

Assignment for Academic Year 2024-2025 (Beginning January 2025)

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 $(y + z)p + (z + x)q = x + y$.