

**International Islamic University Chittagong**

Department of Computer Science and Engineering

B. Sc. in CSE

Final Exam, Spring-2023

Course Code: **PHY 1101**

Time: 2 hours 30 minutes

Course Title: **Physics-I**

Full Marks: 50

The figures in the right-hand margin indicate full marks

**Part A**

[Answer the questions from the followings]

1. a) Distinguish between the longitudinal and transverse wave? CO1 U 2  
1. b) Derive the expression "the apparent frequency of the note when the stationary source moves towards and away from an observer" CO1 R 5

Or

With a neat diagram, build up the equation form of stationary waves.

1. c) A person is standing on a platform. An engine while approaching the platform blows a whistle of pitch 560 hertz. The speed of the engine is 72 Km/hr, velocity of sound  $350 \text{ m/s}^2$ . Calculate the apparent pitch of the whistle as heard by the person. CO2 E 3  
2. a) Show the graphical representations of SHM. CO1 R 2  
2. b) Show that, the average kinetic energy of a vibrating particle is directly proportional to the square of the amplitude. CO1 U 5  
2 c) 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 E 3

Or

The driver of a car moving towards a factory with a velocity of 30 m/sec sounds the horn with a frequency of 240 Hz. Find the apparent frequency of sound heard by the watchman of the factory.

**Part B**

[Answer the questions from the followings]

3. a) State second law of thermodynamics? CO1 U 2  
3. b) Explain the Carnot's cycle in different state. CO1 R 5  
3. c) Find the efficiency of a Carnot's engine working between  $137^\circ\text{C}$  and  $37^\circ\text{C}$ . CO2 E 3

4. a) What is interference of light. Find the final expression for intensity from the analytical treatment of Interference. CO1 U 7

Or

Define diffraction of light? Derive an expression for the intensity pattern due to single slit diffraction.

4. b) Light from a sodium vapour lamp ( $\lambda=589 \text{ nm}$ ) forms an interference pattern on a screen 0.8 m from a pair of slits. The bright fringes in the pattern are 0.35 cm apart. What is the slit separation? CO2 E 3

5. a) Explain Brewster's law. Show from this law that light is incident on a transparent substance at the polarizing angle; the reflected and refracted rays are at right angles. CO1 U 7  
5. b) An unpolarized light is incident at an angle equal to the polarizing angle on glass surface. For a refractive index 1.54, what is the value of polarizing angle? CO2 E 3

Or

Show that how intensity would be maximum or minimum for  $\pi/2$ ,  $3\lambda/2$  in details.