

**CIRCLE SYSTEM ASSIGNMENT**

1.  $y = mx$  is a chord of a circle of radius  $a$  and the diameter of the circle lies along  $x$ -axis and one end of this chord is origin. The equation of the circle described on this chord as diameter is
- (a)  $(1 + m^2)(x^2 + y^2) - 2ax = 0$  (b)  $(1 + m^2)(x^2 + y^2) - 2a(x + my) = 0$   
 (c)  $(1 + m^2)(x^2 + y^2) + 2a(x + my) = 0$  (d)  $(1 + m^2)(x^2 + y^2) - 2a(x - my) = 0$
2. If  $y = 2x$  is a chord of the circle  $x^2 + y^2 - 10x = 0$ , then the equation of the circle of which this chord is a diameter, 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)  $x^2 + y^2 - 2x - 4y = 0$
3. The circle on the chord  $x \cos \alpha + y \sin \alpha = p$  of the circle  $x^2 + y^2 = a^2$  as diameter has the equation
- (a)  $x^2 + y^2 - a^2 - 2p(x \cos \alpha + y \sin \alpha - p) = 0$  (b)  $x^2 + y^2 + a^2 + 2p(x \cos \alpha - y \sin \alpha + p) = 0$   
 (c)  $x^2 + y^2 - a^2 + 2p(x \cos \alpha + y \sin \alpha + p) = 0$  (d)  $x^2 + y^2 - a^2 - 2p(x \cos \alpha - y \sin \alpha - p) = 0$
4. The equation of circle which touches the axes of coordinates and the line  $\frac{x}{3} + \frac{y}{4} = 1$  and whose centre lies in the first quadrant is  $x^2 + y^2 - 2cx - 2cy + c^2 = 0$ , where  $c$  is
- (a) 1 (b) 2 (c) 3 (d) 6
5. The equation of a circle which touches both axes and the line  $3x - 4y + 8 = 0$  and lies in the third quadrant is
- (a)  $x^2 + y^2 - 4x + 4y - 4 = 0$  (b)  $x^2 + y^2 - 4x + 4y + 4 = 0$   
 (c)  $x^2 + y^2 + 4x + 4y + 4 = 0$  (d)  $x^2 + y^2 - 4x - 4y - 4 = 0$
6. Equation of the circle which touches the lines  $x = 0$ ,  $y = 0$  and  $3x + 4y = 4$  is
- (a)  $x^2 - 4x + y^2 + 4y + 4 = 0$  (b)  $x^2 - 4x + y^2 - 4y + 4 = 0$   
 (c)  $x^2 + 4x + y^2 + 4y + 4 = 0$  (d)  $x^2 + 4x + y^2 - 4y + 4 = 0$
7. The equation of the circumcircle of the triangle formed by the lines  $y + \sqrt{3}x = 6$ ,  $y - \sqrt{3}x = 6$  and  $y = 0$ , is
- (a)  $x^2 + y^2 - 4y = 0$  (b)  $x^2 + y^2 + 4x = 0$  (c)  $x^2 + y^2 - 4y = 12$  (d)  $x^2 + y^2 + 4x = 12$
8. A variable circle passes through the fixed point  $A(p, q)$  and touches  $x$ -axis. The locus of the other end of the diameter through  $A$  is
- (a)  $(y - q)^2 = 4px$  (b)  $(x - q)^2 = 4py$  (c)  $(y - p)^2 = 4qx$  (d)  $(x - p)^2 = 4qy$
9. If a circle passes through the points of intersection of the coordinate axes with the lines  $\lambda x - y + 1 = 0$  and  $x - 2y + 3 = 0$ , then the value of  $\lambda$  is
- (a) 1 (b) 2 (c) 3 (d) 4
10. Equation to the circles which touch the lines  $3x - 4y + 1 = 0$ ,  $4x + 3y - 7 = 0$  and pass through  $(2, 3)$  are
- (a)  $(x - 2)^2 + (y - 8)^2 = 25$  (b)  $5x^2 + 5y^2 - 12x - 24y + 31 = 0$   
 (c) Both (a) and (b) (d) None of these
11. The equation of the circle which passes through  $(1, 0)$  and  $(0, 1)$  and has its radius as small as possible, is
