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: $x^3\frac{d^3y}{dx^3}+4x^2\frac{d^2y}{dx^2}-8x\frac{dy}{dx}+8y=$ x	[6]	CO2
	b)	**Solve** the following higher order ODE: $\frac{d^3y}{dx^3}-\frac{d^2y}{dx^2}-4\frac{dy}{dx}+4y=e^{2x}+e^{-x}$.	[4]	
2.	*a)*	**Simplify** the following expression: $\mathcal{L}\left\{t^{3/2}+10t^3+2e^{-5t}-7\cos 4t+9\sin 9t\right\}$.	[5]	CO3
	b)	**Simplify** the following expression: $\mathcal{L}\left\{4e^{3t}t\cos^2 2t\right\}$.	[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: $F(x)=\cos x;\quad 0<x<\pi$.	[5]	