EXERCISE – I SINGLE CORRECT (OBJECTIVE QUESTIONS)

1. The lines $2x - 3y = 5$ and $3x - 4y = 7$ are diameters of a circle of area 154 sq. units. The equation of the circle is
(A) $x^2 + y^2 - 2x - 2y = 47$ (B) $x^2 + y^2 - 2x - 2y = 62$
(C) $x^2 + y^2 - 2x + 2y = 47$ (D) $x^2 + y^2 - 2x + 2y = 62$

2. If a be the radius of a circle which touches x-axis at the origin, then its equation is
(A) $x^2 + y^2 + ax = 0$ (B) $x^2 + y^2 \pm 2ya = 0$
(C) $x^2 + y^2 \pm 2xa = 0$ (D) $x^2 + y^2 + ya = 0$

3. The equation of the circle which touches the axis of y at the origin and passes through (3, 4) is
(A) $4(x^2 + y^2) - 25x = 0$ (B) $3(x^2 + y^2) - 25x = 0$
(C) $2(x^2 + y^2) - 3x = 0$ (D) $4(x^2 + y^2) - 25x + 10 = 0$

4. The equation of the circle passing through (3, 6) and whose centre is (2, –1) is
(A) $x^2 + y^2 - 4x + 2y = 45$ (B) $x^2 + y^2 - 4x - 2y + 45 = 0$
(C) $x^2 + y^2 + 4x - 2y = 45$ (D) $x^2 + y^2 - 4x + 2y + 45 = 0$

5. The equation to the circle whose radius is 4 and which touches the negative x-axis at a distance 3 units from the origin is
(A) $x^2 + y^2 - 6x + 8y - 9 = 0$ (B) $x^2 + y^2 \pm 6x - 8y + 9=0$
(C) $x^2 + y^2 + 6x \pm 8y + 9 = 0$ (D) $x^2 + y^2 \pm 6x - 8y - 9=0$

6. The equation of a circle which passes through the three points (3, 0) (1, –6), (4, –1) is
(A) $2x^2 + 2y^2 + 5x - 11y + 3 = 0$
(B) $x^2 + y^2 - 5x + 11y - 3 = 0$
(C) $x^2 + y^2 + 5x - 11y + 3 = 0$
(D) $2x^2 + 2y^2 - 5x + 11y - 3 = 0$

7. $y = \sqrt{3}x + c_1$ & $y = \sqrt{3}x + c_2$ are two parallel tangents of a circle of radius 2 units, then $|c_1 - c_2|$ is equal to
(A) 8 (B) 4 (C) 2 (D) 1

8. Number of different circles that can be drawn touching 3 lines, no two of which are parallel and they are neither coincident nor concurrent, are
(A) 1 (B) 2 (C) 3 (D) 4

9. B and C are fixed point having co-ordinates (3, 0) and (–3, 0) respectively. If the vertical angle BAC is 90º, then the locus of the centroid of the ΔABC has the equation
(A) $x^2 + y^2 = 1$ (B) $x^2 + y^2 = 2$
(C) $9(x^2 + y^2) = 1$ (D) $9(x^2 + y^2) = 4$

10. If a circle of constant radius 3k passes through the origin 'O' and meets co-ordinate axes at A and B then the locus of the centroid of the triangle OAB is
(A) $x^2 + y^2 = (2k)^2$ (B) $x^2 + y^2 = (3k)^2$
(C) $x^2 + y^2 = (4k)^2$ (D) $x^2 + y^2 = (6k)^2$

11. The area of an equilateral triangle inscribed in the circle $x^2 + y^2 - 2x = 0$ is
(A) $\frac{3\sqrt{3}}{2}$ (B) $\frac{3\sqrt{3}}{4}$ (C) $\frac{3\sqrt{3}}{8}$ (D) none

12. The length of intercept on y-axis, by a circle whose diameter is the line joining the points (–4,3) and (12,–1) is
(A) $3\sqrt{2}$ (B) $\sqrt{13}$ (C) $4\sqrt{13}$ (D) none of these

13. The gradient of the tangent line at the point $(a \cos \alpha, a \sin \alpha)$ to the circle $x^2 + y^2 = a^2$, is
(A) $\tan(\pi-\alpha)$ (B) $\tan \alpha$ (C) $\cot \alpha$ (D) $-\cot \alpha$

