

International Islamic University Chittagong
Department of Electrical and Electronic Engineering
B. Sc. Engineering in EEE
Final Exam, Spring 2022

Course Code: **PHY-1101**

Course Title: **Physics I**

Time: 2 hours 30 minutes

Full Marks: 50

(i) The figures in the right-hand margin indicate full marks

(ii) Course Outcomes and Bloom's Levels are mentioned in additional Columns

Course Outcomes (COs) of the Questions	
CO1	Understand some fundamental laws and theorem of physics.
CO2	Apply mathematical knowledge to formulate and solve engineering problems.

Bloom's Levels of the Questions						
Letter Symbols	R	U	Ap	An	E	C
Meaning	Remember	Understand	Apply	Analyze	Evaluate	Create

Part A

[Answer the questions from the followings]

1. a) Compare between adhesion and cohesion. Develop the relation between the height h and a capillary tube of radius r to when a liquid rises in the tube and judge the relation $h = \left(\frac{2T}{\rho g r}\right) - \frac{r}{3}$ **CO1** **An, C** **2+5**

1. b) A liquid drop of radius R breaks up into 64 small drops. Calculate the change in energy. **CO2** **An** **3**

2. a) When do we get stream line motion and turbulent motion in fluid? What is the equation of continuity? Justify for a liquid in stream line motion $\frac{P}{\rho} + gh + \frac{v^2}{2} = \text{Constant}$ **CO1** **U, E** **2+5**

2. b) Calculate the speed at which the velocity head of a stream of water is equal to 0.5m of Hg. **CO2** **E** **3**

Or,

2. a) Explain the various forms of energy possessed by the liquid in motion? Using Stoke's law, deduce an expression for the terminal velocity of a spherical ball falling under gravity through a viscous fluid. **CO1** **U, An** **2+5**

2. b) Calculate the work done in spraying a spherical drop of mercury of radius $10^{-3}m$ into a million drops of equal size. Surface tension of mercury is $550 \times 10^{-3}N/m$ **CO2** **An** **3**

Part B

[Answer the questions from the followings]

3. a) Distinguish between the longitudinal and transverse wave? Derive the expression "the apparent frequency of the note when the observer moves towards and away from a stationary source" **CO1** **U, E** **3+4**
3. b) Two airplanes A and B are approaching each other and their velocities are 108 km/hr and 144 km/hr respectively. The frequency of a note emitted by A as heard by the passengers in B is 1170 Hz. Calculate the frequency of the note heard by the passengers in A. Velocity of sound = 350 m/s. **CO2** **E** **3**
4. a) State second 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. **CO1** **U, E** **2+5**
4. b) A motor car tyre has a pressure of 2 atmospheres at the room temperature of 27°C. If the tyre suddenly bursts, determine the resulting temperature. **CO2** **E** **3**
5. a) What is interference of light? State the fundamental conditions for the interference. Explain the Young's double slit experiment and determine the condition of the bright and dark fringe. **CO1** **U, E** **2+5**
5. b) A light source emits light of two wavelength 4300 Å and 5100 Å. The source is used in a double slit experiment. The distance between the sources and the screen is 1.5 m and the distance between the slits is 0.025 mm. Calculate the separation between the third order bright fringes due to these two wavelengths. **CO2** **E** **3**

Or,

5. a) Define simple harmonic motion? "The total energy of the simple harmonic motion is proportional to the square of the amplitude" Justify the statement **CO1** **Ap** **1+6**
5. b) The equation of a particle executing simple harmonic motion is, $y = 10 \sin(\omega t + \delta)$. If time period is 30 sec, find out the angular frequency. **CO2** **An** **3**