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Daffodil International University

Department of Computer Science and Engineering
Faculty of Science & Information Technology
Final Examination, Fall-2023
Course Code: MAT101, Course Title: Mathematics I
Level: 1 Term: 1 Batch: 65

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)~~	Find the partial fractions of the following rational fraction $\frac{2x-3}{(x+4)(x^2+7)}$	6	CO2
	b)	Find the partial fractions of the following improper fraction $\frac{2x^3-3x-7}{x^2+4x-5}$	4	
2.	~~a)~~	Identify the maximum and the minimum value of the function $f(x) = 2x^3 - 15x^2 + 36x + 10$	6	CO3
	~~b)~~	Solve the derivative $\frac{d}{dx}\left(\sin^{-1}\left(e^{\cot^{-1}x}\right)\right)$	4	
3.	a)	Solve the following integrals ~~(i)~~ $\int x^2 sin3x\, dx$ (ii) $\int \frac{e^x(1+x)}{cos^2(xe^x)} dx$ (iii) $\int_0^{\frac{\pi}{2}} \frac{dx}{1+\cot x}$	5 4 4	CO4
	b)	Identify the area of an ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ by using integration. Then deduce the area if $a^2 = 25$ *and* $b^2 = 4$.	7	