The Open University of Sri Lanka

B.Sc./B.Ed. Degree, Continuing Education Programme

No Book Test (NBT) - 2023/2024

Level 4 - Applied Mathematics

ADU4303- Applied Linear Algebra & Differential Equations

DURATION: ONE HOUR

Date: 26.01.2024   **09.00a.m.-10.00a.m.**

ANSWER **ALL** QUESTIONS.

1. Find the general solution of each the following systems of simultaneous differential equations:

   (i) $\dot{x}_1 = 3x_1 + 2x_2 - x_3$

   $\dot{x}_2 = -2x_1 - 2x_2 + 2x_3$

   $\dot{x}_3 = 3x_1 + 6x_2 - x_3$

   (ii) $\dot{x}_1 = x_1 + 4x_2 + 6t$

   $\dot{x}_2 = 2x_1 + 3x_2 + 3e^{2t}$

   (iii) $\ddot{x}_1 = x_1 - 2x_2$

   $\ddot{x}_2 = x_1 + 4x_2$

2. Find the general solution of the differential equations given below:

$$x^2 \frac{d^2 y}{dx^2} - 4x \frac{dy}{dx} + 6y = 4x - 6$$

3. Find the general solution of the following simultaneous partial differential equations:

$$\frac{\partial u}{\partial x} = 3x^2 y - a \sin ax, \quad \frac{\partial u}{\partial y} = x^3 - e^{-y}.$$