



Daffodil International University

Faculty of Science & Information Technology
Department of Computer Science and Engineering

Midterm Examination, Fall-2026

Course Code: MAT 102, Course Title: Mathematics II

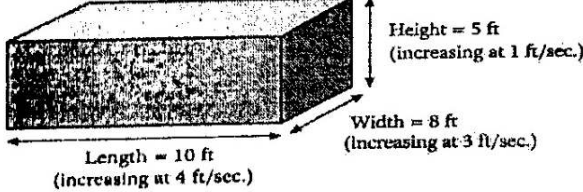
Level: 01 Term: 02 Batch: 72

Time: 1.5 Hours

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)	Demonstrate the value of $\int_0^{\frac{\pi}{2}} \sqrt{64 \sin^{12} \theta \cos^2 \theta} d\theta$ using β - Γ function.	[3]	CO1
	b)	Illustrate β - Γ function to find the value of $\int_0^1 x^{\frac{3}{2}} (1-\sqrt{x})^5 dx$	[2]	
	c)	Demonstrate the value of $\int_0^{\infty} 5^{10} e^{-5x} x^9 dx$ using Γ function.	[2]	
2.	a)	Identify the rate of volume changing of the given box 	[4]	CO2
	b)	Apply Euler's theorem to show that $x \frac{\partial r}{\partial x} + y \frac{\partial r}{\partial y} + z \frac{\partial r}{\partial z} = \frac{1}{2} \sin 2r$, where $r = \tan^{-1} \frac{x^2 + y^2 + z^2}{x + y + z}$	[4]	
	c)	Construct the Matrix form of, $Z = (Z_1)^5 - 7Z_2 + 6Z_3$ by following $Z_1 = -8 + 3i$, $Z_2 = e^{2.5i}$, and $Z_3 = (4.9, 231^\circ)$	[5]	
3.		Solve the following triple integration of $V = \int_0^{2\pi} \int_0^{\pi/4} \int_0^4 (\rho \cos \phi) \rho^2 \sin \phi d\rho d\phi d\theta$	[5]	CO4