



Daffodil International University

Faculty of Science & Information Technology

Department of Computer Science & Engineering

Final Examination, Spring 2026

Course Code: MAT101, Course Title: Mathematics I

Level: 1 Term: 1 Batch: 71

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 $\frac{x^3}{(x^2 + 2)(x^2 + 1)}$	[6]	CO2
	b)	Construct the following rational fraction into the partial fraction $\frac{x^2}{x^2 - x - 132}$	[4]	
2.		A smartphone manufacturer in Dhaka produces a new model. The profit function (in thousand dollars) from selling x hundred units is: $f(x) = x^5 - 25x^4 + 125x^3 + 500$ 1. List the critical points of the profit function. 2. Examine the maximum and minimum profit values using the derivative tests.	[5]	CO3
3.	a)	Simplify the following integrals (i) $\int \cos^5 x dx$ (ii) $\int \frac{1}{1 + \sin^2 x} dx$ (iii) $\int_0^{\pi/2} \frac{\sin x}{\sin x + \cos x} dx$	[5] [5] [5]	CO4
	b)	Consider the circle given by the equation $x^2 + y^2 = 36$ and the vertical line $x = -3$. Examine the largest area of the region bounded by the circle and the line.	[5]	
4.		Assume $\phi = x^2 y^2 + y^2 z^2 + z^2 x^2$ then inspect the value of $\nabla \times (\nabla \phi)$.	[5]	