



Daffodil International University

Faculty of Science & Information Technology

Department of Computer Science & Engineering

Final Examination, Summer 2026

Course Code: MAT101, Course Title: Mathematics I

Level: 1 Term: 1 Batch: 72

Time: 2:00 Hrs

Marks: 40

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)	Construct the following rational fraction into the partial fraction $\frac{x}{(x^2-4)(x^2+3)(x+4)}$	[6]	CO2
	b)	Construct the following rational fraction into the partial fraction $\frac{-4x^4}{x^3+x^2-56x}$	[4]	
2.		A laptop manufacturer in Dhaka launches a new laptop model. The profit function, measured in thousands of dollars, gives the profit from selling x units.: $f(x) = 3x^5 - 15x^4 + 20x^3 + 5$ (i) List the critical points of the profit function. (ii) Examine the maximum and minimum profit values using the derivative tests.	[5]	CO3
3.	a)	Simplify the following integrals (i) $\int \frac{x}{x^3-2x^2-3x} dx$ (ii) $\int \frac{1}{(1+x^2)\sqrt{1-x^2}} dx$	[5] [5]	CO4
	b)	Let the function $f(x) = \frac{\sin^2 x}{\sin x + \cos x}$ represent a rate of thermal exchange along a thin rod. Inspect the total accumulated exchange from $x = 0$ to $x = \frac{\pi}{2}$	[5]	
	c)	Consider the parabola given by the equation $x^2 = y$ and the line $y = x + 2$. Examine the area of the region bounded by the parabola and the line.	[5]	
4.		Assume $\phi = x^4 yz i + y^3 z^3 x j + x^3 k$ then inspect the value of $\nabla \cdot (\nabla \times \phi) = 0$.	[5]	