



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
Marks: 40

Time: 2 Hrs

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.	<p>a) Compare the following integral problems with the existing integral laws and hence derive them</p> $\int (2x - 3)^{-3} dx, \int e^{5x-2} dx, \int \frac{1}{x+3} dx, \int \frac{2}{(2x)^2+3} dx, \int 5 dx$	[5]	CLO-1 Level-2
	<p>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</p> $u = (x^2 + y^2 + z^2)^{-\frac{1}{2}}$	[5]	
2.	<p>a) Apply the Euler theorem to prove</p> $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \frac{1}{2} \sin 2u, \text{ where, } u = \tan^{-1} \frac{x^2+y^2}{x-y}$	[5]	CLO-2 Level-3
	<p>b) We have an area bounded by the curves $y = e^x, y = e^{2x}$ and the lines $x = 0$ and $x = \ln 2$.</p> <p>Investigate the above problem to find the area with the application of integration.</p>	[5]	

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