IMPORTANT INSTRUCTIONS FOR PAPER ID 53841

1. The maximum marks of this paper is 16 instead of 20

(b) Find the locus of the point of intersection of perpendicular generators of the hyperbolic paraboloid. **2½**

5. (a) Show that the two confocal paraboloids cut everywhere at right angles. **2½**

(b) Show that the surface represented by the equation :

$$2x^2 + 5y^2 + 2z^2 - 2yz + 4zx - 2xy + 14x - 16y + 14z + 26$$

is an elliptic cylinder. **2½**

Subject Code—53841

B. A. EXAMINATION

(Batch 2018 Onwards)

(Main)

(Sixth Semester)

MATHEMATICS

BAMH-307

Solid Geometry

Time : 3 *Hours* *Maximum Marks :* 20

Note : Attempt *Three* questions in all. Q. No. **1** is compulsory.

(Compulsory Question)

1. (a) Show that the plane $x + 2y + 3z = 2$ touches the conicoid $x^2 - 2y^2 + 3z^2 = 2$ and find the point of contact. **1**

(b) If the polar plane of a point P w.r.t the conicoid $ax^2 + by^2 + cz^2 = 1$ passes through a point Q, then the polar plane of Q passes through P. **1**

(c) Determine the circular section of the paraboloid $ax^2 + by^2 = 2cz$. **1**

(d) Prove that if three points of any straight line $\frac{x-\alpha}{l} = \frac{y-\beta}{m} = \frac{z-\gamma}{n}$ lie on the conicoid, then the line wholly lies on the conicoid. **1**

(e) Prove that the tetrahedron PQRS is self-polar with respect to the given conicoid. **1**

(f) Define diametral plane and the principal plane. **1**

Unit I

2. (a) Find the equations of the two tangent planes which contain the lines given by $7x + 10y = 30$, $5y - 3z = 0$ and touch the ellipsoid $7x^2 + 5y^2 + 3z^2 = 60$. **2½**

(b) Find the locus of the point of intersection of three mutually perpendicular tangent planes to the central conicoid $ax^2 + by^2 + cz^2 = 1$. **2½**

3. (a) Prove that the enveloping cylinder of the ellipsoid $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$, whose generators are parallel to the lines $\frac{x}{0} = \frac{y}{\pm\sqrt{a^2 - b^2}} = \frac{z}{c}$ meet the plane $z = 0$ in circles. **2½**

(b) Find the equation of the polar plane of a point (x_1, y_1, z_1) w.r.t. the conicoid $ax^2 + by^2 + cz^2 = 1$. **2½**

Unit II

4. (a) Find the lengths of semi-axis of the sections of the paraboloid $2x^2 + y^2 - z = 0$ by the plane $x + 2y + z = 4$. **2½**