- (a)  $x^2 + y^2 - 2x - 2y + 1 = 0$  (b)  $x^2 + y^2 - x - y = 0$   
 (c)  $2x^2 + 2y^2 - 3x - 3y + 1 = 0$  (d)  $x^2 + y^2 - 3x - 3y + 2 = 0$
12. The centres of a set of circles, each of radius 3, lie on the circle  $x^2 + y^2 = 25$ . The locus of any point in the set is
- (a)  $4 \leq x^2 + y^2 \leq 64$  (b)  $x^2 + y^2 \leq 25$  (c)  $x^2 + y^2 \geq 25$  (d)  $3 \leq x^2 + y^2 \leq 9$
13. The equation of the circle which touches both the axes and the straight line  $4x + 3y = 6$  in the first quadrant and lies below it is
- (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)  $4(x^2 + y^2 - x - 6y) + 1 = 0$
14. If  $2x - 4y = 9$  and  $6x - 12y + 7 = 0$  are the tangents of same circle, then its radius will be
- (a)  $\frac{\sqrt{3}}{5}$  (b)  $\frac{17}{6\sqrt{5}}$  (c)  $\frac{2\sqrt{5}}{3}$  (d)  $\frac{17}{3\sqrt{5}}$
15. If  $5x - 12y + 10 = 0$  and  $12y - 5x + 16 = 0$  are two tangents to a circle, then the radius of the circle is
- (a) 1 (b) 2 (c) 4 (d) 6

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16. If  $2x^2 + \lambda xy + 2y^2 + (\lambda - 4)x + 6y - 5 = 0$  is the equation of a circle then its radius is  
 (a)  $3\sqrt{2}$  (b)  $2\sqrt{3}$  (c)  $2\sqrt{2}$  (d) None of these
17.  $C_1$  is a circle of radius 1 touching the  $x$ -axis and the  $y$ -axis.  $C_2$  is another circle of radius  $>1$  and touching the axes as well as the circle  $C_1$ . Then the radius of  $C_2$  is  
 (a)  $3 - 2\sqrt{2}$  (b)  $3 + 2\sqrt{2}$  (c)  $3 + 2\sqrt{3}$  (d) None of these
18. If  $p$  and  $q$  be the longest distance and the shortest distance respectively of the point  $(-7, 2)$  from any point  $(\alpha, \beta)$  on the curve whose equation is  $x^2 + y^2 - 10x - 14y - 51 = 0$  then  $GM$  of  $p$  and  $q$  is equal to  
 (a)  $2\sqrt{11}$  (b)  $5\sqrt{5}$  (c) 13 (d) None of these
19. The equation of a circle is  $x^2 + y^2 = 4$ . The centre of the smallest circle touching this circle and the line  $x + y = 5\sqrt{2}$  has the coordinates  
 (a)  $\left(\frac{7}{2\sqrt{2}}, \frac{7}{2\sqrt{2}}\right)$  (b)  $\left(\frac{3}{2}, \frac{3}{2}\right)$  (c)  $\left(-\frac{7}{2\sqrt{2}}, -\frac{7}{2\sqrt{2}}\right)$  (d) None of these
20. A circle touches the line  $2x - y - 1 = 0$  at the point  $(3, 5)$ . If its centre lies on the line  $x + y = 5$  then the centre of that circle is  
 (a)  $(3, 2)$  (b)  $(-3, 8)$  (c)  $(4, 1)$  (d)  $(8, -3)$
21. The locus of the centre of the circle  $(x \cos \theta + y \sin \theta - a)^2 + (x \sin \theta - y \cos \theta + a)^2 = a^2$  is  
 (a)  $x^2 + y^2 = a^2$  (b)  $x^2 + y^2 = 2a^2$  (c)  $x^2 + y^2 = 4a^2$  (d)  $x^2 + y^2 - 2ax - 2ay + a^2 = 0$
22. If a circle  $S(x, y) = 0$  touches at the point  $(2, 3)$  of the line  $x + y = 5$  and  $S(1, 2) = 0$ , then radius of such circle  
