International Islamic University Chittagong

Department of Computer Science and Engineering

B. Sc. in CSE

Final Exam, Spring-2023

Course Code: **PHY 1101** Course Title: **Physics-I**

Time: 2 hours 30 minutes 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 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^{0}C and 37^{0}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 (λ=589 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.			

`International Islamic University Chittagong

Department of Computer Science and Engineering

B. Sc. in CSE

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**	**App**	**An**	**E**	**C**
Meaning	Remember	Understand	Apply	Analyze	Evaluate	Create

Part A

[Answer the questions from the followings]

1.	a)	Distinguish between the longitudinal and transverse wave?	**CO1**	**U**	**2**
1.	b)	With a neat diagram, show that the number of beats is equal to the frequency differences.	**CO1**	**R**	**5**
		Or,			
1	b)	Develop the relation of the mathematical form of beats and write the condition of loud and soft beats.	**CO1**	**C**	**5**
1.	c)	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 350m/s^{-2}. Calculate the apparent pitch of the whistle as heard by the person.	**CO2**	**An**	**3**
2.	a)	Why all periodic motions are not simple harmonic motion?	**CO1**	**U**	**2**
		Or,			
2	a)	Distinguish between the damped and forced oscillation?	**CO1**	**U**	**2**
2.	b)	"The total energy of the simple harmonic motion is proportional to the square of the amplitude" Justify the statement	**CO1**	**E**	**5**
2.	c)	A particle performs simple harmonic motion given by the equation, y = 22 Sin [ωt+α]. If the time period is 32s and the particle has a displacement of 15cm at t=0, find epoch; the phase angle at t = 5s; and the phase difference between two positions of the particle 13s apart.	**CO2**	**An**	**3**
		Or,			
2	c)	The tuning fork A of frequency 384 Hz gives 6 beats per second when sounded with another tuning fork B. On loading B with a little wax, the number of beats per second becomes 4. What is the frequency of B.	**CO2**	**An**	**3**

Part B

[Answer the questions from the followings]

3.	a)	What is the basic difference between isothermal graph and adiabatic graph?	CO1	U	2
3.	b)	"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	E	5
		Or,			
3.	b)	Define molar specific heat and with detailed calculation show that Cp is greater that Cv.	CLO1	R	5
3.	c)	Find the efficiency of a Carnot's engine working between 1270C and 270C.	CO2	An	3
4.	a)	What is interference of light? State the fundamental conditions for the interference.	CO1	R	3
4.	b)	From Young's double slit experiment: show that the width of the bright and dark fringes is the same.	CO1	C	5
		Or,			
4.	b)	Explain and derive the intensity of diffraction pattern by single slit.	CO1	C	5
4.	c)	A plano-convex lens of radius 300cm is place on an optically flat glass plate and is illuminated by a monochromatic light. The diameter of the 8^{th} dark ring in the reflected system is 0.72cm. Calculate the wavelength of light used.	CO2	An	2
5.	a)	Distinguish between two types of diffraction of light.	CO1	U	2
5.	b)	"The refracted and the reflected (polarized) rays are perpendicular to each other" Justify the statement	CO1	E	5
5.	c)	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	An	3

Bismillahir Rahmanir Rahim

International Islamic University Chittagong

Department of Computer Science & Engineering

B. Sc. in CSE Semester Final Examination, Autumn-2023(Special)

Course Code: PHY-1101 Course Title: Physics-I

Total marks: ***50*** Time: *2* hours ***30*** minutes

[Answer ***all*** the questions. Figures in the right hand margin indicate full marks.
Separate answer script must be used for Group A and Group B]

		Group-A			
1.	a)	What is Doppler effect? Find the apparent frequency i) When the observer moves towards the stationary source. ii) When the observer moves away from the stationary source.	CLO1	U	7
		Or,			
		What is standing wave? With a neat diagram, build up the expression of standing wave and write down the condition of nodes and antinodes. .			
1.	b)	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. [Velocity of sound 350 m/s].	CLO2	E	3
2.	a)	Show the graphical representations of SHM.	CLO1	R	2
2.	b)	Show that, the average kinetic energy of a vibrating particle is directly proportional to the square of the amplitude.	CLO1	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.	CLO2	E	3
		Or,			
		A simple harmonic motion is represented by $y = 10\sin(10t - \frac{\pi}{6})$ Where y is measured in meters, t is seconds and the phase angle in radians. Calculate (i) the frequency (ii) the time period (iii) the maximum displacement.			
		Group-B			
3.	a)	State the first law of thermodynamics?	CLO1	R	2
3.	b)	Explain the Carnot's cycle in different state.	CLO1	U	5
3.	c)	Find the efficiency of a Carnot's engine working between 137^0C and 37^0C.	CLO2	E	3
4.	a)	What is superposition of light? Discuss interference of light analytically and obtain the conditions of maximum and minimum intensities.	CLO1	U	7
		Or,			
		Define diffraction of light? Derive an expression for the intensity pattern due to single slit diffraction.			
4.	b)	Show that phase difference $= \frac{2\pi}{\lambda} \times$ path difference.	CLO2	U	3
5.	a)	Distinction between Fresnel and Fraunhofer diffraction.	CLO1	R	2
5.	b)	Define polarization of light. "The refracted and the reflected (polarized) rays are perpendicular to each other" Justify the statement	CLO1	U	5
5.	c)	The refractive index of crown glass is 1.52. Find the angle of polarization.	CLO2	E	3
		Or,			
		Show that how intensity would be maximum or minimum for $\pi/2$, $3\lambda/2$ in details.			

