Bismillahir Rahmanir Raheem

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

Program: B.Sc. (Engg) in ETE   **Semester:** Autumn 2024
Course Code: PHY-1101   **Course Title:** Physics-I
Time: 2 hours 30 minutes   **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	Demonstrate an 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 surface energy.	U	CO1	2
	(b)	Derive the expression $T = \dfrac{r\left[h+\frac{r}{3}\right]\rho.g}{2}$ where the symbols have their usual meaning.	An	CO2	6
	(c)	Mention some examples of capillarity.	U	CO1	2
[2]	(a)	Illustrate your idea on viscosity.	U	CO1	2
	(b)	Derive the equation $P + \frac{1}{2}\rho v^2 = C$, where the symbols have their usual meaning.	An	CO2	6
	(c)	An incompressible liquid filled in a cylinder is draining through an orifice at a height 5m from the liquid surface. Estimate the value of velocity efflux.	Ap	CO2	2
		OR			
[2]	(a)	Express your idea on velocity efflux.	U	CO1	2
	(b)	Derive expression for equation of continuity of fluid in streamline motion.	An	CO2	6
	(c)	A fluid is flowing through a pipeline in streamline motion. If the entering velocity of the fluid is 34 m/s at the opening of the pipe of inner radius 2 cm, what will be the leaving velocity of that at the other end of the pipe of inner radius 1 cm?	Ap	CO2	2

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		Part B			
[3]	(a)	Compose your understanding on simple harmonic motion.	R	CO1	2
	(b)	Derive the time period equation of a mass loaded at the free end of weightless spring oscillating in simple harmonic motion.	An	CO2	6
	(c)	A particle of mass 0.03 gm is oscillating in the medium with an amplitude 5 mm. If the angular velocity of the produced wave is 20 rad/s, estimate the value of energy in the particle during its oscillation.	AP	CO2	2
[4]	(a)	What do you understand about thermodynamics? Mention some branches of thermodynamics.	R	CO1	2
	(b)	Explain the first law of thermodynamics.	An	CO2	6
	(c)	At 350^0K, a gas in a system attains an increase in volume by 30 mm^3. Calculate the amount of work done by the gas in the system. Consider n=500.	Ap	CO2	2
		OR			
[4]	(a)	State the second law of thermodynamics.	R	CO1	4
	(b)	Sketch the theoretical Carnot heat engine and describe its essential parts.	An	CO2	4
	(c)	A Carnot engine has efficiency 45% , it's temperature at source is 230^0. Find the temperature of the sink.	Ap	CO2	2
[5]	(a)	Illustrate your idea on coherent sources of light.	U	CO1	1
	(b)	Prove that light energy is conserved during interference of light.	An	CO2	7
	(c)	A light of wavelength 0.02 Å is propagating along a straight line with a path difference of 2mm from predecessor light. Evaluate the phase difference between the lights.	An	CO2	2