



Daffodil International University
Faculty of Science & Information Technology
Department of Computer Science and Engineering
Final Semester Examination, Spring 2025
Course Code: MAT211, Course Title: Engineering Mathematics
Level: 2 Term: 1 Batch: 66

Time: 2:00 Hrs

Marks: 40

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)	Solve the following higher order ODE: $x^3 \frac{d^3 y}{dx^3} + 4x^2 \frac{d^2 y}{dx^2} - 8x \frac{dy}{dx} + 8y = e^x$ ✕	[6]	CO2
	b)	Solve the following higher order ODE: $\frac{d^3 y}{dx^3} - \frac{d^2 y}{dx^2} - 4 \frac{dy}{dx} + 4y = e^{2x} + e^{-x}$.	[4]	
2.	a)	Simplify the following expression: $\mathcal{L}\{t^{3/2} + 10t^3 + 2e^{-5t} - 7\cos 4t + 9\sin 9t\}$.	[5]	CO3
	b)	Simplify the following expression: $\mathcal{L}\{4e^{3t}t \cos^2 2t\}$.	[5]	
3.	a)	Apply the Convolution theorem to calculate the expression: $\mathcal{L}^{-1}\left\{\frac{s}{(s-1)(s^2+1)}\right\}$.	[4]	CO4
	b)	Apply the Laplace transformation technique to solve the following higher order ODE: $Y''(t) + 4Y(t) = 8te^{2t}$, $Y(0) = 2$, $Y'(0) = -3$.	[6]	
4.	a)	Construct the Finite Fourier Cosine transformation $f_c(n)$ of the following function: $F(x) = 3x + e^{4x}$, $0 < x < \pi$.	[5]	CO4
	b)	Develop the Fourier Sine series of the given function: $F(x) = \cos x$; $0 < x < \pi$.	[5]	