1. The equation of circles passing through (3, –6) touching both the axes is
(A) $x^2 + y^2 - 6x + 6y + 9 = 0$ (B) $x^2 + y^2 + 6x - 6y + 9 = 0$
(C) $x^2 + y^2 + 30x - 30y + 225 = 0$ (D) $x^2 + y^2 - 30x + 30y + 225 = 0$

2. Equations of circles which pass through the points (1, –2) and (3, – 4) and touch the x-axis is **[16JM110524]**
(A) $x^2 + y^2 + 6x + 2y + 9 = 0$ (B) $x^2 + y^2 + 10x + 20y + 25 = 0$
(C) $x^2 + y^2 - 6x + 4y + 9 = 0$ (D) $x^2 + y^2 + 10x + 20y - 25 = 0$

3. The centre of a circle passing through the points (0, 0), (1, 0) & touching the circle $x^2 + y^2 = 9$ is :
(A) $\left(\frac{3}{2}, \frac{1}{2}\right)$ (B) $\left(\frac{1}{2}, \sqrt{2}\right)$ (C) $\left(\frac{1}{2}, \frac{1}{2}\right)$ (D) $\left(\frac{1}{2}, -\sqrt{2}\right)$

4. The equation of the circle which touches both the axes and the line $\frac{x}{3} + \frac{y}{4} = 1$ and lies in the first quadrant is $(x - c)^2 + (y - c)^2 = c^2$ where c is **[15JM110362]**
(A) 1 (B) 2 (C) 4 (D) 6

5. Find the equations of straight lines which pass through the intersection of the lines $x - 2y - 5 = 0$, $7x + y = 50$ & divide the circumference of the circle $x^2 + y^2 = 100$ into two arcs whose lengths are in the ratio 2 : 1.
(A) $3x - 4y - 25 = 0$ (B) $4x + 3y - 25 = 0$ (C) $4x - 3y - 25 = 0$ (D) $3x + 4y - 25 = 0$

6_. Tangents are drawn to the circle $x^2 + y^2 = 50$ from a point 'P' lying on the x-axis. These tangents meet the y-axis at points 'P_1' and 'P_2'. Possible coordinates of 'P' so that area of triangle PP_1P_2 is minimum, is/are

(A) (10, 0) (B) $(10\sqrt{2}, 0)$ (C) (–10, 0) (D) $(-10\sqrt{2}, 0)$ **[16JM110525]**

7_. If (a, 0) is a point on a diameter segment of the circle $x^2 + y^2 = 4$, then $x^2 - 4x - a^2 = 0$ has

(A) exactly one real root in (– 1, 0] (B) Exactly one real root in [2, 5]

(C) distinct roots greater than-1 (D) Distinct roots less than 5

8_. The tangents drawn from the origin to the circle $x^2 + y^2 - 2rx - 2hy + h^2 = 0$ are perpendicular if **[16JM110526]**

(A) h = r (B) h = – r (C) $r^2 + h^2 = 1$ (D) $r^2 = h^2$

9_. The equation (s) of the tangent at the point (0, 0) to the circle where circle makes intercepts of length 2a and 2b units on the coordinate axes, is (are) -

(A) ax + by = 0 (B) ax – by = 0 (C) x = y (D) bx + ay = ab

10_. Consider two circles $C_1 : x^2 + y^2 - 1 = 0$ and $C_2 : x^2 + y^2 - 2 = 0$. Let A(1,0) be a fixed point on the circle C_1 and B be any variable point on the circle C_2. The line BA meets the curve C_2 again at C. **[16JM110527]**

Which of the following alternative(s) is/are correct ?

(A) $OA^2 + OB^2 + BC^2 \in [7, 11]$, where O is the origin.

(B) $OA^2 + OB^2 + BC^2 \in [4, 7]$, where O is the origin.

(C) Locus of midpoint of AB is a circle of radius $\frac{1}{\sqrt{2}}$.

(D) Locus of midpoint of AB is a circle of area $\frac{\pi}{2}$.

11_. One of the diameter of the circle circumscribing the rectangle ABCD is $x - 3y + 1 = 0$.

If two verticles of rectangle are the points (– 2, 5) and (6, 5) respectively, then which of the following hold(s) good?

(A) Area of rectangle ABCD is 64 square units.

(B) Centre of circle is (2, 1)

(C) The other two vertices of the rectangle are (– 2, – 3) and (6, – 3)

(D) Equation of sides are x = – 2, y = – 3, x = 5 and y = 6.

