The Open University of Sri Lanka

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

No Book Test (NBT) - 2024/2025

Level 4 - Applied Mathematics

ADU4303- Applied Linear Algebra & Differential Equations

DURATION: ONE HOUR

Date: 23.03.2025   **01.00p.m.-02.00p.m.**

ANSWER ALL QUESTIONS.

1. Find the general solution of each of the systems of simultaneous differential equations, given below in the standard notation:

   (i) $\dot{x}_1 = x_1 + x_2 - x_3$
   $\dot{x}_2 = 2x_1 + 3x_2 - 4x_3$
   $\dot{x}_3 = 4x_1 + x_2 - 4x_3$,

   (ii) $\dot{x}_1 = 2x_1 + 3x_2 + 4e^{3t}$
   $\dot{x}_2 = -x_1 - 2x_2 - e^{3t}$

   (iii) $\ddot{y}_1 = y_1 + 2y_2$
   $\ddot{y}_2 = 2y_1 - 2y_2$

2. Find a sinusoidal particular solution for the following system of partial differential equations:

   $\ddot{x}_1 - 8x_1 + 5x_2 = \sin 2t$
   $\ddot{x}_2 - 10x_1 + 7x_2 = 2\cos 2t.$

3. Find the general solution of the differential equation given below:

$$6x^2 \frac{d^2 y}{dx^2} - x \frac{dy}{dx} - 3y = 0, \quad (x > 0).$$