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

CLASS: BA-1st Year **Course Name: Differential Equations**

Course Code: MATH102TH

ASSIGNMENT-1

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

Ques 1. Solve the differential equation $(x^2 + y^2 - a^2)x\,dx + (x^2 - y^2 - b^2)y\,dy = 0$.

Ques 2. Show that $\frac{1}{x^2}$ is an integrating factor of the equation $y\,dx - x\,dy = 0$. Also solve it.

Ques 3. (a) Show that the functions e^{ax} and e^{bx} are L.I. unless $a = b$.

(b) Show that the functions $e^{2x}\sin 3x$, $e^{2x}\cos 3x$, $e^{2x}(2\sin 3x + 5\cos 3x)$ are linearly dependent.

Ques 4. Find the necessary and sufficient condition that the equation $M\,dx + N\,dy = 0$ (where M and N) are functions of x and y with the condition that M , N, $\frac{\partial M}{\partial y}$, $\frac{\partial N}{\partial x}$ are continuous functions of x and y) may be exact.

ASSIGNMENT-2

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

Ques 1. Solve $\frac{d^2y}{dx^2} - 7\frac{dy}{dx} + 6y = e^{2x}$ given that $y = 0$ when $x = 0$.

Ques 2. Solve $\frac{d^2y}{dx^2} - y = \frac{2}{1+e^x}$ by the method of variation of parameters.

Ques 3. Solve $y = 3px + 4p^3$

Ques 4. Solve $\frac{d^3y}{dx^3} + \frac{d^2y}{dx^2} - \frac{dy}{dx} - y = \sin 2x$

ASSIGNMENT-3

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

Ques 1. Find the complete solution of $2z + p^2 + qy + 2y^2 = 0$

Ques 2. Solve $s = 2x + 2y$

Ques 3. Classify and reduce to canonical form $\frac{\partial^2 z}{\partial x^2} - \frac{\partial^2 z}{\partial y^2} = 0$, Find its solution also.

Ques 4. Find the general solution of the following Lagrange's linear equation $(y + z)p + (z + x)q = x + y$.