SYSTEM OF CIRCLES

PREVIOUS EAMCET BITS

1. The point (3, –4) lies on both the circle $x^2+y^2-2x+8y+13=0$ and $x^2+y^2-4x+6y+11=0$. Then the angle between the circles is **[EAMCET 2009]**

   1) 60° 2) $\tan^{-1}\left(\frac{1}{2}\right)$ 3) $\tan^{-1}\left(\frac{3}{5}\right)$ 4) 135°

   Ans: 4

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

$r_1=2, r_2=\sqrt{2}, d=\sqrt{2}$

$\Rightarrow \theta=135°$

2. The equation of the circle which passes through the origin and cuts orthogonally each of the circle $x^2+y^2-6x+8=0$ and $x^2+y^2-2x-2y=7$ is **[EAMCET 2009]**

   1) $3x^2+3y^2-8x-13y=0$ 2) $3x^2+3y^2-8x-29y=0$

   3) $3x^2+3y^2+8x+29y=0$ 4) $3x^2+3y^2-8x-29y=0$

   Ans: 2

Sol. Find the radical axis and centre of required circle lies on radical axis.

3. The condition for the coaxial system $x^2+y^2+2\lambda x+c=0$, where λ is a parameter and c is a constant, to have distinct limiting points is **[EAMCET 2007]**

   1) c = 0 2) c < 0 3) c = – 1 4) c > 0

   Ans: 4

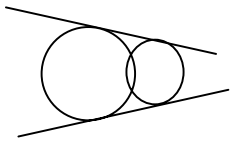
Sol. Limiting points are $(\pm\sqrt{c},0)\Rightarrow c>0$

4. The number of common tangent to the two circles $x^2+y^2-8x+2y=0$ and $x^2+y^2-2x-16y+25=0$ is **[EAMCET 2006]**

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

   Ans: 2

Sol. $r_1=\sqrt{17}, r_2=\sqrt{40}$



$c_1c_2=\sqrt{90}$

$|r_1-r_2|<c_1c_2<r_1+r_2$

Two circle intersect each other

$\therefore$ Number of common tangents = 2

5. The equation of the circle whose diameter is the common chord of the circles **[EAMCET 2005]** $x^2+y^2+2x+3y+2=0$ and $x^2+y^2+2x-3y-4=0$ is

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

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

Ans: 3

Sol. $L=S-S'\equiv y+1=0$

Equation of circle is $S+\lambda L=0$

Whose centre lies on the line $L\equiv O$

$\therefore -\frac{(3-\lambda)}{2}+1=0\Rightarrow\lambda=-1$

$\therefore$ Equation of circle is $x^2+y^2+2x+2y+1=0$

6. A line ℓ meets the circle $x^2+y^2=61$ in A, B and P(–5, 6) is such that PA =PB = 10. Then the equation of ℓ is **[EAMCET 2004]**

1) $5x+6y+11=0$ 2) $5x-6y-11=0$ 3) $5x-6y+11=0$ 4) $5x-6y+12=0$

Ans: 3

Sol. $S=x^2+y^2-61=0$

$S'=(x+5)^2+(y-6)^2=100$

$L=S-S'=0$

7. If the circle $x^2+y^2+6x-2y+k=0$ bisects the circumference of the $x^2+y^2+2x-6y-15=0$ then k = …… **[EAMCET 2003]**

1) 21 2) – 21 3) 23 4) –23

Ans: 4

Sol. $S=x^2+y^2+6x-2y+k=0$

$S'=x^2+y^2+2x-6y+15=0$

common chord of S = 0 $S'=0$ is $S-S'=0$

$\Rightarrow 4x+4y+k-15=0\rightarrow(1)$

Centre of S' = 0 is (–1, 3) lies on (1)

k = –23

8. The limiting points of the coaxal system containing the two circles $x^2+y^2+2x-2y+2=0$ and $25(x^2+y^2)-10x-80y+65=0$ are **[EAMCET 2001]**

1) (1, 1) (–5, –40) 2) $(1,-1)\left[\frac{-1}{5},\frac{-8}{5}\right]$ 3) $(-1,1)\left[\frac{1}{5},\frac{8}{5}\right]$ 4) $(-1,1)\left[\frac{-1}{5},\frac{-8}{5}\right]$

Ans: 3

Sol. The radius of the circle $x^2+y^2+2x-2y+2=0$ is zero

Its centre is one limiting point i.e. (–1, 1)

Radical axis is 4x + 2y – 1 = 0

The other limiting point is image of (–1, 1) w.r.t the radical axis

$\therefore$ The other limiting point is $\left(\frac{1}{5},\frac{8}{5}\right)$.

9. The radical axis of the circles $x^2+y^2+3x+4y-5=0$ and $x^2+y^2-5x+5y-6=0$ is **[EAMCET 2001]**

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

Ans: 2

Sol. *R.A is* $S-S'=0\Rightarrow 8x-y+1=0$

10. Two circles of equal radius 'r' cut orthogonally. If their centres are (2, 3) and (5, 6), then r = **[EAMCET 2000]**

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

Ans: 3

Sol. $d^2=r_1^2+r_2^2 \quad \Rightarrow 9+9=r^2+r^2\Rightarrow r=3$

11. If (1, 2) is a limiting point of a coaxal system of circles containing the circle $x^2+y^2+x-5y+9=0$, then the equation of radical axis is **[EAMCET 2009]**

1) $x+3y+9=0$ 2) $3x-y+4=0$ 3) $x+9y-4=0$ 4) $3x-y-1=0$

Ans: 2

Sol. The equation of the limiting point circle is $S=(x-1)^2+(y-2)^2=0$

Equation of the given circle is $S'=x^2+y^2+x-5y+9=0$

$\therefore$ equation of the radical axis is $S-S'=0\Rightarrow 3x-y+4=0$