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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) $\int \frac{x}{x^3-2x^2-3x}dx$	[5]	CO4
		(ii) $\int \frac{1}{(1+x^2)\sqrt{1-x^2}}dx$	[5]	
	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 $\varphi=x^4yzi+y^3z^3xj+x^3k$ then inspect the value of $\nabla.(\nabla\times\varphi)=0$.	[5]	