Daffodil International University

Faculty of Science & Information Technology

Department of Computer Science & Engineering

Final Examination, Summer 2025

Course Code: MAT101, Course Title: Mathematics I

Level: 01 Term: 01 Batch: 69

Time: 02:00 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 $\frac{2x^3}{x^2-x-30}$	**4**	**CO2**
	b)	Construct the following rational fraction into the partial fraction $\frac{x-2}{(x^2+1)(x-3)^2}$	**6**	
2.		A manufacturer produces a certain product, and the profit (in thousands of dollars) from selling x units of the product is modeled by the function: $f(x)=4x^5-5x^4-20x^3+50x^2-40x$ Where x represents the number of units (in hundreds) sold. 1. List the critical points of the profit function. 2. Examine the maximum and minimum profit values using the derivative test.	**5**	**CO3**
3.	***a)***	Simplify the following integrals (i) $\int \frac{2x^3}{18x+2x^3}dx$ (ii) $\int e^{-4x}\cos 3x dx$	**5+5**	**CO4**
	b)	Consider the circle given by the equation $x^2+y^2=a^2$ and the vertical line $y=c$ $(-a<c<0)$.Examine the largest area of the region bounded by the circle and the line.	**5**	
	c)	Examine the total accumulated value of $f(x)=\frac{\cos^3 x}{\sin x+\cos x}$ from $x=0$ to $x=\frac{\pi}{2}$	**5**	
4.		Assume the Scalar $\varphi(x,y,z)=x^3y-y^3z+z^3x$ then conclusion that $\nabla.(\nabla\varphi)=\nabla^2\varphi$.	**5**	