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: $x^5\frac{d^3y}{dx^3}+2y\left(\frac{d^4y}{dx^4}\right)^{-5}=x^2\frac{d^4y}{dx^4}$.	[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: $\frac{dy}{dx}=e^{2x+2y}$.	[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), γ = 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 $\frac{d^3y}{dx^3}-2\frac{d^2y}{dx^2}-4\frac{dy}{dx}+8y=f(x)$ where $f(x)=e^{-x}\cos 2x$.	[5]	CO2