1. If two lines $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ cut the coordinate axes at concyclic points, then
(a) $a_1a_2 + b_1b_2 = 0$ (b) $a_1a_2 - b_1b_2 = 0$
(c) $a_1b_1 + a_2b_2 = 0$ (d) $a_1b_1 - a_2b_2 = 0$

2. The equation of the chord of the circle $x^2 + y^2 = a^2$ passing through the pt. (2, 3) farthest from the centre is
(a) $2x + 3y = 13$ (b) $3x - y = 3$
(c) $x - 2y + 4 = 0$ (d) $x - y + 1 = 0$

3. The coordinates of the radical centre of the three circles $x^2 + y^2 = 9$, $x^2 + y^2 - 2x - 2y = 5$ and $x^2 + y^2 + 4x + 6y = 19$ are
(a) (– 1, 1) (b) (1, – 1) (c) (1, 1) (d) (0, 0)

4. The length of the tangent drawn from any point on the circle $x^2 + y^2 + 2gx + 2fy + \alpha = 0$ to the circle $x^2 + y^2 + 2gx + 2fy + \beta = 0$ is
(a) $\sqrt{\beta - \alpha}$ (b) $\sqrt{\alpha - \beta}$ (c) $\sqrt{\alpha\beta}$ (d) $\sqrt{\alpha/\beta}$

5. The equation of the normal at the point (2, 3) to the circle $x^2 + y^2 - 2x - 2y - 3 = 0$ is
(a) $2x + y - 7 = 0$ (b) $x + 2y - 3 = 0$
(c) $2x - y - 1 = 0$ (d) $x - 2y + 1 = 0$

6. If $ax^2 + by^2 + (a + b - 4)xy - ax - by - 20 = 0$ represents a circle, the radius of the circle is
(a) $\sqrt{21}/2$ (b) $\sqrt{42}/2$ (c) $2\sqrt{21}$ (d) $\sqrt{22}$

7. The line $x + y \tan\theta = \cos\theta$ touches the circle $x^2 + y^2 = 4$ for
(a) $\theta = \pi/6$ (b) $\theta = \pi/3$ (c) $\theta = \pi/2$ (d) no value of θ

8. An equilateral Δ is inscribed in the circle $x^2 + y^2 = a^2$ with the vertex at (a, 0). The equation of the side opposite to this vertex is
(a) $2x - a = 0$ (b) $x + a = 0$ (c) $2x + a = 0$ (d) $3x - 2a = 0$

9. Length of the common chord of the circles $(x - 1)^2 + (y + 1)^2 = c^2$ and $(x + 1)^2 + (y - 1)^2 = c^2$ is
(a) $\frac{1}{2}\sqrt{c^2 - 2}$ (b) $\sqrt{c^2 - 2}$ (c) $2\sqrt{c^2 - 2}$ (d) $c + 2$

10. Equation of the family of circles which have the same radical axis as the circles $x^2 + y^2 = 4$ and $x^2 + y^2 + 2x + 4y = 6$ is
(a) $x^2 + y^2 + \lambda x + 2\lambda y - (4 + \lambda) = 0$ (b) $x^2 + y^2 + \lambda(x - 2y - 1) = 4$
(c) $x^2 + y^2 + \lambda(x + 2y - 4) = 1$ (d) $x^2 + y^2 + 2\lambda x + \lambda y - (4 + \lambda) = 0$

11. The lines $2x - 3y = 5$ and $3x - 4y = 7$ are the diameters of a circle of area 154 square units. The equation of this circle is ($\pi = 22/7$)
(a) $x^2 + y^2 + 2x - 2y = 62$ (b) $x^2 + y^2 + 2x - 2y = 47$
(c) $x^2 + y^2 - 2x + 2y = 47$ (d) $x^2 + y^2 - 2x + 2y = 62$

12. If (x, 3) and (3, 5) are the extremities of a diameter of a circle with centre at (2x, y), then the values of x and y are
(a) x = 1, y = 4 (b) x = 4, y = 1 (c) x = 8, y = 2 (d) none of these

13. The circles $x^2 + y^2 - 10x + 16 = 0$ and $x^2 + y^2 = r^2$ intersect each other in two distinct points if
(a) $r < 2$ (b) $r > 8$ (c) $2 < r < 8$ (d) $2 \le r \le 8$

14. A line is drawn through the point P(3, 11) to cut the circle $x^2 + y^2 = 9$ at A and B. Then PA . PB is equal to
(a) 9 (b) 121 (c) 205 (d) 139

15. A circle is given by $x^2 + y^2 + 4x - 7y + 12 = 0$. The points P (0, 0) and Q(– 2, 4) are such that
(a) both lie inside the circle
(b) both lie outside the circle
(c) one lies inside and the other outside the circle
(d) one lies on the circle and the other is outside the circle

16. If the line x cos α + y sin α = p represents the common chord APQB of the circles $x^2 + y^2 = a^2$ and $x^2 + y^2 = b^2$ (a > b), then AP is equal to