12. Three concentric circles of which the biggest is $x^2 + y^2 = 1$, have their radii in A.P. If the line y = x + 1 cuts all the circles in real and distinct points. The permissible values of common difference of A.P. is/are **[16JM110528]**

(A) 0.4 (B) 0.6 (C) 0.01 (D) 0.1

13. If $4\ell^2 - 5m^2 + 6\ell + 1 = 0$. Prove that $\ell x + my + 1 = 0$ touches a definite circle, then which of the following is/are true.

(A) Centre (0, 3) (B) centre (3, 0) (C) Radius $\sqrt{5}$ (D) Radius 5

14. If the circle $C_1: x^2 + y^2 = 16$ intersects another circle C_2 of radius 5 in such a manner that the common chord is of maximum length and has a slope equal to 3/4, then the co-ordinates of the centre of C_2 are.

(A) $\left(\frac{9}{5}, \frac{12}{5}\right)$ (B) $\left(\frac{9}{5}, \frac{-12}{5}\right)$ (C) $\left(\frac{-9}{5}, \frac{-12}{5}\right)$ (D) $\left(\frac{-9}{5}, \frac{+12}{5}\right)$ **[16JM110529]**

15_. If $a\ell^2 - bm^2 + 2d\ell + 1 = 0$, where a, b, d are fixed real numbers such that $a + b = d^2$, then the line $\ell x + my + 1 = 0$ touches a fixed circle

(A) which cuts the x-axis orthogonally

(B) with radius equal to b

(C) on which the length of the tangent from the origin is $\sqrt{d^2 - b}$

(D) none of these.

16. For the circles $x^2 + y^2 - 10x + 16y + 89 - r^2 = 0$ and $x^2 + y^2 + 6x - 14y + 42 = 0$ which of the following is/are true. **[16JM110530]**

(A) Number of integral values of r are 7 for which circles are intersecting.

(B) Number of integral values of r are 9 for which circles are intersecting.

(C) For r equal to 13 number of common tangents are 3.

(D) For r equal to 21 number of common tangents are 2.

17. Which of the following statement(s) is/are correct with respect to the circles $S_1 \equiv x^2 + y^2 - 4 = 0$ and $S_2 \equiv x^2 + y^2 - 2x - 4y + 4 = 0$?

(A) S_1 and S_2 intersect at an angle of 90°.

(B) The point of intersection of the two circle are (2, 0) and $\left(\frac{6}{5}, \frac{8}{5}\right)$.

(C) Length of the common of chord of S_1 and S_2 is $\frac{4}{\sqrt{5}}$.

(D) The point (2, 3) lies outside the circles S_1 and S_2.

18. $x^2 + y^2 = a^2$ and $(x - 2a)^2 + y^2 = a^2$ are two equal circles touching each other. Find the equation of circle (or circles) of the same radius touching both the circles. **[16JM110531]**

(A) $x^2 + y^2 + 2ax + 2\sqrt{3}\,ay + 3a^2 = 0$ (B) $x^2 + y^2 - 2ax + 2\sqrt{3}\,ay + 3a^2 = 0$

(C) $x^2 + y^2 + 2ax - 2\sqrt{3}\,ay + 3a^2 = 0$ (D) $x^2 + y^2 - 2ax - 2\sqrt{3}\,ay + 3a^2 = 0$

19. The circle $x^2 + y^2 - 2x - 3ky - 2 = 0$ passes through two fixed points, (k is the parameter)

(A) $(1 + \sqrt{3}, 0)$ (B) $(-1 + \sqrt{3}, 0)$ (C) $(-\sqrt{3} - 1, 0)$ (D) $(1 - \sqrt{3}, 0)$ **[15JM110361]**

20. Curves $ax^2 + 2hxy + by^2 - 2gx - 2fy + c = 0$ and $a'x^2 - 2hxy + (a' + a - b)y^2 - 2g'x - 2f'y + c = 0$ intersect at four concyclic point A, B, C and D. If P is the point $\left(\frac{g' + g}{a' + a}, \frac{f' + f}{a' + a}\right)$, then which of the following is/are true **[16JM110532]**

(A) P is also concyclic with points A,B,C,D (B) PA, PB, PC in G.P.

(C) $PA^2 + PB^2 + PC^2 = 3PD^2$ (D) PA, PB, PC in A.P.