with the x-axis is

A. $y = \sqrt{3}x + 2\sqrt{3}$

B. $y\sqrt{3} = x + 2\sqrt{3}$

C. $y = -x\sqrt{3} + 4\sqrt{3}$

D. $y = -\sqrt{3}x - 2\sqrt{3}$

Answer: A

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59. Find the equation of the normal to the circle $x^2 + y^2 - 4x - 6y + 110$ at (3,2) Also find the other where the normal meets the circles.

A. $3x - 4y = 0$

B. $3x + 4y = 0$

C. $4x + 3y = 0$

D. $4x - 3y = 0$

Answer: C

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60. The number of circles that touch all the 3 lines 2x+y=3, 4x-y=3, x+y=2 is

A. 1

B. 2

C. 3

D. 4

Answer: D

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61. P(-9,-1) is a point on the circle $x^2 + y^2 + 4x + 8y - 38 = 0$. The equation to the tangent at the other end of the diameter thorugh P is

A. $7x - 3y = 60$

B. $7x + 3y = 56$

C. $7x - 3y = 56$

D. $7x + 3y = 60$

Answer: C

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62. The line $x\cos\alpha + y\sin\alpha = p$ touches the circle $x^2 + y^2 - 2ax\cos\alpha - 2ay\sin\alpha = 0. then p =$

A. All values of k

B. 2a

C. $-a$

D. $a/2$

Answer: B

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63. The equation of the tangent to the circle $x^2 + y^2 + 4x - 4y + 4 = 0$ which make equal intercepts on the positive coordinates, is

A. $x + y = 2$

B. $x + y = \sqrt{2}$

C. $x + y = 2\sqrt{2}$

D. None

Answer: C

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64. The tangent at (3,4), (4,-3) to the circle $x^2 + y^2 = 25$ are

A. coincident

B. parallel

C. perpendicular

D. at an angle of $45\degree$

Answer: C

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65. If O is the origin OP, OQ are the tangent to the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ then the circumcentre of the $\triangle OPQ$ is

A. $(-g, -f)$

B. $(-f, -g)$

C. $(-g/2, -f/2)$

D. $(-f/2, -g/2)$

Answer: C

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66. Show that $x + y + 1 = 0$ touches the circle

$x^2 + y^2 - 3x + 7y14 = 0$ and find its

point of contact.

A. (1,0)

B. (2,-3)

C. (5,3)

D. (-1,0)

Answer: B

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67. Find the equation of the circles which touch $2x - 3y + 1 = 0$ at (1,1)

and having radius $\sqrt{13}$.

A. $(x + 1)^2 + (y - 4)^2 = 13$

B. $(x - 1)^2 + (y - 4)^2 = 13$

C. $(x - 1)^2 + (y + 4)^2 = 13$

D. $(x + 1)^2 + (y + 4)^2 = 13$

Answer: A

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68. If the equatio of one tangent to the circle with centre (2,-1) from the origin is 3x+y=0, then the equation of the other tangent through the origin is

A. $3x - y = 0$

B. $x + 3y = 0$

C. $x - 3y = 0$

D. $x + 2y = 0$

Answer: C

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69. 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 is

A. $2x + y + 3 = 0$

B. $2x + y - 4 = 0$

C. $2x + y - 5 = 0$

D. $2x + y - 7 = 0$

Answer: C

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70. The equation of the diameter of the circle $x^2 + y^2 + 2x - 4y = 4 = 0$ that is parallel to $3x + 5y - 4 = 0$ is

A. $3x + 5y = 7$

B. $3x + 5y = -7$

C. $3x - 5y = 7$

D. $3x - 5y = -7$

Answer: A

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71. The angle between the tangents to the circle with centre (4,5) drawn from P(-2,-3) is 120° then length of the tagent to the circle from P is

A. $4\sqrt{3}$

B. 12

C. $3\sqrt{2}$

D. $12\sqrt{3}$

Answer: B

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72. The locus of the point of intersection of two perpendicular tangents to the circle $x^2 + y^2 = a^2 is$

A. $x^2 + y^2 = \sqrt{2}a^2$

B. $x^2 + y^2 = 3a^2$

C. $x^2 + y^2 = 4a^2$

D. $x^2 + y^2 = 2a^2$

Answer: D

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73. Locus of point of intersection of perpendicular tangents to the circle $x^2 + y^2 - 4x - 6y - 1 = 0$ is

A. $x^2 + y^2 - 4x + 6y - 12 = 0$

B. $x^2 + y^2 - 4x + 6y - 17 = 0$

C. $x^2 + y^2 - 4x + 6y - 37 = 0$

D. $x^2 + y^2 - 4x + 6y + 13 = 0$

Answer: C

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74. The locus of the point of intersection of the perpendicular tangents to the circle $x^2 + y^2 = a^2, x^2 + y^2 = b$ is

A. $x^2 + y^2 = a^2 + b^2$

B. $x^2 + y^2 = a^2 - b^2$

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

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

Answer: A

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75. Tangents from point P are drawn one of each of th circle $x^2 + y^2 - 4x - 8y + 11 = 0$ and $x^2 + y^2 - 4x - 8y + 15 = 0$ if the tangents are perpendicular then the locus o P is

A. $x^2 + y^2 - 4x - 8y + 6 = 0$

B. $x + y + 10 = 0$

C. $y^2 - 2(x - 8)$

D. $x^2 + y^2 - 4x - 8y - 6 = 0$

Answer: A

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76. From any point on the circle $x^2 + y^2 = a^2$ tangent are drawn to the circle $x^2 + y^2 = a^2 \sin^2 \theta$. The angle between them is

A. $\theta / 2$

B. θ

C. 2θ

D. 4θ

Answer: C

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77. The tangents drawn from the origin $x^2 + y^2 - 2rx - 2hy + h^2 = 0$ are per-pendicular if

A. $h = r + 1$

B. $h = -r$

C. $r^2 + h^2 = 1$

D. $r^2 = h^2$

Answer: D

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78. The length of the tangent from a point on $x^2 + y^2 + 8x + 8y - 4 = 0$ to $2x^2 + 2y^2 + 16x + 16y + 1 = 0$ is

A. 3

B. $\frac{3}{2}$

C. $\frac{3}{\sqrt{2}}$

D. $3\sqrt{2}$

Answer: C

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79. If the length of the tangent from (f,g) to the circle $x^2 + y^2 = 6$ be twice the length of the tangent from the same point to the circle $x^2 + y^2 + 3x + 3y = 0$, then

A. $x^2 + y^2 + 4x + 4y + 2 = 0$

B. $x^2 + y^2 + 4x - 4y + 2 = 0$

C. $x^2 + y^2 - 4x_4y + 2 = 0$

D. $x^2 + y^2 - 4x - 4y + 2 = 0$

Answer: A

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80. If the square of the length of the tangents from a point P to the circles $x^2 + y^2 = a^2, x^2 + y^2 = b^2, x^2 + y^2 = c^2$ are in A.P. then a^2, b^2, c^2 are in

A. A.P.

B. G.P.

C. H.P.

D. A.G.P.

Answer: A

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81. If the length of the tangent from (1,2) to the circle $x^2 + y^2 + x + y - 4 = 0$ and $3x^2 + 3y^2 - x - y - \lambda = 0$ are in the ratio 4:3 then $\lambda =$

A. $\frac{23}{4}$

B. $\frac{21}{4}$

C. $\frac{17}{4}$

D. $\frac{19}{4}$

Answer: B

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82. A tangent to the circle $x^2 + y^2 = 4$ meets the coordinate axes at P and Q. The locus of midpoint of PQ is

A. $\frac{1}{x^2} + \frac{1}{y^2} = 1$

B. $\frac{1}{x^2} + \frac{1}{y^2} = \frac{1}{2}$

C. $\frac{1}{x^2} + \frac{1}{y^2} = \frac{1}{3}$

D. $\frac{1}{x^2} + \frac{1}{y^2} = \frac{1}{4}$

Answer: A

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83. The locus of the point of intersection of tangents to the circle $x = a\cos\theta, y = a\sin\theta$ at points whose parametric angles differ by $\pi/4$ is

A. $x^2 + y^2 = 2\left(\sqrt{2} - 1\right)^2 a^2$

B. $x^2 + y^2 = 2\left(2 - \sqrt{2}\right)a^2$

C. $x^2 + y^2 - \left(\sqrt{2} + 1\right)^2 a^2$

D. $9\left(x^2 + y^2\right) = 4a^2$

Answer: B

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84. The circle with centre (2,3) touching x-axis has the radius equal to

A. 2

B. 3

C. $\sqrt{13}$

D. $\sqrt{5}$

Answer: B

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85. Circle touching y-axis and centre (3,2) is

A. $x^2 + y^2 - 8x + 2y + 16 = 0$

B. $x^2 + y^2 + 18x - 2y - 16 = 0$

C. $x^2 + y^2 - 6x - 4y + 4 = 0$

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

Answer: C

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86. The equation of the circle touching both the axes, lying in the third quadrant and having the radius 1 is

A. $x^2 + y^2 - 6x - 6y + 9 = 0$

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

C. $x^2 + y^2 + 2x + 2y + 1 = 0$

D. $x^2 + y^2 - 4x + 4y + 4 = 0$

Answer: C

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87. The x intercept of the circle $x^2 + y^2 + 8x - 9 = 0$ is

A. 8

B. 10

C. 7

D. 20

Answer: B

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88. $x^2 + y^2 - 14x - 10y + 24 = 0$ makes an

List - I	List - II
A) Intercept on x-axis	1) 0
B) Intercept on y-axis	2) 2
C) Intercept on $y = x$	3) $8\sqrt{3}$
D) Intercept on $7x + y - 4 = 0$	4) 10

The correct match is

A. $\begin{array}{cccc} A & B & C & D \\ 1 & 2 & 3 & 4 \end{array}$

B. $\begin{array}{cccc} A & B & C & D \\ 2 & 1 & 4 & 3 \end{array}$

C. $\begin{array}{cccc} A & B & C & D \\ 3 & 4 & 1 & 2 \end{array}$

D. $\begin{array}{cccc} A & B & C & D \\ 4 & 2 & 3 & 1 \end{array}$

Answer: D

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89. If $x^2 + y^2 + 6x + 2ky + 25 = 0$ to touch y-axis then k=

A. ± 20

B. $-1, \ -5$

C. ± 5

D. 4

Answer: C

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90. A circle passes through (-2,4) and touches the y-axis at (0,2). Which one of the following equations can represent a diameter of this circle

A. $2x - 3y + 10 = 0$

B. $3x + 4y - 3 = 0$

C. $4x + 5y - 6 = 0$

D. $5x + 2y + 4 = 0$

Answer: A

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91. If I_1, I_2, I_3 are the intercept on x-axis, y-axis, y=x w.r.t $x^2 + y^2 - 14x - 10y + 24 = 0$ then

