MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 56

Total Marks : 25

Max. Time : 29 min.

Topics : Circle, Straight Lines

Type of Questions		**M.M., Min.**
Comprehension (no negative marking) Q.1 to Q.3	**(3 marks, 3 min.)**	**[9, 9]**
Subjective Questions (no negative marking) Q.4,5,6,7	**(4 marks, 5 min.)**	**[16, 20]**

COMPREHENSION (For Q.No. 1 to 3)

Let $f(x) \equiv x^2 + px + q = 0$ have real roots α, β and $g(x) \equiv x^2 + rx + s = 0$ have real roots γ, δ

1. The area of the quadrilateral formed by points $(\gamma, 0)$, $(\alpha, 0)$, $(0, \beta)$, $(0, \delta)$ taken in order is

(A) $\frac{|q-s|}{2}$ (B) $\frac{|q+s|}{2}$ (C) $\frac{|r+p|}{2}$ (D) $\frac{|p-r|}{2}$

2. The centre of the circle passing through the points of intersection of pairs of lines $f(x) = 0$ and $g(y) = 0$ is

(A) $\left(\frac{p}{2}, \frac{r}{2}\right)$ (B) $\left(\frac{q}{2}, \frac{s}{2}\right)$ (C) $\left(-\frac{q}{2}, -\frac{s}{2}\right)$ (D) $\left(-\frac{p}{2}, -\frac{r}{2}\right)$

3. Equation of the director circle of the circle $f(x) + g(y) = 0$ is

(A) $f(x) + g(y) = p^2 + r^2 - q - s$ (B) $f(x) + g(y) = q^2 + s^2$

(C) $f(x) + g(y) = \frac{p^2+r^2}{4} - q - s$ (D) $f(x) + g(y) = p + r - \frac{(q^2+s^2)}{4}$

4. Two circles touch the x-axis and the line $y = mx$ $(m>0)$. They meet at (9, 6) and at another point and the product of their radii is 68. Find 'm'.

5. Show that the common tangents to the circles $x^2 + y^2 - 6x = 0$ and $x^2 + y^2 + 2x = 0$ form an equilateral triangle.

6. The circle $x^2 + y^2 - 4x - 4y + 4 = 0$ is inscribed in a triangle which has two of its sides along the co-ordinate axes. The locus of the circumcentre of the triangle is $x + y - xy + k\sqrt{x^2+y^2} = 0$, find k.

7. Let A, B, C be real numbers such that

(1) (sin A, cos B) lies on a unit circle centred at origin.

(2) tan C and cot C are defined.

If the minimum value of $(\tan C - \sin A)^2 + (\cot C - \cos B)^2$ is $a + b\sqrt{2}$, where $a, b \in I$, find the value of $a^3 + b^3$.

Answers Key

1. A **2.** D **3.** C **4.** $m = \frac{12\sqrt{221}}{49}$ **6.** k = 1

7. 19