37. SYSTEM OF CIRCLES

1 Find the minimum radius of the circle which is orthogonal to both the circles

$x^2+y^2+4x+3=0$ and $x^2+y^2-12x+35=0$

[AP EAMCET 18-09-20_Shift-2]

1. 1 2. 4
3. $\sqrt{17}$ 4. $\sqrt{15}$

2. The radical axis of the co axial system of circles with limiting points (1, 2) and (-2, 1) is **[AP EAMCET 21-09-20_Shift-2]**

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

3 The radical axes of any two circles is ....to the joining their centres

[AP EAMCET 21-09-20_Shift-2]

1. Parallel
2. Perpendicular
3. Intersecting but perpendicular
4. Can't be determined

4. If the circles $x^2+y^2-2x-2y-7=0$ and $x^2+y^2+4x+2y+k=0$ cut orthogonally, then the length of their common chord is ___ units.

[AP EAMCET 22-09-20_Shift-1]

1. 2 2. 5
3. $\frac{6}{\sqrt{13}}$ 4. $\frac{12}{\sqrt{13}}$

5. If the circle $x^2+y^2+6x-2y+k=0$ bisects the circumference of the circle $x^2+y^2+2x-6y-15=0$, then 'k' is equal to **[AP EAMCET 22-09-20_Shift-2]**

1. 21 2. -21
3. 23 4. -23

6. If $x^2+y^2-6x-8y+12=0$ and

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

cut orthogonally, then k

1. -24 2. 24
3. -48 4. -42

7. The equation of the common chord of the circles $x^2+y^2+2x+3y+1=0$ and $x^2+y^2-5x-6y+4=0$ is___

1. 3x-3y+5=0 2. 7y+9x-3=0
3. 7x-9y+3=0 4. 7x+9y-3=0

8. If the angle between the circles

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

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

is $\frac{\pi}{3}$, then a value of k is

[TS EAMCET 09-09-20_Shift-1]

1. -3 2. 36
3. 3 4. 2

9. $r_1, r_2>0$ *and if* C_1, C_2 are centres of the two circles having only two common tangents and $C_1C_2=r_1+r_2$, then which of the following is correct. **[TS EAMCET 09-09-20_Shift-2]**

1. r_1, r_2 are the radii of the two circles
2. The common chord may divide the line joining the centres in the ratio $r_1:r_2$
3. r_1, r_2 are always the distances of the centres from the common tangent of the two circles
4. External centre of similitude divides C_1C_2 in the ratio $r_1:r_2$

10. Let $S\equiv x^2+y^2-6x-6y+4=0$ *and* $S'\equiv x^2+y^2-2x-4y+3=0$ be two circles. The centre of a circle of radius $\sqrt{14}$ and having same radical axis with either of S=0 or $S'=0$ is

[TS EAMCET 09-09-20_Shift-2]

1. (3,3) 2. $\left(\frac{-19}{5},\frac{-2}{5}\right)$
3. (1,2) 4. $\left(\frac{2}{5},\frac{3}{5}\right)$

11. The circle S=0 cuts the circles

$C_1 = x^2+y^2-8x-2y+16=0$ and

$C_2 = x^2+y^2-4x-4y-1=0$ orthogonally. If the common chord of S=0 and

$C_1 = 0$ *is* $2x+13y-15=0$, then the centre of S=0 is

[TS EAMCET 10-09-20_Shift-1]

1. $\left(-\frac{11}{3},\frac{7}{6}\right)$
2. $\left(\frac{11}{3},\frac{-7}{6}\right)$
3. $\left(\frac{2}{13},\frac{11}{15}\right)$
4. $\left(\frac{11}{15},\frac{-2}{13}\right)$

12. The equation of the circle passing through the points of intersection of the two orthogonal circles $S_1 = x^2+y^2+kx-4y-1=0$, and $S_2 = 3x^2+3y^2-14x+23y-15=0$ and passing through the point (-1,-1) is

[TS EAMCET 10-09-20_Shift-1]

1. $x^2+y^2-8x-2y-12=0$
2. $3x^2+3y^2+18x-12y=0$
3. $5x^2+5y^2-22x+15y-17=0$
4. $x^2+y^2-5x+14y+7=0$

13. Suppose the circle $S: x^2+y^2+2gx+2fy+c=0$ cuts orthogonally the two circles

$S' = x^2+y^2-4x-6y+11=0$ *and*

$S'' = x^2+y^2-10x-4y+21=0$. .If the centres of S=0 lies on the bisector of the angle between the positive coordinate axes, then

$2g+2f+c=$ **[TS EAMCET 10-09-20_Shift-2]**

1. 12
2. 8
3. 4
4. 0

14. If the circles $S_1 : x^2+y^2=16$ intersects another circle S_2 of radius 5 units such that the common chord is of maximum length and slope $\frac{3}{4}$, ,then the centre of the circle S_2 is

[TS EAMCET 10-09-20_Shift-2]

1. $\left(\frac{-9}{5},\frac{12}{5}\right) or \left(\frac{9}{5},\frac{-12}{5}\right)$
2. $\left(\frac{7}{5},\frac{-12}{5}\right) or \left(\frac{-7}{5},\frac{12}{5}\right)$
3. $\left(-\frac{9}{5},\frac{-12}{5}\right) or \left(\frac{9}{5},\frac{12}{5}\right)$
4. $\left(\frac{12}{5},\frac{9}{5}\right) or \left(-\frac{12}{5},\frac{-9}{5}\right)$

15. The centre of the circle passing through the points intersection of the circles

$(x+3)^2+(y+2)^2=25$ and

$(x-2)^2+(y-3)^2=25$ and cutting the circle

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

[TS EAMCET 11-09-20_Shift-1]

1. $\left(\frac{-27}{2},\frac{-25}{2}\right)$
2. $(0,0)$
3. $\left(\frac{16}{3},\frac{-25}{4}\right)$
4. $\left(\frac{4}{7},\frac{3}{7}\right)$

16. L_1 and L_2 are the common tangents to two circles. If L_1 touches the two circles at A(1,1) and B(0,1) and L_2 touches the two circles at $C\left(\frac{3}{4},\frac{4}{5}\right), D\left(\frac{-1}{5},\frac{7}{5}\right)$, then the equation of the radical axis of the two circles is

[TS EAMCET 11-09-20_Shift-2]

1. 2x-6y=7
2. 2x+y+7=0
3. 2x+6y=7
4. x=y

17. The centre of the smallest circle which cuts the circles $x^2+y^2-2x-4y-4=0$ and $x^2+y^2-10x+12y+52=0$ orthogonally is

[TS EAMCET 11-09-20_Shift-2]

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

18. If $x^2+y^2-a^2+\lambda(x\cos\alpha+y\sin\alpha-p)=0$ is the smallest circle through the points of intersection of $x^2+y^2=a^2$ and $x\cos\alpha+y\sin\alpha=p$, (0<p<a), then $\lambda=$ **[TS EAMCET 11-09-20_Shift-2]**

1. 1
2. -p
3. -2p
4. -3p

19. The equation of the tangents drawn from the origin to the circle $x^2+y^2+2gx+2fy+g^2=0$ **[TS EAMCET 14-09-20_Shift-2]**

1. $x=0,(g^2+f^2)x-2gfy=0$
2. $x=0,(g^2-f^2)x-2gfy=0$
3. $y=0,(g^2-f^2)y-2gfx=0$
4. $y=0,(g^2+f^2)y-2gfx=0$

20. If 2x+y=0 is the equation of the chord of a circle $x^2+y^2-2x-6y+3=0$, then the circle with this chord as diameter passes through the point **[TS EAMCET 14-09-20_Shift-2]**

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

21 If the radical axis of the circles $x^2+y^2+2\alpha x+2\beta y+c=0$ and $x^2+y^2+\frac{3}{2}x+4y+c=0$ touches the circle $x^2+y^2+2x+2y+1=0$, then $4\alpha\beta-8\alpha-3\beta+10=$ **[TS EAMCET 14-09-20_Shift-2]**

1. 2
2. -2
3. 4
4. -4

22. The radius of the circle whose center lies at $(1,2)$, while cutting the circle $x^2+y^2+4x+16y-30=0$ orthogonally, Is_____ units. **[AP EAMCET 19-08-2021_Shift-1]**

1. $\sqrt{41}$
2. $\sqrt{31}$
3. $\sqrt{21}$
4. $\sqrt{11}$

23 The point which has same power with respect to each of the circles $x^2+y^2-8x+40=0$, $x^2+y^2-5x+16=0$ and $x^2+y^2-8x+16y+160=0$ is_____ **[AP EAMCET 19-08-2021_Shift-1]**

