North Gauhati College
Department of Mathematics

SEMESTER III(HONOURS)
HOME ASSIGNMENT I 2021

MAT-HC-3036
Analytical Geometry

August 2021 TOTAL MARKS: 30

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" and send a copy to the email id **mathngc1969@gmail.com**.
4. Write your **Name**, **GU Roll No.**, and **Registration Number** in the assignment .
5. Submission **Due Date** is on or before 7th August, 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

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

(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