14. $\ell x + my + n = 0$ is a tangent line to the circle $x^2 + y^2 = r^2$, if
(A) $\ell^2 + m^2 = n^2 r^2$ (B) $\ell^2 + m^2 = n^2 + r^2$
(C) $n^2 = r^2(\ell^2 + m^2)$ (D) none of these

15. If y=c is a tangent to the circle $x^2+y^2-2x+2y-2 =0$ at (1, 1), then the value of c is
(A) 1 (B) 2 (C) –1 (D) –2

16. Line $3x + 4y = 25$ touches the circle $x^2 + y^2 = 25$ at the point
(A) (4, 3) (B) (3, 4)
(C) (–3, –4) (D) none of these

17. The equations of the tangents drawn from the point (0, 1) to the circle $x^2 + y^2 - 2x + 4y = 0$ are
(A) $2x - y + 1 = 0$, $x + 2y - 2 = 0$
(B) $2x - y - 1 = 0$, $x + 2y - 2 = 0$
(C) $2x - y + 1 = 0$, $x + 2y + 2 = 0$
(D) $2x - y - 1 = 0$, $x + 2y + 2 = 0$

18. The greatest distance of the point P(10, 7) from the circle $x^2 + y^2 - 4x - 2y - 20 = 0$ is
(A) 5 (B) 15 (C) 10 (D) none of these

19. The equation of the normal to the circle $x^2+y^2 = 9$ at the point $\left(\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$ is

(A) $x - y = \frac{\sqrt{2}}{3}$ (B) $x + y = 0$

(C) $x - y = 0$ (D) none of these

20. The parametric coordinates of any point on the circle $x^2 + y^2 - 4x - 4y = 0$ are

(A) $(-2 + 2\cos\alpha, -2 + 2\sin\alpha)$

(B) $(2 + 2\cos\alpha, 2 + 2\sin\alpha)$

(C) $(2 + 2\sqrt{2}\cos\alpha, 2 + 2\sqrt{2}\sin\alpha)$

(D) none of these

21. The length of the tangent drawn from the point (2, 3) to the circles $2(x^2 + y^2) - 7x + 9y - 11 = 0$.

(A) 18 (B) 14 (C) $\sqrt{14}$ (D) $\sqrt{28}$

22. A pair of tangents are drawn from the origin to the circle $x^2 + y^2 + 20(x + y) + 20 = 0$. The equation of the pair of tangents is

(A) $x^2 + y^2 + 5xy = 0$ (B) $x^2 + y^2 + 10xy = 0$

(C) $2x^2 + 2y^2 + 5xy = 0$ (D) $2x^2 + 2y^2 - 5xy = 0$

23. Tangents are drawn from (4, 4) to the circle $x^2 + y^2 - 2x - 2y - 7 = 0$ to meet the circle at A and B. The length of the chord AB is

(A) $2\sqrt{3}$ (B) $3\sqrt{2}$ (C) $2\sqrt{6}$ (D) $6\sqrt{2}$

24. The angle between the two tangents from the origin to the circle $(x - 7)^2 + (y + 1)^2 = 25$ equals

(A) $\frac{\pi}{2}$ (B) $\frac{\pi}{3}$ (C) $\frac{\pi}{4}$ (D) none

25. Pair of tangents are drawn from every point on the line $3x + 4y = 12$ on the circle $x^2 + y^2 = 4$. Their variable chord of contact always passes through a fixed point whose co-ordinates are

(A) $\left(\frac{4}{3}, \frac{3}{4}\right)$ (B) $\left(\frac{3}{4}, \frac{3}{4}\right)$ (C) (1, 1) (D) $\left(1, \frac{4}{3}\right)$

26. The locus of the mid-points of the chords of the circle $x^2 + y^2 - 2x - 4y - 11 = 0$ which subtend 60º at the centre is

(A) $x^2 + y^2 - 4x - 2y - 7 = 0$

(B) $x^2 + y^2 + 4x + 2y - 7 = 0$

(C) $x^2 + y^2 - 2x - 4y - 7 = 0$

(D) $x^2 + y^2 + 2x + 4y + 7 = 0$

27. The locus of the centres of the circles such that the point (2, 3) is the mid point of the chord $5x + 2y = 16$ is

(A) $2x - 5y + 11 = 0$ (B) $2x + 5y - 11 = 0$

(C) $2x + 5y + 11 = 0$ (D) none

28. 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) $y^2 - 10x - 6y+14 = 0$

