JEE MAIN : CHAPTER WISE TEST PAPER-9

SUBJECT :- MATHEMATICS **DATE.....**
CLASS :- 11th **NAME.....**
CHAPTER :- CIRCLE **SECTION.....**

(SECTION-A)

1. Three circles lie on a plane so that each of them externally touches the other two. Two of them has radius 3, the third having radius unity . If A, B and C are the points of tangency of the circles then the area of the triangle ABC is

(A) $\frac{9\sqrt{7}}{4}$ (B) $\frac{9\sqrt{7}}{8}$

(C) $\frac{9\sqrt{7}}{16}$ (D) none

2. ABCD is a square of unit area. A circle is tangent to two sides of ABCD and passes through exactly one of its vertices. The radius of the circle is

(A) $2-\sqrt{2}$ (B) $\sqrt{2}-1$

(C) $\frac{1}{2}$ (D) $\frac{1}{\sqrt{2}}$

3. A pair of tangents are drawn to a unit circle with centre at the origin and these tangents intersect at A enclosing an angle of 60°. The area enclosed by these tangents and the arc of the circle is

(A) $\frac{2}{\sqrt{3}}-\frac{\pi}{6}$ (B) $\sqrt{3}-\frac{\pi}{3}$

(C) $\frac{\pi}{3}-\frac{\sqrt{3}}{6}$ (D) $\sqrt{3}\left(1-\frac{\pi}{6}\right)$

4. The equation of the circle symmetric to the circle $x^2 + y^2 - 2x - 4y + 4 = 0$ about the line $x - y = 3$ is

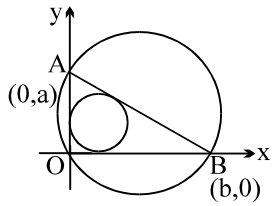
(A) $x^2 + y^2 - 10x + 4y + 28 = 0$
(B) $x^2 + y^2 + 6x + 8 = 0$
(C) $x^2 + y^2 - 14x - 2y + 49 = 0$
(D) $x^2 + y^2 + 8x + 2y + 16 = 0$

5. Let C be a circle with two diameters intersecting at an angle of 30 degrees. A circle S is tangent to both the diameters and to C, and has radius unity. The largest radius of C is

(A) $1 + \sqrt{6}+\sqrt{2}$ (B) $1 + \sqrt{6}-\sqrt{2}$

(C) $\sqrt{6}+\sqrt{2}-1$ (D) none of these

6. Let a and b represent the length of a right triangle's legs. If d is the diameter of a circle inscribed into the triangle, and D is the diameter of a circle superscribed on the triangle, then d + D equals



(A) a + b (B) 2(a + b)

(C) $\frac{1}{2}(a+b)$ (D) $\sqrt{a^2+b^2}$

7. Locus of the point of intersection of the pair of perpendicular tangents to the circles $x^2 + y^2 = 1$ and $x^2 + y^2 = 7$ is the director circle of the circle with radius.

(A) $\sqrt{2}$ (B) 2 (C) $2\sqrt{2}$ (D) 4

8. The ends of a quadrant of a circle have the coordinates (1, 3) and (3, 1) then the centre of the such a circle is

(A) (1, 1) (B) (2, 2)
(C) (2, 6) (D) (4, 4)

9. Let ABC be a triangle with $\angle A = 45°$. Let P be a point on the side BC with PB = 3 and PC = 5. If 'O' is the circumcentre of the triangle ABC then the length OP is equal to

(A) $\sqrt{15}$ (B) $\sqrt{17}$ (C) $\sqrt{18}$ (D) $\sqrt{19}$

10. Let C be a circle $x^2 + y^2 = 1$. The line *l* intersects C at the point (–1, 0) and the point P. Suppose that the slope of the line *l* is a rational number *m*. Number of choices for *m* for which both the coordinates of P are rational, is

(A) 3 (B) 4
(C) 5 (D) infinitely many

11. Let C_1 be the circle of radius $r > 0$ with centre at (0, 0) and let C_2 be the circle of radius 'r' with centre at (r, 0). The length of the arc of the circle C_1 that lies inside the circle C_2, is

(A) $\frac{\pi r}{3}$ (B) $\frac{2\pi r}{3}$ (C) $\frac{3\pi r}{4}$ (D) $\frac{5\pi r}{6}$

12. Find the equation of the circle which passes through the points (1, –2) and (4, –3) and has its centre on the line 3x + 4y = 7.
(A) $15(x^2 + y^2) + 94x + 18y – 33 = 0$
(B) $15(x^2 + y^2) - 94x + 18y + 33 = 0$
(C) $5(x^2 + y^2) - 18x + 92y + 3 = 0$
(D) None of these

13. Consider the points P (2, 1) ; Q (0, 0) ; R (4, –3) and the circle S : $x^2 + y^2 – 5x + 2y – 5 = 0$
(A) exactly one point lies outside S
(B) exactly two points lie outside S
(C) all the three points lie outside S
(D) none of the point lies outside S

14. Chord AB of the circle $x^2 + y^2 = 100$ passes through the point (7, 1) and subtends an angle of 60° at the circumference of the circle. If m_1 and m_2 are the slopes of two such chords then the value of m_1m_2, is
(A) – 1 (B) 1 (C) 7/12 (D) – 3