1. $\left(-8,\frac{-15}{2}\right)$
2. $\left(8,\frac{-15}{2}\right)$
3. $\left(8,\frac{15}{2}\right)$
4. $\left(-8,\frac{15}{2}\right)$

24. The equation of the circle, which cuts orthogonally each of three circles $x^2+y^2-2x+3y-7=0$, $x^2+y^2+5x-5y+9=0$ and $x^2+y^2+7x-9y+29=0$ is_____ **[AP EAMCET 19-08-2021_Shift-2]**

1. $x^2+y^2-16x-18y-4=0$
2. $x^2+y^2=a^2$
3. $x^2+y^2-16x=0$
4. $y^2-x^2+2x=0$

25. The length of the common chord of the circles $x^2+y^2+3x+5y+4=0$ and $x^2+y^2+5x+3y+4=0$ is _____ units **[AP EAMCET 20-08-2021_Shift-1]**

1. 3
2. 2
3. 6
4. 4

26. Find the equation of the circle which passes through the point $(1,2)$ and the points of intersection of the circles $x^2+y^2-8x-6y+21=0$ and $x^2+y^2-2x-15=0$. **[AP EAMCET 20-08-2021_Shift-1]**

1. $x^2+y^2-18x-12y+27=0$
2. $2(x^2+y^2)-18x-12y+27=0$
3. $3(x^2+y^2)-18x-12y+27=0$
4. $4(x^2+y^2)-18x-12y+27=0$

27. The equation of radical axis of the circles $x^2+y^2+4x+6y+7=0$ & $4x^2+4y^2+8x+12y-9=0$ Is **[AP EAMCET 20-08-2021_Shift-2]**

1. $x+y+1=0$
2. $8x+12y=0$
3. $8x+12y+37=0$
4. $2x+3y+7=0$

28. The radical axis of the circles $S_1: x^2+y^2-4x+6y-10=0$ and $S_2: x^2+y^2+2x-6y+2=0$ cut the circle s_1 in **[AP EAMCET 20-08-2021_Shift-2]**

1. two real and distinct points
2. one real point
3. imaginary points
4. can't be determined

29. If $(4,7)$ & $(-2,-1)$ are ends of a diameter of a circle which intersects X-axis at A and B, then AB is equal to_____ **[AP EAMCET 23-08-2021_Shift-1]**

1. 5
2. 6
3. 7
4. 8

30. If L_1 represents the radical axis of circles $x^2+y^2-4x-6y+5=0$ and $x^2+y^2-2x-4y-1=0$ and L_2 represents the radical axis of $x^2+y^2+2x+2y-7=0$ and $x^2+y^2+x+y+9=0$, then _____ **[AP EAMCET 23-08-2021_Shift-1]**

1. L_1 is parallel to L_2
2. L_1 is perpendicular to L_2
3. L_1 & L_2 intersect at an angle 30^0
4. L_1 & L_2 intersect at $(1,7)$

31 Which circle among the following bisects the circumference of the circle $x^2+y^2-8x-6y+23=0$? **[AP EAMCET 23-08-2021_Shift-1]**

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

32. If the circles $x^2+y^2-6x-8y-12=0$ and $x^2+y^2-4x+6y+k=0$ are perpendicular to each other, then 'k' equals _______ **[AP EAMCET 24-08-2021_Shift-1]**

1. 4
2. 0
3. –2
4. 12

33. Find the equation of a circle which passes through the point (1,2) and the points of intersection of the circles $x^2+y^2-8x-6y+21=0$ and $x^2+y^2-2x-15=0$. **[AP EAMCET 24-08-2021_Shift-1]**

1. $x^2+y^2-6x-4y+9=0$
2. $x^2+y^2-18x-12y+27=0$
3. $2(x^2+y^2)-18x+12y+27=0$
4. $4(x^2+y^2)-3x+12y+16=0$

34. If $S=x^2+y^2+2x+17y+4=0$, $S'=x^2+y^2+7x+6y+11=0$ and $S''=x^2+y^2-x+22y+3=0$ are three circles, then the length of tangent from their radical center to S = 0 is _____ units. **[AP EAMCET 24-08-2021_Shift-2]**

1. $\sqrt{53}$
2. $\sqrt{57}$
3. $\sqrt{15}$
4. $\sqrt{17}$

35. The angle between circles $x^2+y^2+2x+4y+1=0$ and $x^2+y^2-2x+6y-3=0$ is

[AP EAMCET 25-08-2021_Shift-2]

1. $\cos^{-1}\left(\frac{3}{\sqrt{13}}\right)$
2. $\cos^{-1}\left(\frac{3}{\sqrt{31}}\right)$
3. $\cos^{-1}\left(\sqrt{\frac{3}{31}}\right)$
4. $2\cos^{-1}\left(\frac{3}{\sqrt{13}}\right)$

36 The locus of the centres of the circles that are passing through the intersection of the circles $x^2+y^2=1$ and $x^2+y^2-2x+y=0$

[AP EAMCET 25-08-2021_Shift-2]

1. A line whose equation is $x+2y=0$
2. A circle
3. A parabola
4. A line whose equation is $2x-y=0$

37. Choose the correct option regarding the following statements:

Statement – 1: The length of common chord of circles $x^2+y^2+ax+by+c=0$ and $x^2+y^2+bx+ay+c=0$ equals $\frac{\sqrt{(a+b)^2-8c}}{2}$

Statement–2: If two circles intersect at two distinct points, then their radical axis is their common chord.

[AP EAMCET 23-08-2021_Shift-2]

1. Both statements are true and statement–2 is a correct explanation for statement – 1.
2. Both statements are true but statement – 2 is not a correct explanation for statement – 1.
3. Statement – 1 is true, Statement –2 is false.
4. Statement –1 is false, statement – 2 is true.

38. Find the equation of a circle which cuts the circle $x^2+y^2-6x+4y-3=0$ orthogonally, while passing through (3, 0) and touching the y– axis.

[AP EAMCET 23-08-2021_Shift-2]

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

39 If the radical centre of the circles $x^2+y^2-8x-2y+8=0, x^2+y^2+6x+8y-24=0,$ And $x^2+y^2-2x+2y+2=0$ is (a,b), then $a+b=$

[TS EAMCET 04-08-2021_Shift-2]

1. 34
2. 10
3. -15
4. -24

40. The equation of the circle passing through (1,1) and through the points of intersection of the circles $x^2+y^2+13x-3y=0$ *and* $2x^2+2y^2+4x-7y-25=0$ is

[TS EAMCET 04-08-2021_Shift-1]

1. $4x^2+4y^2+30x-13y-25=0$
2. $2x^2+2y^2+15x-19y=0$
3. $4x^2+4y^2+25x+12y-45=0$
4. $4x^2+4y^2+13x-30y+9=0$

41 If the circles $(x-2)^2+(y-3)^2=25$ and $25x^2+25y^2-40x-70y-160=0$ touch internally at (α,β) then $\alpha+\beta=$

[TS EAMCET 04-08-2021_Shift-1]

1. 0
2. -2
3. -1
4. 1

42. The equation of the circle passing through the points of intersection of two circles

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

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

and the point $(-1,1)$ is

[TS EAMCET 05-08-2021_Shift-1]

1. $x^2+y^2+10x+3y+5=0$
2. $x^2+y^2+10x-3y+11=0$
3. $x^2+y^2+20x-3y+21=0$
4. $x^2+y^2+20x+3y+15=0$

43. If the circle $x^2+y^2+2kx+4y-4=0$ has its centre in 4th quadrant and touches the circle $x^2+y^2+6x-2y+6=0$ then, $k=$

[TS EAMCET 05-08-2021_Shift-1]

1. -5
2. $\frac{-15}{7}$
3. $\frac{-23}{5}$
4. -1

44. The locus of the centre of circles passing through (a,b) and cut the circle $x^2+y^2-2x+4y-4=0$ orthogonally is

[TS EAMCET 06-08-2021_Shift-2]

1. $(a+1)x+(b+2)y=\frac{a^2+b^2+4}{2}$
2. $(a+1)x+(b-2)y=\frac{a^2+b^2+4}{2}$
3. $(a-1)x+(b+2)y=-\left(\frac{a^2+b^2+4}{2}\right)$
4. $(a-1)x+(b-2)y=\frac{a^2+b^2+4}{2}$

