MATHS

BOOKS - VIKRAM PUBLICATION (ANDHRA PUBLICATION)

SYSTEM OF CIRCLE

Solved Probems

1. Find the angle between the circles

$x^2 + y^2 + 4x - 14y + 28 = 0$ and

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

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2. If the angle between the circles

$x^2 + y^2 - 12x - 6y + 41 = 0$ and

$x^2 + y^2 + kx + 6y - 59 = 0$ is 45° find k.

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3. Find the question of the circle which passes through (1, 1) and cuts orthogonally each of the circles.

$x^2 + y^2 - 8x - 2y + 16 = 0$ and $\_\_\_(1)$

$x^2 + y^2 - 4x - 1 = 0.\_\_\_(2)$

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4. Find the equation of the circle which is orthogonal to each of the following three circles.

$x^2 + y^2 + 2x + 17y + 4 = 0\_\_\_(1)$

$x^2 + y^2 + 7x + 6y + 11 = 0$(___)(2)

and $x^2 + y^2 - x + 22y + 3 = 0$___(3)

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5. If the straight line represented by ltbgt

$x \cos \alpha + y \sin \alpha = p$____ (1)

inersects the circle

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

at the points A and B, then show that the equation of the circle with AB as diameter is $(x^2 + y^2 - a^2) - 2p(x \cos \alpha + y \sin \alpha - p) = 0$.

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6. Find the equation of the circle passing therough the points of intersection of the circles.

$x^2 + y^2 - 8x - 6y + 21 = 0$__(1)

$x^2 + y^2 - 2x - 15 = 0$ ___(2)

and (1, 2).

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7. Let us find the equation the radical axis of the circles S $\equiv x^2 + y^2 - 5x + 6y + 12 = 0$

and $S^1 \equiv x^2 + y^2 + 6x - 4y - 14 = 0$

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8. Let us find the equation of the radical axis of the circles

$2x^2 + 2y^2 + 3x + 6y - 5 = 0$ ___(1)

and $3x^2 + 3y^2 - 7x + 8y - 11 = 0$ ___(2)

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9. Let find the radical and centre of the circles

$x^2 + y^2 - 2x + 6y = 0 \quad \_\_\_(1)$

$x^2 + y^2 - 4x - 2y + 6 = 0 \quad \_\_\_\_(2)$

and $x^2 + y^2 - 12x + 2y + 3 = 0 \_\_\_(3)$

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10. Find the equation and length of the common chord of the two circles

$S \equiv x^2 + y^2 + 3x + 5y + 4 = 0$

and $S^1 \equiv x^2 + y^2 + 5x + 3y + 4 = 0$

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11. Show that the circles

$S \equiv x^2 + y^2 - 2x - 4y - 20 = 0 \quad \_\_\_(1)$

and $S^1 \equiv x^2 + y^2 + 6x + 2y - 90 = 0 \quad \_\_\_(2)$

touch each other internally. Find their point of contact and the equation of common tnagent.

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12. Find the equation fo the circle whose diameter is the common chord of the circles

$S \equiv x^2 + y^2 + 2x + 3y + 1 = 0 \quad \_\_(1)$

and $S^1 \equiv x^2 + y^2 + 4x + 3y + 2 = 0 \quad \_\_(2)$

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13. Let us find the equation of a circle which cuts each of the following circles orthogonally

$S' \equiv x^2 + y^2 + 3x + 2y + 1 = 0 \quad \_\_(1)$

$S'' \equiv x^2 + y^2 - x + 6y + 5 = 0 \quad \_\_(2)$

and $S''' \equiv x^2 + y^2 + 5x - 8y + 15 = 0 \quad \_\_(3)$

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Exerxcise 2 A

1. Find k if the following pairs of circles are orthogonal.

$x^2 + y^2 + 2by - k = 0, x^2 + y^2 + 2ax + 8 = 0.$

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2. Find k if the following pairs of circles are orthogonal.

$x^2 + y^2 - 6x - 8y + 12 = 0,$

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

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3. Find k if the following pairs of circles are orthogonal.

$x^2 + y^2 - 5x - 14y - 34 = 0.$

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

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4. Find k if the following pairs of circles are orthogonal.