29. The common chord of two intersecting circles C_1 and C_2 can be seen from their centres at the angles of 90º and 60º respectively. If the distance between their centres is equal to $\sqrt{3} + 1$ then the radius of C_1 and C_2 are

(A) $\sqrt{3}$ and 3 (B) $\sqrt{2}$ and $2\sqrt{2}$

(C) $\sqrt{2}$ and 2 (D) $2\sqrt{2}$ and 4

30. A circle touches a straight line $\ell x + my + n = 0$ and cuts the circle $x^2 + y^2 = 9$ orthogonally, The locus of centres of such circles is

(A) $(\ell x + my + n)^2 = (\ell^2 + m^2)(x^2 + y^2 - 9)$

(B) $(\ell x + my - n)^2 = (\ell^2 + m^2)(x^2 + y^2 - 9)$

(C) $(\ell x + my + n)^2 = (\ell^2 + m^2)(x^2 + y^2 + 9)$

(D) none of these

31. The equation of the circle having the lines $y^2 - 2y + 4x - 2xy = 0$ as its normals & passing through the point (2, 1) is

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

(B) $x^2 + y^2 - 2x + 4y - 5 = 0$

(C) $x^2 + y^2 + 2x + 4y - 13 = 0$ (D) none

32. A circle is drawn touching the x-axis and centre at the point which is the reflection of (a, b) in the line $y - x = 0$. The equation of the circle is

(A) $x^2 + y^2 - 2bx - 2ay + a^2 = 0$

(B) $x^2 + y^2 - 2bx - 2ay + b^2 = 0$

(C) $x^2 + y^2 - 2ax - 2by + b^2 = 0$

(D) $x^2 + y^2 - 2ax - 2by + a^2 = 0$

33. The length of the common chord of circles $x^2 + y^2 - 6x - 16 = 0$ and $x^2 + y^2 - 8y - 9 = 0$ is

(A) $10\sqrt{3}$ (B) $5\sqrt{3}$ (C) $5\sqrt{3}/2$ (D) none of these

34. The number of common tangents of the circles $x^2 + y^2 - 2x - 1 = 0$ and $x^2 + y^2 - 2y - 7 = 0$
(A) 1 (B) 3 (C) 2 (D) 4

35. The point from which the tangents to the circles
$x^2 + y^2 - 8x + 40 = 0$
$5x^2 + 5y^2 - 25x + 80 = 0$
$x^2 + y^2 - 8x + 16y + 160 = 0$
are equal in length is

(A) $\left(8, \frac{15}{2}\right)$ (B) $\left(-8, \frac{15}{2}\right)$ (C) $\left(8, -\frac{15}{2}\right)$ (D) none of these

36. If the circle $x^2 + y^2 = 9$ touches the circle $x^2 + y^2 + 6y + c = 0$, then c is equal to
(A) −27 (B) 36 (C) −36 (D) 27

37. If the two circles, $x^2 + y^2 + 2g_1x + 2f_1y = 0$ and $x^2 + y^2 + 2g_2x + 2f_2y = 0$ touches each other, then

(A) $f_1g_1 = f_2g_2$ (B) $\frac{f_1}{g_1} = \frac{f_2}{g_2}$ (C) $f_1f_2 = g_1g_2$ (D) none

38. If $\left(a, \frac{1}{a}\right)$, $\left(b, \frac{1}{b}\right)$, $\left(c, \frac{1}{c}\right)$ & $\left(d, \frac{1}{d}\right)$ are four distinct points on a circle of radius 4 units then, abcd =
(A) 4 (B) 1/4 (C) 1 (D) 16

39. The tangent from the point of intersection of the lines $2x - 3y + 1 = 0$ and $3x - 2y - 1 = 0$ to the circle $x^2 + y^2 + 2x - 4y = 0$ is
(A) $x + 2y = 0$, $x - 2y + 1 = 0$ (B) $2x - y - 1 = 0$
(C) $y = x$, $y = 3x - 2$ (D) $2x + y + 1 = 0$

40. What is the length of shortest path by which one can go from (−2, 0) to (2, 0) without entering the interior of circle, $x^2 + y^2 = 1$

(A) $2\sqrt{3}$ (B) $\sqrt{3} + \frac{2\pi}{3}$

(C) $2\sqrt{3} + \frac{\pi}{3}$ (D) none of these

41. Three equal circles each of radius r touch one another. The radius of the circle touching all the three given circle internally is

