



Daffodil International University
Department of Electrical and Electronic Engineering
Faculty of Engineering
Midterm Examination, Spring-2026

Course Code: 0541-123
Section: A, B, C, D, E, F, G
Full Marks: 25

Course Title: Ordinary and Partial Differential Equation
Level-Term: L1-T2
Exam Date: February 24, 2026

Teacher's Initial: SDN, TRS, IJM
Time: 1.5 Hours

[Answer all the following questions sequentially]

[The second right-most column indicates the COs with the respective Bloom's level]

[The right-most column indicates the assigned marks]

- Q1. (a) **Explain** the general solution and the particular solution of differential equation. CO-1 3
C(2)
- (b) **Identify** the order, degree, and linearity or nonlinearity of the following differential equation with justification. CO-1 3
C(2)
- (i) $3 \frac{d^2y}{dx^2} + 5 \frac{dy}{dx} - 3y = \cos y$ (ii) $\sqrt{1 + \frac{d^2y}{dx^2}} = x \frac{dy}{dx}$
- (c) **Express** $xy = Ae^{2x} + Be^{-2x}$ in the form of an ordinary differential equation. CO-1 2
C(2)
- Q2. (a) **Solve** the following differential equation. CO-2 9
C(3)
- (i) $\frac{dy}{dx} = \sin(x - y + 5)$ (ii) $\frac{dy}{dx} = \frac{x+2y}{2x+y}$
- (iii) $\sec^2 x \cot y \, dx = \operatorname{cosec}^2 y \tan x \, dy$
- Q3. (a) The potential difference V , between the plates of a capacitor C charged by a steady voltage E through the resistor R is given by the equation $CR \frac{dV}{dt} + V = E$. CO-3 4
C(3)
- (i) **Build** the solution of the equation for V , given that at $t = 0$, $V = 0$.
- (ii) **Compute** V , when $E = 25 \, \text{V}$, $C = 20 \times 10^{-6} \, \text{F}$, $R = 200 \times 10^3 \, \Omega$ and $t = 3 \, \text{s}$.
- (b) An RL circuit has an emf given by $3\sin 2t$ volts, a resistance of $10 \, \Omega$, an inductance of 0.5 henry, and an initial current of 6 amperes. **Compute** the current in the circuit at any time t . CO-3 4
C(3)