A. $I_2 > I_3 > I_1$

B. $I_3 > I_1 > I_2$

C. $I_1 > I_3 > I_2$

D. $I_3 > I_2 > I_1$

Answer: B

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92. If a circle of radius 4 touches x-axis at (2,0) then its centre may be

A. (2,2)(2,-2)

B. (2,4)(2,-4)

C. (4,2)(4,-2)

D. (4,4)(4,-4)

Answer: B

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93. The equation of the circle touching the coordinate axes the line $x + 2 = 0$ is

A. $x^2 + y^2 + 2x + 2y + 1 = 0$

B. $x^2 + y^2 - 2x + 2y + 1 = 0$

C. $x^2 + y^2 - 2x - 2y + 1 = 0$

D. $x^2 + y^2 + 2x - 2y - 1 = 0$

Answer: A

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94. Two circles touching both the axes intersect at (3,-2) then the coordinates of their other point of intersection is

A. (2,3)

B. (2,-3)

C. (-2,3)

D. (-2,-3)

Answer: B

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95. If two circles touching both the axes intersect at two points P and Q where P=(3,1) then PQ=

A. $\sqrt{2}$

B. $2\sqrt{2}$

C. $3\sqrt{2}$

D. $4\sqrt{2}$

Answer: B

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96. The equation of the circle passing through (2,1) and touching the coordinate axes is

A. $x^2 + y^2 - 2x - 2y + 1 = 0$

B. $x^2 + y^2 + 2x + 2y + 1 = 0$

C. $x^2 + y^2 - 2x - 2y - 1 = 0$

D. $x^2 + y^2 + 2x + 2y - 1 = 0$

Answer: A

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97. The radius of the circle of least size that passes through (-2,1) and touches both axes is

A. 1

B. 2

C. 3

D. 5

Answer: A

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98. The equation of the circle which touches both the axes and the line $4x + 3y = 6$ in first quadrant and lies below it

A. $4x^2 + 4y^2 - 4x - 4y + 1 = 0$

B. $x^2 + y^2 - 6x - 6y + 9 = 0$

C. $x^2 + y^2 - 6x - y + 9 = 0$

D. $4\left(x^2 + y^2 - x - 6y\right) + 1 = 0$

Answer: A

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99. Equation of circle which touch X-axies at (3,0) and making Y-intercept of length 8 units is

A. $x^2 + y^2 - 6x \pm 10y + 9 = 0$

B. $x^2 + y^2 - 6x \pm 10y - 9 = 0$

C. $x^2 + y^2 + 16x + 110y + 9 = 0$

D. None

Answer: A

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100. The equation of the circles which touch the y-axis at the origin and the line 5x+12y-72=0 is

A. $x^2 + y^2 - 6y = 0, x^2 + y^2 + 24y = 0$

B. $x^2 + y^2 + 2y = 0, x^2 + y^2 - 18y = 0$

C. $x^2 + y^2 + 18x = 0, x^2 + y^2 - 8x = 0$

D. $x^2 + y^2 + 4x = 0, x^2 + y^2 - 16x = 0$

Answer: C

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101. The circle passing through origin and making intercepts 6 and -4 onx and y-axes respectively has the centre

A. (3,-2)

B. (-2,4)

C. (8,-4)

D. Both 1 and 2

Answer: A

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102. The equation to the cicle of radius 5. which pass through the two points on the x-axis which are at a distance of 4 from the origin is

A. $x^2 + y^2 - 6x - 16 = 0$

B. $x^2 + y^2 - 6y - 25 = 0$

C. $x^2 + y^2 + 6y - 16 = 0$

D. $x^2 + y^2 + 6y - 25 = 0$

Answer: C

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103. The centre of the circle touching y-axis at (0,4) and making an intercept 2 units on the positive x-axis is

A. $\left(10, \sqrt{3}\right)$

B. $\left(\sqrt{17}, 3\right)$

C. $\left(\sqrt{17}, 4\right)$

D. $\left(3, \sqrt{17}\right)$

Answer: C

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104. The chord of contact of (2,1) with respect to the circle $x^2 + y^2 = 2$ is

A. $x + 2y = 2$

B. $2x + y = 2$

C. $2x + y = 1$

D. $x + 2y = \sqrt{2}$

Answer: B

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105. The polar of (3,-1) w.r.t the circle $x^2 + y^2 \_ 2x - 4y + 1 = 0$ is

A. $4x - 3y + 6 = 0$

B. $4x - 3y + 1 = 0$

C. $x + 2y = 0$

D. $4x - 3y + 11 = 0$

Answer: A

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106. The pole of $2x + 3y = 0$ with respect to $x^2 + y^2 + 6x - 4y = 0$ is

A. $\left(\frac{-5}{6}, \frac{5}{4}\right)$

B. $(2, 3)$

C. $(- 3, 2)$

D. not existing

Answer: D

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107. If the points (k,1) (2,-3) are conjugate w.r.t. $x^2 + y^2 + 4x - 6y - 12 = 0$ then k

A. 4

B. 5

C. 44291

D. 44320

Answer: D

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108. If (1,2),(3,a) are conjugate points w.r.t $x^2 + y^2 = 16$ then a=

A. 8

B. 7.5

C. 6.5

D. 5.5

Answer: C

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109. If $2x + 3y = 1$ and $3x + 4y = k$ are conjugate lines w.r. the circle $x^2 + y^2 = 4$ then k=

A. 36

B. 72

C. 24

D. 144

Answer: B

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110. If the lines $2x + y + 12 = 0, 4x - 3y - 10 = 0$ are conjugate w.r.t the circle with centre $\left(2, \frac{-3}{2}\right)$ then r=

A. $\frac{\sqrt{29}}{2}$

B. $\sqrt{29}$

C. $\frac{5}{2}$

D. 5

Answer: A

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111. The points (-6,2),(-3,1) w.r.t the circle $x^2 + y^2 = 20$ are

A. extremities of a diameter

B. conjugate points

C. inverse points

D. lie on the circle

Answer: C

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112. The inverse point of (1,2) w.r.t. the circle $x^2 + y^2 = 25$, is (5,k) then k=

A. 10

B. 12

C. 22

D. 40

Answer: A

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113. The length of the chord of contact of (-2,3) with respect to the circle $x^2 + y^2 - 2x + 4y + 1 = 0$ is

A. $15\sqrt{\frac{13}{3}}$

B. $5\sqrt{\frac{3}{13}}$

C. $4\sqrt{\frac{15}{17}}$

D. $15\sqrt{\frac{3}{13}}$

Answer: C

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114. The locus of the point, the chord of contact of which wrt the circle $x^2 + y^2 = a^2$ subtends a right angle at the centre of the circle is

A. $x^2 + y^2 = a^2/2$

B. $x^2 + y = a^2/3$

C. $x^2 + y^2 = 2a^2$

D. $x^2 + y^2 = 3a^2$

Answer: C

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115. The polar of the point (1,2) w.r.t. the circle $x^2 + y^2 - 2x - 4y - 4 = 0$

A. Touches the circle

B. Intersects the circle in two points

C. Does not meet the circle

D. None

Answer: C

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116. The straight line $x - 2y + 5 = 0$ intersects the circle $x^2 + y^2 = 25$ in points P and Q, the coordinates of the point of the intersection of tangents drawn at P and Q to the circle is

A. (25, 50)

B. (-5,10)

C. (25,-50)

D. (-5,-10)

Answer: B

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117. The line 4x+4y-11=0 intersects the circle $x^2 + y^2 - 6x - 4y + 4 = 0$ at A and B. The point of intersection of the tangents at A,B is

A. (-1,-2)

B. (1,2)

C. (-1,2)

D. (1,-2)

Answer: A

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118. If the pole of a line w.r.t to the circle $x^2 + y^2 = a^2$ lies on the circle $x^2 + y^2 = a^4$ then the line touches the circle

A. $x^2 + y^2 = 2$

B. $x^2 + y^2 = 1$

C. $x^2 + y^2 = 3$

D. $x^2 + y^2 = 4$

Answer: B

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119. The locus of poles of tangents to the circle $(x - p)^2 + y^2 = b^2$ w.r.t. the circle $x^2 + y^2 = a^2$ is

A. $\left(a^2 - px\right)^2 = b^2\left(x^2 + y^2\right)$

B. $\left(a^2 \_ bx\right)^2 = p^2\left(x^2 + y^2\right)$

C. $\left(a^2 + px\right)^2 = b^2\left(x^2 + y^2\right)$

D. $\left(a^2 + bx\right)^2 = p^2\left(x^2 + y^2\right)$

Answer: A

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120. If the pole of the line with respect to the circle $x^2 + y^2 = c^2$ lies on the circle $x^2 + y^2 = 9c^2$ then the line is a tangent to the circle with centre origin is

A. $x^2 + y^2 = 9c^2$

B. $9x^2 + 9y^2 = c^2$

C. $3x^2 + 3y^2 = c^2$

D. $81x^2 + 81y^2 = c^2$

Answer: B

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

A. (1,3)

B. (1,-3)

C. (-3,1)

D. (3,1)

Answer: D

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122. In ΔABC the midpoints are D,E and F of the sides AB,BC and CA, then $\Delta DEF : \Delta ABC$ is

A. Centroid of ΔABC

B. Ortho centre of ΔABC

C. Incentre of ΔABC

D. Circumcentre of ΔABC

Answer: C

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123. If (1, a), (b, 2) are conjugate points with renpcet to the circle $x^2 + y^2 = 25$, then 4a+2b=

A. (3,1)

B. (3,-1)

C. (1,3)

D. (1,-3)

Answer: B

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124. If the lengths of the tangents from two points A, B to a circle are 4, 3 respectively. If A,B are conjugate points then AB=

A. 5

B. $\sqrt{85}$

C. $\frac{\sqrt{85}}{2}$

D. $\frac{\sqrt{85}}{3}$

Answer: A

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125. If A and B are conjugate points w.r.t to circle $x^2 + y^2 = r^2$ then $OA^2 + OB^2 =$

A. $AB^2 - r^2$

B. $AB^2 + r^2$

C. $AB^2 + 2r^2$

D. $AB^2 - 2r^2$

Answer: C

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126. Inverse of (0,0) w.r.t to circle $x^2 + y^2 - 4x - 6y + 3 = 0$ is

A. $\left(\frac{6}{13}, \frac{9}{13}\right)$

B. $\left(\frac{-5}{13}, \frac{9}{13}\right)$

C. $\left(\frac{6}{13}, \frac{-9}{13}\right)$

D. $\left(\frac{-6}{13}, \frac{-9}{13}\right)$

Answer: A

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127. The midpoint of the chord $3x - y = 10$ w.r.t $x^2 + y^2 = 18$ is

