



Daffodil International University

Faculty of Science & Information Technology

Department of Software Engineering

Final Examination, Summer 2025

Course Code: MAT101

Course Title: Mathematics I

Batch: 44; Section: A-L

Teachers Initial: MMH, DMMK, MIA, GRS

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 geometrically a. Saddle point b. Inflection point	2 × 2=4	
2.	a. An open box is to be made from a 16-inch by 30-inch piece of cardboard by cutting out squares of equal size from the four corners and bending up the sides. Compute the size of the squares to obtain a box with the largest volume. b. Compute the intervals on which y is increasing and decreasing $y = 3x^4 + 4x^3 - 12x^2 - 2$ Also compute the inflection points, if any, of the above function.	5 x x 6	CLO-1 L-2
3.	Calculate the followings: a. $\int \frac{(1+x)e^x}{\cos^2(xe^x)} dx$ b. $\int \frac{\sin 2x}{a \sin^2 x + b \cos^2 x} dx$ c. $\int_0^{\frac{\pi}{2b}} e^{ax} \cos bx dx$ d. $\int_0^2 \int_0^z \int_0^{x\sqrt{3}} \frac{px}{x^2+y^2} dy dx dz$ e. $\int_0^{\infty} \frac{x^3}{(1+x^2)^{\frac{9}{2}}} dx$	5 × 3=15	CLO-2 L-3
4.	a. Identify the area of the ellipse $b^2x^2 + a^2y^2 = a^2b^2$ b. Identify the area of the region enclosed between the parabola $y = \frac{3x^2}{4}$ and the line $3x - 2y + 12 = 0$.	5 5	CLO-3 L-4