A/2051

4303/MH

Subject: Analytic Geometry **Paper: P-VI**

Title of the Paper: Analytic Geometry

Time allowed: 3 Hrs. **Maximum Marks: 40**

Note: The candidates are required to attempt two questions each from the Section A & B. Section C will be compulsory.

Section-A

Q1. Prove that the general equation of the second degree is $ax^2 + 2hxy + by^2 + 2gx + 2fy = 0$ by rotating the axes through an angle θ. (6)

Q2. Find the equation of the tangent at the point α to the conic $\frac{l}{r} = 1 - e\cos\theta$. (6)

Q3 If PSP′ be a focal chord of a conic, then prove that:

(i) tangents at P and P′ intersect at the directrix.

(ii) the angle between P and P′ is $tan^{-1}\left(\frac{2e\sin\alpha}{1-e^2}\right)$. (6)

Q4. Trace the conic $x^2 - 2xy + y^2 - 3x + y - 2 = 0$. (6)

Section-B

Q5. Find an equation of sphere which passes through the points (1, 2, 3), (1, 1, 4), (0, 3, 3), and (1, 3, 2). (6)

Q6. (a) Find the equation of the tangent plane at the point (x_1, y_1, z_1) of the sphere $x^2 + y^2 + z^2 = a^2$. (3)

(b) Obtain the equation to the sphere which passes through the circle $x^2 + y^2 + z^2 - 2x + 2y + 4z - 3 = 0$, $2x + y + z = 4$ and touch the plane $3x + 4y = 14$. (3)

Contd—2

Q7. Find the equation of the cone whose vertex is at (1, 1, 1) and pass through the curve $x^2+y^2+z^2=1$ and $x+y+z=1$. (6)

Q8. Find the equation of the right circular cylinder of radius 3 whose axis passes through the point (1, – 1, 2) and has the direction numbers <2, – 1, – 3>. (6)

Section-C

Q9.

(i) Find the eccentricity and directrix of $r(1-2\sin\theta)=2$.

(ii) Find the area of triangle with one vertex at origin in polar form.

(iii) Change to Cartesian coordinates the equation $r = a\sin 2\theta$.

(iv) What do you mean by invariants? Give its conditions.

(v) Show that section of a sphere by a plane is a circle.

(vi) What is the orthogonality condition of two spheres?

(vii) Define right circular cone. Also write its equation.

(viii) Differentiate between a cylinder and a right circular cylinder. $2 \times 8 = 16$