A. (3,-1)

B. (5,5)

C. (1,3)

D. not existing

Answer: A

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128. The mixpoint of chord $2x + y - 6 = 0$ of circle $x^2 + y^2 = 9$ is

A. (1,2)

B. (2,1)

C. (-1,2)

D. (2,-1)

Answer: B

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129. The length and the midpoint of the chord 4x-3y+5=0 w.r.t. the circle $x^2 + y^2 - 2x + 4y - 20 = 0$ is

A. $\left(-\frac{7}{5}, -\frac{1}{5}\right)$

B. $\left(\frac{7}{5}, \frac{1}{5}\right)$

C. $\left(-\frac{17}{5}, -\frac{11}{5}\right)$

D. $\left(-\frac{7}{5}, -\frac{8}{5}\right)$

Answer: A

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130. The pair of tangents from (2,1) to the circle $x^2 + y^2 = 1$ is

A. $3y^2 - 4xy + 16x + 8y - 20 = 0$

B. $3y^2 + 4xy + 4x - 2y - 5 = 0$

C. $3x^2 - 4xy - 16x - 8y + 20 = 0$

D. $3x^2 - 4xy - 16x + 8y - 20 = 0$

Answer: A

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131. The midpoint of chord formed by the polar of (-9,2) w.r.t $x^2 + y^2 = 100$ is

A. $\left(4, -\frac{4}{3}\right)$

B. $\left(-4, \frac{16}{3}\right)$

C. $\left(-4, \frac{16}{9}\right)$

D. $\left(4, \frac{16}{3}\right)$

Answer: B

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132. If (3,-2) is the midpoint of the chord AB of the circle $x^2 + y^2 - 4x + 6y - 5 = 0$ then AB=

A. 4

B. 8

C. 12

D. 16

Answer: B

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133. Locus of midpoints of chords of circles $x^2 + y^2 - 4x - 2y - 4 = 0$ which are perpendicular to the line $4x - 3y + 10 = 0$ is

A. $4x - 3y + 5 = 0$

B. $4x - 3y - 5 = 0$

C. $4x - 3y + 10 = 0$

D. $4x + 3y + 5 = 0$

Answer: B

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134. From the origin chords are drawn to the circle $(x - 1)^2 + y^2 = 1$ then equation of locus of mid ponts of these chords is

A. $x^2 + y^2 + x = 0$

B. $x^2 + y^2 - x = 0$

C. $x^2 + y^2 - 2x = 0$

D. $x^2 + y^2 - 2x - 2y = 0$

Answer: B

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135. The locus of the midpoints oof chords of the circle $x^2 + y^2 = 4$ which substends a right angle at the origin is

A. $x^2 + y^2 = 4r^2$

B. $x^2 + y^2 = r^2$

C. $x^2 + y^2 = 2r^2$

D. $x^2 + y^2 = r^2/2$

Answer: B

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136. Angle between tangents at the ends chords of circle $(x - 1)^2 + (y - 2)^2 = 16$ is 60° then locus of midpoints of all such chords is

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

B. $(x - 1)^2 + (y - 2)^2 = 4$

C. $x^2 + y^2 = 4$

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

Answer: B

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137. The circle $x^2 + y^2 - 4x - 6y - 12 = 0, x^2 + y^2 + 6x - 8y + 21 = 0$ are

A. intersection

B. toching exterally

C. touching internally

D. one is lying inside the other

Answer: A

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138. The circle $x^2 + y^2 \_ 2x + 4y + 4y = 0, x^2 + y^2 + 4x - 2y + 1 = 0$ are

A. intersecting

B. touching externally

C. touching internally

D. one is lying inside the other

Answer: D

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139. The number of common tangents to $x^2 + y^2 = 1, x^2 + y^2 - 6x - 8y + 24 = 0$ is

A. one

B. two

C. four

D. zero

Answer: D

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140. The number of common tangents to $x^2 + y^2 = 4, (x - 3)^2 + (y - 4)^2 = 9$ is

A. 1

B. 2

C. 3

D. 0

Answer: C

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141. The internal cent re of similitude of two circles $(x - 2)^2 + (y - 3)^2 = 9, (x + 6)^2 + (y + 5)^2 + 9$ divides the segement joining their centres in the ratio

A. 0.085416666666667

B. 0.25347222222222

C. 0.084027777777778

D. 0.042361111111111

Answer: D

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142. The external centre of similitude of the two circles $x^2 + y^2 - 2x - 6y + 9 = 0, x^2 + y^2 = 4$ is

A. (1,3)

B. (2,6)

C. (3,9)

D. (1,2)

Answer: B

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143. It is not possible to find the equation of a cicle

I: If radius centre of circle are given

II: IF thre non collinear points on the circle are given

III: If the centre and a tangent of the circle are known

IV: If the centre and a chord length of the circle are known, the order of trueness, falseness of above statements is

A. T,T,T,T

B. F,T,T,F

C. F,F,F,T

D. F,F,F,F

Answer: C

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144. Read of the following two statements

I: $\sqrt{3}x - y + 4 = 0$ is tangent to the circle $x^2 + y^2 = 4$

II: $y = \left(\sqrt{m^2 - 1}\right)x \pm mr$ is tangent to the circle $x^2 + y^2 = r^2$

A. I is true, II is true, II is correct explanation of I.

B. I is true,II is true, II is not correct explanation of I.

C. I is false, II is false

D. I is true , II is true

Answer: B

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145. The number of parameters of the equation $ax^2 + ay^2 + 2fy + c = 0$ is

A. 3

B. 2

C. 4

D. 5

Answer: A

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146. If the circles $x^2 + y^2 = a^2, x^2 + y^2 - 6x - 8y + 9 = 0$ touch externally then a=

A. 4

B. 3

C. 2

D. 1

Answer: D

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147. The condition that the circles $x^2 + y^2 + 2ax + c = 0, x^2 + y^2 + 2by + c = 0$ may touch each other is

A. $\frac{1}{a^2} + \frac{1}{b^2} = \frac{1}{c}$

B. $\frac{1}{a^2} + \frac{1}{b^2} = \frac{1}{c^2}$

C. $\frac{1}{a^2} + \frac{1}{b^2} = \frac{2}{c^2}$

D. $\frac{1}{a} + \frac{1}{b} = \frac{2}{c}$

Answer: A

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148. The equation to the circle whose radius is 3 and which touches internally the circle $x^2 + y^2 - 4x + 6y - 12 = 0$ at this point (-1,1) is

A. $\left(x - \frac{4}{5}\right)^2 | \left(y - \frac{7}{5}\right)^2 = 9$

B. $\left(x - \frac{7}{5}\right)^2 + \left(y - \frac{4}{5}\right)^2 = 9$

C. $x^2 + y^2 = 9$

D. $(x - 9)^2 + (y - 8)^2 = 25$

Answer: A

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149. A circle of radius 2 units rolls inside the ring of the circle $x^2 + y^2 + 8x - 2y - 19 = 0$ then the locus of its centre is

A. $x^2 + y^2 + 8x + 2y - 47 = 0$

B. $x^2 + y^2 + 8x - 2y - 1 = 0$

C. $x^2 + y^2 + 8x - 2y + 1 = 0$

D. $x^2 + y^2 - 8x + 2y + 1 = 0$

Answer: C

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150. If 4y=x +7 is a diameter of the circumscribing circle of the rectangle ABCD and A(-3,4), B(5,4). then the area of the rectangle.

A. 31 s.u.

B. 32 s.u.

C. 35 s.u.

D. 16 s.u.

Answer: B

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151. The area of the quadrilateral formed by the tangents from the point (4,5) to the circle $x^2 + y^2 - 4x - 2y - 11 = 0$ with a pair of the radii joining the points of contact of these tangents is

A. 4

B. 6

C. 8

D. 10

Answer: C

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152. The area (in sq units) of the triangle formed by the tangent, normal at $\left(1, \sqrt{3}\right)$ to the circle $x^2 + y^2 = 4$ and the X-axis, is

A. $\sqrt{3}$

B. $2\sqrt{3}$

C. $3\sqrt{3}$

D. $4\sqrt{3}$

Answer: B

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153. The area of the triangle formed with coordinate axes and the tangent at (x_1, y_1) on the circle $x^2 + y^2 = a^2$ is

A. $\dfrac{a^4}{|x_1y_1|}$

B. $\dfrac{a^4}{2|x_1y_1|}$

C. $\dfrac{2a^4}{|x_1y_1|}$

D. $\dfrac{a^2}{2|x_1y_1|}$

Answer: B

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154. The area of the triangle formed by the tangents from (1,3) to the circle $x^2 + y^2 - 4x + 6y + 1 = 0$ and its chord of contact is

A. $\frac{250\sqrt{3}}{37}$

B. $\frac{125\sqrt{3}}{37}$

C. $\frac{250\sqrt{3}}{17}$

D. $\frac{125\sqrt{3}}{17}$

Answer: A

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155. The area of an equilateral triangle inscribed in the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ is

A. $\pi\left(g^2 + f^2 - c\right)^2$

B. $\frac{1}{4}\left(g^2 + f^2 = c\right)$

C. $\frac{3\sqrt{3}}{4}\left(g^2 + f^2 - c\right)$

D. $\frac{\sqrt{3}}{4}\left(g^2 + f^2 - c\right)$

Answer: C

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156. A right angled isoceles triangle is inscribed in the circle $x^2 + y^2 - 6x + 10y - 38 = 0$ then its area is (square units)

A. 18

B. 12

C. 72

D. 36

Answer: C

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157. Observed the following statements

I: The intercepts of the circle $x^2 + y^2 - 4x + 13 = 0$ on y-axis is $\sqrt{7}$

II: The intercept made by the circle $x^2 + y^2 - 4x - 8y + 13 = 0$ on x-axis is 15

III: The straight line $y = x + 1$ cuts the circle $x^2 + y^2 = 1$ in two, two distinct points, then truness, falseness of the above statements are

A. F,T,F

B. F,F,T

C. T,T,F

D. T,T,T

Answer: B

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158. The polar of p with respect to a circle $s = x^2 + y^2 + 2gx + 2fy + c = 0$ with centre C is

A. Parallel to the tangent at P

B. Parallel to CP

C. Perpendicular to CP

D. Perpendicular to the tangent at P

Answer: C

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159. Given that $p\left(x_1, y_1\right)$ is interior point of the circle $S = x^2 + y^2 + 2gc + 2fy + c = 0$

I: Polar of P and tangent at P coincide

II: Polar of P exists, chord of contact of P does not exist. Which of the following is correct?

