PART - II : SINGLE AND DOUBLE VALUE INTEGER TYPE

1. Find maximum number of points having integer coordinates (both x, y integer) which can lie on a circle with centre at $\left(\sqrt{2}, \sqrt{3}\right)$ is (are)

2. The axes are translated so that the new equation of the circle $x^2 + y^2 - 5x + 2y - 5 = 0$ has no first degree terms and the new equation $x^2 + y^2 = \frac{\lambda}{4}$, then find the value of λ. **[16JM110516]**

3. Find the sum of co-ordinates of the centre of the smallest circle touching the circles $x^2 + y^2 - 2y - 3 = 0$ and $x^2 + y^2 - 8x - 18y + 93 = 0$.

4. A line meets the co-ordinate axes in A and B. A circle is circumscribed about the triangle OAB. If d_1 and d_2 are the distances of the tangent to the circle at the origin O from the points A and B respectively and diameter of the circle is $\lambda_1 d_1 + \lambda_2 d_2$, then find the value of $\lambda_1 + \lambda_2$. **[16JM110517]**

5. A circle is inscribed (i.e. touches all four sides) into a rhombous ABCD with one angle 60°. 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:

6. Find the number of integral points which lie on or inside the circle $x^2 + y^2 = 4$. **[16JM110518]**

7. Let x & y be the real numbers satisfying the equation $x^2 - 4x + y^2 + 3 = 0$. If the maximum and minimum values of $x^2 + y^2$ are M & m respectively, then find the numerical value of (M + m).

8. Find number of values of 'c' for which the set,
$\{(x, y) \mid x^2 + y^2 + 2x \le 1\} \cap \{(x, y) \mid x - y + c \ge 0\}$ contains only one point is common. **[16JM110519]**

9. A rhombus is inscribed in the region common to the two circles $x^2 + y^2 - 4x - 12 = 0$ and $x^2 + y^2 + 4x - 12 = 0$ with two of its vertices on the line joining the centres of the circles and the area of the rhombus is $a\sqrt{3}$ sq. units, then find the value of a.

10. If (α, β) is a point on the circle whose centre is on the x-axis and which touches the line $x + y = 0$ at $(2, -2)$, then find the greatest integral value of 'α'. **[16JM110520]**

11. Two circles whose radii are equal to 4 and 8 intersect at right angles. The length of their common chord is $\frac{\lambda}{\sqrt{5}}$, then find λ

12. A variable circle passes through the point A (a, b) & touches the x–axis and the locus of the other end of the diameter through A is $(x - a)^2 = \lambda by$, then find the value of λ. **[16JM110521]**

13. Let A be the centre of the circle $x^2 + y^2 - 2x - 4y - 20 = 0$. Suppose that the tangents at the points B (1, 7) & D (4, – 2) on the circle meet at the point C. Find the area of the quadrilateral ABCD.

14. Find the greatest integer values of a for which the point (2a, a + 1) is an interior point of the larger segment of the circle $x^2 + y^2 - 2x - 2y - 8 = 0$ made by the chord whose equation is $x - y + 1 = 0$. **[16JM110522]**

15. The circles $x^2 + y^2 + 2ax + cy + a = 0$ and $x^2 + y^2 - 3ax + dy - 1 = 0$ intersect in two distinct points P and Q, then find the number of values of 'a' for which the line $5x + by - a = 0$ passes through P and Q.

16. The circumference of the circle $x^2 + y^2 - 2x + 8y - q = 0$ is bisected by the circle $x^2 + y^2 + 4x + 12y + p = 0$, then find p + q **[16JM110523]**