International Islamic University Chittagong
Department of Electrical and Electronic Engineering
B. Sc. Engineering in EEE
Semester End Examination, Spring 2023

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), Program Outcomes (POs) and Bloom's Levels (BL) of the Questions			
CO	CO Statements	PO	BL
CO1	Understand the basic knowledge of mechanics, optics and thermodynamics in the context of engineering.	POb	C2
CO2	Apply mathematical knowledge of mechanics, optics and thermodynamics to formulate and solve basic engineering problems.	POa	C3

Bloom's Levels (BL) of the Questions						
Letter Symbols	C1	C2	C3	C4	C5	C6
Meaning	Remember	Understand	Apply	Analyze	Evaluate	Create

Part A

[Answer the questions from the followings]

1.	a)	Compare between surface tension and surface energy. Compute the relation between the surface tension T, height h and a capillary tube of radius r, when a liquid rises in the tube and judge the relation $T = \left(\frac{hr\rho g}{2}\right)$	CO1	C2	2+5
1.	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 = 550×10^{-3} N/m.	CO2	C3	3
2.	a)	When do we get stream line motion and turbulent motion in fluid? Implement the equation for a liquid in stream line motion $\frac{P}{\rho} + gh + \frac{v^2}{2} = \text{Constant}$	CO1	C2	2+5
2.	b)	Calculate the limiting velocity of a rain drop, where diameter = $10^{-3}\,m$ density of air relative to water = 1.3×10^{-3}, coefficient of viscosity of air = $1.81\times10^{-5} N/m$ and density of water tension of mercury is $10^{-3} Kg/m^3$	CO2	C3	3

Or

2.	a)	Define surface energy. Show that the surface energy per unit area is numerically equal to the surface tension per unit length.	CO1	C2	2+5
2.	b)	In a capillary tube water rises to a height of 0.1 m. In the same capillary tube mercury is depressed by 3.42×10^{-2} m. Angle of contact for water = 0. Angle of contact for mercury = 135°. Calculate the surface tension of mercury of mercury given that the surface tension of water as 72×10^{-3} N/m. Density of mercury = 13.6×10^{3}.	CO2	C3	3

Part B

[Answer the questions from the followings]

3.	a)	Define simple harmonic motion. Establish the differential equation of simple harmonic motion and solve it to obtain an expression for the displacement of a particle executing simple harmonic motion.	CO1	C2	2+5
3.	b)	A person is standing on a platform. An engine while approaching the platform blows a whistle of pitch 660 hertz. The speed of the engine is 72 Km/hr, velocity of sound $350 m/s^2$. Calculate the apparent pitch of the whistle as heard by the person.	CO2	C3	3
4.	a)	State 1st law of thermodynamics. "Molar specific heat of gas at constant pressure is always smaller than molar specific heat of gas at constant volume". Explain the statement and write your comment on that statement.	CO1	C2	2+5
4.	b)	Find the efficiency of a Carnot's engine working between 1270 °C and 270 °C.	CO2	C3	3
5.	a)	Compare between interference and diffraction. Describe and explain the Fraunhofer diffraction pattern obtained with a narrow slit and illuminated by a parallel beam of monochromatic light.	CO1	C2	2+5
5.	b)	Diffraction pattern of a single slit of width 0.5 cm is formed by a lens of focal length 40 cm. Calculate the distance between the first dark and next bright fringe form the axis. Wavelength of light used is 4890 A°.	CO2	C3	3

Or

5.	a)	Define simple harmonic motion? "The total energy of the simple harmonic motion is proportional to the square of the amplitude" Explain the statement.	CO1	C2	2+5
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	C3	3