

Roll No. 223112320008

Exam Code : M-25

Subject Code—64500

B.Sc. EXAMINATION

(Batch 2022 Onwards)

(Sixth Semester)

MATHEMATICS

CMS-608 (i)

Skills Enhancement Course-Solid Geometry

Time : 3 Hours

Maximum Marks : 80

Note : Attempt *Three* questions in all, selecting *one* question from each Unit. Q. No. 1 is compulsory.

Compulsory Question

1. (a) Find the equations of the polar of the line $\frac{x-x_1}{l} = \frac{y-y_1}{m} = \frac{z-z_1}{n}$ w.r.t. the central conicoid $ax^2 + by^2 + cz^2 = 1$.

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(b) Define the central conicoid and show that the origin bisects all the chords of the ellipsoid $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$, which pass through it.

(c) Prove that six normals can be drawn from a given point to the ellipsoid.

(d) Find the locus of centres of sections of

the ellipsoid $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$, whose area is constant.

(e) Show that the plane $2x - 4y - z + 3 = 0$ touches the paraboloid $x^2 - 2y^2 = 3z$.

Also Find the the point of contact.

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Unit I

2. (a) Find the equations of the polar of the

lines $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ w.r.t. the

conicoid. $x^2 - 2y^2 + 3z^2 = 4$ in the

symmetrical form. 15

- (b) Find the equation of tangent planes

to $2x^2 - 6y^2 + 3z^2 = 5$ which pass

through the lines $x + 9y - 3z = 0$,

$3x - 3y + 6z - 5 = 0$. 15

3. (a) Find the equation of the enveloping
cylinder of the conicoid

$ax^2 + by^2 + cz^2 = 1$ whose generator and

Parallel to the line $\frac{x}{l} = \frac{y}{m} = \frac{z}{n}$. 15

- (b) The section of the enveloping cone of the ellipsoid $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$, whose vertex is P, by the plane $z=0$ is parabola, find the locus P. 15

Unit II

4. (a) Show that the section of the Surface $yz + zx + xy = a^2$ by the plane $lx + my + nz = p$ will be parabola if $\sqrt{l} + \sqrt{m} + \sqrt{n} = 0$. 15
- (b) Show that the circular section of the ellipsoid Passing through one extremity of x-axis are both of radius r , where

$$\frac{r^2}{b^2} = \frac{b^2 - c^2}{a^2 - c^2} \quad 15$$

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5. (a) Find
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hype
(b) Red
11x
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5. (a) Find the locus of the point of intersection of perpendicular generator of a hyperboloid of one sheet. 15

- (b) Reduce the equation :

$$11x^2 + 10y^2 + 6z^2 - 8yz + 4zx - 12xy + 72x - 72y + 36z + 150 = 0$$

to the standard form and show that it represents an ellipsoid and find the equation of axes. 15

