

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

**Program:** B.Sc. (Engg) in ETE

**Course Code:** PHY-1101

**Time:** 2 hours 30 minutes

**Semester:** Spring 2024

**Course Title:** Physics-I

**Full Marks:** 50

(i) Answer all the questions. The figures in the right-hand margin indicate full marks.

(ii) Course Outcomes (COs) and Bloom's Level are mentioned in additional Column.

Course Outcomes (COs) of this course	
<b>CO1</b>	Demonstrate an understanding of mechanics, waves, optics, heat and thermodynamics
<b>CO2</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 Level of the Questions						
Letter Symbols	R	U	Ap	An	E	C
Meaning	Remember	Understand	Apply	Analysis	Evaluate	Create

**Part A**

[1]	(a)	Illustrate your idea on Angle of contact.	U	CO1	2
	(b)	Explain molecular theory of surface tension in details.	An	CO2	6
	(c)	A capillary tube with an inner radius of 0.5 mm is dipped into water and results in a rise of water by 11 mm within the tube from the liquid surface. Estimate the value of surface tension of water.	Ap	CO2	2
[2]	(a)	Illustrate your idea on streamline motion.	U	CO1	2
	(b)	Derive the equation $\frac{v^2}{2} + gh + \frac{P}{\rho} = C$ , where the symbols have their usual meaning.	An	CO2	6
	(c)	An orifice is set at a height of 5 cm from the bottom of a container filled with oil. If the height of the oil surface from the bottom is 55 cm, estimate the value of velocity efflux through the orifice.	Ap	CO2	2
		<b>OR</b>			
[2]	(a)	Express your idea on critical velocity.	U	CO1	2
	(b)	Derive expression for terminal velocity of a fluid from Stoke's formula.	An	CO2	6
	(c)	A fluid of density 1000 Kg <sup>m</sup> <sup>-3</sup> is flowing through a narrow pipeline of inner radius 1.2 cm. If the value of coefficient of viscosity of the fluid is 170, determine the value of critical velocity.	Ap	CO2	2

		<b>Part B</b>			
[3]	(a)	Illustrate your understanding on phase of a particle in simple harmonic motion.	R	CO1	2
	(b)	Prove that total energy of a particles in simple harmonic motion is $\frac{1}{2}KA^2$ .	An	CO2	6
	(c)	A weightless spring suspended from ceiling is weighted by 100 gm ball and extended by 4 cm at the free end. If the ball is pulled down by 3 cm and allowed for oscillation, estimate the time period of the spring.	AP	CO2	2
[4]	(a)	What do you understand about thermodynamic system? Mention some types of thermodynamic systems.	R	CO1	2
	(b)	Explain isothermal and adiabatic process in detail.	An	CO2	6
	(c)	At 350 <sup>0</sup> K, a gas in a system attains an increase in volume by 30 mm <sup>3</sup> . Calculate the amount of work done by the gas in the system. Consider n=500.	Ap	CO2	2
		<b>OR</b>			
[4]	(a)	Sketch heat engine and refrigerator as block diagram.	U	CO1	2
	(b)	Derive the relation $W = R \log \frac{V_2}{V_1} [T_1 - T_2]$ , where the symbols correspond to terms related to Carnot heat engine.	An	CO2	7
	(c)	A Carnot engine has efficiency 33 % , it's temperature at sink is 37 <sup>0</sup> . Find the temperature of the source.	Ap	CO2	1
[5]	(a)	Elaborate on polarization of light.	U	CO1	2
	(b)	Explain the process of plane polarized light by reflection process.	An	CO2	3
	(c)	State and explain Brewster's law for polarization of light.	An	CO2	3
	(c)	Prove that light waves are transverse waves.	An	CO2	2