45 Consider the system of circles

$x^2+y^2+2fy+\lambda\left(x^2+y^2+2gx+k\right)=0$,

where $g\neq 0, f\neq 0$ and λ a parameter. If A,B are the point circles of this system such that $\angle AOB=\frac{\pi}{2}$, then g^2

[TS EAMCET 06-08-2021_Shift-2]

1. $-k$
2. $\frac{k}{2}$
3. 0
4. f^2

46. The angle between the circles

$x^2+y^2-2x-9=0 \& x^2+y^2-4y-1=0$

at their point of intersection is

[TS EAMCET 06-08-2021_Shift-1]

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

47. If two circles touch at $(0,0)$ externally, then their radical axis is

[TS EAMCET 06-08-2021_Shift-1]

1. $x=y$ or $x=-y$
2. does not exist
3. any line passing through $(0,0)$
4. their common tangent at $(0,0)$

48. If the straight line $x\cos\alpha+y\sin\alpha=P$ intersects the circle $x^2+y^2=a^2$ at A and B then the equation of circle with diameter $\overline{AB}$ is

[TS EAMCET 06-08-2021_Shift-1]

1. $x^2+y^2-2Px\cos\alpha-2Py\sin\alpha+2P^2-a^2=0$
2. $x^2+y^2+2Px\cos\alpha-2Py\sin\alpha+2P^2+a^2=0$
3. $x^2+y^2-2Px\cos\alpha+2Py\sin\alpha-2P^2-a^2=0$
4. $x^2+y^2-2Px\cos\alpha-2Py\sin\alpha-2P^2+a^2=0$

49. The image of the point (3,4) with respect to the radical axis of the circles

$x^2+y^2+8x+2y+10=0$ and

$x^2+y^2+7x+3y+10=0$ is

[AP EAMCET 04-07-2022_Shift-2]

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

50 The radical centre of the three circles $x^2+y^2-1=0$, $x^2+y^2-8x+15=0$ and $x^2+y^2+10y+24=0$ is

[AP EAMCET 05-07-2022_Shift-1]

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

51. The radical centre of the circles

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

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

$x^2+y^2+5x-8y+15=0$ is

[AP EAMCET 06-07-2022_Shift-2]

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

52 The equation of circle passing through (0,0) and cutting orthogonally the circles $x^2+y^2+6x-15=0$ and $x^2+y^2-8y-10=0$ is

[AP EAMCET 07-07-2022_Shift-1]

1. $2(x^2+y^2)-10x+5y=0$
2. $2(x^2+y^2)+10x-5y=0$
3. $2(x^2-y^2)+10x+5y=0$
4. $2(x^2-y^2)-10x-5y=0$

53 Suppose A(2,3) and B are the points of intersections of two circles. The points P lying on one circle and Q lying on the other circle are such that BP and BQ constitute the diameters of the circles. If the slopes of the radical axis and PQ are ¾ and a/b respectively, then the value of 3a+4b is **[AP EAMCET 07-07-2022_Shift-2]**

1. 1
2. 0
3. 2
4. -1

54. The straight line $x\cos\alpha+y\sin\alpha=p$ cuts the circle $x^2+y^2-a^2=0$ at A and B. then the equation of circle having AB as diameter is

[AP EAMCET 08-07-2022_Shift-1]

1. $x^2+y^2-a^2+p(x\cos\alpha+y\sin\alpha-p)=0$
2. $x^2+y^2-a^2-p(x\cos\alpha+y\sin\alpha+p)=0$
3. $x^2+y^2-a^2+2p(x\cos\alpha+y\sin\alpha-p)=0$
4. $x^2+y^2-a^2-2p(x\cos\alpha+y\sin\alpha-p)=0$

55. Number of circles intersecting $x^2+y^2=4,\ x^2+y^2-2x-3=0$ *and* $x^2+y^2-2y-3=0$ orthogonally is

[AP EAMCET 08-07-2022_Shift-2]

1. 0
2. 1
3. 2
4. ∞

56. If the common chord of the circles $x^2+y^2+4y=0$ and $x^2+y^2-4x-5=0$ is the diameter of the circle S = 0 then the abscissa of the centre of the circle S = 0 is

[TS EAMCET 18-07-2022_Shift-1]

1. $\frac{-13}{8}$
2. $\frac{3}{8}$
3. $\frac{3}{4}$
4. $\frac{-13}{4}$

57. If $\left(0,\frac{3}{4}\right)$ is the radical centre of the circles

$S\equiv x^2+y^2+\alpha x+6y=0,$

$S'\equiv x^2+y^2+2\alpha x+\alpha y+6=0$ and

$S''\equiv x^2+y^2+6\alpha x-\alpha y+3=0$ then the distance between the radical centre and the centre of the circle S' = 0 is

[TS EAMCET 18-07-2022_Shift-2]

1. 8
2. 15
3. $\frac{\sqrt{65}}{4}$
4. $\frac{\sqrt{5}}{4}$

58. Let $x+y=0$ be the radical axis of the circles $S\equiv x^2+y^2+2gx+2fy+c=0$ and $S^1\equiv x^2+y^2-6x-4y+4=0$ and the radius of the circle $S=0$ be 1. The $g+f=$

[TS EAMCET 19-07-2022_Shift-I]

1. ±5
2. ±3
3. ±2
4. ±1

59. the radius of the circle which cuts all the three circles $x^2+y^2-4x-4y+3=0$, $x^2+y^2+4x-4y+3=0$, and $x^2+y^2+4x+4y+3=0$, orthogonally is

[TS EAMCET 19-07-2022_Shift-I]

1. 1
2. $\sqrt{3}$
3. $\sqrt{5}$
4. $\sqrt{7}$

60 If the circle $x^2+y^2-6x-12y+1=0$ cuts another circle C orthogonally and the centre of circle C is (–4,2), then its radius is

[TS EAMCET 19-07-2022_Shift-2]

1. $\sqrt{21}$
2. 5
3. $\frac{3}{4}$
4. $\sqrt{15}$

61. The length of the common chord of the two circles $x^2+y^2-4x-8y+4=0$ and $x^2+y^2-8x-12y+16=0$ is

[TS EAMCET 20-07-2022_Shift-1]

1. $\sqrt{46}$
2. $\sqrt{15}$
3. $\sqrt{55}$
4. 3

62. If (h,k) is the centre of the circle which passes through the origin and cuts the circles $x^2+y^2+4x+6y+12=0$ and $x^2+y^2+4x-6y+9=0$ orthogonally, then $k-2h=$

[TS EAMCET 20-07-2022_Shift-2]

1. 0
2. 1
3. –1
4. 5

63. If $(-1,-1)$ is the radical centre of the circles $x^2+y^2+2gx-4y+4=0$, $x^2+y^2+6x+2fy+12=0$ and $x^2+y^2+10y+20=0$ then $g-f=$

[TS EAMCET 20-07-2022_Shift-2]

1. 0
2. –1
3. 1
4. 2

64 Let the circle $S\equiv x^2+y^2+2gx+2fy+c=0$ cut the circles $x^2+y^2-2x+2y-2=0$ and $x^2+y^2+4x-6y+9=0$ orthogonally. If the centre of the circle S = 0 lies on the line $2x+3y-2=0$, then $2g+f=$

[15th May 2023 Shift 1]

1. C
2. $c+f$
3. $2g-c$
4. $c-f$

65. Let $A(1,2)$ be the centre and 3 be the radius of a circle S. Let B $(-1,-1)$ be the centre and r be the radius of another circle S^1. If $\frac{\pi}{3}$ is the angle between the circles S and S^1, then the number of possible values of r is

[15th May 2023 Shift 2]

1. 1
2. 2
3. 3
4. 4

66 P is a point of intersection of the circles S=$S^1=x^2+y^2+2kx-6y-7=0$. If the tangent at P to S =0 pass through the centre of $S^1=0$ and the tangent at P to S^1=0 pass through the centre of $S=0$, then the radius of $S^1=0$ is

[16th May 2023 Shift 2]

1. $\frac{\sqrt{33}}{2}$
2. 33
3. $\sqrt{17}$
4. $\frac{\sqrt{65}}{2}$

67. If the angle between the circles $x^2+y^2+2x-4y+1=0$ and $x^2+y^2-4x-2y+c=0$ is $\frac{\pi}{4}$, then c =

[17th May 2023 Shift 1]

1. 3
2. -13
3. -3 or 13
4. -31 or -3

68. If the circles $x^2+y^2-4x+2fy+1=0$ and $x^2+y^2+2gx-4y-1=0$ cut orthogonally, then $r_1^2+r_2^2-8=$ **[18th May2023 shift -1]**

