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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.		$4 \times 2 = 8$	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 $f'(z)$ $f(z) = \frac{z}{\lvert z \rvert};\ z = x + iy$	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: $F(x) = \pi x^2;\ -\pi < x < \pi$	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: $F(x) = \begin{cases} \sin(nx) & , -\pi < x < 0 \\ x^2 & , 0 < x < \pi \end{cases}$ **Detect** the Fourier series of the load signal function $F(x)$	5	CLO-4 *Level-4*

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	b)	**Identify** the solution of the following system of linear equations $x + y - 2z + s + 3t = 1$ $2x - y + 2z + 2s + 6t = 2$ $3x + 2y - 4z - 3s - 9t = 3$	5	