A. I is true , II is true

B. I is false , II is false

C. I is false, II is true

D. I is true, II is false.

Answer: C

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160. The line $y = mx + c$ intersects the circle $x^2 + y^2 = r^2$ in two distinct points if

A. $-r\sqrt{1+m^2} < C < r\sqrt{1+m^2}$

B. $c < -r\sqrt{1+m^2}$

C. $c < r\sqrt{1+m^2}$

D. $-\sqrt{1+m^2} < c < \sqrt{1+m^2}$

Answer: A

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161. The locus of the point $(2+3\cos\theta, 1+3\sin\theta)$ when θ is parameter is

A. $x^2 + y^2 \_ 4x - 2y + 4 = 0$

B. $x^2 + y^2 - 4x - 2y - 4 = 0$

C. $x^2 + y^2 + 4x + 2y - 4 = 0$

D. $x^2 + y^2 + 4x + 2y + 4 = 0$

Answer: B

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162. The coordinate of the point on the circle $(x - 1)^2 + (y + 2)^2 = 9$ having θ as the parameter are

A. $(2 + 3\cos\theta, 2 + 3\sin\theta)$

B. $(1 + 3\cos\theta, - 2 + 3\sin\theta)$

C. $(1 - 3\cos\theta, - 2 - 3\cos\theta)$

D. $(10 + 13\cos\theta, - 5 + 8\sin\theta)$

Answer: B

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163. The parametric equation of the circle $x^2 + y^2 + 8x - 6y = 0$ are

A. $x = 4y + 5\cos\theta, y = 3 + 5\sin\theta$

B. $x = -4 + 5\cos\theta, y = 3 + 5\sin\theta$

C. $x = 4 + 5\cos\theta, y = -3 + 5\sin\theta$

D. $x = -4 + 5\cos thea, y = -3 + 5\sin\theta$

Answer: B

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164. To the circle $x^2 + y^2 = 16$ tangent at the point $\theta = \frac{\pi}{3}$ is

A. $x + \sqrt{3}y = 8$

B. $x + \sqrt{3}y = 16$

C. $x + \sqrt{3}y = 32$

D. $x + \sqrt{3}y = 4$

Answer: A

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EXAMPLE

1. Find the centre and radius of the circle

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

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2. Find the centre and radius of the circle

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

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3. Find the equation of the circle with centre (2,3) and passing through the point (2,-1).

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4. Find the equation of the circle passing through $(2, 3)$ and concentric with the circle $x^2 + y^2 + 8x + 12y + 15 = 0$

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5. If $x^2 + y^2 + 2gx + 2fy - 12 = 0$ represents a circle with centre $(2, 3)$, find g, f and its radius.

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6. If $x^2 + y^2 - 4x + 6y + c = 0$ represents a circle with radius 6 then find the value of c.

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7. If $x^2 + y^2 + 2gx + 2fy = 0$ represents a circle with cerntre $(- 4, \ - 3)$ then find g, f and the radius of the circle.

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8. Find the equation of the circle passing through the point (1,2) (3,-4) and (5,-6) .

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9. Find the equation of the circle passing through $(4, 1), (6, 5)$ and having the centre on the line $4x + y - 16 = 0.$

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10. Find the equation of the circumeircle of the triangles formed by the straight lines x + y = 6, 2x+ y= 4 and x+ 2y = 5

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11. Find the equation of circle passing through intersection points of line $ax + by + c = 0$ with coordinate axes and through origin.

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12. From the point A $(0, 3)$ on the circle

$x^2 + 4x + (y - 3)^2 = 0$ a chord AB is drawn

and extended to a point M such that

AM = 2 AB. Find the equation of the locus

of M.

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13. Suppose a point $\left(x_1, y_1\right)$ satisfies $x^2 + y^2 + 2gx + 2fy + c = 0$ then show that it represents a circle whenever g,f and c are real.

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14. Find the equation of tangent and normal at

$(3, 2)$ of the circle $x^2 + y^2 - x3y - 4 = 0$.

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15. Show that the line $lx + my + n = 0$ is a normal to the circles S=0 iff $gl + mf = mn$.

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16. The equation of the chord of contact of the point (4,2) with respect to the circle $x^2 + y^2 - 5x + 4y - 3 = 0$ is

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17. Find the power of the point P(2,3) with respect to the circle $S = x^2 + y^2 - 2x + 8y - 23 = 0$

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18. If the length of the tangent from $(2, 5)$ to the circle $x^2 + y^2 - 5x + 4y + k = 0$ is $\sqrt{37}$ then find k.

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19. If a point P is moving such that the lengths of tangents drawn from P to the circles

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

$x^2 + y^2 + 6x + 18y + 26 = 0$ are the ratio 2:3, then find the equation to the locus of P.

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20. Find the length of the chord intercepted

by the circle $x^2 + y^2 - x3y - 22 = 0$ on

the line $y = x - 3$

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21. Find the equation of circle with centre

$(2, 3)$ and touching the line $3x - 4y + 1 = 0$

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22. Find the equation of tangents of the circle

$x^2 + y^2 - 8x - 22y + 12 = 0$ at the points

whose ordinates are 1.

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23. Find the equation of the tangent to

$x^2 + y^2 - 2x + 4y = 0$ at$(3, -1)$ Also find

the equation of tangent parallel to it.

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24. If $x^2 + y^2 = c^2$ and $\frac{x}{a} + \frac{y}{b} = 1$ intersect at A and B, then find AB.

Hence deduce the condition that the line touches the circle.

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25. Show that the tangent at $(-1, 2)$ of the

circle $x^2 + y^2 - 4x - 8y + 7 = 0$

touches

the circle $x^2 + y^2 + 4x + 6y = 0$ and also

find its point of contact.

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26. Find the equations of the

circle $x^2 + y^2 + 2x - 2y + 3 = 0$ which are

perpendicular to $3x - y + 4 = 0$

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27. Find the equation of the of the cirlces which touch 2x- 3y +1 =0 at

(1,1) and having radius $\sqrt{3}$.

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28. Find the equations of the circles passing through (1,-1) touching the lines $4c + 3y + 5 = 0$ and $3x - 4y - 10 = 0$

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29. Find the locus of the point of intersections of the tangent drawn to the circles $x^2 + y^2 = a^2$ which makes a constant angle α to each other.

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30. If θ_1 and θ_2 are the angles of inclination of tangents through a point P to the circles $x^2 + y^2 = a^2$, then find the locus of P when $\cot\theta_1 + \cot\theta_1 = k$

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31. Find the equation of the normal to the circle $x^2 + y^2 - 4x - 6y + 110$ at (3,2) Also find the other where the normal meets the circles.

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32. Find the equation of the circle which touches X-axis at a distance of 3 units from the origin and making an intercept of length 6 on Y- axis.

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33. If the chord of contact of a point P with respect to the circles $x^2 + y^2 = a^2$ cut the circle at A and B such that $\angle AOB = 90^{\circ}$. Find the locus of P.

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34. Show that the poles of the tangents to the circle $x^2 + y^2 = a^2$ with respect to the circle $(x + a)^2 + y^2 = 2a^2$ lie on $y^2 + 4ax = 0$.

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35. Find the value of k if the point (4,2) and (k,-3) are conjugate points with respect to the circles $x^2 + y^2 - 5x + 8y + 6 = 0$

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36. Find the value of k if $x + y - 5 = 0$ $2x + ky - 8 = 0$ are conjugate with respect to the circle $x^2 + y^2 - 2x - 2y - 1 = 0$

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37. Show that the area of the triangle formed by the two tangents through $P(x_1, y_1)$ to the circle $S = x^2 + y^2 + 2gx + 2fy + c = 0$ and the chord of contact of P w.r.t S=0 is $\frac{r(S_{11})^{3/2}}{S_n + r^2}$, where r is the radius of the circle.

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38. Find the mid point of the chord

intercepted by

$x^2 + y^2 - 2x - 10y + 1 = 0$ ___(1)

on the line $x - 2y + 7 = -0.$ _____(2)

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39. Find the locus of the mid point of the chord of contact of $x^2 + y^2 = a^2$ from the points lying on the line $lx + my + n = 0$

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40. Find the conditions that the tangents drawn from the exteriorpoint (g,f) to $S = x^2 + y^2 + 2gx + 2fy + c = 0$ are perpendicular to each other.

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42. Find the locus of midpoint of chords of the circle $x^2 + y^2 = r^2$, substending a right angle at the point (a,b)

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43. Discuss the relative position of the following pair of circles.

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

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

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44. Find the number of possible common tangent that exits for the following pairs of circle.

(a) $x^2 + y^2 - 4x - 2y + 1 = 0, x^2 + y^2 - 6x - 4y + 4 = 0$

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

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45. Find the internal centre of similitude for the circles $x^2 + y^2 + 6x - 2y + 1 = 0$ and $x^2 + y^2 - 6y + 9 = 0$

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47. Show that the circles $x^2 + y^2 - 6x - 2y + 1 = 0, x^2 + y^2 + 2x - 8y + 13 = 0$ touch each other find the point of contact and the equation of the common tangent at their point of contact.

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48. Find the equation of the circle which touches $x^2 + y^2 - 4x + 6y - 1 = 0$ at (-1,1) internally with a radius of 2.

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49. Show that the circles $x^2+y^2+2ax+c=0$ and $x^2+y^2+2by+c=0$ to touch each other if $\frac{1}{a^2}+\frac{1}{b^2}=\frac{1}{c}$

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50. Find the equation to all possible tangents of the circles $x^2+y^2-2x-6y+6=0$ and $x^2+y^2=1$

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51. Find the centre and radius of the circle $x^2+y^2+2x-4y-4=0$

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52. Find the centre and radius of the circle

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

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56. If $x^2 + y^2 - 4x + 6y + c = 0$ represents a circle with radius 6 then find the value of c.

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57. If $x^2 + y^2 + 2gx + 2fy = 0$ represents a circle with cerntre $(-4, -3)$ then find g, f and the radius of the circle.

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58. Find the equation of circle passing through each of the following three points.

$(1, 2), (3, -4), (5, -6)$

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59. Find the equation of the circle passing through the points $(4, 1)$ and $(6, 5)$ and whose centre is on the line $4x + y = 16$.

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Hence deduce the coordinates that the line touches the circle.

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75. Show that the tangent at $(-1, 2)$ of the

circle $x^2 + y^2 - 4x - 8y + 7 = 0$

touches

the circle $x^2 + y^2 + 4x + 6y = 0$ and also

find its point of contact.

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87. Show that the area of the triangle formed by the two tangents through $P(x_1, y_1)$ to the circle $S = x^2 + y^2 + 2gx + 2fy + c = 0$ and the chord of contact of P w.r.t S=0 is $\frac{r(S_{11})^{3/2}}{S_n + r^2}$, where r is the radius of the circle.

