



Daffodil International University

Faculty of Science & Information Technology

Department of Computer Science & Engineering

Mid Examination, Summer 2025

Course Code: MAT101, Course Title: Mathematics I

Level: L1 Term: T1 Batch: 69

Time: 01:30 Hrs

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)	Classify the Relation is an Injective, Surjective, and Bijective Function and why:	3	CO1
	i)			
	ii)			
	iii)			
	b)	Demonstrate the Differentiability of the following function at the point $x = 2$	3	
		$f(x) = \begin{cases} \ln x; 0 < x \leq 1 \\ 0; 1 < x \leq 2 \\ 1 + x^2; x > 2 \end{cases}$		
2.		Find the solution of the inequality $\frac{x^2 - 2x - 15}{x^2 - 14x + 49} \geq 0$ using sign table.	4	CO1
3.		Apply the Factor Theorem to solve the following polynomial equation $x^4 - 6x^2 - 7x - 6 = 0$	5	CO2
4.	a)	Inspect the rate of change of y with respect to x , or $\frac{dy}{dx}$ of the function $(\cos x)^y = xy$.	3	CO3
	b)	A bike rider riding a bike on a hill road, if the equation of path is $y = \sin^{-1}\left(\frac{1-x^2}{1+x^2}\right) + (\cos x)^{e^{\ln x}}$ then, Inspect the slope of the path at $x = 0.5$	4	
	c)	If $y = e^{\ln(\cos^{-1}(\cos(10^x)))}$ and $z = x + \sqrt{x^2 + 1}$ then, Inspect the rate of change of z with respect to y , or $\frac{dz}{dy}$.	3	