1. g^2
2. $-f^2$
3. $2g^2$
4. $-2f^2$

69 If A and B are the points of intersection of the circles $x^2+y^2-4x+6y-3=0$ and $x^2+y^2+2x-2y-2=0$, then the distance between A and B is

[18th May 2023 Shift 2]

1. $\frac{13}{10}$
2. $\frac{\sqrt{41}}{3}$
3. $\frac{\sqrt{231}}{5}$
4. $\frac{26}{5}$

70 The line $x+y+2=0$ intersects the circle $x^2+y^2+4x-4y-4=0$ in two points A and B. let $S\equiv x^2+y^2+2gx+2fy+c=0$ be a different circle passing through the points A and B. If the distance of the centre of S=0 from AB is $\sqrt{2}$, then $g+f+c=$

[19th May 2023 Shift 1]

1. 12
2. 8
3. 6
4. 0

71 The equation of the circle whose diameter is the common chord of the circles $x^2+y^2+2x+3y+1=0$ and $x^2+y^2+4x+3y+2=0$ is

[12TH MAY 2023 SHIFT -2]

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

72 The equation of the line perpendicular to the radical axis of two circles $x^2+y^2-5x+6y+12=0, x^2+y^2+6x-4y-14=0$ and passing through (1,1) is

[12TH MAY 2023 SHIFT -2]

1. $2x+3y-5=0$
2. $x+y-2=0$
3. $10x+11y-21=0$
4. $11x+10y-21=0$

73 If the angle between the circles $x^2+y^2-2x-4y+c=0$ and $x^2+y^2-4x-2y+4=0$ is 60^o, then c=

[12TH MAY 2023 SHIFT -2]

1. $\frac{3\pm\sqrt{5}}{2}$
2. $\frac{6\pm\sqrt{5}}{2}$
3. $\frac{7\pm\sqrt{5}}{2}$
4. $\frac{9\pm\sqrt{5}}{2}$

74. If the angle between the circles $x^2+y^2-2x+2y+1=0$ and $x^2+y^2+2x-2y+k=0 is \frac{\pi}{3}, then$

[13TH MAY 2023 SHIFT-1]

1. k is a rational number but not an integer
2. k is an irrational number
3. There is no real number k satisfying the given condition
4. k is an integer

75 Let the line $x-y+1=0$ intersect the circle $x^2+y^2+2x+2y+1=0$ in two points A and B. If AB is the diameter of the circle $x^2+y^2+2gx+2fy+c=0$ then $g+f=$ **[13TH MAY 2023 SHIFT-1]**

1. 3c
2. 2c
3. c
4. 0

76 If the angle between the circles $x^2+y^2-4x-6y+k=0$ and $x^2+y^2+8x-4y+11=0$ is $\frac{\pi}{2}$, then the value of k is **[EAPCET 14-05-23 SHIFT-1]**

1. -3
2. 3
3. -15
4. 15

77 If the radical centre of the given three circles $x^2+y^2=1, x^2+y^2-2x-3=0$ and $x^2+y^2-2y-3=0$ is $C(\alpha,\beta)$ and r is the sum of the radii of the given circles, then the circle with $C(\alpha,\beta)$ as centre and r as radius is

[EAPCET 14-05-23 SHIFT-1]

1. $(x-1)^2+(y-1)^2=2$
2. $(x-1)^2+(y+1)^2=4$
3. $(x-2)^2+(y-2)^2=25$
4. $(x+1)^2+(y+1)^2=25$

78 A circle $S\equiv x^2+y^2+2gx+2fy+4=0$ cuts the circle $x^2+y^2-4x-4y-4=0$ orthogonally and makes an angle of 60^0 with the circle $x^2+y^2+4x+4y+4=0$. Then the radius of the circle S=0 is

[EAPCET 13-05-23 SHIFT-2]

1. 4
2. 3
3. 5
4. 1

79 If the circle $S\equiv x^2+y^2+2gx+2fy+c=0$ cuts each of the three circles $x^2+y^2+4x+4y+7=0$, $x^2+y^2-4x+4y+7=0$ and $x^2+y^2-4x-4y+7=0$ orthogonally, then the equation of the tangent drawn at the point $(\sqrt{3},2)$ to the circle $S=0$ *is*

[EAPCET 13-05-23 SHIFT-2]

1. $(\sqrt{3}-1)x+4y+(\sqrt{3}-1)=0$
2. $\sqrt{3}x+2y-7=0$
3. $(\sqrt{3}+2)x+3y+(\sqrt{3}+1)=0$
4. $\sqrt{3x}-2y+7=0$

KEY

1)	4	2)	4	3)	2	4)	4	5)	4
6)	1	7)	4	8)	1	9)	2	10)	2
11)	3	12)	3	13)	1	14)	1	15)	3
16)	3	17)	3	18)	3	19)	3	20)	4
21)	3	22)	4	23)	2	24)	1	25)	4
26)	3	27)	3	28)	1	29)	4	30)	1
31)	1	32)	2	33)	3	34)	2	35)	1
36)	1	37)	4	38)	2	39)	2	40)	1
41)	2	42)	1	43)	4	44)	3	45)	2
46)	2	47)	4	48)	1	49)	3	50)	1
51)	1	52)	1	53)	2	54)	4	55)	1
56)	2	57)	3	58)	2	59)	2	60)	1
61)	1	62)	4	63)	3	64)	4	65)	2
66)	4	67)	1	68)	3	69)	3	70)	2
71)	1	72)	3	73)	3	74)	2	75)	3
76)	3	77)	4	78)	1	79)	2	80)	

SOLUTIONS

1. Radical axis is $S-S'=0$

$\Rightarrow x=2$

$\therefore C(2,0)$

Minimum radius is $\sqrt{4-24+35}=\sqrt{15}$

2. Limiting points (1,2) and (-2,1) so radical axis perpendicular bisector of the line joining the limiting points $P=\left(\frac{-1}{2},\frac{3}{2}\right)$

Line passing through $P=\left(\frac{-1}{2},\frac{3}{2}\right)$ and having slope '-3' is 3x+y=0

3 The radical axis of the two circles are perpendicular to the joining their centres

4 $2(gg^1+ff^1)=c+c^1$ K=1 $d^2=r_1^2+r_2^2$ $d=\sqrt{5}$

5. $x^2+y^2+6x-2y+k=0$.......(1)

$x^2+y^2+2x-6y-15=0$.....(2)