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

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5. Find the angle between the circles given by the equations.

$x^2 + y^2 - 12x - 6y + 41 = 0,$

$x^2 + y^2 + 4x + 6y - 59 = 0.$

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6. Find the angle between the circles given by the equations.

$x^2 + y^2 + 6x - 10y - 135 = 0,$

$x^2 + y^2 - 4x - 116 = 0$

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7. Show that the angle between the circles

$x^2 + y^2 = a^2, x^2 + y^2 = ax + ay$ is $\frac{3\pi}{4}$.

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8. Show that the circles given by the following equation intersect each other orthogonally.

$x^2 + y^2 - 2x - 2y - 7 = 0,$

$3x^2 + 3y^2 - 8x + 29y = 0.$

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9. Show that the circles given by the following equation intersect each other orthogonally.

$x^2 + y^2 + 4x - 2y - 11 = 0,$

$x^2 + y^2 - 4x - 8y + 11 = 0.$

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10. Show that the circles given by the following equation intersect each other orthogonally.

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

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

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11. Show that the circles given by the following equation intersect each other orthogonally.

$x^2 + y^2 - 2lx + g = 0,$

$x^2 + y^2 - 2my - g = 0.$

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12. Find the equation of the circle which passes through the origin and intersects the circles below, orthogonally.

$x^2 + y^2 - 4x + 6y + 10 = 0.$

$x^2 + y^2 + 12y + 6 = 0.$

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13. Find the equation of the circle which passes through the origin and intersects the circles below, orthogonally.

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

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

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14. Find the equation of the circle which passes through the point (0,-3) and intersects the circles given by the equation $x^2 + y^2 - 6x + 3y + 5 = 0$ and $x^2 + y^2 - x - 7y = 0$ orthogonally.

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15. Find the equation of the circle passing through the origin, having its centre on the line x + y = 4 and intersecting the circle $x^2 + y^2 - 4x + 2y + 4 = 0$ orthogonlly.

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16. Find the equation of the circle which passes through the point (2,0), (0,2) and orthogonally to the circle $2x^2 + 2y^2 + 5x - 6y + 4 = 0$.

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17. Find the equation of the circle which cuts orthogonally the circle $x^2 + y^2 - 4x + 2y - 7 = 0$ and having a center at (2,3).

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18. Find the equation of the circle which intersects the circle $x^2 + y^2 - 6x + 4y - 3 = 0$ orthogonally and passes through the point (3,0) and touches Y-axis.

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19. Find the equation of the circle which cuts the circle $x^2 + y^2 + 4x - 6y + 11 = 0$and $x^2 + y^2 - 10x - 4y + 21 = 0$

rthogonally and has the diameter along the staight line $2x + 3y = 7$

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20. If P, Q are conjugate points with respect to a circles $S \equiv x^2 + y^2 + 2gx + 2fy + c = 0$ then prove that the circle PQ as diameter cuts the circles S = 0 orthogonally.

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21. If the equation fo two circles whose radii are a, a ' are S = 0 and $S' = 0$, then show that circles $\frac{S}{a} + \frac{S'}{a'} = 0$ and $\frac{S}{a} - \frac{S'}{a'} = 0$ intersect orthogonally.

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22. Find the equation of the circle which intersects each of the following circles orthogonlly

i) $x^2 + y^2 + 2x + 4y + 1 = 0.$

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

$2(x^2 + y^2) + 6x + 8y - 3 = 0.$

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23. Find the equation of the circle which intersects each of the following circles orthogonlly

$x^2 + y^2 + 4x + 2y + 1 = 0.$

$2(x^2 + y^2) + 8x + 6y - 3 = 0,$

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

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24. If the straight line 2x + 3y = 1 intersects the circle $x^2 + y^2 = 4$ at the points A and B, then find the equation of the circle having AB as diameter.

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25. If x + y = 3 is the equation of the chord AB of circle $x^2 + y^2 - 2x + 4y - 8 = 0$, find the equation of the circle having $\overline{AB}$ as diameter.

