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Daffodil International University

Department of Software Engineering
Faculty of Science & Information Technology
Final Examination, Spring 2024
Course Code: MAT-101; Course Title: Mathematics-I

Sections-A-M **Teachers: KK, MMH, MMR**
Time: 2 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) Compare** the following integral problems with the existing integral laws and hence derive them $\int (2x-3)^{-3}dx, \int e^{5x-2}dx, \int \frac{1}{x+3}dx, \int \frac{2}{(2x)^2+3}dx, \int 5dx$	[5]	CLO-1 *Level-2*
	b) What do you mean by Partial differentiation? If you understand it then **compute**, $\frac{\partial^2 u}{\partial x^2}+\frac{\partial^2 u}{\partial y^2}+\frac{\partial^2 u}{\partial z^2}$, where $u = \left(x^2+y^2+z^2\right)^{\frac{1}{2}}$	[5]	
2.	**a) Apply** the Euler theorem to **prove** $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}=\frac{1}{2}sin2u$, where, $u = tan^{-1}\frac{x^2+y^2}{x-y}$	[5]	CLO-2 *Level-3*
	b) We have an area bounded by the curves $y = e^x, y = e^{2x}$ and the lines $x = 0$ *and* $x = ln2$. **Investigate** the above problem to find the area with the application of integration.	[5]	

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3.	**Determine** the integral value of the following integrals $\int_0^{\pi} \frac{a\cos^3 x + b\sin^3 x}{\cos^2 x \sin^2 x} dx, \int_{-1}^{2} \frac{dx}{(x+3)\sqrt{x^2-6}}, \int_0^{\pi} e^{2x} \sin x dx,$ $\int_0^3 \frac{dx}{(1+x^2)\{9+(\tan^{-1}x)^2\}}, \int_{-1}^{2} \frac{2x^2+3}{(x^2+2)(x-7)} dx.$	[15]	CLO-2 *Level-3*
4.	What do you mean by multiple integration? **Compute** the following integral with the concept of multiple integrals. $\int_1^2 \int_{-2}^{4} \int_0^{2y} (4x - 2yz) dz dx dy$	[5]	CLO-1 *Level-2*