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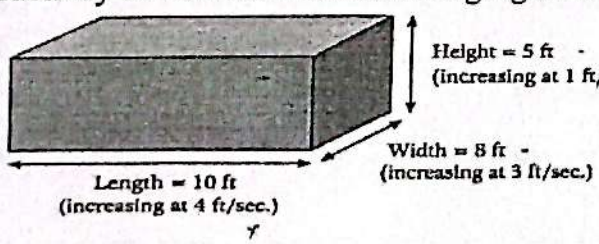
Daffodil International University

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 $\int_0^{\frac{\pi}{2}} \sqrt{64\sin^{12}\theta\cos^{\frac{7}{2}}\theta}\,d\theta$ using $\beta-\Gamma$ function.	[3]	CO1
	b)	Illustrate $\beta-\Gamma$ function to find the value of $\int_0^1 x^{3/2}(1-\sqrt{x})^5\,dx$	[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