

6. If θ is the angle between the tangents from $(-1, 0)$ to the circle $x^2 + y^2 - 5x + 4y - 2 = 0$, then $\theta =$ **[EAMCET 2008]**

1) $2 \tan^{-1}\left(\frac{7}{4}\right)$ 2) $\tan^{-1}\left(\frac{7}{4}\right)$ 3) $2 \cot^{-1}\left(\frac{7}{4}\right)$ 4) $\cot^{-1}\left(\frac{7}{4}\right)$

Ans: 1

Sol. Radius $r = \sqrt{\frac{25}{4} + 4 + 2} = \frac{7}{2}$ $S_{11} = 1 + 0 + 5 + 0 - 2 = 4$

$$\tan \frac{\theta}{2} = \frac{r}{\sqrt{S_{11}}} = \frac{7}{2\sqrt{4}} = \frac{7}{4} \Rightarrow \frac{\theta}{2} = \tan^{-1} \frac{7}{4} \Rightarrow \theta = 2 \tan^{-1} \frac{7}{4}$$

7. The equation of the circle of radius 3 that lies in the fourth quadrant and touching the lines $x = 0$ and $y = 0$ is **[EAMCET 2007]**

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

Ans: 1

Sol. Centre = $(3, -3)$ radius = 3

Equation of the circle is $x^2 + y^2 - 6x + 6y + 9 = 0$

8. The inverse point of $(1, 2)$ with respect to the circle $x^2 + y^2 - 4x - 6y + 9 = 0$ is **[EAMCET 2007]**

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

Ans: 3

Sol. Polar of $(1, 2)$ w.r. to given circle is $S_1 = 0 \Rightarrow x + y - 1 = 0 \dots\dots(1)$

Foot of the perpendicular from $(1, 2)$ to (1) is $(0, 1)$

\therefore Inverse point is $(0, 1)$

9. Observe the following statements :

[EAMCET 2006]

I) The circle $x^2 + y^2 - 6x - 4y - 7 = 0$ touches y-axis

II) The circle $x^2 + y^2 + 6x + 4y - 7 = 0$ touches x-axis.

Which of the following is a correct statement?

1) Both I and II are true 2) Neither I nor II is true
3) I is true, II is false 4) I is false, II is true

Ans: 2

Sol. For circle (1) $f^2 - c = 4 + 7 = 11 > 0$; For circle (2) $g^2 - c = 4 + 7 = 11 > 0$

Both circles intersect X and Y axis

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

[EAMCET 2006]

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

Ans: 3

Sol. Length of tangent = $\sqrt{S_{11}}$

$$= \sqrt{1 + 9 - 2 + 12 - 11} = 3$$

11. 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 **[EAMCET 2005]**

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

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

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

Ans: 1

Sol. $S + \lambda L = 0$

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

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

$$\therefore \lambda = \frac{3}{2}, \text{ Required equation of circle is } 2(x^2 + y^2) + 3x - y + 1 = 0$$

12. 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 : **[EAMCET 2005]**

1) $3y = x$

2) $y = -3x$

3) $y = 2x$

4) $y = -2x$

Ans: 1

Sol. By verification $r = d$ is true for $3y = x$.13. If P_1, P_2, P_3 are the perimeters of the three circles $x^2 + y^2 + 8x - 6y = 0$.

$$4x^2 + 4y^2 - 4x - 12y - 186 = 0 \text{ and } x^2 + y^2 - 6x + 6y - 9 = 0 \text{ respectively. Then [EAMCET 2004]}$$

1) $P_1 < P_2 < P_3$

2) $P_1 < P_3 < P_2$

3) $P_3 < P_2 < P_1$

4) $P_2 < P_3 < P_1$

Ans: 2

Sol. Perimeter of the circle $= 2\pi r$

$$r_1 = 5, r_2 = 7, r_3 = 3\sqrt{3} \Rightarrow P_1 < P_3 < P_2$$

14. If the line $3x - 2y + 6 = 0$ meets X-axis and Y-axis respectively at A and B, then the equation of the circle with radius AB and centre at A is **[EAMCET 2004]**

1) $x^2 + y^2 + 4x + 9 = 0$

2) $x^2 + y^2 + 4x - 9 = 0$

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

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

Ans: 2

Sol. $A(-2, 0), B = (0, 3)$

$$AB = \sqrt{3}$$

$$\therefore \text{Equation of the circle is } (x + 2)^2 + y^2 = 13$$

15. If $(1, a), (b, 2)$ are conjugate points with respect to the circle $x^2 + y^2 = 25$, then $4a + 2b =$ **[EAMCET 2004]**

1) 25

2) 50

3) 100

4) 150

Ans: 2

Sol. $S_{12} = 0 \Rightarrow b + 2a = 25$

$$\Rightarrow 4a + 2b = 50$$

16. 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 **[EAMCET 2003]**

1) $(7, -8)$

2) $(-7, 8)$

3) $(7, 8)$

4) $(-7, -8)$

Ans: 2

Sol. $S_{11} : S'_{11} = 2 : 3 = 3S = 2S'$

$$\Rightarrow x^2 + y^2 + 14x - 16y + 28 = 0$$

\therefore Centre = $(-7, 8)$

17. If $5x - 2y + 10 = 0$ and $12y - 5x + 16 = 0$ are two tangents to a circle, then the radius of the circle is **[EAMCET 2003]**

