



# Daffodil International University

Faculty of Science & Information Technology  
Department of Computer Science and Engineering  
Mid Examination, Summer 2025

Course Code: MAT211, Course Title: Engineering Mathematics

Level: L1 Term: T3 Batch: 67

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 order and degree of the ODE: $x^5 \frac{d^3 y}{dx^3} + 2y \left( \frac{d^4 y}{dx^4} \right)^{-5} = x^2 \frac{d^4 y}{dx^4}$ .	[2]	CO1
	b)	Outline an ODE corresponding to the following function: $y = Pe^{2x} + Qe^{-2x} + R \sin 2x + S \cos 2x$ .	[4]	
	c)	Interpret the solution to the following ODE: $\frac{dy}{dx} = e^{-x+2y}$ .	[4]	
2.	a)	Solve the following Bernoulli's ODE: $\frac{dy}{dx} + 3y = e^{2x} y^{-4}$ .	[5]	CO2
	b)	The packet loss rate $L(t)$ due to buffer overflow can be modeled as: $\frac{dL}{dt} = \gamma(B - L)$ where $B$ = buffer capacity (1000 packets), $\gamma$ = rate of loss increase (0.05 per second), initial loss rate $L(0) = 50$ . Solve for the loss rate after 10 seconds.	[5]	
3.		Solve the following higher order ordinary differential equation (ODE) with constant coefficients $\frac{d^3 y}{dx^3} - 2 \frac{d^2 y}{dx^2} - 4 \frac{dy}{dx} + 8y = f(x)$ where $f(x) = e^{-x} \cos 2x$ .	[5]	CO2