

North Gauhati College
Department of Mathematics

SEMESTER III(HONOURS)
HOME ASSIGNMENT 2022

MAT-HC-3036
Analytical Geometry

January 2022

TOTAL MARKS: 30

INSTRUCTIONS TO CANDIDATES

1. This assignment paper contains **Eight (8)** questions and comprises **Two (2)** printed pages.
2. Each question carry **Five** marks. Answer any **Six** of all questions.
3. Submit the assignment as a single **PDF** file through the online portal of our college website under section “Assignments” and submit a hard copy in the Department of Mathematics.
4. Write your **Name, GU Roll No., and Registration Number** in the assignment .
5. Submission **Due Date** is on or before **22nd January, 2022**.

(Answer any **Six**)

1. Find the equation of the tangents planes to the sphere $x^2 + y^2 + z^2 = 49$, which passes through the line $2x + z - 21 = 0 = 3y - z + 14$.

2. Show that the equation of the cylinder whose generators are parallel to the line $\frac{x}{1} = \frac{y}{-2} = \frac{z}{3}$ and the guiding curve is $x^2 + 2z^2 = 1, z = 3$ is

$$3(x^2 + 2y^2 + z^2) + 8yz - 2zx + 6x - 24y - 18z + 24 = 0.$$

3. Prove that the section of a cone with vertex P and guiding curve the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1, z = 0$ by y plane is rectangular hyperbola.

4. Find the condition that the two lines whose equations are

$$\frac{x-1}{1} = \frac{y-2}{-2} = \frac{z-3}{3}, \quad \text{and} \quad \frac{x-2}{3} = \frac{y-2}{-2} = \frac{z-4}{2}.$$

may intersect and also find the equation of the plane in which they lie.

5. Find the asymptotes of the hyperbola

$$2x^2 + 5xy + 2y^2 + 4x + 5y = 0.$$

6. 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

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

7. Find the equation of the pair of tangents from (x', y') to the parabola $y^2 = 4ax$.

8. Prove that from any point six normals can be drawn to the conicoid $ax^2 + by^2 + cz^2 = 1$.

END OF PAPER