(a) $\sqrt{a^2+p^2}+\sqrt{b^2+p^2}$
(b) $\sqrt{a^2-p^2}+\sqrt{b^2-p^2}$
(c) $\sqrt{a^2-p^2}-\sqrt{b^2-p^2}$
(d) $\sqrt{a^2+p^2}-\sqrt{b^2+p^2}$

17. If a circle passes through the point (1, 2) and cuts the circle $x^2 + y^2 = 4$ orthogonally, then the equation of the locus of its centre is

(a) $x^2 + y^2 – 3x – 8y + 1 = 0$
(b) $x^2 + y^2 – 2x – 6y – 7 = 0$
(c) $2x + 4y – 9 = 0$
(d) $2x + 4y – 1 = 0$

18. The equation of the circle having its centre on the line x + 2y – 3 = 0 and passing through the point of intersection of the circles $x^2 + y^2 – 2x – 4y + 1 = 0$ and $x^2 + y^2 – 4x – 2y + 4 = 0$ is

(a) $x^2 + y^2 – 6x + 7 = 0$
(b) $x^2 + y^2 – 3x + 4 = 0$
(c) $x^2 + y^2 – 2x – 2y + 1 = 0$
(d) $x^2 + y^2 + 2x – 4y + 4 = 0$

19. The angle between the tangents drawn from the origin to the circle $(x – 7)^2 + (y + 1)^2 = 25$ is

(a) $\pi/3$ (b) $\pi/6$ (c) $\pi/2$ (d) $\pi/8$

20. The equation of the circumcircle of the triangle formed by the lines y + √3 x = 6, y – √3 x = 6 and y = 0 is

(a) $x^2 + y^2 – 4y = 0$
(b) $x^2 + y^2 + 4x = 0$
(c) $x^2 + y^2 – 4y – 12 = 0$
(d) $x^2 + y^2 + 4x = 12$

21. The equation of a circle with origin as centre and passing through the vertices of an equilateral triangle whose median is of length 3a is

(a) $x^2 + y^2 = 9a^2$
(b) $x^2 + y^2 = 16a^2$
(c) $x^2 + y^2 = 4a^2$
(d) $x^2 + y^2 = a^2$

22. The radius of the circle passing through the point (6, 2), two of whose diameters are x + y = 6 and x + 2y = 4 is

(a) 10 (b) 2√5 (c) 6 (d) 4

23. The equation $x^2 + y^2 + 4x + 6y + 13 = 0$ represents

(a) a circle
(b) a pair of two straight lines
(c) a pair of coincident straight lines
(d) a point

24. To which of the following circles, the line y – x + 3 = 0 is normal at the point $\left(3+\frac{3}{\sqrt{2}}, \frac{3}{\sqrt{2}}\right)$

(a) $\left(x-3-\frac{3}{\sqrt{2}}\right)^2+\left(y-\frac{3}{\sqrt{2}}\right)^2=9$ a circle
(b) $\left(x-\frac{3}{\sqrt{2}}\right)^2+\left(y-\frac{3}{\sqrt{2}}\right)^2=9$
(c) $x^2 + (y – 3)^2 = 9$
(d) $(x – 3)^2 + y^2 = 9$

25. Circles are drawn through the point (2, 0) to cut intercepts of length 5 units on the x–axis. If their centres lie in the first quadrant, then their equation is

(a) $x^2 + y^2 - 9x + 2ky + 14 = 0$ (b) $3x^2 + 3y^2 + 27x - 2ky + 42 = 0$
(c) $x^2 + y^2 - 9x - 2ky + 14 = 0$ (d) $x^2 + y^2 - 2kx - 9y + 14 = 0$

26. 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) $4(x^2 + y^2 - x - 6y) + 1 = 0$

27. The slope of the tangent at the point (h, h) of the circle $x^2 + y^2 = a^2$ is
(a) 0 (b) 1 (c) – 1 (d) depends on h

28. The circles $x^2 + y^2 - 10x + 16 = 0$ and $x^2 + y^2 = r^2$ intersect each other in two distinct points if
(a) $r < 2$ (b) $r > 8$ (c) $2 < r < 8$ (d) $2 \le r \le 8$

29. The locus of the centre of a circle which touches externally the circle $x^2 + y^2 - 6x - 6y + 14 = 0$ and also touches the y–axis is given by the equation
(a) $x^2 - 6x - 10y + 14 = 0$ (b) $x^2 - 10x - 6y + 14 = 0$
(c) $y^2 - 6x - 10y + 14 = 0$ (d) $y^2 - 10x - 6y + 14 = 0$

30. If a circle passes through the point (a, b) and cuts the circle $x^2 + y^2 = p^2$ orthogonally, then the equation of the locus of its centre is
(a) $2ax + 2by - (a^2 + b^2 + p^2) = 0$ (b) $2ax + 2by - (a^2 - b^2 + p^2) = 0$
(c) $x^2 + y^2 - 3ax - 4by + (a^2 + b^2 - p^2) = 0$ (d) $x^2 + y^2 - 2ax - 3by + (a^2 - b^2 - p^2) = 0$