



Daffodil International University

Faculty of Science & Information Technology

Department of Computer Science and Engineering

Midterm Examination, Summer-2026

Course Code: MAT 102, Course Title: Mathematics II

Level: 01 Term: 02 Batch: 71

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 $\int_0^{\frac{\pi}{2}} \sqrt{\sin^{11}\theta \cot \theta} d\theta$.	[2]	CO1
	b)	Illustrate β - Γ function to find the value of $\int_0^1 \frac{\left(\sqrt{1-x^3}\right)^5}{\sqrt[3]{x^{-5}}} dx$.	[3]	
	c)	Demonstrate the value of $\int_0^{\infty} 13 e^{-32x^2} x^7 dx$.	[2]	
2.	a)	Identify the value of Q_{xz} . Where, $Q(x, y, z) = 2z \sin^2(xy) - \ln\left(\frac{x}{z}\right)$.	[2]	CO2
	b)	Apply Euler's theorem to show that $x \frac{\partial w}{\partial x} + y \frac{\partial w}{\partial y} + z \frac{\partial w}{\partial z} + u \frac{\partial w}{\partial u} = \frac{1}{4} \cot w$ for the function $w(x, y, z, u) = \cos^{-1}\left(\frac{\sqrt{x-2y+3z+2u}}{\sqrt[4]{x^3}-\sqrt[4]{y^3}+\sqrt[4]{z^3}+\sqrt[4]{u^3}}\right)$.	[5]	
	c)	Construct the Matrix form of, $Z = 10Z_1 - \frac{11}{3}Z_2 + 7(Z_3)^5$ where, $Z_1 = (4.2, 218^\circ)$, $Z_2 = 2e^{3.9i}$, and $Z_3 = (4 - 7i)$.	[6]	
3.		A mathematician finds a mysterious 3D chamber which is bounded by $(0 \leq x \leq \ln y^2)$, $(\pi \leq y \leq e^2)$, and $(-1 \leq z \leq 3)$. To uncover the vault's secret, the mathematician must calculate the total measure of what lies within. $V = \iiint \left(\frac{e^x z}{y^3}\right) dz dx dy$ Solve triple integration to find the exact value of V .	[5]	CO4