

Assignment for Academic Year 2025-2026 (Session Beginning January 2026)

CLASS: BA-1st Year

Course Name: Differential Calculus

Course Code: MATH101TH

ASSIGNMENT-1

Attempt any **TWO** of the following questions:

Ques 1. Evaluate $\log_{x \rightarrow 1} \frac{x^6 - 5x + 4}{x^3 - 2x + 1}$.

Ques 2. Find the nth derivative of $x^n e^x$.

Ques 3. Examine the continuity of the function $f(x) = \begin{cases} \frac{x-|x|}{x}, & x \neq 0 \\ 2, & x = 0, \end{cases}$ at $x = 0$.

Ques 4. Find the approximate values of $\sqrt{66}$.

ASSIGNMENT-2

Attempt any **TWO** of the following questions:

Ques 1. Verify Lagrange's mean value theorem for the function $f(x) = x + \frac{1}{x}$ in $\left[\frac{1}{2}, 3\right]$.

Ques 2. Find the points of inflexion on the curve $x = a \tan \theta, y = a \sin \theta \cos \theta$.

Ques 3. Find all asymptotes of the curve $x^3 - 2y^3 + xy(2x - y) + y(x - y) + 1 = 0$.

Ques 4. Trace the curve $y = x^3$.

ASSIGNMENT-3

Attempt any **TWO** of the following questions:

Ques 1. Trace the curve $r = a \cos 3\theta$.

Ques 2. Prove that curvature of a straight line is zero.

Ques 3. If $x = u(1 + v), y = v(1 + u)$ find the Jacobian of x, y with respect to u, v .

Ques 4. Examine the continuity at the indicated point for the function

$$f(x, y) = \begin{cases} \frac{x^2 y}{x^3 + y^3}, & (x, y) \neq (0, 0) \\ 0, & (x, y) = (0, 0) \end{cases} \text{ at } (0, 0).$$