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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 $x^2 y dx - \left(x^3 + y^3\right) dy = 0$	[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 $D^3y - D^2y - 4y = \sin x + e^{2x}$	[6]	CO2