



Daffodil International University

Faculty of Science & Information Technology

Department of Software Engineering

Final Examination, Fall-2025

Course Code: MAT 102; Course Title: Mathematics II

Sections & Teachers: (A-K) ZT, NRA, DK, MMH

Time: 2:00 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.	a) Explain geometrically that the complex number is two dimensional. b) Describe the nature of the arguments of all purely imaginary numbers. c) Extend the idea of harmonic function with an example. d) Describe the Fourier series for even and odd function.	4 × 2=8	CLO-1 Level-2
2.	a) Identify all the sixth roots of the following complex number z and locate them in the complex plane, where z is: $z = \frac{1}{2i^3} (1 - i)^2$	5	CLO-2 Level-4
	b) Examine whether the following function $f(z)$ is analytic or not; if it is analytic, then identify $f'(z)$ $f(z) = ze^{-z} + 1 ; z = x + iy$	5	
3.	a) Construct the complex function $f(z) = u + iv$, where u is given below $u(x, y) = \frac{1}{2} \ln(x^2 + y^2) + \frac{1}{10} \ln e^{py}$	8	CLO-3 Level-3
	b) Compute the polar form and exponential form of the following complex number, where z is: $z = -1 - \sqrt{3}i$	4	
4.	a) A web server shows two different types of load behavior within each daily cycle. The server-load signal function $f(x)$ over one period $[-\pi, \pi]$ is defined as: $F(x) = \begin{cases} \pi, & -\pi \leq x < 0 \\ x^3, & 0 \leq x \leq \pi \end{cases}$ Detect the Fourier series of the load signal function $F(x)$	6	CLO-4 Level-4
	b) Identify the Fourier cosine transform of the following function: $F(x) = \sin(mx), 0 < x < \pi$	4	