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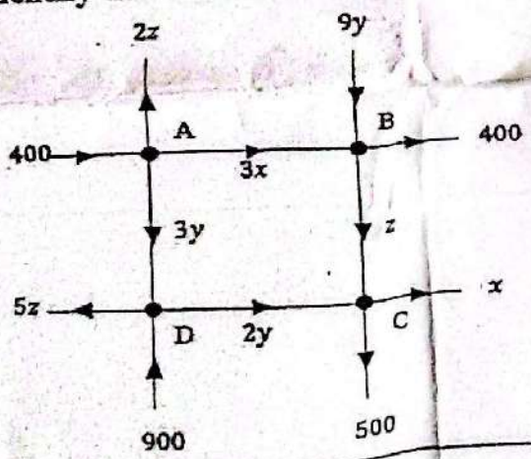
Daffodil International University

Department of Software Engineering
Faculty of Science & Information Technology
Final Examination, Spring-2025
Course Code: MAT 102; Course Title: Mathematics II
Sections: A-Q & Teachers: MMH, MIA, NA, MNM

Time: 2:00 Hrs **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.		i. **Explain** Modulus & Argument geometrically. ii. **Describe** the Analytic function with example. iii. **Extend the idea** of the Harmonic function with example. iv. **Describe** the nature of a of Fourier series if the function is even.	4 × 2=8	CLO-1 *Level-2*
2.	a)	**Determine** z^3 by applying the De Moiver's theorem and, **plot** it in the complex plane alone with z, where z is: $z = i^4 + \sqrt{3}i^3$	4+1=5	CLO-2 *Level-3*
	b)	**Calculate** the Fourier series of the following function: $F(x) = x^2 \cos(nx)\ ,\quad -\pi \le x \le \pi$	5	
3.	a)	**Examine** whether the following function u is harmonic or not; if it is harmonic, then **Construct** the conjugate harmonic function v. **Complete** the complex variable $f(z) = u + iv$ $u(x, y) = 2x + 12xy - x^3 + 3xy^2 + p$	3+4+1=8	CLO-3 *Level-3*
	b)	**Determine** whether the following function $f(z)$ is analytic or not; if it is analytic, then **Calculate** $f'(z)$ $f(z) = e^{z^4}\ ;\ z = x + iy$	4	
4.	a)	**Identify** the Fourier cosine transform of the following function: $F(x) = sin(kx),\ 0 < x < \pi$	4	
	b)	The following diagram describes the traffic flow of a congested area of a city on some day. Construct the system of linear equations from this scenario. Then, **Identify** the solution of the system for the unknown flow rates. 	6	CLO-4 *Level-4*