

The Open University of Sri Lanka

B.Sc/B.Ed Degree programme

Applied Mathematics – Level 03

ADU-3302- Differential Equations

Open Book Test (OBT)- 2023/2024



Date: 22.12.2023

Time: 02.30 p.m. – 03.30 p.m.

Answer All Questions

1. Consider the equation $\frac{dy}{dx} = \frac{y-4x}{x-y}$.

- Show that the given equation is homogeneous.
- Introduce a new variable v to replace the independent variable y . Express dy/dx in terms of $v, x, dv/dx$.
- Replace y and dy/dx in the original equation with the expressions obtained for v and dv/dx in part (b). Show that the resulting differential equation is:

$$x \frac{dv}{dx} = \frac{v^2 - 4}{1 - v}.$$

2. Solve the differential equation $\frac{1}{x} dx + \frac{1}{y} dy = 0$.

3. Determine whether the equation $(2x + 3) + (2y - 2) \frac{dy}{dx} = 0$ is exact. If it is exact, find the solution.