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26. Find the equation of the circle passing through the intersection of the circles $x^2 + y^2 = 2ax$ and $x^2 + y^2 = by$and having its center on the line $\frac{x}{a} - \frac{y}{b} = 2.$

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Exerxcise 2 B

1. Find the equation of the radical axis of the following circles.

$x^2 + y^2 - 3x - 4y + 5 = 0.$

$3(x^2 + y^2) - 7x + 8y - 11 = 0$

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2. Find the equation of the radical axis of the following circles.

$x^2 + y^2 + 2x + 4y + 1 = 0.$

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

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3. Find the equation of the radical axis of the following circles.

$x^2 + y^2 + 4x + 6y - 7 = 0.$

$4(x^2 + y^2) + 8x + 12y - 9 = 0.$

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4. Find the equation of the radical axis of the following circles.

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

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

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5. Find the equation of the common chord of the following pair of circles.

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

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

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6. Find the equation of the common chord of the following pair of circles.

$x^2 + y^2 + 3y + 1 = 0,$

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

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7. Find the equation of the common chord of the following pair of circles.

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

$(x - b)^2 + (y - a)^2 = c^2 (a \neq b)$

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8. find the equation of the common tangent of the following circles at their point of contact.

$x^2 + y^2 + 10x - 2y + 22 = 0,$

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

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9. find the equation of the common tangent of the following circles at their point of contact.

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

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10. Show that the circles

$x^2 + y^2 - 2y - 8x + 8 = 0$ and

$x^2 + y^2 - 2x + 6y + 6 = 0$ touch each other and find the point of contact.

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11. if the two circles

$x^2 + y^2 + 2gx + 2fy = 0$ and

$x^2 + y^2 + 2g'x + 2f'y = 0$touch each other then show that f'g = fg'

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12. Find the radical centre of the following circles.

$x^2 + y^2 - 4x - 6y + 5 = 0 \quad \_\_(i)$

$x^2 + y^2 - 2x - 4y - 1 = 0 \quad \_\_\_(ii)$

$x^2 + y^2 - 6x - 2y = 0 \quad \_\_(iii)$

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13. Find the radical centre of the following circles.

$x^2 + y^2 + 4x - 7 = 0, 2x^2 + 2y^2 + 3x + 5y - 9 = 0, x^2 + y^2 + y = 0$

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14. Show that the common chord of the circle cles $x^2 + y^2 - 6x - 4y + 9 = 0$ and $x^2 + y^2 - 8x - 6y + 23 = 0$ is the diameter of the second circle and also find its length.

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15. Find the equation and length of the common chord of the following circles.

$x^2 + y^2 + 2x + 2y + 1 = 0,$

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

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16. Find the equation and length of the common chord of the following circles.

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

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

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17. Prove that the radical axis of the circles

$x^2 + y^2 + 2gx + 2fy + c = 0$ and $x^2 + y^2 + 2g'x + 2f'y + c' = 0$ is the diameter of the latter circle (or the former bisects the circumference fo the latter) if 2g'(g-g') + 2f'(f-f') = c-c'.

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18. Show that the circles

$x^2 + y^2 + 2ax + c = 0$ and

$x^2 + y^2 + 2by + c = 0$touch each other if

$1/a^2 + 1/b^2 = 1/c.$

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19. Show that the circles $x^2 + y^2 - 2x = 0$ and $x^2 + y^2 + 6x - 6y + 2 = 0$ touch each of contact . Is the point of contact external or internal?

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20. Find the equation of the circle which cuts the following circles orthogonally.

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

$2x^2 + 2y^2 + 3x + 5y - 9 = 0,$

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

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21. Find the equation of the circle which cuts the following circles orthogonally.

$x^2 + y^2 + 2x + 4y + 1 = 0,$

$2x^2 + 2y^2 + 6x + 8y - 3 = 0,$

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

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22. Find the equation of the circle which cuts the following circles orthogonally.

$x^2 + y^2 + 2x + 17y + 4 = 0,$

$x^2 + y^2 + 7x + 6y + 11 = 0,$

$x^2 + y^2 - x + 22y + 3 = 0.$

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23. Find the equation of the circle which intersects each of the following circles orthogonlly

$x^2 + y^2 + 4x + 2y + 1 = 0.$

$2\left(x^2 + y^2\right) + 8x + 6y - 3 = 0,$

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

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