Equation of radical axis is $(1)-(2)=0$

$4x+4y+k+15=0$

Centre of equation (2) lies on radical axis

$4(-1)+4(3)+k+15=0$

$k=-23$

6 The two circles cut orthogonally

$2gg'+2ff'=c+c'$ We get $k=-24$

7 $S \equiv x^2+y^2+2x+3y+1=0$

$S' \equiv x^2+y^2-5x-6y+4=0$

Equation of common chord, $S-S'=0$

$\Rightarrow 7x+9y-3=0$

8 $x^2+y^2-4x-6y+k=0$ $x^2+y^2+8x-4y+11=0$

$C_1=(2,3), r_1=\sqrt{13-k}$ $C_2=(-4,2), r_2=3$

$d=c_1c_2=\sqrt{37}$

$$\cos\theta=\frac{d^2-r_1^2-r_2^2}{2r_1r_2}$$

$k^2+39k+108=0$

K= -36, -3

9 Conceptual

10 $S \equiv x^2+y^2-6x-6y+4=0$

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

Required circle is

$s''=x^2+y^2+2gx+2fy+c=0$

$s-s''=(2g+6)x+(2f+6)y+c-4=0 \to (1)$

$s'-s''=(2g+2)x+(2f+4)y+c-3=0 \to (2)$

(1) and (2) samelines

$$\frac{2g+6}{2g+2}=\frac{2f+6}{2f+4}=\frac{c-4}{c-3}$$

$$\frac{g+3}{g+1}=\frac{f+3}{f+2}=\frac{c-4}{c-3}=k$$

$$g=\frac{k-3}{1-k}, f=\frac{2k-3}{1-k}, c=\frac{-3k+4}{1-k}$$

$r^2=14$

$g^2+f^2-c=14$

$12k^2-17k=0$

$k=0, k=\frac{17}{12}$

$If\ k=0\ then\ g=-3, f=-3, c=4$

$If\ k=\frac{17}{12}\ then\ g=\frac{19}{5}, f=\frac{2}{5}$

$\therefore Centre=(-g,-f)=(\frac{-19}{5},\frac{-2}{5})$

11 $C+\lambda L=0$

$x^2+y^2+(-8+2\lambda)x+(-2+13\lambda)y+(16-15\lambda)=0....(1)$

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

Circles (1) and (2) cuts orthogonally

$$2(\lambda-4)(-2)+2\left(\frac{13\lambda-2}{2}\right)(-2)=16-15\lambda-1$$

$5-15\lambda=0$

$\lambda=\frac{1}{3}$

$(1)\Rightarrow 3x^2+3y^2-22x+7y+33=0$

$$x^2+y^2-\frac{22}{3}x+\frac{7y}{3}+11=0$$

$$g=-\frac{11}{3}, f=\frac{7}{6}$$

$$\text{Centre}=\left(\frac{11}{3},-\frac{7}{6}\right)$$

12. $g_1=\frac{k}{2}; f_1=-2; c_1=-1$

$$g_2=-\frac{7}{3}; f_2=\frac{23}{6}; c_2=-\frac{15}{3}$$

Given $2g_1g_2+2f_1f_2=c_1+c_2$

$$2\left(\frac{k}{2}\right)\left(-\frac{7}{3}\right)+2(-2)\left(\frac{23}{6}\right)=-1-\frac{15}{3}$$

$k=-4$

Required equation of circle is

$S+\lambda S'=0$

$x^2+y^2-4x-4y-1+$

$\lambda(3x^2+3y^2-14x+23y-15)=0\to(1)$

$(x, y)=(-1,-1)$

$\lambda=\frac{1}{2}$

$(1)\Rightarrow 5x^2+5y^2-22x+15y-17=0$

13. Orthogonal condition

$\Rightarrow c = -4g - 6f - 11$ and $c = -10g - 4f - 21$

$\Rightarrow 3g - f + 5 = 0 \rightarrow (1)$

Also $(-g, -f)$ lies on $y = x \Rightarrow -g = -f \rightarrow (2)$

From (1) & (2) $\Rightarrow g = f = -\frac{5}{2}$

$\therefore c = 14 \Rightarrow 2g + 2f + c = 4$

14 $c_1 = (0,0),\ c_2 = (h,k)$

$(x-h)^2 + (y-k)^2 = 5^2$

$S \equiv x^2 + y^2 - 2hx - 2ky + h^2 + k^2 = 25$

$S_1 \equiv x^2 + y^2 = 16$

$S - S_1 = 0 \Rightarrow 2hx + 2ky - h^2 - k^2 = -9$

Slope of chord $= \frac{3}{4}$

Slope of required line $= \frac{-4}{3}$

passing through (0, 0)

$y = -\frac{4}{3}x \Rightarrow \frac{y}{x} = -\frac{4}{3}$

$P = \left|\frac{-h^2 - k^2 + 9}{4h^2 + 4k^2}\right| = 0$

$h^2 + k^2 = 9$

$h^2 + \frac{16h^2}{9} = 9 \Rightarrow h = \pm\frac{9}{5}$

$\therefore \left(\frac{9}{5}, -\frac{12}{5}\right)$ or $\left(-\frac{9}{5}, \frac{12}{5}\right)$

15. Given

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

$S' \cong x^2 + y^2 - 4x - 6y - 12 = 0$

Here $L \cong S - S' = 0 \Rightarrow x + y = 0$

Required circle is

$S + \lambda L = 0$

$\Rightarrow x^2 + y^2 + (6+\lambda)x + (4+\lambda)y - 12 = 0$

Which cuts orthogonally the other circle.

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

By using orthogonality condition, we can write

$2\left[3 + \frac{\lambda}{2} - 4 - \lambda\right] = -23$

$\Rightarrow \lambda = 21$

Required circle is

$x^2 + y^2 + 27x + 25y - 12 = 0$

and its centre is $\left(\frac{-27}{2}, \frac{-25}{2}\right)$

16. Equation of radical axis passing through the mid points of AB and mid points of CD

17 The locus of centre of a circle which cuts orthogonally given two circles is radical axes. Equation of radical axis $x - 2y - 7 = 0$. It is diameter of smallest circle. By verification centre $(3, -2)$ lies on $x - 2y - 7 = 0$

18 $x^2 + y^2 - a^2 + \lambda x\cos\alpha + \lambda y\sin\alpha - p\lambda = 0$

$x^2 + y^2 + \lambda x\cos\alpha + \lambda y\sin\alpha - (p\lambda + a^2) = 0$

If it is a small circle then intersecting line is diameter.

$\Rightarrow \lambda = -2p$

19. Equation of tangents are

$S_1^2 = SS_{11}$

$(gx + fy + g^2)^2 = g^2(x^2 + y^2 + 2gx + 2fy + g^2) = 0$

$\Rightarrow y\left[(g^2 - f^2)y - 2gfx\right] = 0$

20. $S \cong x^2+y^2-2x-6y+3=0$ $L=2x+y$

Equation of a circle be $S+\lambda L=0$

Centre $\left(1-\lambda, \frac{6-\lambda}{2}\right)$

This centre lies on L=0

$2-2\lambda+\frac{6-\lambda}{2}=0$

$\Rightarrow \lambda=2$

equation of circle be

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

Which satisfies $(-2,1)$

21 Equation of radical axis is

$$\left(2\alpha-\frac{3}{2}\right)x+(2\beta-4)y=0$$

Which touches the circle

$x^2+y^2+2x+2y+1=0$ then r=d

$$1=\frac{\left(2\alpha-\frac{3}{2}\right)(-1)+(2\beta-4)(-1)}{\sqrt{\left(2\alpha-\frac{3}{2}\right)^2+(2\beta-4)^2}}$$

After simplification we get

$4\alpha\beta-8\alpha-3\beta+10=4$

22. Given centre $(1,2)$

$S_1 \equiv x^2+y^2+4x+16y-30=0$

$S_2 \equiv x^2+y^2+2gx+2fy+c=0$

Orthogonally $2gg'+2ff'=c+c'$

$\Rightarrow c=-6, r=\sqrt{1+4+6}=\sqrt{11}$

23. Given that

$S \equiv x^2+y^2-8x+40=0$

$S' \equiv x^2+y^2-5x+16=0$

$S'' \equiv x^2+y^2-8x+16y+160=0$

$S-S'=0 \Rightarrow x=8$

$S'-S''=0 \Rightarrow y=\frac{-15}{2}$ $\therefore (x,y)=\left(8,\frac{-15}{2}\right)$

24. IPE

25 $S-S'=0 \Rightarrow x-y=0$

$C_1\left(\frac{-3}{2},\frac{-5}{2}\right), r_1=\frac{3}{\sqrt{2}}, d=\frac{1}{\sqrt{2}}$

Common chord $=2\sqrt{r^2-d^2}=4$

26 $S \equiv x^2+y^2-8x-6y+21=0$

$S' \equiv x^2+y^2-2x-15=0$

$P(1,2)$, $S+\lambda S'=0 \Rightarrow \lambda=\frac{1}{2}$

$2(x^2+y^2)-18x-12y+27=0$

27. $S \equiv x^2+y^2+4x+6y+7=0$

$S' \equiv 4x^2+4y^2+8x+12y-9=0$

$S-S'=0 \Rightarrow 8x+12y+37=0$

28 $|r_1-r_2|<C_1C_2<r_1+r_2$

It has two real and distinct points

29 $x^2+y^2-2x-6y-15=0$, $y=0$

$x^2-2x-15=0 \Rightarrow x=-3,5$

$A(-3,0), B(5,0) \Rightarrow AB=8$

30 $S \equiv x^2+y^2-4x-6y+5=0$

$S' \equiv x^2+y^2-2x-4y-1=0$

$S-S'=0 \Rightarrow L_1 \equiv x+y-3=0$

$S'' \equiv x^2+y^2+2x+2y-7=0$

$S''' \equiv x^2+y^2+x+y+9=0$

$S''-S'''=0 \Rightarrow L_2 \equiv x+y-16=0$

L_1 is parallel to L_2

31 Centre $=(4,3)$

$S-S'=0 \Rightarrow 2x+2y-14=0$

C lies on $2x+2y-14=0$

$\therefore$ Required eqn is $x^2+y^2-6x-4y+9=0$

32. $S \equiv x^2+y^2-6x-8y-12=0$

$S' \equiv x^2+y^2-4x+6y+k=0,\ \theta=90^0$

$0=c_1+c_2-2(g_1g_2+f_1f_2) \Rightarrow k=0$

33. $S \equiv x^2+y^2-8x-6y+21=0$

$S' \equiv x^2+y^2-2x-15=0$

$P(1,2),\ S+\lambda S'=0 \Rightarrow \lambda=\frac{1}{2}$

$2(x^2+y^2)-18x-12y+27=0$

34. IPE

35 IPE

36 $S-S'=0 \Rightarrow 2x-y-1=0, S+\lambda L=0$

$$(\alpha,\beta)=\left(-\lambda,\frac{\lambda}{2}\right) \Rightarrow \alpha=-\lambda, \beta=\frac{\lambda}{2}$$

