THE OPEN UNIVERSITY OF SRI LANKA

B.Sc./ B.Ed. Degree Programme

APPLIED MATHEMATICS - LEVEL 03

ADU3302 - Differential Equations

OPEN BOOK TEST - 2024/2025

DURATION: ONE HOUR

Date: 08.02.2025   **Time: 2.30 p.m. to 3.30 p.m.**

ANSWER ALL QUESTIONS

1. Find the order and degree of each of the following differential equations.

   (a) $\frac{d^2y}{dx^2} = [y + (\frac{dy}{dx})^6]^{\frac{1}{4}}$

   (b) $y = \ln[\frac{d^3y}{dx^3} + (\frac{dy}{dx})^2]$

   (c) $e^{y'''} - xy'' + y = 0$

2. Using the variable separable method, find the solution of the differential equation given below.

$$(x + 2)\frac{dy}{dx} = x^2 + 4x - 5 \quad when \ y(2) = 0.$$

3. Determine whether the differential equation provided below is homogeneous and solve it.

$$\frac{dy}{dx} = \frac{y(x - y)}{x^2}$$

4. Determine whether each of the following differential equations are exact or not.

   (a) $(y^2 - 2x)dx + (2xy + 1)dy = 0$

   (b) $e^y dx + (2y + xe^y)dy = 0$

   (c) $(6x^2 - y + 3)dx + (3y^2 - x - 2)dy = 0$

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