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Daffodil International University

Faculty of Science & Information Technology

Department of Computer Science and Engineering

Final Examination, Summer 2025

Course Code: MAT211, Course Title: Engineering Mathematics

Level: 1 Term: 3 Batch: 67

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: $x^2\frac{d^2y}{dx^2}+x\frac{dy}{dx}-4y=x^2\cos(\ln x)$.	[5]	CO2
	b)	**Solve** the following higher order ODE: $\frac{d^3y}{dx^3}-6\frac{d^2y}{dx^2}+11\frac{dy}{dx}-6y=10+e^{3x}$.	[5]	
2.	*a)*	**Test for** the proof of the following equation: $\mathcal{L}\{e^{at}\}=\frac{1}{s-a}$.	[2]	CO3
	b)	**Simplify** the following expression: a) $\mathcal{L}\{19+2e^{3t}-t^{3/2}\}$, b) $\mathcal{L}\{6e^{-5t}t\sin^2 3t\}$.	[3+5]	
3.	*a)*	**Apply** the Convolution theorem to calculate the expression: $\mathcal{L}^{-1}\left\{\frac{30}{s^3-2s^2+9s-18}\right\}$.	[5]	CO4
	b)	**Apply** the Laplace transformation technique to solve the following higher order ODE: $Y''(t)+4Y(t)=\cos 3t, Y(0)=1, Y'(0)=\frac{12}{5}$.	[5]	
4.	*a)*	**Construct** the Finite Fourier Sine and Cosine transformation of the following function: $F(x)=e^{2x}$, $0<x<\pi$.	[5]	CO4
	b)	**Develop** the Half-Range Fourier Cosine series of the given function: $F(x)=x;\quad 0<x<4$.	[5]	