 (a) 2 units (b) 4 units (c)  $\frac{1}{2}$  units (d)  $\frac{1}{\sqrt{2}}$  units
23. A region in the  $x$ - $y$  plane is bounded by the curve  $y = \sqrt{25 - x^2}$  and the line  $y = 0$ . If the point  $(a, a + 1)$  lies in the interior of the region, then  
 (a)  $a \in (-4, 3)$  (b)  $a \in (-\infty, -1) \cup (3, +\infty)$  (c)  $a \in (-1, 3)$  (d) None of these
24. If  $(2, 4)$  is a point interior to the circle  $x^2 + y^2 - 6x - 10y + \lambda = 0$  and the circle does not cut the axes at any point, then  $\lambda$  belongs to the interval  
 (a)  $(25, 32)$  (b)  $(9, 32)$  (c)  $(32, +\infty)$  (d) None of these
25. The range of values of  $\theta \in [0, 2\pi]$  for which  $(1 + \cos \theta, \sin \theta)$  is an interior point of the circle  $x^2 + y^2 = 1$  is  
 (a)  $(\pi/6, 5\pi/6)$  (b)  $(2\pi/3, 5\pi/3)$  (c)  $(\pi/6, 7\pi/6)$  (d)  $(2\pi/3, 4\pi/3)$
26. The range of values of  $r$  for which the point  $\left(-5 + \frac{r}{\sqrt{2}}, -3 + \frac{r}{\sqrt{2}}\right)$  is an interior point of the major segment of the circle  $x^2 + y^2 = 16$ , cut off by the line  $x + y = 2$  is  
 (a)  $(-\infty, 5\sqrt{2})$  (b)  $(4\sqrt{2} - \sqrt{14}, 5\sqrt{2})$  (c)  $(4\sqrt{2} - \sqrt{14}, 4\sqrt{2} + \sqrt{14})$  (d) None of these
27. If  $P(2, 8)$  is an interior point of a circle  $x^2 + y^2 - 2x + 4y - p = 0$  which neither touches nor intersects the axes, then set for  $p$  is  
 (a)  $p < -1$  (b)  $p < -4$  (c)  $p > 96$  (d)  $\phi$
28. The coordinates of the point from where the tangents are drawn to the circles  $x^2 + y^2 = 1$ ,  $x^2 + y^2 + 8x + 15 = 0$  and  $x^2 + y^2 + 10y + 24 = 0$  are of same length, are  
 (a)  $\left(2, \frac{5}{2}\right)$  (b)  $\left(-2, -\frac{5}{2}\right)$  (c)  $\left(-2, \frac{5}{2}\right)$  (d)  $\left(2, -\frac{5}{2}\right)$
29. Length of the tangent drawn from any point on the circle  $x^2 + y^2 + 2gx + 2fy + c_1 = 0$  to the circle  $x^2 + y^2 + 2gx + 2fy + c = 0$  is  
 (a)  $\sqrt{c_1 - c}$  (b)  $\sqrt{c - c_1}$  (c)  $\sqrt{c_1 + c}$  (d) None of these
30. 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)  $(-7, -8)$

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31. The lengths of the tangents from any point on the circle  $15x^2 + 15y^2 - 48x + 64y = 0$  to the two circles  $5x^2 + 5y^2 - 24x + 32y + 75 = 0$ ,  $5x^2 + 5y^2 - 48x + 64y + 300 = 0$  are in the ratio  
 (a) 1 : 2 (b) 2 : 3 (c) 3 : 4 (d) None of these
32. If the squares of the lengths of the tangents from a point  $P$  to the circles  $x^2 + y^2 = a^2$ ,  $x^2 + y^2 = b^2$  and  $x^2 + y^2 = c^2$  are in A.P., then  
 (a)  $a, b, c$  are in G.P. (b)  $a, b, c$  are in A.P. (c)  $a^2, b^2, c^2$  are in A.P. (d)  $a^2, b^2, c^2$  are in G.P.