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

Ans: 1

- Sol. Radius = $1/2$ (distance between the given lines)

$$= \frac{1}{2} \left(\frac{10+16}{13} \right) = 1$$

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

[EAMCET 2002]

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

3) $(x+4)^2 + (y+4)^2 = 25$ 4) $(x+6)^2 + (y+6)^2 = 25$

Ans: 2

- Sol. Centre $(-a, -a)$ radius = $a = 5$

$$\therefore (x+5)^2 + (y+5)^2 = 25$$

19. The radius of the larger circle lying in the first quadrant and touching the lines $4x + 3y - 12 = 0$ and the coordinate axes is **[EAMCET 2002]**

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

Ans: 2

- Sol. Centre (a, a) , radius = a

For distance from centre $(a, 0)$; To line $4x + 3y - 12 = 0$

$$\left| \frac{4a + 3a - 12}{5} \right| = a \Rightarrow a = 1 \text{ to } 6$$

\therefore Large radius = 6

20. The four distinct points $(0, 0)$, $(2, 0)$, $(0, -2)$ and $(k, -2)$ are concyclic if $k =$ **[EAMCET 2002]**

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

Ans: 1

- Sol. Equation of circle $(0, 0)$, $(a, 0)$, $(0, b)$ is $x^2 + y^2 - 2x + 2y = 0$

Substituting $(k, -2)$ in equation $\Rightarrow k = 2$

21. A line is at a constant distance C from the origin and meets the coordinate axes in A and B . The locus of the centre of the circle passing through O, A, B is **[EAMCET 2002]**

1) $x^{-2} + y^{-2} = c^{-2}$ 2) $x^{-2} + y^{-2} = 2c^{-2}$ 3) $x^{-2} + y^{-2} = 3c^{-2}$ 4) $x^{-2} + y^{-2} = 4c^{-2}$

Ans: 4

- Sol. Let the line be $x \cos \alpha + y \sin \alpha = c$ $\therefore A \left(\frac{c}{\cos \alpha}, 0 \right); B \left(0, \frac{c}{\sin \alpha} \right)$

Midpoint of AB is centre of circle passing through O, A, B i.e $\left(\frac{c}{2 \cos \alpha}, \frac{c}{2 \sin \alpha} \right)$

\therefore Locus of the centre is $x^{-2} + y^{-2} = 4c^{-2}$

22. The equation of the normal to the circle $x^2 + y^2 + 6x + 4y - 3 = 0$ at $(1, -2)$ is **[EAMCET 2001]**

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

Ans: 2

- Sol. Centre of the circle = $(-3, -2)$;

Normal passes through centre

\therefore The normal at $(1, -2)$ is $y + 2 = 0$

23. If the polar of a point on the circle $x^2 + y^2 = p^2$ with respect to the circle $x^2 + y^2 = q^2$ touches the circle $x^2 + y^2 = r^2$, then p, q, r are inprogression **[EAMCET 2001]**

1) Arithmetic 2) Geometric 3) Harmonic 4) Arithmetico Geometric

Ans: 2

Sol. Let (x_1, y_1) is a point on $x^2 + y^2 = p^2 \Rightarrow x_1^2 + y_1^2 = P^2$

The Polar of (x_1, y_1) w.r.t $x^2 + y^2 = q^2$ is $xx_1 + yy_1 = q^2$(1)

(1) touches $x^2 + y^2 = r^2$

$$\Rightarrow \frac{q^2}{\sqrt{x_1^2 + y_1^2}} = r \Rightarrow q^2 = pr$$

24. The centre of the circle touching the y-axis at $(0, 3)$ and making an intercept of 2 units on the positive x-axis is **[EAMCET 2000]**

1) $(10, \sqrt{3})$ 2) $(\sqrt{3}, 10)$ 3) $(\sqrt{10}, 3)$ 4) $(3, \sqrt{10})$

Ans: 3

Sol. The circle touches y-axis at $(0, 3)$

$\therefore f = -3; c = 9$

The length of intercept made by the circle on x-axis = $2\sqrt{g^2 - c} = 2 \Rightarrow g = \pm\sqrt{10}$

\therefore centre = $(\sqrt{10}, 3)$

(\because lies in the first Quadrant)

25. The slope m of a tangent through the point $(7, 1)$ to the circle $x^2 + y^2 = 25$ satisfies the equation **[EAMCET 2000]**

1) $12m^2 + 7m - 12 = 0$ 2) $16m^2 - 24m + 9 = 0$
3) $12m^2 - 7m - 12 = 0$ 4) $9m^2 + 24m + 16 = 0$

Ans: 3

Sol. The equation of the tangents is $(y - 1) = m(x - 7)$

$\Rightarrow mx - y + (1 - 7m) = 0$(1)

(1) touches the circles $x^2 + y^2 = 25$

$$\left| \frac{1 - 7m}{\sqrt{m^2 + 1}} \right| = 5 \Rightarrow 12m^2 - 7m - 12 = 0$$

26. The number of common tangent that can be drawn to the circles $x^2 + y^2 = 1$ and

$x^2 + y^2 - 2x - 6y + 6 = 0$ is **[EAMCET 2000]**

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

Ans: 4

Sol. $C_1(0,0)C_2(1,3), r_1 = 1; r_2 = 2$

$$\overline{C_1C_2} = \sqrt{10} > r_1 + r_2$$

