ourdiu.com | Shared by MD. ABDUR RAFI

Daffodil International University

Faculty of Science & Information Technology
Department of Computer Science and Engineering
Final Examination, Fall-2024
Course Code: MAT101, Course Title: Mathematics I
Level: 1 Term: 1 Batch: 67

Time: 2 Hours **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 $\frac{x^2-5x+2}{x(x^2+9)(x-3)^2}$	[6]	CO2
	b)	Construct the following rational fraction into the partial fraction $\frac{x^3+7}{x^2-x-20}$	[4]	
2.		Analyze the maximum and the minimum value of the function. $f(x) = x^5 - 4x^4 + 6x^3 - 4x^2 + x$	[5]	CO3
3.	a)	Simplify the following integrals (i) $\int e^{-3x} \sin 7x \, dx$ (ii) $\int (sin^2x + cos^3x)dx$ (iii) $\int_0^{\frac{\pi}{2}} \frac{\sin^3 x}{\sin x + \cos x} \, dx$	[4] [4] [5]	CO4
	b)	Consider the ellipse given by the equation $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ and the vertical line $x = c$, *where* $0 < c < a$. Examine the largest area of the region bounded by the ellipse and the line.	[6]	
4.		Assume the vector $\vec{A} = (6xy + z^3)\hat{\imath} + (3x^2 - z)\hat{\jmath} + (3xz^2 - y)\hat{k}$, then examine that the vector is irrotational (i.e. Curl $\vec{A} = 0$). Also simplify the Divergence of $\vec{A}$.	[6]	