$$\Rightarrow \beta=\frac{-\alpha}{2} \Rightarrow 2\beta=-\alpha$$

$$\Rightarrow \alpha+2\beta=0 \Rightarrow x+2y=0$$

37 $(i) \Rightarrow S \equiv x^2+y^2+ax+by+c=0$

$S' \equiv x^2+y^2+bx+ay+c=0$

$$S-S'=0 \Rightarrow x-y=0,\ C\left(\frac{-a}{2},\frac{b}{2}\right)$$

$$r=\frac{\sqrt{a^2+b^2-4c}}{2}, d=\frac{|b-a|}{2\sqrt{2}}$$

$$2\sqrt{r^2-d^2}=\frac{\sqrt{(a+b)^2-8c}}{2\sqrt{2}}$$

(ii) conceptual

38 IPE problem

39 Given circles $x^2+y^2-8x-2y+8=0....(1)$

$x^2+y^2+6x+8y-24=0....(2)$

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

Radical axis of (1) and (2) is

$7x+5y-16=0....(A)$

Radical axis of (2) and (3) is

$4x+3y-13=0....(B)$

Radical centre is $(-17,27)=(a,b)$

$a+b=10$

40. $R.A, L=22x+y+25=0$

$S+\lambda L=0$

$x^2+y^2+13x-3y+\lambda(22x+y+25)=0$

$12+\lambda(48)=0$

$$\lambda=\frac{-1}{4}$$

$\Rightarrow 4x^2+4y^2+30x-13y-25=0$

41 $$\left(\frac{4-6}{2},\frac{7-9}{2}\right)=(-1,-1)=(\alpha,\beta)$$

$\therefore \alpha+\beta=-1-1=-2$

42. Diagram

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

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

Equation of the circle $S+\lambda S'=0$

$x^2+y^2+2x+3y+1$

$+\lambda(x^2+y^2+4x+3y+2)=0...(1)$

It passes through $(-1,1)$

$$\lambda=\frac{-4}{3}$$

Put λ value in (1)

$\Rightarrow x^2+y^2+2x+3y$

$+1-\frac{4}{3}(x^2+y^2+4x+3y+2)=0$

$$x^2+y^2+10x+3y+5=0$$

43 Given circle $x^2+y^2+2kx+4y-4=0.....(1)$

Centre $C_1=(-k,-2), r_1=\sqrt{k^2+4+4}=\sqrt{k^2+8}$

C_1 lies in 4th quadrant $-k>0 \Rightarrow k<0.$

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

$C_2=(-3,1), r_2=\sqrt{9+1-6}=2$

Circle (1) touches circle (2).

$C_1C_2=r_1 \pm r_2$

$\sqrt{(k-3)^2+3^2}=\sqrt{k^2+8} \pm 2$

S.O.B.S

$(k-3)^2+9=k^2+8+4 \pm 4\sqrt{k^2+8}$

$-3(k-1)=\pm 2\sqrt{k^2+8}$

Again S.O.B.S

$9(k-1)^2=4(k^2+9)$

$\Rightarrow 5k^2-18k-23=0$

$\Rightarrow k=\frac{23}{5}, k=-1$

$\therefore \boxed{k=-1}$

44. Let $C(h,k)$ be locus of centre of circles

$d^2=r_1^2+r_2^2$

$(h-1)^2+(k+2)^2=(h-a)^2+(k-b)^2+9$

$(a-1)h+(b+2)k=\frac{a^2+b^2+4}{2}$

The locus of $P(h,k)$ is

$(a-1)x+(b+2)y=\frac{a^2+b^2+4}{2}$.

45. $x^2+y^2+\frac{2g\lambda}{1+\lambda}x+\frac{2f}{1+\lambda}y+\frac{k\lambda}{a+\lambda}=0$

Centre $=\left(\frac{-g\lambda}{1+\lambda}, \frac{-f}{1+\lambda}\right)$

For point circles radius is zero

$\frac{g^2\lambda^2}{1+\lambda^2}+\frac{f^2}{1+\lambda^2}-\frac{k\lambda}{1+\lambda}=0$

$(g^2-k)\lambda^2-k\lambda+f^2=0$

$\lambda_1\lambda_2=\frac{f^2}{g^2-k}$

$A\left(\frac{-g\lambda_1}{1+\lambda_1}, \frac{-f}{1+\lambda_1}\right)$, $B\left(\frac{-g\lambda_2}{1+\lambda_2}, \frac{-f}{1+\lambda_2}\right)$

Slope of $OA \times$ slope of $OB=-1$

$-g^2+k=g^2 \Rightarrow g^2=\frac{k}{2}$.

46. Given circles are

$x^2+y^2-2x-9=0, x^2+y^2-4y-1=0$

$C_1=(1,0), C_2=(0,2) \Rightarrow d=\sqrt{5}$

$r_1=\sqrt{10}, r_2=\sqrt{5}$

$\cos\theta=\frac{|d^2-r_1^2-r_2^2|}{2r_1r_2}=\frac{1}{\sqrt{2}}$

$\therefore$ *Angle* $\theta=\frac{\pi}{4}$

47 Two circles touch at $(0,0)$ externally.

$\therefore$ Radical axis is their common tangent at $(0,0)$.

48 Required circle equation is $S+\lambda L=0$

$(x^2+y^2-a^2)+\lambda(x\cos\alpha+y\sin\alpha-P)=0$

$C=\left(\frac{-\lambda\cos\alpha}{2}, \frac{-\lambda\sin\alpha}{2}\right)$

C lies on $x\cos\alpha+y\sin\alpha=P$

$\Rightarrow \frac{-\lambda}{2}=P \Rightarrow \lambda=-2P$

49 Radical axis $s-s'=0$

$\Rightarrow x-y=0$

Image of (3,4) w.r.to x=y is (4,3)

50 Radical centre of s, s' Is

$s-s'=0 \Rightarrow 8x-16=0$

$\Rightarrow x=2$

Radical centre of s', s''

is $s'-s''=0$

$-8x-10y-9=0$

$\Rightarrow -8(-2)-10y-9=0$

$\Rightarrow y=\frac{-5}{2}$

$R.C=\left(2,\frac{-5}{2}\right)$

51 $s-s'=0$

$\Rightarrow 4x-4y-4=0$

$x-y-1=0 \quad \rightarrow(1)$

$s'-s''=0$

$\Rightarrow -6x+14y-10=0$

$\Rightarrow 3x-7y+5=0 \Rightarrow 3x-7y+5=0 \quad \rightarrow(2)$

Solve (1) & (2) $\Rightarrow$ (3, 2)

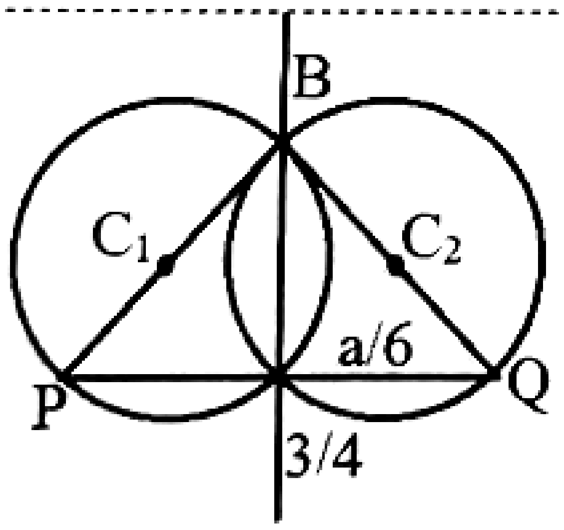
52 $s-s'=0$

$\Rightarrow 6x+8y-5=0...(1)$

Centre lies on eq(1) we get

$\therefore$ By verification (1) option

53

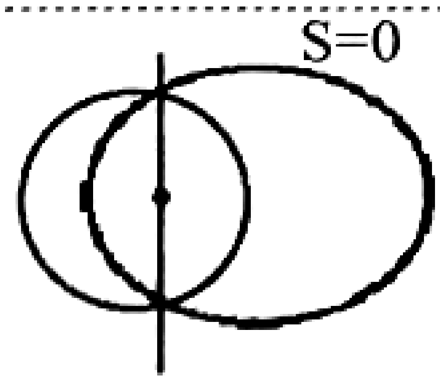


$\frac{a}{b}=\frac{-4}{3}$

$3a=-4b$

$3a+4b=0$

54



Req. circle $s+\lambda l=0$

$\left(x^2+y^2-a^2\right)+\lambda\left(x\cos\alpha+y\sin\alpha-p\right)=0 \quad \rightarrow(1)$

