

International Islamic University Chittagong (IIUC)  
 Department of Electronic and Telecommunication Engineering (ETE)  
**Midterm Examination**

Program: **B.Sc (Engg.)**  
 Course Code: **Math-2407**  
 Total Marks: **30**

Semester: **Autumn 2023**  
 Course Title: **Complex Variable, Higher Trigonometry and Random Process**  
 Time: **1 Hour 30 Minutes**

- (i) Answer all the questions. The figures in the right-hand margin indicate full marks.  
 (ii) Course Learning Outcomes (CLOs) and Bloom's Levels are mentioned in additional Columns.

**Course Learning Outcomes (CLOs) of the Questions**

- CLO1** analyze the basic idea of complex variable, higher trigonometry & random process, complex functions.
- CLO2** The advancement of the knowledge of Complex variables, higher trigonometry & random process, complex functions, are implemented in engineering problem interpretation and applicability by using the mathematical formulations.

**Bloom's Levels of the Questions**

Letter Symbols	R	U	Ap	An	E	C
Meaning	Remember	Understand	Apply	Analyze	Evaluate	Create

Q1.	a)	Define complex number and imaginary number with examples.  Express $\frac{4+6i}{2-5i}$ in the form $r(\cos\theta+i\sin\theta)$ .	CLO1	R,U	5
	b)	Apply the De-Moiver's theorem and express $\frac{(\cos\theta+i\sin\theta)^{12}}{(\sin\theta+i\cos\theta)^6}$ in the form $(x+iy)$ .	CLO1	Ap	5
Q2.	a)	State and prove De-Moiver's theorem.	CLO1	E	5
	b)	Apply the De-Moiver's theorem to solve the equation $x^4 + i = 0$	CLO1	Ap	5
<b>OR</b>					
Q2.	a)	Discuss geometrical representation of imaginary number. What is argand diagram?	CLO1	R,U	5
	b)	Apply the Cauchy-Riemann equations, show that $f(z) = Z^2$ is analytic in the entire Z-plane.	CLO1	Ap	5
Q3.	a)	Define analytic function with examples. Apply the Cauchy-Riemann equations, show that $f(z) = Z^3$ is analytic in the entire Z-plane.	CLO1	Ap	5
	b)	Define harmonic function with examples. Show that the function $e^{3x}(\cos y + i \sin y)$ is an analytic function, find its derivative.	CLO1	An	5