A/2051

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

4553/MH

Title of the Paper: Analytic Geometry

Time allowed: 3 Hrs. **Maximum Marks: 50**

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

Section-A

Q1. Show that the equation $3x^2 + 8xy - 3y^2 - 40x - 20y + 50 = 0$ represents a hyperbola. Also trace it. (7.5)

Q2. Find the equation of the chord of contact of tangents drawn from the point (r_1, θ_1) to the conic $\frac{l}{r} = 1 - e\cos\theta$. (7.5)

Q3 Prove that the tangents at the extremities of a focal chord of a parabola intersect at right angle on the directrix. (7.5)

Q4. Define pole and polar of any point w.r.t. the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$. Also find the pole of the line $Ax + By + C = 0$ w.r.t. the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$. (7.5)

Section-B

Q5. Find the equation of the tangent plane at the point (x_1, y_1, z_1) to the sphere $x^2 + y^2 + z^2 + 2ux + 2vy + 2wz + d = 0$ (7.5)

Q6. Find the equation to the sphere which passes through the circle $x^2 + y^2 = 4$, $z = 0$ and is cut by the plane $x + 2y + 2z = 0$ in a circle of radius 3. (7.5)

Q7. Define the enveloping cone. Also find the equation of the enveloping cone of the sphere $x^2 + y^2 + z^2 = a^2$ with vertex at P (x_1, y_1, z_1). (7.5)

Q8. Find the equation of the right circular cylinder of radius 2 whose axis is the line $\frac{x-3}{5}=\frac{y-1}{4}=\frac{z+2}{2}$. (7.5)

Section-C

Q9.

(i) Find the reflection of the point (r, θ) in the line through O perpendicular to initial line.

(ii) Graphically represent the relation between Cartesian and Polar coordinates.

(iii) Write down the equation of director circle of ellipse $16x^2 + 9y^2 = 144$.

(iv) Define the angle between pair of lines. Also give example.

(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. $(2.5 \times 8 = 20)$

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