

A/2051

5068/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. Trace the curve $x^2 - 3xy + y^2 + 10x - 10y + 21 = 0$. (6)
- Q2. Describe the relation between rectangular Cartesian and Polar coordinates. (6)
- Q3. Find the equation of the asymptotes to the hyperbola $\frac{l}{r} = 1 - e \cos \theta$. (6)
- Q4. Show that if the tangent at any point P of a conic meets the directrix in T, then $\angle TSP$ is a right angle where S is the focus of the conic. (6)

Section-B

- Q5. Find the co-ordinates of the points where the line $\frac{x+3}{4} = \frac{y+4}{3} = \frac{z-8}{-5}$ intersect the sphere $x^2 + y^2 + z^2 + 2x - 10y - 23 = 0$. (6)
- Q6. Prove that the two spheres $x^2 + y^2 + z^2 - 2x + 4y - 4z = 0$ and $x^2 + y^2 + z^2 + 10x + 2z + 10 = 0$ touch each other. (6)
- Q7. Determine the equation of cones with vertex at the origin and passes through the curves

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$$x^2 + y^2 - 4z^2 - 4x + 8z + 5 = 0; \quad y + z = 2. \quad (6)$$

Q8. Determine the equation of right circular cylinder whose radius and axis are given by:

$$\frac{x}{1} = \frac{y}{1} = \frac{z}{1}, \quad r = \sqrt{\frac{2}{3}}. \quad (6)$$

Section-C

Q9.

- (i) Find the reflection of the point (r, θ) in the initial line.
- (ii) Change to polar co-ordinates the equation $x^2 = y^2(2a - x)$.
- (iii) Find the distance between the points $(\sqrt{7}, \frac{\pi}{2})$ and $(\sqrt{7}, \frac{\pi}{6})$.
- (iv) Define the angle between two lines.
- (v) What do you mean by touching spheres?
- (vi) Prove that a line meets a sphere in at the most two points.
- (vii) What is an elliptic cone? Write down its equation.
- (viii) Describe the different kinds of cylinder.

$$2 \times 8 = 16$$

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