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89. Find the locus of the mid point of the chord of contact of $x^2 + y^2 = a^2$ from the points lying on the line $lx + my + n = 0$

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

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95. Find the internal centre of similitude for the circles $x^2 + y^2 + 6x - 2y + 1 = 0$ and $x^2 + y^2 - 6y + 9 = 0$

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96. Find the external centre of similitude for the circles $x^2 + y^2 - 2x - 6y + 9 = 0$ and $x^2 + y^2 = 4$

Watch Video Solution

97. Show that the circles $x^2 + y^2 - 6x - 2y + 1 = 0, x^2 + y^2 + 2x - 8y + 13 = 0$ touch each other find the point of contact and the equation of the common tangent at their point of contact.

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98. Find the equation of the circle which touches $x^2 + y^2 - 4x + 6y - 1 = 0$ at (-1,1) internally with a radius of 2.

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99. Show that the circles $x^2 + y^2 + 2ax + c = 0$ and $x^2 + y^2 + 2by + c = 0$ to touch each other if $\frac{1}{a^2} + \frac{1}{b^2} = \frac{1}{c}$

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100. Find the equation to all possible tangents of the circles $x^2 + y^2 - 2x - 6y + 6 = 0$ and $x^2 + y^2 = 1$

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EXERCISE -1.1

1. Find the equation of the circle with centre

C and redius r where.

$C = (a, \ - b), r = a + b$

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2. Find the equation of the circle with centre C and radius r where

C = (-a,-b) , r = $\sqrt{a^2 - b^2}(|a|| > |b \mid)$

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3. Find the equation of the circle with centre C and radius r where

$C = (\cos\alpha, \sin\alpha), r = 1$

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4. Find the equation of the circle with centre C and radius r where

$C = (-7, -3), r = 4$

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5. Find the equation of the circle with centre C and radius r where

$C = \left(\frac{1}{2}, -9\right), r = 5$

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6. Find the equation of the circle with centre C and radius r where

$C = \left(\frac{5}{2}, \frac{-4}{3}\right), r = 6$

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7. Find the equation of the circle with centre

C and redius r where.

$C = (1, 7), r = \frac{5}{2}$

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8. Find the equation of the circle with centre

C and redius r where.

$C = (0, 0), r = 9$

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9. Find the centre and radius of each of the

circles whose equations are given below.

$3x^2 + 3y^2 - 5x - 6y + 4 = 0$

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10. Find the centre and radius of each of the circles whose equations are given below.

$3x^2 + 3y^2 - 6x - 12y - 1 = 0$

Find the radius and centre of the circle.

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11. Find the centre and radius of each of the circles whose equations are given below.

$x^2 + y^2 + 6x + 8y - 96 = 0$

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12. Find the centre and radius of each of the circles whose equations are given below.

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

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13. Find the centre and radius of each of the circles whose equations are given below.

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

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14. Find the centre and radius of each of the circles whose equations are given below.

$\sqrt{1 + m^3}\left(x^2 + y^2\right) - 2cx - 2mcy = 0$

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15. Find the equation of the circle passing through the origin and having the centre at (-4,3)

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16. Find the equation of the circle passing through (-2,3) and having centre (0,0)

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17. Find the equation of the circle passing through (3,4) and having the centre at (-3,4)

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18. Find the equation of the circle whose centre is (-1,2) and which passes thorugh (5,6)

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19. Find the value of aif $2x^2 + ay^2 - 3x + 2y - 1 = 0$ represents a circle and also find its radius

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20. Find the values of a,b if $ax^2 + bxy + 3y^2 - 5x + 2y - 3 = 0$ represents a circle . Also find the radius and centre of the circle .

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21. If $x^2 + y^2 + 2gx + 2fy = 0$ represents a circle with cerntre $(-4, -3)$ then find g, f and the radius of the circle.

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22. If the circle $x^2 + y^2 + ax + by - 12 = 0$ has the centre at (2,3) then find a, b and the radius of the circle .

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23. If the circle $x^2 + y^2 - 4x + 6y + a = 0$ has radius 4, find a.

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24. Find the equations of the circles for which

the points given below are the end points

of a diameter.

$(1, 2), (4, 6)$

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25. Find the equation of the circle for which the point given below are

the end points of a diameter.

(-4,3),(3,-4)

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26. Find the equation of the circle for which the point given below are the end points of a diameter.

(7,-3) ,(3,5)

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27. Find the equation of the circle for which the point given below are the end points of a diameter.

(1,1) (2,-1)

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28. Find the equation of the circle for which the point given below are the end points of a diameter.

(0,0) ,(8,5)

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29. Find the equation of the circle for which the point given below are the end points of a diameter.

(3,1) ,(2,7)

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30. Find the other end of the diameter of the circle $x^2 + y^2 - 8x + 27 = 0$ if one end of it is (2,3)

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31. Show that $A(3, -1)$ lies on the circle

$x^2 +_y^2 - 2x + 4y = 0$. Also find the other

end of the diameter through A.

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32. Show that $A(-3, 0)$ lies on $x^2 + y^2 + 8x + 12y + 15 = 0$ and find the other end of

diameter thorugh A.

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33. Find the equation of the circle passing through (-2,14) and concentric with the circle

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

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34. If the abscissae of points A, B are the roots of the equation $x^2 + 2ax - b^2 = 0$ and ordinates of A, B are roots of $y^2 + 2py - q^2 = 0$, then find the equation of the circle for which AB is a diameter.

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35. Find the equation of the circle passing through (2,-3) , (-4,5) and having the centre on 4x+ 3y+1=0 .

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36. Find the equation of a circle which passes through $(4, 1)(6, 5)$ and having the centre on $4x + 3y - 24 = 0$

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37. Find the equation of the circle passing through (-2,3) (4,5) and whose centre lies on x-axis

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38. If ABCD is a square then show that the points, A,B, C and D are concyclic.

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39. Find the centre of the circle passing through the points $(0, 0), (2, 0)$ and $(0, 2)$.

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40. Find the equation of the circle passing through the points $(3, 4)(3, 2), (1, 4)$

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41. Find the equation of circle passing through each of the following three points.

(2, 1), (5, 5), (- 6, 7)

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42. Find the equation of circle passing through each of the following three points.

(5, 7), (8, 1), (1, 3)

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43. Show that the following four points in each jof the following are concyclic and find the equation of the circle on which they lie.

(1, 1), (- 6, 0), (- 2, 2), (- 2 - 8)1

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44. Show that the following four points in each jof the following are concyclic and find the equation of the circle on which they lie.

$(1, 2), (3, -4), (5, -6), (19, 8)$

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45. Show that the following four points in each jof the following are concyclic and find the equation of the circle on which they lie.

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

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46. Show that the points (9, 1), (7, 9), (-2, 12), (6, 10) are concyclic and find the equation of the circle on which they lie.

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47. If (2,0),(0,1),(4,5) and (0,c) are concyclic then find c.

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48. Find the equation of the circum circle of the triangle formed by the lines

$x + 3y = 1, x + y + 1 = 0, 2x + 3y - 4 = 0$

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49. Find the equation of the circum circle of the triangle formed by the lines

$x + y + 1 = 0, 3x + y - 5 = 0, 2x + y - 5 = 0$

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50. Find the equation of the circum circle of the triangle formed by the lines

$5x - 3y + 4 = 0, 2x + 3y - 5 = 0, x + y = 0$

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51. Find the equation of the circum circle of the triangle formed by the lines $x - y - 2 = 0, 2x - 3y + 4 = 0, 3x - y + 6 = 0$

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52. The locus of the point of intersection of the lines $x\cos\alpha + y\sin\alpha = a$ and $x\sin\alpha - y\cos\alpha = b$, where α is a parameter is

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53. Show that the locus of a point such that the ratio of its distances from two given points is a constant $k(\neq 1)$ is a circle.

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54. Find the equation of the circle whose centre

lies on the X- axis and passing through $(-2, 3)$ and $(4, 5)$

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diameter thorugh A.

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87. Find the equation of a circle which is

concentirc with $x^2 = y^2 - 6x - 4y - 12 = 0$

and passing through $(-2, 14)$.

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$(3, 4), (3, 2), (1, 4)$

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$(2, 1), (5, 5), (- 6, 7)$

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$(5, 7), (8, 1), (1, 3)$

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$(1, 1), (- 6, 0), (- 2, 2), (- 2 - 8)1$

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$(1, 2), (3, \ - 4), (5, \ - 6), (19, 8)$

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99. Show that the following four points in each jof the following are concyclic and find the equation of the circle on which they lie.

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

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(9,1) ,(7,9),(-2,12),(6,10)

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103. Find the equation of the circum circle of the triangle formed by the lines

$x + y + 1 = 0, 3x + y - 5 = 0, 2x + y - 5 = 0$

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104. Find the equation of the circum circle of the triangle formed by the lines

$5x - 3y + 4 = 0, 2x + 3y - 5 = 0, x + y = 0$

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105. Find the equation of the circum circle of the triangle formed by the lines

$x - y - 2 = 0, 2x - 3y + 4 = 0, 3x - y + 6 = 0$

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106. The locus of the point of intersection of the lines $x\cos\alpha + y\sin\alpha = a$ and $x\sin\alpha - y\cos\alpha = b$, where α is a parameter is

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107. Show that the locus of a point such that the ratio of its distances from two given points is a constant $k(\neq 1)$, is a circle.

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108. Find the equation of the circle whose centre

lies on the X- axis and passing through $(-2, 3)$ and $(4, 5)$

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EXERCISE -1.2

1. Locate the position of the point P with respect to the circle S =0

when

P (1,2) and S = $x^2 + y^2 + 6x + 8y - 96$

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2. Locate the position of the point P with respect to the circle S =0

when

$P(2, 1)$ and $S = x^2 + y^2 - 2x - 4y + 3$

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3. Locate the position of the point P with respect to the circle S =0 when

$P(2, 1)$ and $S = x^2 + y^2 - 2x - 4y + 3$

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4. Find the power of the point P w.r.t the circle S=0 when

(i) P(1,2) and $S = x^2 + y^2 + 6x + 8y - 96$

(ii) P(5,-6) and $S = x^2 + y^2 + 8x + 12y + 15$

(iii) P(2,4) and $S = x^2 + y^2 - 4x - 6y - 12$

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5. Find the power of the point P with respect to the circle $S = 0$ when

$P = (5, -6)$, and $S \equiv x^2 + y^2 + 8x + 12y + 15$

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6. Find the power of the point P w.r.t. the circle S =0 when

$P(2, 4)$ and $S = x^2 + y^2 - 4x - 6y - 12$

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7. Find the power of the point P w.r.t the circle S=0 when

(i) P(1,2) and $S = x^2 + y^2 + 6x + 8y - 96$

(ii) P(5,-6) and $S = x^2 + y^2 + 8x + 12y + 15$

(iii) P(2,4) and $S = x^2 + y^2 - 4x - 6y - 12$

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8. Find the power of the point P with respect

to the circle $S = 0$ when

$P = (5, -6)$, and $S \equiv x^2 + y^2 + 8x + 12y + 15$

Watch Video Solution

9. Find the power of the point P w.r.t the circle S=0 when

(i) P(1,2) and $S = x^2 + y^2 + 6x + 8y - 96$

(ii) P(5,-6) and $S = x^2 + y^2 + 8x + 12y + 15$

(iii) P(2,4) and $S = x^2 + y^2 - 4x - 6y - 12$

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10. Find the equation of the normal at P of the circle $S = 0$ where P and S are given by

$P = (3, -4), S \equiv x^2 + y^2 + x + y - 24$

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11. Find the equation of the normal at P of the circle $S = 0$ where P and S are given by

$P = (1, 3), S \equiv 3\left(x^2 + y^2\right) - 19x - 29y + 76$

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12. Find the equation of the tangent and normal at $(1, 1)$ to the circle $2x^2 + 2y^2 - 2x - 5y + 3 = 0$

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13. Find the area of the triangle formed by the tangent at $P\left(x_1, y_1\right)$ to the circle $x^2 + y^2 = a^2$ with co-ordinate axes where $x - (1)y_1 \neq 0$.

