



Daffodil International University

Faculty of Science & Information Technology
Department of Computer Science and Engineering
Midterm Examination, Fall-2024

Course Code: MAT 102, Course Title: Mathematics II

Level: 01 Term: 02 Batch: 66

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)	Illustrate β - Γ function to calculate the exact value of $\int_0^1 \sqrt{x} (1-x^2)^3 dx$.	[3]	CO1
	b)	Demonstrate the value of $\int_0^{\pi/2} \cos^3 \theta \sin^{\frac{5}{2}} \theta d\theta$.	[3]	
	c)	Show that $\int_0^\infty \sqrt{x} e^{-2x} dx = \frac{\sqrt{\pi}}{4\sqrt{2}}$.	[2]	
2.	a)	In a gaming simulation, the score S is modeled by the function $S(x, y) = \ln(x^2 + y^2) + e^x \cos(y)$, where x represents the number of enemies defeated and y represents the number of levels completed. Identify the value of S_x , S_y and S_{yx} .	[3]	CO2
	b)	Apply Euler's theorem for the function $u = \sin^{-1} \left(\frac{x+2y+3z}{\sqrt{x^8+y^8+z^8}} \right)$ to show that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z} = -3 \tan u.$	[4]	
3.		Evaluate $\iiint_V (x+z) dy dx dz$, where V is the region of space bounded by $x=0$, $x=z^2$, $y=x$, $y=z$ and $z=2$, $z=0$.	[5]	CO4
4.		Two fluids in the complex plane are represented by the <u>vectors</u> $z_1 = 3 + 7i$ and $z_2 = -4 + 5i$. (i) Identify the resultant fluid. (ii) Construct the resultant fluid flow <u>vector</u> in both <u>polar form</u> and <u>exponential form</u> .	[1+4]	CO2

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