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Daffodil International University

Faculty of Science & Information Technology
Department of Software Engineering
Final Examination, Fall 2025
Course Code: MAT101
Course Title: Mathematics I
Batch: 45; Section: All
Teachers Initial: MMR (AKA), DMMK, DK, HSA, NRA, AAR

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.	**Explain** the following terms a. Condition of a function to have maximum & minimum values. b. Condition of a function to have inflection point.	$2.5 \times 2.5=5$	CLO-1 L-2
2.	**Compute** the maximum and minimum values of $y = x^6 - 12x^5 + 36x^4 + 4$ Also, **identify** the critical points and inflection points (if any), of the above function.	6+2+2=10	
3.	**Calculate** the followings: a. $\int \frac{(1+x)e^x}{\cos^2(xe^x)}\, dx$ b. $\int Sin^4x\, dx$ c. $\int_0^{\frac{\pi}{2}} sin2x\, sinx\, dx$ d. $\int_0^2 \int_0^z \int_0^{x\sqrt{3}} \frac{x}{x^2+y^2}\, dy\, dx\, dz$ e. $\int_0^1 x^4(1-x)^{\frac{3}{2}}\, dx$	$5 \times 3=15$	CLO-2 L-3
4.	a. **Calculate** the area of the circle $x^2 + y^2 = a^2$ b. **Calculate** the area of the region enclosed by the curve $y^2 = 4ax$ from $x = 0$ and $x = a$.	6 4	CLO-3 L-4