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14. Find the area of the triangle formed by

the normal at $(3, -4)$ to the circle

$x^2 + y^2 - 22x - 4y + 25 = 0$ with the co-ordinate axes.

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15. Find the length of the chord intercepted

by the circle $x^2 + y^2 - 8x - 2y - 8 = 0$ on the

line $x + y + 1 = 0$

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16. Find the length of the chord intercepted

by the circle $x^2 + y^2 + 8x - 4y - 16 = 0$ on

the line $3x - y + 4 = 0$.

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17. Fins the length of the cord formed by

$x^2 + y^2 = a^2$ on the line

$x\cos\alpha + y\sin\alpha = p.$

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18. If y = mx + c and $x^2 + y^2 = a^2$ intersect at A and B and if AB $= 2\lambda,$

then show that $c^2 = \left(1 + m^2\right)\left(a^2 - \lambda^2\right)$

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19. Find the equation of the circle with centre $(-2, 3)$ cutting a chord

length 2 units

on $3x + 4y + 4 = 0$

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20. Find the equation of tangents of the circle

$x^2 + y^2 - 10 = 0$ at the points whose

abscissae are 1.

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21. Find the equation of the circle passing

through $(0, 0)$ and making intercepts

$4, 3$ on X- axis and Y - axis respectively

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22. (i) Find the equation of the circle passing through (0,0) and making intercepts 4,3 on X axis and Y-axis respectively.

(ii) Find the equation of the circle passing through (0,0) and making intercepts 6 units on X-axis and intercepts 4 units on Y-axis.

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23. If $S \equiv x^2 + y^2 + 2gx = 2fy + c = 0$ represents a circle then show that the straight line $lx + my = n = 0$

(i) touches the circle S=0 if

$$g^2 + f^2 - c = \frac{(gl + mf - n)^2}{l^2 + m^2}$$

(ii) meets the circle S=0 in two points if

$$g^2 + f^2 - c > \frac{(gl + mf - n)^2}{l^2 + m^2}$$

(iii) will not meet the circle if

$$g^2 + f^2 - c < \frac{(gl + mf - n)^2}{l^2 + m^2}$$

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24. If $S \equiv x^2 + y^2 + 2gx = 2fy + c = 0$ represents a circle then show that the straight line $lx + my = n = 0$

(i) touches the circle S=0 if

$$g^2 + f^2 - c = \frac{(gl + mf - n)^2}{l^2 + m^2}$$

(ii) meets the circle S=0 in two points if

$$g^2 + f^2 - c > \frac{(gl + mf - n)^2}{l^2 + m^2}$$

(iii) will not meet the circle if

$$g^2 + f^2 - c < \frac{(gl + mf - n)^2}{l^2 + m^2}$$

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25. If $S \equiv x^2 + y^2 + 2gx = 2fy + c = 0$ represents a circle then show that the straight line $lx + my = n = 0$

(i) touches the circle S=0 if

$$g^2 + f^2 - c = \frac{(gl + mf - n)^2}{l^2 + m^2}$$

(ii) meets the circle S=0 in two points if

$$g^2 + f^2 - c > \frac{(gl + mf - n)^2}{l^2 + m^2}$$

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26. find the equation of the tajngents ot the circle $x^2 + y^2 - 4x + 6y - 12 = 0$ which are parallel to $x + y - 8 = 0$

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27. Show that the circle $S = x^2 + y^2 + 2gx + 2fy + c = 0$ touches the X - axis if $g^2 = c$

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28. Show that the circle $S = x^2 + y^2 + 2gx + 2fy + c = 0$ touches the y - axis if $f^2 = c$

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29. Find the equation of the circle with centre

$(-3, 4)$ and touching y - axis.

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30. Show that the line $5x + 12y - 4 = 0$

touches the circle

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

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31. If $4 - 3y + 7 = 0$ is a tangent ot the circle

repesented by $x^2 + y^2 - 6x + 4y - 12 = 0$,

then find its point of contact.

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32. Prove that the tangent at $(3, -2)$ of the circle $x^2 + y^2 = 13$ touches the circle

$x^2 + y^2 + 2x - 10y - 26 = 0$ and find its point of contact.

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33. Show that $x + y + 1 = 0$ touches the circle

$x^2 + y^2 - 3x + 7y14 = 0$ and find its point of contact.

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34. Find the equation of the circle passing through $(-1, 0)$ and touching $x + y - 7 = 0$ at $(3, 4)$

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35. Fing the length of tangent from P to the ltbr., circle $S = 0$ when

$P = (-2, 5)$ and $S \equiv x^2 + y^2 - 25$

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36. Fing the length of tangent from P to the ltbr., circle $S = 0$ when

$P = (0, 0), S \equiv x^2 y^2 - 14x + 2y + 25$

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37. Fing the length of tangent from P to the ltbr., circle $S = 0$ when

$P = (2, 5)$ and $S \equiv x^2 + y^2 - 5x + 4y - 5$

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38. If the length of the tangent from $(5, 4)$ to

the circle $x^2 + y^2 + 2ky = 0$ is 1 the n find k.

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39. If a point P is moving such that the lengths

of the tangents drawn form P to the circles

$x^2 + y^2 + 8x + 12y + 15 = 0$and

$x^2 + y^2 - 4x - 6y - 12 = 0$ are equal

then find the equation of the locus of P

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40. If a point P is moving such that the length

of tangents drawn from P to

$x^2 + y^2 - 2x + 4y - 20 = 0$ ___(1).

and $x^2 + y^2 - 2x - 8y + 1 = 0$ ___(2).

are in the ratio $2:1$

Then show that the equation of the locus

of P is $x^2 + y^2 - 2x - 12y + 8 = 0$

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41. Find the locus of P if the tangents drawn

from P to $x^2 + y^2 = a^2$ are perpendicular

to each othe.

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42. From any point on the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ tangents are drawn to the circle $x^2 + y^2 + 2gx + 2fy + c\sin^2\alpha + \left(g^2 + f\right)\cos^2\alpha = 0.$ The angle between the tangents is

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43. Find the parametric equations of the cirlces

(i) $x^2 + y^2 = 1$

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

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

(iv) $2x^2 + 2y^2 = 7$

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

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44. Obtain the parametric equation of each

of the following circles.

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

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45. Obtain the parametric equation of each

of the following circles.

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

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46. If $x = -1 + 5\cos\theta, y = 2 + 5\sin\theta,$ show that the locus of the point (x,y) is a circle . Find its centre and radius .

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47. If the parametric values of two points

A and B lying on the circle $x^2 + y^2 - 6x + 4y - 12 = 0$

are 30° and 60° respectively,

then find the equation of the chord

joining A and B

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48. Find the equation of the tangent at the point 30° (parametric value of θ) of the circle is $x^2 + y^2 + 4x + 6y - 39 = 0$.

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49. Locate the position of the point P with respect to the circle S =0 when

P (1,2) and S = $x^2 + y^2 + 6x + 8y - 96$

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50. Locate the position of the point P with respect to the circle S =0 when

P (1,2) and S = $x^2 + y^2 + 6x + 8y - 96$

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51. Locate the position of the point P with respect to the circle S =0 when

$P(2, 1)$ and $S = x^2 + y^2 - 2x - 4y + 3$

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52. Locate the position of the point P with respect to the circle S =0 when

P (1,2) and S = $x^2 + y^2 + 6x + 8y - 96$

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53. Find the power of the point P w.r.t the circle S=0 when

(i) P(1,2) and $S = x^2 + y^2 + 6x + 8y - 96$

(ii) P(5,-6) and $S = x^2 + y^2 + 8x + 12y + 15$

(iii) P(2,4) and $S = x^2 + y^2 - 4x - 6y - 12$

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54. Find the power of the point P w.r.t. the circle S =0 when

$P(2, 4)$ and $S = x^2 + y^2 - 4x - 6y - 12$

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55. Locate the position of the point P with respect to the circle S =0 when

P (1,2) and S = $x^2 + y^2 + 6x + 8y - 96$

Watch Video Solution

56. Find the power of the point P w.r.t the circle S=0 when

(i) P(1,2) and $S = x^2 + y^2 + 6x + 8y - 96$

(ii) P(5,-6) and $S = x^2 + y^2 + 8x + 12y + 15$

(iii) P(2,4) and $S = x^2 + y^2 - 4x - 6y - 12$

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57. Find the power of the point P w.r.t. the circle S =0 when

$P(2, 4)$ and $S = x^2 + y^2 - 4x - 6y - 12$

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58. Find the equation of the normal at P of the

circle $S = 0$ where P and S are given by

$P = (3, -4), S \equiv x^2 + y^2 + x + y - 24$

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59. Find the equation of the normal at P of the

circle $S = 0$ where P and S are given by

$P = (1, 3), S \equiv 3\left(x^2 + y^2\right) - 19x - 29y + 76$

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60. Find the equation of the tangent and normal at $(1, 1)$ to the circle $2x^2 + 2y^2 - 2x - 5y + 3 = 0$

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61. Find the area of the triangle formed by the tangent at $P\left(x_1, y_1\right)$ to the circle $x^2 + y^2 = a^2$ with co-ordinate axes where $x - (1)y_1 \neq 0$.

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62. Find the area of the triangle formed by the normal at $(3, -4)$ to the circle $x^2 + y^2 - 22x - 4y + 25 = 0$ with the co-ordinate axes.

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63. Find the length of the chord intercepted by the circle $x^2 + y^2 - 8x - 2y - 8 = 0$ on the line $x + y + 1 = 0$

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64. Find the length of the chord intercepted by the circle $x^2 + y^2 + 8x - 4y - 16 = 0$ on the line $3x - y + 4 = 0$.

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65. Fins the length of the cord formed by $x^2 + y^2 = a^2$ on the line $x\cos\alpha + y\sin\alpha = p$.

