



Daffodil International University

Faculty of Science & Information Technology
Department of Computer Science & Engineering
Mid Examination, Summer 2025

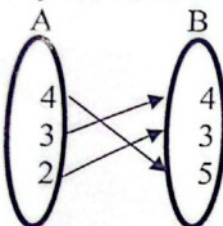
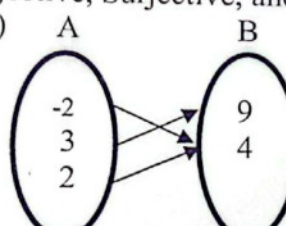
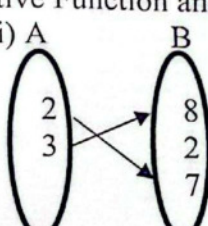
Course Code: MAT101, Course Title: Mathematics I
Level: L1 Term: T1 Batch: 69

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.	<p>a) Classify the Relation is an Injective, Surjective, and Bijective Function and why:</p> <p>i) </p> <p>ii) </p> <p>iii) </p>	3	CO1
	<p>b) Demonstrate the Differentiability of the following function at the point $x = 2$</p> $f(x) = \begin{cases} \ln x; 0 < x \leq 1 \\ 0; 1 < x \leq 2 \\ 1 + x^2; x > 2 \end{cases}$	3	
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.	<p>a) Inspect the rate of change of y with respect to x, or $\frac{dy}{dx}$ of the function $(\cos x)^y = xy$.</p>	3	CO3
	<p>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 $x = 0.5$</p>	4	
	<p>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 $\frac{dz}{dy}$.</p>	3	