



Daffodil International University

Faculty of Science & Information Technology

Department of Computer Science and Engineering

Midterm Examination, Spring 2026

Course Code: MAT211, Course Title: Engineering Mathematics

Level: L2 Term: T1 Batch: 68

Time: 01:30 Hrs

Marks: 25

Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1.	a.	Explain the conditions of the linear ODE and give an example of linear ODE.	[2]	CO1
	b.	Demonstrate the ordinary differential equation of a family of curves $y = Me^{-5x} + Ne^{4x} + 2x^3$	[4]	
2.	a.	In a laptop, the battery charge $Q(t)$ decreases at a rate proportional to the current remaining charge. The discharge rate can be modeled as: $\frac{dQ}{dt} = -kQ$; $k > 0$. If the initial battery charge is $Q_0 = 100\%$ and the discharge rate is $k = 0.15$ per hour, identify the remaining battery charge after 4 hours.	[5]	CO2
	b.	Solve the first order first degree homogeneous ODE $x^2 y dx - (x^3 + y^3) dy = 0$	[4]	
	c.	Solve the first order first degree ODE $x \frac{dy}{dx} + 2y = x^2 \ln x$	[4]	
3.		Solve the higher order ODE $D^3 y - D^2 y - 4y = \sin x + e^{2x}$	[6]	CO2