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66. The lilne $y = mx + x$ and the circle $x^2 + y^2 = a^2$ intersect at A and B.

If $AB = 2\lambda$, then show that : $c^2 = \left(1 + m^2\right)\left(a^2 - \lambda^2\right)$.

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67. Find the equation of the circle with centre $(-2, 3)$ cutting a chord

length 2 units

on $3x + 4y + 4 = 0$

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68. Find the equation of tangents of the circle

$x^2 + y^2 - 10 = 0$ at the points whose

abscissae are 1.

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69. Find the equation of the circle passing through $(0, 0)$ and making intercepts $4, 3$ on X- axis and Y - axis respectively

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70. (i) Find the equation of the circle passing through (0,0) and making intercepts 4,3 on X axis and Y-axis respectively.

(ii) Find the equation of the circle passing through (0,0) and making intercepts 6 units on X-axis and intercepts 4 units on Y-axis.

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71. If $S \equiv x^2 + y^2 + 2gx = 2fy + c = 0$ represents a circle then show that the straight line $lx + my = n = 0$

(i) touches the circle S=0 if

$$g^2 + f^2 - c = \frac{(gl + mf - n)^2}{l^2 + m^2}$$

(ii) meets the circle S=0 in two points if

$$g^2 + f^2 - c > \frac{(gl + mf - n)^2}{l^2 + m^2}$$

(iii) will not meet the circle if

$$g^2 + f^2 - c < \frac{(gl + mf - n)^2}{l^2 + m^2}$$

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72. If $S \equiv x^2 + y^2 + 2gx = 2fy + c = 0$ represents a circle then show that the straight line $lx + my = n = 0$

(i) touches the circle S=0 if

$$g^2 + f^2 - c = \frac{(gl + mf - n)^2}{l^2 + m^2}$$

(ii) meets the circle S=0 in two points if

$$g^2 + f^2 - c > \frac{(gl + mf - n)^2}{l^2 + m^2}$$

(iii) will not meet the circle if

$$g^2 + f^2 - c < \frac{(gl + mf - n)^2}{l^2 + m^2}$$

Watch Video Solution

73. If $S \equiv x^2 + y^2 + 2gx = 2fy + c = 0$ represents a circle then show that the straight line $lx + my = n = 0$

(i) touches the circle S=0 if

$$g^2 + f^2 - c = \frac{(gl + mf - n)^2}{l^2 + m^2}$$

(ii) meets the circle S=0 in two points if

$$g^2 + f^2 - c > \frac{(gl + mf - n)^2}{l^2 + m^2}$$

(iii) will not meet the circle if

$$g^2 + f^2 - c < \frac{(gl + mf - n)^2}{l^2 + m^2}$$

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74. find the equation of the tajngents ot the circle $x^2 + y^2 - 4x + 6y - 12 = 0$ which are parallel to $x + y - 8 = 0$

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75. Show that the circle $S \equiv x^2 + y^2 + 2gx + 2fy + c = 0$ touches the

(i) X- axis if $g^2 = c$

(ii) Y - axis if $f^2 = c$.

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76. Show that the circle $S \equiv x^2 + y^2 + 2gx + 2fy + c = 0$ touches the

(i) X- axis if $g^2 = c$

(ii) Y - axis if $f^2 = c$.

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77. Find the equation of the circle with centre $(-3, 4)$ and touching y - axis.

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78. Show that the line $5x + 12y - 4 = 0$

touches the circle

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

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79. If $4 - 3y + 7 = 0$ is a tangent ot the circle

repesented by $x^2 + y^2 - 6x + 4y - 12 = 0$,

then find its point of contact.

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80. Prove that the tangent at $(3, -2)$ of the circle $x^2 + y^2 = 13$ touches

the circle

$x^2 + y^2 + 2x - 10y - 26 = 0$ and find its

point of contact.

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81. Show that $x + y + 1 = 0$ touches the circle

$x^2 + y^2 - 3x + 7y14 = 0$ and find its

point of contact.

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82. Find the equation of the circle passing

through $(-1, 0)$ and touching $x + y - 7 = 0$

at $(3, 4)$

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83. Fing the length of tangent from P to the ltbr., circle $S = 0$ when

$P = (-2, 5)$ and $S \equiv x^2 + y^2 - 25$

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84. Fing the length of tangent from P to the ltbr., circle $S = 0$ when

$P = (0, 0), S \equiv x^2y^2 - 14x + 2y + 25$

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85. Fing the length of tangent from P to the ltbr., circle $S = 0$ when

$P = (2, 5)$ and $S \equiv x^2 + y^2 - 5x + 4y - 5$

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86. If the length of the tangent from $(5, 4)$ to

the circle $x^2 + y^2 + 2ky = 0$ is 1 the n find k.

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87. If a point P is moving such that the lengths

of the tangents drawn form P to the circles

$x^2 + y^2 + 8x + 12y + 15 = 0$and

$x^2 + y^2 - 4x - 6y - 12 = 0$ are equal

then find the equation of the locus of P

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88. If the lengths of the tangents drawn from P to the circles $x^2 + y^2 - 2x + 4y - 20 = 0$ and $x^2 + y^2 - 2x - 8y + 1 = 0$ are in the ratio 2:1, then the locus P is

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89. Find the locus of P if the tangents drawn

from P to $x^2 + y^2 = a^2$ are perpendicular

to each othe.

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90. From any point on the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ tangents are drawn to the circle $x^2 + y^2 + 2gx + 2fy + c\sin^2\alpha + \left(g^2 + f\right)\cos^2\alpha = 0.$ The angle between the tangents is

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91. Find the parametric equations of the circles

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

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92. Find the parametric equations of the cirlces

(i) $x^2 + y^2 = 1$

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

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

(iv) $2x^2 + 2y^2 = 7$

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

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93. Obtain the parametric equation of each

of the following circles.

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

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94. If $x = -1 + 5\cos\theta, y = 2 + 5\sin\theta,$ show that the locus of the point

(x,y) is a circle . Find its centre and radius .

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95. If the parametric values of two points

A and B lying on the circle $x^2 + y^2 - 6x + 4y - 12 = 0$

are 30° and 60° respectively, then find the equation of the chord

joining A and B

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96. Find the equation of the tangent at the

point 30° (parametric value of θ) of the

circle is $x^2 + y^2 + 4x + 6y - 39 = 0$.

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EXERCISE -1.3

1. Find the chord of contact of $(1, 1)$ to the

circle $x^2 + y^2 = 9$.

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2. Find the chord of contact of $(0, 5)$ with

respect to the circle

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

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3. Find the polar of $(1, 2)$ with respect to

$x^2 + y^2 = 7$

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4. Find the polar of $(3, -1)$ with respect to

$2x^2 + 2y^2 = 11$

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5. Find the polar of $(1, -2)$ with respect of

$x^2 + y^2 - 10x - 10y + 25 = 0$

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6. Find the pole of $3x + 4y - 045 = 0$ with

respect to$x^2 + y^2 - 6x8y + 5 = 0$

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7. Find the pole of $x - 2y + 22 = 0$ with respect

to $x^2 + y^2 - 5x + 8y + 6 = 0$

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8. Find the slope of the polar of $(1, 3)$ with

respect to the circle $x^2 + y^2 - 4x - 4y = 0$

Also find the distance from the centre to

it.

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9. If $ax + by + c = 0$ is the polar of $(1, 1)$ with respect to the circle

$x^2 + y^2 - 2x + 2y$

$+1 = 0$ and H. C. F. of a, b, c is equal to

one then find $a^2 + b^2 + c^2$.

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10. Find the coordinates of the point of intersection of tangent at the

points where $x + 4y - 14 = 0$ meets the circle $x^2 + y^2 - 2x + 3y - 5 = 0$

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11. (prove that) If the polar of the points on the circle

$x^2 + y^2 = a^2$ with respect to the circle

$x^2 + y^2 = b^2$ touches the circle $x^2 + y^2 = c^2$

then prove that a, b, c, are in Geometrical

progression.

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12. Tangents are drawn to the circle $x^2 + y^2 = 16$

from the point $P(3, 5)$. Find the area

of the triangle formend by these tangents

and the chord of contact of P.

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13. Find the locus of the point whose polars with respect to the circles

$x^2 + y^2 - 4x - 4y - 8 = 0$ and $x^2 + y^2 - 2x + 6y - 2 = 0$ are mutually perpendicular.

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14. If the polars of the points (x_1, y_1), (x_2, y_2) and (x_3, y_3) with respects to a circle are concurrent , prove that these points are collinear.

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15. Show that

$(-6, 1)$ and $(2, 3)$ are conjugate points w.r.t. the circle $x^2 + y^2 - 2x + 2y + 1 = 0$

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16. Show that the points $(4, 2)(3, -5)$ are conjugate points with respect to the circle $x^2 + y^2 - 3x - 5y + 1 = 0$

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17. Show that $(4, -2)$ and $(3, -6)$ are conjugate with respect to the circle $x^2 + y^2 - 24 = 0.$

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18. if $(4, k)$ and $(2, 3)$ are conjugate points with respect to the circle $x^2 + y^2 = 17$ then find k.

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19. Find the value of k if the points $(1, 3)$ and $(2, k)$ are coujuate with respect to the circle $x^2 + y^2 = 35$.

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20. Show thet the lines $2x + 3y + 11 = 0$ and $2x - 2y - 1 = 0$ are conjugate with respect to the circle $x^2 + y^2 + 4x + 6y - 12 = 0$

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21. Find the value of k if $kx + 3y - 1 = 0$, $2x + y + 5 = 0$ are conjugate lines with respect to the circle

$x^2 + y^2 - 2x - 4y - 4 = 0$.

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22. The inverse point of (1,2) origin w.r.t. the circle $x^2 + y^2 - 4x - 6y + 9 = 0$ is

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23. Find the length and mid-point of the chord $2x + y - 5$ with respect to the circle $x^2 + y^2 = 9$,

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24. Find the pair of tangents drawn from $(0, 0)$ to $x^2 + y^2 + 10x + 10y + 40 = 0$.

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25. Find the pair of tangents drawn from

$(3, 2)$to the circle $x^2 + y^2 - 6x + 4y - 2 = 0$

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26. Find the pair of tangents drawn from

$(1, 3)$ to the circle $x^2 + y^2 - 2x + 4y - 11 = 0$

and also find the angle between them.

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27. Find the pair of tangents form the origin

to the circle $x^2 + y^2 + 2gx + 2fy + c = 0$

and hence deduce a condition for these

tangents to be perpendicular.