15. If the curve $y = 1 + \sqrt{4 - x^2}$ and the line y = (x – 2)k + 4 has two distinct points of intersection then the range of k, is
(A) [1, 3] (B) $\left[\frac{5}{12}, \infty\right)$
(C) $\left[\frac{5}{12}, \frac{3}{4}\right]$ (D) $\left(\frac{5}{12}, \frac{3}{4}\right]$

16. The locus of the midpoints of the chords drawn from the point M (1, 8) to the circle $x^2 + y^2 – 6x – 4y – 11 = 0$, is a circle whose radius, is
(A) $2\sqrt{2}$ (B) 3 (C) $\sqrt{10}$ (D) $4\sqrt{2}$

17. A circle touches the circle $x^2 + y^2 – 2x – 2y = 0$ internally and also touches pair of lines passing through origin making an angle of 30° with y = x, in first quadrant, then the radius of the circle is
(A) $\frac{2\sqrt{2}}{3}$. (B) $\frac{2}{3}$ (C) $\frac{\sqrt{2}}{3}$ (D) $\frac{4\sqrt{2}}{3}$

18. The chords of contact of the pair of tangents drawn from points on the line 2x + y = 4 to the circle $x^2 + y^2 = 1$ passes through a fixed point M (a, b). The value of $\left(\frac{1}{a} + \frac{1}{b}\right)$, is equal to
(A) 3 (B) 4 (C) 5 (D) 6

19. The line *l*x + my = 1 meets the circle $x^2 + y^2 = a^2$ at P and Q. If $\angle$ POQ = α, where 'O' is the origin then α is equal to
(A) $2\sec^{-1}(a\sqrt{l^2 + m^2})$
(B) $2\,\text{cosec}^{-1}(a\sqrt{l^2 + m^2})$
(C) $\frac{1}{2}\sec^{-1}(a\sqrt{l^2 + m^2})$
(D) $\frac{1}{2}\,\text{cosec}^{-1}(a\sqrt{l^2 + m^2})$

20. Let ABC be a triangle whose vertices are A (–5, 5) and B (7, – 1). If vertex C lies on the circle whose director circle has equation $x^2 + y^2 = 100$, then the locus of orthocentre of triangle ABC is equal to
(A) $x^2 + y^2 + 4x – 8y – 30 = 0$
(B) $x^2 + y^2 – 4x + 8y – 30 = 0$
(C) $x^2 + y^2 – 4x – 8y – 30 = 0$
(D) $x^2 + y^2 + 4x + 8y – 30 = 0$

(SECTION-B)

21. If the common chord of the circles $x^2 + (y – k)^2 = 16$ and $x^2 + y^2 = 16$ subtends a right angle at the origin, then find the value of k^2.
[**Note :** [x] denotes greatest integer less than or equal to x.]

22. Let S_1 and S_2 are the unit circles with centre at $C_1(0, 0)$ and $C_2(1, 0)$ respectively. Let S_3 is another circle of unit radius, passes through C_1 and C_2 and its centre is above the x-axis. If equation of common tangent to S_1 and S_3, which does not pass through S_2, is ax + by + 2 = 0, then find the value of $(a^2 – b)$.

23. Let A (1, 0) be a point on the circle $x^2 + y^2 = 1$. Through another point P (0, 2) chord is drawn to meet the circle at point B and C, then the locus of centroid of ΔABC is $x^2 + y^2 + ax + by + c = 0$ then find the value of (a + b + 18c).

24. Let the circle $x^2 + y^2 + 4x + 6y + c = 0$ ($c \in R$) bisects the circumference of the circle $x^2 + y^2 – 2x + 2y + (\cos\theta + \sin\theta) = 0$ ($\theta \in R$). If the sum of maximum and minimum values of c is λ_1, then find $|\lambda_1|$.

25. Let A (– 4, 0) and B (4, 0). Number of points C = (x, y) on the circle $x^2 + y^2 = 16$ such that the area of the triangle whose vertices are A, B and C is a positive integer, is

26. If pair of lines $(x-2)^2-(m_1+m_2)(x-2)(y+2)+m_1m_2(y+2)^2=0$ is tangent to the circle $(x-1)^2+(y-1)^2=2$, then find the value of $\left(\frac{1}{m_1}+\frac{1}{m_2}\right)$.

27. If S is sum of minimum and maximum distances of origin from the locus of image of the point (2, 3) in the line $(2x-3y+4)+k(x-2y+3)=0$, $k \in R$, then find the value of [S].
[**Note :** [k] denotes greatest integer function less than or equal to k.]

28. If $\sqrt{2}\,r$ be the distance by which the circle $x^2+y^2-5x-3y+8=0$ should roll up on its tangent drawn at (2, 2) so that its equation becomes $x^2+y^2-8x-ay+c=0$ then find the value of $\left(\frac{r+a+c}{8}\right)$.

29. If a circle of constant radius $3\sqrt{2}$ passes through origin O and meets the coordinate axes at A and B, then find the radius of director circle of locus of centroid of ΔOAB.

30. Let S_1 and S_2 be the two circles. S_1 is tangent to x-axis and S_2 is tangent to y-axis and the straight line $y=mx$ $(m>0)$ touches both the circles at their common point. If centre of the circle S_1 is (3, 1) then radius of the circle S_2 is $\frac{p}{q}$, $p, q \in N$. Find the least value of $(p+q)$.