

North Gauhati College  
Department of Mathematics

SEMESTER II(MAJOR)  
HOME ASSIGNMENT 2021

**M-204(Non-CBCS)**  
**Co-Ordinate Geometry**

October 2021

TOTAL MARKS: 30

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INSTRUCTIONS TO CANDIDATES

1. This assignment paper contains **Two (2)** questions and comprises **Three (3)** printed pages.
2. Answer all questions. The marks for each question are indicated at the beginning of each question.
3. Submit the assignment as a single **PDF** file through the online portal of our college website under section “Assignments”.
4. Write your **Name, GU Roll No., and Registration Number** in the assignment .
5. Submission **Due Date** is on or before **8th October, 2021**.

**Question 1.**

[5 × 2=10]

Answer the following questions :

(i) What are the basic natures of the guiding curve and the generator for a right-circular cylinder.

(ii) Find the radius and the centre of the sphere

$$x^2 + y^2 + z^2 - 2x + 4y - 6z = 2.$$

(iii) What is the eccentricity of the ellipse

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1, (a < b).$$

(iv) What is the equation of the tangent to the parabola  $y^2 = 4ax$  at the point  $(x_1, y_1)$ .

(v) Define Skew lines.

*(Continued)*

**Question 2.**

[5×4=20]

Answer the following questions:

- (i) Prove that the line  $lx + my = n$  is a normal to the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ , if

$$\frac{a^2}{l^2} + \frac{b^2}{m^2} = \frac{(a^2 - b^2)^2}{n^2}.$$

- (ii) A sphere of constant radius  $r$  passes through the origin  $O$  and cut the axes at  $A$ ,  $B$  and  $C$ . Prove that the locus of the foot of the perpendicular from  $O$  to the plane  $ABC$  is

$$(x^2 + y^2 + z^2)^2 \left( \frac{1}{x^2} + \frac{1}{y^2} + \frac{1}{z^2} \right) = 4r^2.$$

- (iii) Find the equation of the pair of tangents from  $(x', y')$  to the parabola  $y^2 = 4ax$ .
- (iv) Prove that from any point six normals can be drawn to the conicoid  $ax^2 + by^2 + cz^2 = 1$ .
- (v) Find the lengths of the semi-axes of the conic

$$ax^2 + 2hxy + ay^2 = d.$$

**END OF PAPER**