

261-35-018



Daffodil International University

Faculty of Science & Information Technology

Department of Software Engineering

Final Examination, Summer 2026

Course Code: MAT101; Course Title: Mathematics I

Batch: 47; Section: A-II; Teachers Initial: MMH, SST, AMS

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. Geometrical Concept of Critical Point. b. Geometrical Concept of Integration.	$2 \times 2 = 4$	
2.	a. Compute the maximum/minimum value of the following function $f(x) = \frac{\log x}{x}$ b. A garden is to be laid out in a rectangular area and protected by a chicken wire fence. Compute the largest possible area of the garden if only 100 running feet of chicken wire is available for the fence. c. Compute the critical points of the following function. Identify the intervals on which y is increasing and decreasing, concave up and concave down. Also find the inflection points, if any, of the above function. $y = 3x^4 + 4x^3 - 12x^2 - 2$	3 $4 \times 2 = 8$	CLO-1 L-2
3.	Calculate the followings: a. $\int \sin^4 x \, dx$ b. $\int_1^e \frac{(x+1)(\ln x+x)^3}{x} \, dx$ c. $\int_0^{1-x} \int_0^{2-x} xy \, dx \, dy$ d. $\int_0^\pi x \sin^6 x \cos^4 x \, dx$ e. $\int \frac{\tan x}{\sec x + \tan x} \, dx$	$3 \times 5 = 15$	CLO-2 L-3
4.	a. Identify the area of the circle $x^2 + y^2 = 25$. b. Identify the area enclosed between the circle $x^2 + y^2 = 8x$ and the curve $y = 2\sqrt{x}$.	5 5	CLO-3 L-4