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Daffodil International University

Department of Software Engineering
Faculty of Science & Information Technology
Final Examination, Fall 2024
Course Code: MAT 101 ; Course Title: Mathematics I
Sections & Teachers: All

Time: 2:00 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)	Describe inflection point with example.	[Marks-01]	CLO-1 Level-2
	b)	Classify the maxima-minima of the function: $f(x) = \frac{1}{6}x^6 - 12x^5 + 36x^4 + 6$	[Marks-06]	
2.	a)	If $u = ln\sqrt{(x^2 + y^2 + z^2)}$, then express $(x^2 + y^2 + z^2)\left(\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2}\right) = 1.$	[Marks-04]	CLO-1 Level-2
	b)	Explain Euler's theorem. Also using it express $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = \frac{1}{4}sin2u$, when $u = \tan^{-1}(\frac{x+y}{\sqrt{x}+\sqrt{y}})$.	[Marks-04]	
3.	a)	Solve the following integrals: i. $\int cosx\ cos4x\ cos5x\ dx$ ii. $\int \frac{\tan x sec^2 x}{a^2+b^2 tan^2 x} dx$ iii. $\int (\sin^{-1} x)^2 dx$ iv. $\int_0^{\pi} \frac{dx}{2+cosx}$.	[Marks-2.5×4=10]	CLO-2 Level-3
4.	a)	Examine the area of the circle: $x^2 + y^2 = 16$.	[Marks-05]	CLO-2 Level-3
5.	a)	Using Gamma-Beta function analyze the followings: i. $\int_0^1 x^{\frac{5}{2}}(1-x)^{\frac{3}{2}} dx$ ii. $\int_0^{\frac{\pi}{2}} \sin 2x\ cos^6 x\ dx$	[Marks-2×5=10]	CLO-3 Level-4

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