



Daffodil International University

Faculty of Science & Information Technology

Department of Software Engineering

Final Examination, Spring-2026

Course Code: MAT 102; Course Title: Mathematics II

Sections & Teachers: (A-L) MMH, ZT, DMMK, RAR, MSIM

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 the argument of a complex number in all quadrants. b) Describe the geometric meaning of conjugate of a complex number. c) Describe why a harmonic function (non-constant) can't have a local maximum inside a region. d) Describe the Fourier series for even and odd function.	4 × 2 = 8	CLO-1 Level-2
2.	a) Identify all the 5th roots of the following complex number z and locate them in the complex plane, where z is: $z = \left(\frac{2+i}{3-i}\right)^2$	5	CLO-2 Level-4
	b) Examine whether the following function $f(z)$ is analytic or not; if it is analytic, then identify $f'(z)$ $f(z) = \frac{z}{ z }; \quad z = x + iy$	5	
3.	a) Construct the complex function $f(z) = u + iv$, where u is given below $u(x, y) = 2x + 3xy^2 - x^3 + \frac{1}{2} \ln e^x$	6	CLO-3 Level-3
	b) Compute the Fourier series (upto 5th terms) of the following function: $F(x) = \pi x^2; \quad -\pi < x < \pi$	6	
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: $F(x) = \begin{cases} \sin(nx) & , \quad -\pi < x < 0 \\ x^2 & , \quad 0 < x < \pi \end{cases}$ Detect the Fourier series of the load signal function $F(x)$	5	CLO-4 Level-4

	d)	Identify the solution of the following system of linear equations $\begin{aligned}x + y - 2z + s + 3t &= 1 \\2x - y + 2z + 2s + 6t &= 2 \\3x + 2y - 4z - 3s - 9t &= 3\end{aligned}$		
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