

North Gauhati College
Department of Mathematics

SEMESTER III(GENERAL)
HOME ASSIGNMENT I 2021

E-301 (NON-CBCS)
Calculus: Methods and applications

August 2021

TOTAL MARKS: 25

INSTRUCTIONS TO CANDIDATES

1. This assignment paper contains **Six (6)** questions and comprises **Two (2)** printed pages.
2. Each question carry **Five** marks. Answer any **Five** of all questions.
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**.

(Answer any **Five**)

1. Show that the length of the portion of the tangent to the curve

$$x^{2/3} + y^{2/3} = a^{2/3}$$

intercepted between the coordinate axes is constant.

2. If $y = \log(x + \sqrt{1 + x^2})$, prove by using Leibnitz's theorem that

$$(1 + x^2)y_{n+2} + (2n + 1)xy_{n+1} + n^2y_n = 0.$$

Hence find $y_n(0)$.

3. Prove that for the cardioid

$$r = a(1 + \cos \theta)$$

ρ^2/r is constant, where ρ is the radius of curvature at any point on the curve.

4. Find the area of the region bounded by the parabola $y^2 = 4ax$ and the line $y = 2x$.

5. Find the length of one complete arc of the cycloid

$$x = a(\theta - \sin \theta), \quad y = a(1 - \cos \theta).$$

6. Show that the function

$$f(x, y) = x^3 + 3xy^2 - 15x^2 - 15y^2 + 72x$$

has a maximum value at $(4, 0)$.

END OF PAPER