33. The area of triangle formed by the tangent, normal drawn at  $(1, \sqrt{3})$  to the circle  $x^2 + y^2 = 4$  and positive  $x$ -axis, is  
 (a)  $2\sqrt{3}$  (b)  $\sqrt{3}$  (c)  $4\sqrt{3}$  (d) None of these
34.  $y - x + 3 = 0$  is the equation of normal at  $\left(3 + \frac{3}{\sqrt{2}}, \frac{3}{\sqrt{2}}\right)$  to which of the following circles  
 (a)  $\left(x - 3 - \frac{3}{\sqrt{2}}\right)^2 + \left(y - \frac{\sqrt{3}}{2}\right)^2 = 9$  (b)  $\left(x - 3 - \frac{3}{\sqrt{2}}\right)^2 + y^2 = 6$   
 (c)  $(x - 3)^2 + y^2 = 9$  (d)  $(x - 3)^2 + (y - 3)^2 = 9$
35. The line  $ax + by + c = 0$  is normal to the circle  $x^2 + y^2 = r^2$ . The portion of the line  $ax + by + c = 0$  intercepted by this circle is of length  
 (a)  $r$  (b)  $r^2$  (c)  $2r$  (d)  $\sqrt{r}$
36. If the straight line  $ax + by = 2$ ;  $a, b \neq 0$  touches the circle  $x^2 + y^2 - 2x = 3$  and is normal to the circle  $x^2 + y^2 - 4y = 6$  then the values of  $a$  and  $b$  are respectively  
 (a) 1, -1 (b) 1, 2 (c)  $-\frac{4}{3}, 1$  (d) 2, 1
37. The number of feet of normals from the point  $(7, -4)$  to the circle  $x^2 + y^2 = 5$  is  
 (a) 1 (b) 2 (c) 3 (d) 4
38. If the tangents are drawn to the circle  $x^2 + y^2 = 12$  at the point where it meets the circle  $x^2 + y^2 - 5x + 3y - 2 = 0$ , then the point of intersection of these tangents is  
 (a)  $(6, -6)$  (b)  $(6, 18/5)$  (c)  $(6, -18/5)$  (d) None of these
39. A tangent to the circle  $x^2 + y^2 = 1$  through the point  $(0, 5)$  cuts the circle  $x^2 + y^2 = 4$  at  $A$  and  $B$ . The tangents to the circle  $x^2 + y^2 = 4$  at  $A$  and  $B$  meet at  $C$ . The coordinates of  $C$  are  
 (a)  $\left(\frac{8}{5}\sqrt{6}, \frac{4}{5}\right)$  (b)  $\left(\frac{8}{5}\sqrt{6}, -\frac{4}{5}\right)$  (c)  $\left(-\frac{8}{5}\sqrt{6}, -\frac{4}{5}\right)$  (d) None of these
40. Tangents drawn from  $(2, 0)$  to the circle  $x^2 + y^2 = 1$  touch the circle at  $A$  and  $B$ . Then  
 (a)  $A = \left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right), B = \left(-\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$  (b)  $A = \left(-\frac{1}{2}, -\frac{\sqrt{3}}{2}\right), B = \left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$   
 (c)  $A = \left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right), B = \left(\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$  (d)  $A = \left(\frac{1}{2}, -\frac{\sqrt{3}}{2}\right), B = \left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$
41. The equation of the diameter of the circle  $3(x^2 + y^2) - 2x + 6y - 9 = 0$  which is perpendicular to the line  $2x + 3y = 12$  is  
