The Open University of Sri Lanka

B.Sc. /B.Ed. Degree Programme

Applied Mathematics – Level 04

ADU4303/ADE4303 – Applied Linear Algebra and Differential Equations

No Book Test (NBT) – 2017/2018

DURATION: ONE HOUR.

Date: 03.02.2019 **Time: 01.00 p.m. – 02.00 p.m.**

ANSWER ALL QUESTIONS.

01. Solve each of the following systems of differential equations given below:

(i) $\dot{x}_1 = 4x_1 + 3x_2 + x_3$

$\dot{x}_2 = -4x_1 - 4x_2 - 2x_3$

$\dot{x}_3 = 8x_1 + 12x_2 + 6x_3$.

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

$\dot{x}_2 = -12x_1 + 6x_2 + 8e^{2t}$.

02. (i) Find a particular sinusoidal solution of the following system of differential equations:

$\ddot{x}_1 + 5\dot{x}_2 + 9x_1 = 5\sin 2t$

$\ddot{x}_2 + 4\dot{x}_1 + 2x_2 = 10\cos 2t$.

(ii) Find the general solution of the following differential equation:

$$\frac{x^2\partial^2 y}{\partial x^2} - \frac{x\partial y}{\partial x} - 3y = \log x,\ x > 0 .$$

(iii)Find the general solution of partial differential equation:

$\frac{\partial u}{\partial x} - \frac{1}{y}u = 1\ ;\ (y \neq 0)$, where u is a function of x and y .