

# International Islamic University Chittagong (IIUC)

## Department of Electronic and Telecommunication Engineering

### Final Examination

Program: **B.sc (Engg.)**  
 Course Code: **PHY-1101**  
 Total Marks: **50**

Semester: **Spring 2023**  
 Course Title: **Physics - I**  
 Time: **2 Hours 30 Minutes**

<b>(i) Answer all questions. The figures in the right-hand margin indicate full marks.</b> <b>(ii) Course Outcomes (COs) and Bloom's Levels are mentioned in additional Columns.</b>						
Course Outcomes (COs) of the Questions						
<b>CLO1</b>	Demonstrate an understanding of mechanics, waves, optics, heat and thermodynamics					
<b>CLO2</b>	Apply basic physics laws and formulae to complex cases like; Fly wheel, Elastic bending, forced oscillation, Compound Pendulum, Heat engine, Polarization etc.					
Bloom's Levels of the Questions						
Letter Symbols	R	U	Ap	An	E	C
Meaning	Remember	Understand	Apply	Analyse	Evaluate	Create

PART A						
<b>Q1.</b>	a)	Explain your idea on surface energy.	CLO1	R	1	
	b)	Prove that surface tension can be considered as free energy of the liquid surface.	CLO2	An	6	
	c)	The Surface energy of a soap film is 20 joules and surface tension is $2.2 \times 10^{-3} \text{ Nm}^{-1}$ . Calculate the heat lost by the film due to surface tension.	CLO2	Ap	3	
<b>Q2.</b>	a)	Illustrate your idea on viscosity.	CLO1	R	2	
	b)	Derive the relation $p + \frac{1}{2} \rho v^2 = C$ , where the symbols hold corresponding meanings.	CLO2	An	6	
	c)	The value of dynamic pressure is $18 \text{ Nm}^{-2}$ if a liquid is flowing through a horizontal pipeline with a velocity $66 \text{ ms}^{-1}$ . Find the density of the liquid.	CLO2	Ap	2	
OR						
<b>Q2.</b>	a)	Explain critical velocity.	CLO1	U	2	
	b)	Determine the equation of coefficient of viscosity from Stokes' formula.	CLO2	An	6	
	c)	A fluid of density $1000 \text{ Kg m}^{-3}$ is flowing through a narrow pipeline of inner radius 1.1 cm. If the value of coefficient of viscosity of the fluid is 140, determine the value of critical velocity.	CLO2	Ap	2	
PART B						
<b>Q3.</b>	a)	Illustrate your idea on phase of a wave.	CLO1	U	2	
	b)	Prove that oscillation of a weightless spring can be treated as simple harmonic motion.	CLO2	An	6	
	c)	A particle of mass 2gm is oscillating in simple harmonic motion. If the force constant of the medium is 14 and the amplitude of oscillation is 2 cm, determine the energy applied on the particle.	CLO2	Ap	2	
<b>Q4.</b>	a)	What do you understand by thermodynamic system? Depending on interaction with boundary, how many types of systems are possible?	CLO1	R	1+1	
	b)	Explain zeroth law of thermodynamics.	CLO1	U	2	

	c)	Explain isothermal process with necessary figure and equations.	CLO1	An	4
	d)	A Carnot engine has an efficiency of 33%, its temperature at source is $120^{\circ}\text{C}$ . Find the temperature of the sink.	CLO2	Ap	2
<b>OR</b>					
<b>Q4.</b>	a)	State 2 <sup>nd</sup> law of thermodynamics. "Molar specific heat of gas at constant pressure is always smaller than molar specific heat of gas at constant volume". Judge the statement and write your comment on that statement.	CLO1	U+ E	2+5
	b)	Find the efficiency of a Carnot's engine working between $127^{\circ}\text{C}$ and $27^{\circ}\text{C}$ . It absorbs 80 calories of heat. How much heat is rejected?	CLO2	An	3
<b>Q5.</b>	a)	Explain interference of light, in your own words.	CLO1	U	2
	b)	Prove that energy is conserved during interference of light.	CLO2	An	6
	c)	Mention some differences between Fresnel and Fraunhofer diffraction.	CLO1	An	2