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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 $\varphi=x^2y^2+y^2z^2+z^2x^2$ then inspect the value of $\nabla\times(\nabla\varphi)$.	**[5]**	