$x^2+y^2+(\lambda\cos\alpha)x+\lambda\sin\alpha y-\lambda p-a^2=0$

Centre $\left(\frac{-\lambda\cos\alpha}{2},\frac{-\lambda\sin\alpha}{2}\right)$

$\frac{-\lambda\cos\alpha}{2}.\cos\alpha-\frac{\lambda\sin\alpha}{2}.\sin a=P$

$\Rightarrow -\frac{\lambda}{2}(1)=P\Rightarrow$

$\Rightarrow \lambda=-2p$

$(1)\Rightarrow x^2+y^2-a^2-2$

$P\left(x\cos\alpha+y\sin\alpha-P\right)=0$

55 Given

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

$c+c'=2gy'+2ff'$

C–4=0

C = 4

$c+c''=2gg''+2ff''$

$g=-\frac{1}{2}, f=-1\frac{1}{2}$

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

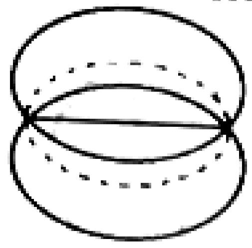
$r=\sqrt{\frac{1}{4}+\frac{1}{4}-4}=\sqrt{\frac{1}{2}-4}$

But $\gamma\angle O$

It does n't exist a circle

Ans : O

56.



Let $s-s'=0$

$\Rightarrow 4x+4y+5=0 \rightarrow (1)$

Req. circle $s+\lambda s'=0$

$\Rightarrow x^2+y^2+4y+\lambda\left(x^2+y^2-4x-5\right)=0$

$\Rightarrow (1+\lambda)x^2+(1+\lambda)y^2+(-4\lambda)x+4y-5\lambda=0$

Centre $\left(\dfrac{2\lambda}{1+\lambda},\dfrac{-2}{1+\lambda}\right)$

Lies on (1)

$\dfrac{8\lambda}{1+\lambda}-\dfrac{-2}{1+\lambda}+5=0$

$\dfrac{2\left(\dfrac{3}{13}\right)}{1+\dfrac{3}{13}}=\dfrac{6}{16} \Rightarrow 8\lambda-8=-5-5\lambda$

$=\dfrac{3}{8} \Rightarrow 13\lambda=3$

$\lambda=\dfrac{3}{13}$

57. Let $s-s'=0$

$\Rightarrow \alpha x+(\alpha-6)y+6=0$

$\left(0,\dfrac{3}{4}\right)$ lines on this

$\Rightarrow 0+(\alpha-6)\left(\dfrac{3}{4}\right)+6=0$

$\Rightarrow 0+(\alpha-6)3+24=0$

$\Rightarrow (\alpha-6)3+24=0 \Rightarrow \alpha=-2$

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

$C=(2,1), \mathrm{P}=\left(0,\dfrac{3}{4}\right)$

$CP=\sqrt{2^2+\left(1+\dfrac{3}{4}\right)^2}$

$=\sqrt{4+\dfrac{1}{16}}=\dfrac{\sqrt{5}}{4}$

58. Given $S \equiv x^2+y^2+2yx+2fy+c=0$

$S' \equiv x^2+y^2+6x-4y+4=0$

$s-s'=0$

$(2g+6)x+(2f+4)y+c-4=0$

$x+y=0 \rightarrow c=4$

r=1

$g^2+f^2-c=1$

$g^2+f^2-4=1$

$g^2+f^2-5=0$

$2g+6=2f+4$

g = f – 1

from $eq^n(1)$

$(f-1)^2+f^2=5$

$f=-1,2$

$g=-2,1$

$g+f=\pm 3$

59. $2\left[g(2)+f(-2)\right]=c+3$

$2\left[g(2)+f(2)\right]=c+3$

$f=0, g=0$

$r=\sqrt{g^2+f^2-c}=\sqrt{3}$

60. Given $s=x^2+y^2+2gx+2fy+c=0$

$s'=x^2+y^2-6x-12y+1=0$

$2(gg'+ff')=c+c'$

$2\left(g(-3)+f(-6)\right)=c+1$

$-6y-12f=c+1 \rightarrow (1)$

Centre $(-4,2)=(-g,-f)$

$g=4, f=-2$

$-24+24=c+1$

$c+1=0$

$c=-1$

$\gamma=\sqrt{g^2+f^2-c}=\sqrt{16+4+1}$

$=\sqrt{21}$

61 $r_1=\sqrt{4+16-4}=4, C(2,4)$

$$d=\frac{|2+4-3|}{\sqrt{1+1}}=\frac{3}{\sqrt{2}}$$

$$\Rightarrow 2\sqrt{r^2-d^2}=2\sqrt{16-\frac{9}{2}}$$

$$\Rightarrow \sqrt{2}\sqrt{23}$$

$$=\sqrt{46}$$

62. Given

$s=x^2+y^2+2gx+2fy+c=0$

Center(h, k)

$x^2+y^2-2hx-2ky+c=0$

$P(0,0)$

$s=x^2+y^2-2hx-2ky=0$

$s'=x^2+y^2+4x+6y+12=0$

$s''=x^2+y^2+4x-6y+9=0$

Orthogonally

$2[gg'+ff']=c+c'$

$$K=\frac{-1}{4}, h=-\frac{21}{8}$$

$$K=2h=\frac{-1}{4}+\frac{21}{4}=\frac{20}{4}=5$$

63. Given

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

$s'=x^2+y^2+6x+2fy+12=0$

$s''=x^2+y^2+10y+20=0$

$s'-s'=0$

$(g-3)x-2g+fy-4=0$

Point $(-1,-1)$

$-3g+f-1=0$

$s'-s''=0$

$3x+(f-5)y-4=0$

point $(-1,-1)$

$f=-2, g=-2$

Then g–f= –1+2=1

64. $S=x^2+y^2+2gx+2fy+c=0$

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

$S''=x^2+y^2+4x-6y+9=0$

$S=0$ & $S'=0$ cuts orthogonally

$\Rightarrow 2g(-1)+2f(1)=c-2$

$\Rightarrow -2g+2f=c-2\rightarrow 1$

$S=0$ & $S''=0$ cuts orthogonally

$\Rightarrow 2g(2)+2f(-3)=c+9$

$\Rightarrow 4g-6f=c+9\rightarrow 2$

$(-g,-f)$ lies on 2x+3y-2=0

$2g+3f+2=0\rightarrow 3$

from 1 and 2 $\Rightarrow$ $6g-8f=11\rightarrow 4$

from 3 and 4 $\Rightarrow$ $4\rightarrow \cancel{6g}-8f=11$

$3\times 3\rightarrow \cancel{6g}+9f=-6$

$-17f=17$

$\boxed{f=-1}$ $\boxed{g=\frac{1}{2}}$

$\boxed{c=1}$

$\boxed{\therefore 2g+f=1-1=0=c-f}$

65 $A(1,2)\ r_1=3\ B(-1,-1)\ r_2=r,\ \theta=\frac{\pi}{3}$

$d=AB=\sqrt{4+9}=\sqrt{13}$

$$\cos\theta=\frac{d^2-r_1^2-r_2^2}{2r_1r_2}\Rightarrow \cos\frac{\pi}{3}=\frac{13-9-r^2}{2(3)r}$$

