



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 $\int_0^{\pi/2} \cos^3 \theta \sin^5 \theta d\theta$.	[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 vectors $z_1 = 3 + 7i$ and $z_2 = -4 + 5i$.	[1+4]	CO2
	(i)	Identify the resultant fluid.		
(ii)	Construct the resultant fluid flow vector in both <u>polar form</u> and <u>exponential form</u> .			

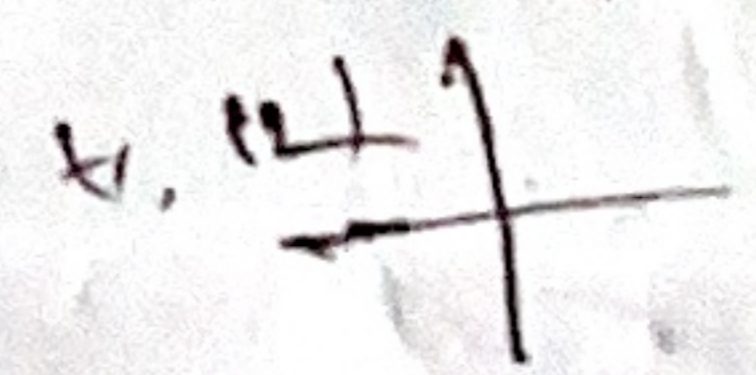
Qat 1 sta 2h
 $\frac{1 \times 1a}{2}$
 $\frac{1 \times 1a}{2}$

5x2/2
 $\frac{10 \times 5}{2}$
 $\frac{15}{2}$

li A re W
 CO2

$\frac{du}{du} = 1$

CO4



28 x/2

Sum 2, 1, A, DE