



The Open University of Sri Lanka

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

CAT 2 - 2021/2022

Level 4 - Applied Mathematics

ADU4303- Applied Linear Algebra & Differential Equations

DURATION: ONE HOUR

Date: 11.02.2023.

Time:01.00 p.m.-02.00 p.m.

Answer All Questions.

1. Find the general solution of the following system of simultaneous differential equations.

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

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

$$\dot{x}_3 = x_2 - 5x_3$$

2. Solve the following system of differential equations.

$$\dot{x}_1 = 2x_1 + 3x_2 + e^{2t}$$

$$\dot{x}_2 = 2x_1 + x_2 + 4e^{2t}$$

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

$$\ddot{x}_1 + 3\dot{x}_2 + 2x_1 = \sin 3t$$

$$\ddot{x}_2 + \dot{x}_1 = \cos 3t$$

4. Find the general solution for the following partial differential equation by using the integrating factor method:

$$\frac{\partial u}{\partial y} + \frac{1}{y}u = e^x + e^y$$

5. Find the equations of the characteristic curves for the following partial differential equation and determine the new variable ϕ .

$$(x+y)\left(\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y}\right) = u.$$