$$\Rightarrow \pm\frac{1}{\cancel{2}}=\frac{4-r^2}{\cancel{2}(3)r}$$

$\Rightarrow \pm 3r=4-r^2$

$r^2+3r-4=0\ (or)\ r^2-3r-4=0$

$r=1\ or\ -4\qquad r=4\ or\ -1$

No.of possible values (r) = 2

66 $s = x^2 + y^2 - 6x + 2ky + 1 = 0$

$s^1 = x^2 + y^2 + 2kx - 6y - 7 = 0$

$c(3, -k)$

$r = \sqrt{k^2 + 8}$

$c^1(-k, 3)$

$r^1 = \sqrt{k^2 + 16}$

$cc^1 = \sqrt{(k+3)^2 + (k+3)^2} = \sqrt{2}(k+3)$

$d^2 = r^2 + r_1^2$

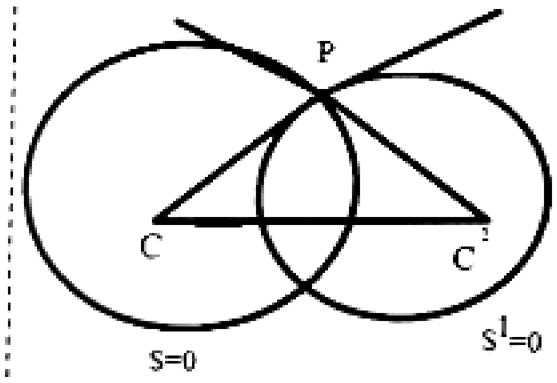
$2(k+3)^2 = 2k^2 + 24$

$k = \frac{1}{2}$

$c^1 = \left(\frac{-1}{2}, 3\right)$

$r^1 = \sqrt{\frac{1}{4} + 9 + 7}$

$= \frac{\sqrt{65}}{2}$



67. $C_1 = (-1, 2)$, $C_2 = (2, 1)$

$r_1 = \sqrt{1+4-1}$, $r_2 = \sqrt{4+1-C}$

$r_1 = 2$, $r_2 = \sqrt{5-C}$

$C_1C_2 = \sqrt{9+1}$

$d = \sqrt{10}$

$\text{Cos}\,45^o = \frac{10-4-5+C}{2(2)\sqrt{5-C}}$

$8(5-C) = 1 + C^2 + 2C$

$C^2 + 10C - 39 = 0$

$(C-3)(C+13) = 0$

$C = 3\ (or)\ C = -13$

not satisfied

68 $2\left[(-2)(g) + f(-2)\right] = 0$

$g = -f \rightarrow$ 1

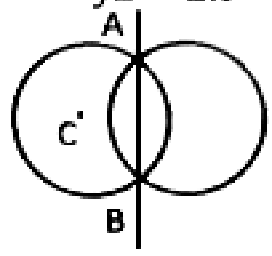
$r_1^2 + r_2^2 - 8 = 4 + f^2 - 1 + g^2 + 5 - 8$

$= f^2 + g^2$

$= 2g^2$ from 1

69 x2 + y2 – 4x + 6y – 3 = 0 → (1)

x2 + y2 + 2x – 2y – 2 = 0 → (2)



(1) – (2) → - 6x + 8y – 1 = 0

6x – 8y + 1 = 0

$G = (2, -3),\ r = \sqrt{4+9+3} = \sqrt{16} = 4$

Length of chord as $AB = 2\sqrt{r^2 - d^2}$

$d = \left|\frac{6(2) - 8(-3) + 1}{10}\right| = \frac{37}{10}$

$\text{length of chord} = \frac{2}{10}\sqrt{231}$

70 x+y+2=0

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

$\left(\frac{-(4+\lambda)}{2}, \frac{-(-4+\lambda)}{2}\right)$

$\lambda = 1$

71 Given circles are

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

$s^1 \equiv x^2 + y^2 + 4x + 3y + 2 = 0 - -(2)$

The common chord of (1) and (2) is

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

Required circle is $s + \lambda L = 0$

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

Centre $\left(-(\lambda + 1), \frac{-3}{2}\right)$ lies on the (3)

$\therefore \lambda = \frac{-1}{2}$

$\therefore$ Required circles is $2x^2 + 2y^2 + 2x + 6y + 1 = 0$

72 Given circles are

$x^2+y^2-5x+6y+12=0---(1)$

$x^2+y^2+6x-4y-14=0---(2)$

Radical axis of (1) and (2) is

$11x-10y+24=0$

Equation of any line perpendicular to the radical axis is

$10x+11y+k=0$

This line posing through (1,1)

$10+11+k=0$

$k=-21$

Required line is $10x+11y-21=0$

73 Given circles are

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

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

Here g = -1 f = - 2 C = c

$g^1=-2, f^1=-1, c^1=4$

$\theta=60^0$

$$\cos\theta=\frac{c+c^1-2gg^1-2ff^1}{2\sqrt{g^2+f^2-c}\sqrt{g^{1^2}+f^{1^2}-c^1}}$$

$$\therefore C=\frac{7\pm\sqrt{5}}{2}$$

74

$$\cos\pi/3=\frac{1+k-2(-1)(1)-2(1)(-1)}{2\sqrt{1+\cancel{1}-\cancel{1}}\quad\sqrt{1+1-k}}$$

$$\frac{1}{\cancel{2}}=\frac{1+k+2+2}{\cancel{2}\sqrt{2-k}}=\frac{k+5}{\sqrt{2-k}}=1$$

$k+5=\sqrt{2-k}$

$k^2+25+10k=2-k$

$k^2+10k+k+23=0$

$k^2+11k+23=0$

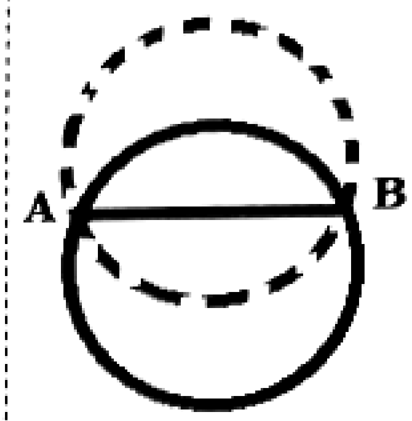
$$k=\frac{-11+\sqrt{121-92}}{2}$$

$$k=\frac{-11\pm\sqrt{29}}{2}$$ (irrational number)

75. $S+\lambda L=0$

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

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



$c\left(-\frac{(2+\lambda)}{2},\frac{\lambda-2}{2}\right)$ *lies on* $x-y+1=0$

$$\frac{-2-\lambda}{2}+\frac{2-\lambda}{2}+1=0\Rightarrow-2-\lambda+2-\lambda+2=0$$

$-2\lambda+2=0$

$2\lambda=2$

$\lambda=1$

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

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

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

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

$g=\frac{3}{2}, f=1/2, c=2$

$g+f=\frac{3}{2}+\frac{1}{2}=2$

$=c$

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

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

$r_1=\sqrt{4+9-k}\quad=\sqrt{13-k}$

$r_2=\sqrt{16+4-11}\quad=\sqrt{9}\ =3$

$d=\sqrt{36+1}\quad=\sqrt{37}$

$\theta=\pi/2$

$d^2=r_1^2+r_2^2$

$37=13-k+9$

$k=-15$

77

$$x^2+y^2-1=0 \to 1$$

$$x^2+y^2-2x-3=0 \to 2$$

$$x^2+y^2-2y-3=0 \to 3$$

$r_1 = 1$

$r_2 = \sqrt{1+3} = 2$

$r_3 = \sqrt{1+3} = 2$

$1-2 \Rightarrow 2x+2=0$

$x=-1$

$3-1 \Rightarrow y+1=0$

$y=-1$

Radical centre $= (-1,-1), (\alpha, \beta)$

$r = r_1+r_2+r_3 = 1+2+2 = 5$

Required circle eqn is

$$(x+1)^2+(y+1)^2 = 5^2$$

78. x2 +y2+2gx+2fy+4=0 _______(1) g , f. 4

x2+y2–4x–4y–4=0 ________(2) –2 –2,–4

1 &2 are orthogonal

2(g)(–2) +2f(–2) =0

g + f = 0

x2 + y2 +4x+4y+4 = 0 ______(3) 2 . 2 ,4

angle b/w (1)&(3) is 600

$$\frac{1}{2} = \frac{8-2(2g+2f)}{2\sqrt{g^2+f^2-4}\sqrt{4+4-4}}$$

g2 +f2 – 4 =16

radius of the circle S = 0

$$\sqrt{g^2+f^2-c} = \sqrt{16} = 4$$

79. R. A of (1) &(2) x= 0

R.A of (2)&(3) y= 0 $\therefore$ c(0, 0)

radius r = length of tangent from (0,0) to circle (1)

$= \sqrt{7}$

x2 + y2 = 7

Eqof tangent at $(\sqrt{3},2)$ to x2 + y2 –7 = 0 is

S1 = 0

xx1 +yy1 – 7=0

$$\sqrt{3}x+2y-7=0$$