 (a)  $3x - 2y = 3$  (b)  $3x - 2y + 1 = 0$  (c)  $3x - 2y = 9$  (d) None of these
42. A point on the line  $x = 3$  from which the tangents drawn to the circle  $x^2 + y^2 = 8$  are at right angles is  
 (a)  $(3, -\sqrt{7})$  (b)  $(3, \sqrt{23})$  (c)  $(3, \sqrt{7})$  (d)  $(3, -\sqrt{23})$
43. If the polar of a point  $(p, q)$  with respect to the circle  $x^2 + y^2 = a^2$  touches the circle  $(x - c)^2 + (y - d)^2 = b^2$ , then  
 (a)  $b^2(p^2 + q^2) = (a^2 - cp - dq)^2$  (b)  $b^2(p^2 + q^2) = (a^2 - cq - dp)^2$   
 (c)  $a^2(p^2 + q^2) = (b^2 - cp - dq)^2$  (d) None of these
44. The equation of a circle is  $x^2 + y^2 - 4x + 2y - 4 = 0$ . With respect to the circle  
 (a) The pole of the line  $x - 2y + 5 = 0$  is  $(1, 1)$   
 (b) The chord of contact of real tangents from  $(1, 1)$  is the line  $x - 2y + 5 = 0$   
 (c) The polar of the point  $(1, 1)$  is  $x - 2y + 5 = 0$   
 (d) None of these

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45. The centre of the circle passing through (0, 0) and (1, 0) and touching the circle  $x^2 + y^2 = 9$  is  
(a)  $\left(\frac{1}{2}, \frac{1}{2}\right)$  (b)  $\left(\frac{1}{2}, -\sqrt{2}\right)$  (c)  $\left(\frac{3}{2}, \frac{1}{2}\right)$  (d)  $\left(\frac{1}{2}, \frac{3}{2}\right)$
46. The locus of the centre of the circles which touch both the circles  $x^2 + y^2 = a^2$  and  $x^2 + y^2 = 4ax$  externally has the equation  
(a)  $12(x-a)^2 - 4y^2 = 3a^2$  (b)  $9(x-a)^2 - 5y^2 = 2a^2$  (c)  $8x^2 - 3(y-a)^2 = 9a^2$  (d) None of these
47. Tangents  $OP$  and  $OQ$  are drawn from the origin  $O$  to the circle  $x^2 + y^2 + 2gx + 2fy + c = 0$ . Then the equation of the circumcircle of the triangle  $OPQ$  is  
(a)  $x^2 + y^2 + 2gx + 2fy = 0$  (b)  $x^2 + y^2 + gx + fy = 0$  (c)  $x^2 + y^2 - gx - fy = 0$  (d)  $x^2 + y^2 - 2gx - 2fy = 0$
48. If the circle  $x^2 + y^2 + 2x + 3y + 1 = 0$  cuts  $x^2 + y^2 + 4x + 3y + 2 = 0$  in  $A$  and  $B$ , then the equation of the circle on  $AB$  as diameter is  
(a)  $x^2 + y^2 + x + 3y + 3 = 0$  (b)  $2x^2 + 2y^2 + 2x + 6y + 1 = 0$  (c)  $x^2 + y^2 + x + 6y + 1 = 0$  (d) None of these
49. The length of common chord of the circles  $(x-a)^2 + y^2 = a^2$  and  $x^2 + (y-b)^2 = b^2$  is  
(a)  $2\sqrt{a^2 + b^2}$  (b)  $\frac{ab}{\sqrt{a^2 + b^2}}$  (c)  $\frac{2ab}{\sqrt{a^2 + b^2}}$  (d) None of these
50. The length of common chord of the circles  $x^2 + y^2 = 12$  and  $x^2 + y^2 - 4x + 3y - 2 = 0$ , is  
(a)  $4\sqrt{2}$  (b)  $5\sqrt{2}$  (c)  $2\sqrt{2}$  (d)  $6\sqrt{2}$