



Daffodil International University
Department of Electrical and Electronic Engineering
Faculty of Engineering
Final Examination, Fall – 2025

Course Code: 0541-123
Section: A,B,C,D
Full Marks: 40

Course Title: Ordinary & Partial Differential Equation
Level-Term: L1-T2
Exam Date: December 17, 2025

Teacher's Initial: TRS, IJM
Time: 2 Hours

[Notes: Answer all the following questions

CO's represent one of the learning outcomes of the course.

Figures on the right hand side indicate marks allocated for the questions.]

		Marks
Q1. Apply the suitable method to solve the following linear differential equations with constant coefficients:	CO-2 (C3)	[8]
i) $D^2(D^2 - 2D + 1)y = 0$		
ii) $D^2y + 4Dy + 3y = e^{-2x}$		
Q2. Compute the general solutions of the following differential equations	CO-2 (C3)	[15]
i) $(D^2 + 4)y = \sin 2x \cos 4x$		
ii) $\frac{d^3y}{dx^3} - 2\frac{d^2y}{dx^2} + 4\frac{dy}{dx} - 8y = e^x \sin 2x$		
iii) $x^2 \frac{d^2y}{dx^2} - 3x \frac{dy}{dx} + 4y = x^2 (\ln x)^3$		
Q3. Apply the appropriate method for solving first-order partial differential equation	CO-2 (C3)	[4]
$xz(z^2 + xy)p - yz(z^2 + xy)q = x^4$		
for $z(x, y)$, where $p = \frac{\partial z}{\partial x}$ and $q = \frac{\partial z}{\partial y}$.		
Q4. Consider a series RLC circuit with resistance R , inductance L and capacitance C . The charge $q(t)$ on the capacitor satisfies the homogeneous second-order differential equation:	CO-3 (C3)	[6]
$L \frac{d^2q}{dt^2} + R \frac{dq}{dt} + \frac{1}{C} q = 0$		
where $L = 1H$, $R = 2\Omega$, $C = \frac{1}{5}F$, initial charge $q(0) = 5C$ and $q'(0) = 0$. Solve the differential equation for $q(t)$.		
Q5. Solve the initial-value problem by applying the method for linear homogeneous differential equations with constant coefficients:	CO-3 (C3)	[7]
$y'' + 2y' + 2y = 0$, $y(0) = 0$, $y'(0) = 1$		