International Islamic University Chittagong (IIUC)

Department of Electronic and Telecommunication Engineering (ETE)

Final Examination

Program: B.Sc. (Engg) in ETE
Course Code:PHY-1101
Time: 2 hours 30minutes

Semester: Autumn 2023
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	
CO1	Demonstratean understanding of mechanics, waves, optics, heat and thermodynamics
CO2	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	**R**emember	**U**nderstand	**Ap**ply	**An**alysis	**E**valuate	**C**reate

Part A

[1]	(a)	Illustrate your idea on capillarity.	**U**	**CO1**	**2**
	(b)	Derive the expression $\mathbf{T} = \frac{r\left[h+\frac{r}{3}\right]\rho.g}{2}$, where the symbols have their usual meanings.	**An**	**CO2**	**6**
	(c)	Mention some examples of capillarity.	**U**	**CO1**	**2**
[2]	(a)	Explain streamline motion of fluid in brief.	**U**	**CO1**	**2**
	(b)	Derive the equation of continuity for fluid in streamline motion.	**An**	**CO2**	**6**
	(c)	An incompressible liquid of density 1400 kgm^{-3} is flowing through a horizontal pipeline in streamline motion at a speed of7 ms^{-1}. What is the value of dynamic pressure?	**Ap**	**CO2**	**2**
		OR			
[2]	(a)	Explain the various forms of energy possessed by the liquid in motion? Prove oan expression for the terminal velocity of a spherical ball falling under gravity through a viscous fluidusing Stoke's law.	**U,E**	**CO1**	**2+5**
	(b)	Calculate the limiting velocity of a rain drop, where diameter = 10^{-3} m density of air relative to water = 1.3×	**An**	**CO2**	**3**

		10^{-3}, coefficient of viscosity of air = $1.81 \times 10^{-5} N/m$ and density of water tension of mercury is $10^{-3} Kg/m^3$			
	(c)	A fluid of density 1100 Kgm^{-3} is flowing through a narrow pipeline of inner radius 1.5 cm. If the value of coefficient of viscosity of the fluid is 140, determine the value of critical velocity.	**Ap**	**CO2**	**2**
		Part B			
[3]	(a)	Illustrate your understanding on simple harmonic motion.	**R**	**CO1**	**2**
	(b)	Prove that $x = A \sin(\omega t + \delta)$ is a solution to the differential equation of simple harmonic motion.	**An**	**CO2**	**6**
	(c)	A particle in S.H.M is oscillating with amplitude 2m. If the energy of the particle is 80 Joule,determine the force constant of the medium.	**AP**	**CO2**	**2**
[4]	(a)	What do you understand about thermodynamic process? Mention some processes with required condition.	**R**	**CO1**	**1+2**
	(b)	Explain first law of thermodynamics in detail.	**U**	**CO1**	**5**
	(c)	Show that the coefficient of performance of refrigerator can be much higher than 100 %.	**An**	**CO2**	**2**
		OR			
[4]	(a)	Elaborate on reversible process with example.	**U**	**CO1**	**2**
	(b)	Sketch Carnot heat engine and describe different parts.	**U**	**CO1**	**5**
	(c)	A Carnot engine has efficiency 30 % , it's temperature at source is 107^0. Find the temperature of the sink.	**Ap**	**CO2**	**3**
[5]	(a)	Elaborate on coherent sources of light.	**U**	**CO1**	**2**
	(b)	Derive the expression $I = 4a^2 cos^2 \frac{\delta}{2}$, where the symbols have their usual meaning.	**An**	**CO2**	**6**
	(c)	Find the angle at which a light can be polarized while reflecting from a crystal of refractive index 1.7.	**Ap**	**CO2**	**2**