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28. Find the chord of contact of

(1,1) with respect to the circle $x^2 + y^2 = 9$

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29. Find the chord of contact of $(0, 5)$ with

respect to the circle

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

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30. Find the polar of $(1, 2)$ with respect to

$x^2 + y^2 = 7$

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31. Find the polar of $(3, -1)$ with respect to

$2x^2 + 2y^2 = 11$

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32. Find the polar of $(1, -2)$ with respect of

$x^2 + y^2 - 10x - 10y + 25 = 0$

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33. Find the pole of $3x + 4y - 045 = 0$ with

respect to$x^2 + y^2 - 6x8y + 5 = 0$

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34. Find the pole of $x - 2y + 22 = 0$ with respect

to $x^2 + y^2 - 5x + 8y + 6 = 0$

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35. Find the slope of the polar of $(1, 3)$ with respect to the circle $x^2 + y^2 - 4x - 4y = 0$

Also find the distance from the centre to it.

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36. If $ax + by + c = 0$ is the polar of $(1, 1)$ with respect to the circle $x^2 + y^2 - 2x + 2y$ $+1 = 0$ and H. C. F. of a, b, c is equal to one then find $a^2 + b^2 + c^2$.

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37. Find the coordinates of the point of intersection of tangent at the points where $x + 4y - 14 = 0$ meets the circle $x^2 + y^2 - 2x + 3y - 5 = 0$

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38. (prove that) If the polar of the points on the circle $x^2 + y^2 = a^2$ with respect to the circle $x^2 + y^2 = b^2$ touches the circle $x^2 + y^2 = c^2$ then prove that a, b, c, are in Geometrical progression.

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39. Tangents are drawn to the circle $x^2 + y^2 = 16$ from the point $P(3, 5)$. Find the area of the triangle formend by these tangents and the chord of contact of P.

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40. Find the locus of the point whose polars with respect to the circles $x^2 + y^2 - 4x - 4y - 8 = 0$ and $x^2 + y^2 - 2x + 6y - 2 = 0$ are mutually perpendicular.

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41. The locus of poles of tangents to the circle $(x - p)^2 + y^2 = b^2$ w.r.t. the circle $x^2 + y^2 = a^2$ is

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42. If the polars of the points (x_1, y_1), (x_2, y_2) and (x_3, y_3) with respects to a circle are concurrent , prove that these points are collinear.

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43. Show that

$(-6, 1)$ and $(2, 3)$ are conjugate points w.r.t. the circle

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

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44. Show that

$(-6, 1)$ and $(2, 3)$ are conjugate points w.r.t. the circle

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

Watch Video Solution

45. Show that $(4, -2)$ and $(3, -6)$ are conjugate

with respect to the circle $x^2 + y^2 - 24 = 0$.

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46. if $(4, k)$ and $(2, 3)$ are conjugate points with respect to the circle $x^2 + y^2 = 17$ then find k.

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47. If (1,3) and (2,k) are conjugate points with respect to the circle $x^2 + y^2 = 35$, then find k .

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48. Show thet the lines $2x + 3y + 11 = 0$ and $2x - 2y - 1 = 0$ are conjugate with respect to the circle $x^2 + y^2 + 4x + 6y - 12 = 0$

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49. Find the value of k if $kx + 3y - 1 = 0$,

$2x + y + 5 = 0$ are conjugate lines with

respect to the circle

$x^2 + y^2 - 2x - 4y - 4 = 0$.

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50. The inverse point of (1,2) origin w.r.t. the circle

$x^2 + y^2 - 4x - 6y + 9 = 0$ is

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51. Find the length and mid-point of the chord $2x + y - 5$ with respect to the circle $x^2 + y^2 = 9$,

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52. Find the pair of tangents drawn from $(0, 0)$

to $x^2 + y^2 + 10x + 10y + 40 = 0$.

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53. Find the pair of tangents drawn from

$(3, 2)$to the circle $x^2 + y^2 - 6x + 4y - 2 = 0$

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54. Find the pair of tangents drawn from

$(1, 3)$ to the circle $x^2 + y^2 - 2x + 4y - 11 = 0$

and also find the angle between them.

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55. Find the pair of tangents form the origin

to the circle $x^2 + y^2 + 2gx + 2fy + c = 0$

and hence deduce a condition for these

tangents to be perpendicular.

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EXERCISE -1.4

1. Discuss the relative position of the fol-

lowing pair of circles.

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

$x^2 + y^2 + 6x + 18y + 26 = 0.$

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2. Discuss the relative position of the fol-

lowing pair of circles.

$x^2 + y^2 + 6x + 6y + 14 = 0$

$x^2 + y^2 - 2x - 4y - 4 = 0.$

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3. Find the number of possible common

tangents that exist for the following pairs

of circles.

$x^2 + y^2 + 6x + 6y + 14 = 0$

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

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4. Find the number of possible common

tangents that exist for the following pairs of circles.

$x^2 + y^2 = 4, x^2 + y^2 - 6x - 8y + 16 = 0$

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5. Find the number of possible common

tangents that exist for the following pairs

of circles.

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

$x^2 + y^2 + 4x - 2y + 4 = 0.$

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6. Show that the circles

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

$5\left(x^2 + y^2\right) - 8x - 14y - 32 = 0$ touch each

other and find their point of contact.

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7. Show that $x^2 + y^2 - 6x - 9y + 13 = 0$, $x^2 + y^2 - 2x - 16y = 0$ touch each other . Find the point of contact and the equation of common tangent at their point of contact.

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8. Show that the circles

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

$x^2 + y^2 + 6x + 18y + 26 = 0$ touch each

other. Also find the point of contact and

common tangent at this point of contact.

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9. Find the equation of the circle which

touches the circle $x^2 + y^2 - 2x - 4y - 20 = 0$

externally at $(5, 5)$ with radius 5.

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10. Show that the circles $S = -x^2 + y^2 - 2x - 4y - 20 = 0, S' = x^2 + y^2 + 6x + 2y - 90 = 0$ touch each other internally . Find their point contact.

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11. Show that the four common tangents can

be drawn for the circles given by

$x^2 + y^2 - 14x + 6y + 33 = 0$ ____(1)

and $x^2 + y^2 + 30x - 2y + 1 = 0$ _____(2)

and find the internal and external centres

of similitude.

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12. Prove that the circles $x^2 + y^2 - 8x - 6y + 21 = 0$ and $x^2 + y^2 - 2y - 15 = 0$ have exactly two common tangents Also find the intersection of those tangents.

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13. Find the direct common tangents of the circles $x^2 + y^2 + 22x - 4y - 100 = 0$ and $x^2 + y^2 - 22x + 4y + 100 = 0$

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14. Find the transberes common tangents of

the circles $x^2 + y^2 - 4x - 10y + 28 = 0$ and $x^2 + y^2$

$+ 4x - 6y + 40.$

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15. Find all common tangents of the pairs of circles

$x^2 + y^2 = 0$ and $x^2 + y^2 - 16x - 2y + 49 = 0$

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16. Find all common tangents of the pairs of circles

$x^2 + y^2 + 4x + 2y - 4 = 0$ and $x^2 + y^2 - 4x - 2y + 4 = 0$

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17. Let A be the centre of the circle $x^2 + y^2 - 2x - 4y - 20 = 0$. Suppose that the tangent at the points B(1,7) and D(4,-2) on the circle meet at the point C. The area of the quadrilateral ABCD is

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18. Find the value of c for which $A(2, 0), B(0, 14/3), C(4, 5)$ and $D(0, c)$ are concylic.

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19. The area of the quadrilateral formed by the tangents from the point (4,5) to the circle $x^2 + y^2 - 4x - 2y - 11 = 0$ with a pair of the radii joining the points of contact of these tangents is

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20. Discuss the relative position of the fol-

lowing pair of circles.

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

$x^2 + y^2 + 6x + 18y + 26 = 0.$

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21. Discuss the relative position of the following pair of circles.

$x^2 + y^2 + 6x + 6y + 14 = 0$

$x^2 + y^2 - 2x - 4y - 4 = 0.$

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22. Find the number of possible common tangents that exist for the following pairs of circles.

$x^2 + y^2 + 6x + 6y + 14 = 0$

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

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23. Find the number of possible common tangents that exist for the following pairs of circles.

$x^2 + y^2 = 4, x^2 + y^2 - 6x - 8y + 16 = 0$

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24. Find the number of possible common tangents that exist for the following pairs of circles.

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

$x^2 + y^2 + 4x - 2y + 4 = 0.$

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25. Show that the circles

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

$5\left(x^2 + y^2\right) - 8x - 14y - 32 = 0$ touch each other and find their point of contact.

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26. Show that the circles $x^2 + y^2 - 6x - 2y + 1 = 0, x^2 + y^2 + 2x - 8y + 13 = 0$ touch each other find the point of contact and the equation of the common tangent at their point of contact.

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27. Show that the circles

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

$x^2 + y^2 + 6x + 18y + 26 = 0$ touch each

other. Also find the point of contact and

common tangent at this point of contact.

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28. Find the equation of the circle which touches the circle $x^2 + y^2 - 2x - 4y - 20 = 0$ externally at $(5, 5)$ with radius 5.

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29. Show that the circles $x^2 + y^2 - 6x - 2y + 1 = 0, x^2 + y^2 + 2x - 8y + 13 = 0$ touch each other find the point of contact and the equation of the common tangent at their point of contact.

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30. Show that the four common tangents can be drawn for the circles given by

$x^2 + y^2 - 14x + 6y + 33 = 0$ ____(1)

and $x^2 + y^2 + 30x - 2y + 1 = 0$ _____(2)

and find the internal and external centres of similitude.

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31. Prove that the circles $x^2 + y^2 - 8x - 6y + 21 = 0$ and $x^2 + y^2 - 2y - 15 = 0$ have exactly two common tangents Also find the intersection of those tangents.

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32. Find the direct common tangents of the circles $x^2 + y^2 + 22x - 4y - 100 = 0$ and $x^2 + y^2 - 22x + 4y + 100 = 0$

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33. Find the transberes common tangents of

the circles $x^2 + y^2 - 4x - 10y + 28 = 0$ and $x^2 + y^2$

$+4x - 6y + 40.$

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34. Find all common tangents of the pairs of circles

$x^2 + y^2 = 0$ and $x^2 + y^2 - 16x - 2y + 49 = 0$

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35. Find all common tangents of the pairs of circles

$x^2 + y^2 = 0$ and $x^2 + y^2 - 16x - 2y + 49 = 0$

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36. Let A be the centre of the circle $x^2 + y^2 - 2x - 4y - 20 = 0$. Suppose that the tangent at the points B(1,7) and D(4,-2) on the circle meet at the point C. The area of the quadrilateral ABCD is

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37. Find the value of c for which $A(2, 0), B(0, 14/3), C(4, 5)$ and $D(0, c)$ are concylic.

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38. The area of the quadrilateral formed by the tangents from the point (4,5) to the circle $x^2 + y^2 - 4x - 2y - 11 = 0$ with a pair of the radii joining the points of contact of these tangents is

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