(A) $\left(2+\sqrt{3}\right)r$ (B) $\frac{\left(2+\sqrt{3}\right)}{\sqrt{3}}r$ (C) $\frac{\left(2-\sqrt{3}\right)}{\sqrt{3}}r$ (D) $\left(2-\sqrt{3}\right)r$

42. If $a^2 + b^2 = 1$, $m^2 + n^2 = 1$, then
(A) $|am + bn| \le 1$ (B) $|am - bn| \ge 1$
(C) $|am + bn| \ge 1$ (D) none of these

43. The distance between the chords of contact of tangents to the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ from the origin and from the point (g, f) is

(A) $\sqrt{g^2 + f^2}$ (B) $\frac{\sqrt{g^2 + f^2 - c}}{2}$ (C) $\frac{g^2 + f^2 - c}{2\sqrt{g^2 + f^2}}$ (D) $\frac{\sqrt{g^2 + f^2 + c}}{2\sqrt{g^2 + f^2}}$

44. In a right triangle ABC, right angled at A, on the leg AC as diameter, a semicircle is described. The chord joining A with the point of intersection D of the hypotenuse and the semicircle, then the length AC equals to

(A) $\frac{AB.AD}{\sqrt{AB^2 + AD^2}}$ (B) $\frac{AB.AD}{AB + AD}$

(C) $\sqrt{AB.AD}$ (D) $\frac{AB.AD}{\sqrt{AB^2 - AD^2}}$

45. The locus of the centers of the circles which cut the circles $x^2 + y^2 + 4x - 6y + 9 = 0$ and $x^2 + y^2 - 5x + 4y - 2 = 0$ orthogonally is
(A) $9x + 10y - 7 = 0$ (B) $x - y + 2 = 0$
(C) $9x - 10y + 11 = 0$ (D) $9x + 10y + 7 = 0$

46. Tangents are drawn to the circle $x^2 + y^2 = 1$ at the points where it is met by the circles.
$x^2 + y^2 - (\lambda + 6)x + (8 - 2\lambda)y - 3 = 0$, λ being the variable. The locus of the point of intersection of these tangents is
(A) $2x - y + 10 = 0$ (B) $x + 2y - 10 = 0$
(C) $x - 2y + 10 = 0$ (D) $2x + y - 10 = 0$

47. The circle passing through the distinct points (1, t), (t, 1) & (t, t) for all values of 't'. passes through the point
(A) (−1, −1) (B) (−1, 1) (C) (1, −1) (D) (1, 1)

48. AB is a diameter of a circle. CD is a chord parallel to AB and 2CD = AB. The tangent at B meets the line AC produced at E then AE is equal to

(A) AB (B) $\sqrt{2}$ AB (C) $2\sqrt{2}$ AB (D) 2AB

49. The locus of the mid points of the chords of the circle $x^2 + y^2 - ax - by = 0$ which subtend a right angle at $\left(\frac{a}{2}, \frac{b}{2}\right)$ is

(A) $ax + by = 0$ (B) $ax + by = a^2 + b^2$

(C) $x^2 + y^2 - ax - by + \frac{a^2+b^2}{8} = 0$

(D) $x^2 + y^2 - ax - by - \frac{a^2+b^2}{8} = 0$

50. A variable circle is drawn to touch the x-axis at the origin. The locus of the pole of the straight line $\ell x + my + n = 0$ w.r.t. the variable circle has the equation

(A) $x(my - n) - \ell y^2 = 0$ (B) $x(my + n) - \ell y^2 = 0$

(C) $x(my - n) + \ell y^2 = 0$ (D) none

51. (6, 0), (0, 6) and (7, 7) are the vertices of a triangle. The circle inscribed in the triangle has the equation

(A) $x^2 + y^2 - 9x + 9y + 36 = 0$

(B) $x^2 + y^2 - 9x - 9y + 36 = 0$

(C) $x^2 + y^2 + 9x - 9y + 36 = 0$

(D) $x^2 + y^2 - 9x - 9y - 36 = 0$

52. A circle is inscribed into a rhombus ABCD with one angle 60º. The distance from the centre of the circle to the nearest vertex is equal to 1. If P is any point of the circle, then $|PA|^2 + |PB|^2 + |PC|^2 + |PD|^2$ is equal to

(A) 12 (B) 11 (C) 9 (D) none

53. Number of points (x, y) having integral coordinates satisfying the condition $x^2 + y^2 < 25$ is

(A) 69 (B) 80 (C) 81 (D) 77