CSE

C

International Islamic University Chittagong

Department of Computer Science & Engineering

B. Sc. in CSE Semester Final Examination, Spring 2018

Course Code: *PHY 1101* Course Title: Physics I

Total marks: *50* Time: *2:30* hours

[Answer any *two* questions from **Group-A** and any ***three*** question from **Group-B**;
Separate answer script must be used for Group-A and Group-B;
Figures in the right hand margin indicate full marks.]

Group-A

1. a) What do you mean by time period? 1

   b) Explain Doppler's effect for stationary source and moving observer. 6

   c) If the frequency of a tuning fork is 400 Hz and the velocity of sound in air is $320ms^{-1}$, find how far sound travels while the fork completes 30 vibrations. 3

2. a) Differentiate between progressive wave and standing wave. 2

   b) What are the characteristics of simple harmonic motion? Derive the differential equation of simple harmonic motion for spring mass system. 5

   c) Explain graphical representation of Simple Harmonic Motion. 3

3. a) Find the total energy of SHM. 3

   b) Show that for a particle executing SHM, the instantaneous velocity is $\omega\sqrt{(a^2-y^2)}$ and instantaneous acceleration is $-\omega^2 y$. 3

   c) Derive an expression to calculate the time period of a torsion pendulum. 4

Group-B

4. a) Give the statement of 3rd law of thermodynamics. 2

   b) Explain the four cycles of carnot heat engine. 5

   c) A Carnot engine has 50% efficiency when the sink temperature is 27°C. What is the increase in temperature of the heat source when its efficiency is 60%? 3

5. a) What is interference of light and what are the conditions for interference? 2

   b) Explain Young's double slit experiment for interference of light to produce bright and dark fringes. 5

   c) In Young's double slit experiment the separation of the slits is 1.9mm and the fringe spacing is 0.31mm at a distance of 1m from the slits. Calculate the wavelength of light. 3

6. a) What is polarization of light. 2

   b) Prove that the reflected light and refracted light are at right angles to each other due to Brewster's polarization. 5

   c) A light ray incident on a glass plate from air medium, if the reflected ray is polarized then find the angle of polarization. [Refractive index of the medium is 1.52] 3

7. a) What are group velocity and phase velocity. 2

   b) What is aberration? Explain different types of aberration. 3

   c) What is heat engine. Explain the working principle for heat engine. 5

International Islamic University Chittagong

Department of Computer Science & Engineering

B. Sc. in CSE Semester Final Examination, Spring 2019

Course Code: *PHY* 1101 Course Title: Physics I

Total marks: ***50*** Time: ***2:30*** hours

[Answer any ***two*** questions from **Group-A** and any ***three*** questions from **Group-B;**
Separate answer script must be used for Group-A and Group-B;
Figures in the right hand margin indicate full marks.]

Group-A

1. a) What is propagated in wave? 1
   b) Define longitudinal wave and transverse wave with examples. 2
   c) Show that number of beats produced per second is difference of frequencies of the two sound waves. 4
   d) A tuning fork *A* produces 4 beat per second while it is vibrating along with another tuning fork *B* of frequency 400 Hz. If the tuning fork *A* is filed then the beat occurs at a shorter interval of time. Find the frequency of the fork *A*. 3

2. a) Write down the criteria for simple harmonic motion? 2
   b) Derive the differential equation of simple harmonic motion for spring mass system. 5
   c) What is forced harmonic oscillator? How does a forced harmonic oscillator is related to resonance frequency? 3

3. a) Derive the equation of wave. 2
   b) What is Doppler effect? Derive expressions for apparent change in frequency when an observer is moving towards a stationary source of sound. 4
   c) A train is moving away from a standing observer with a velocity of 60km/s. If the frequency of whistle producing by the train is 250Hz, then find the apparent change in frequency. [Velocity of sound is 332 m/s] 4

Group-B

4. a) What is entropy? State and explain 3rd law of thermodynamics. 2
   b) Explain the four cycles of carnot heat engine. 5
   c) A Carnot engine has 40% efficiency when the sink temperature is 30°C. What is the increase in temperature of the heat source when its efficiency is 60%? 3

5. a) What do you mean by interference of light? 2
   b) Describe Young's double slit experiment. Obtain the expression for the fringe width. 6
   c) In Young's double slit experiment, separation of the slits is 1.9 mm and the fringe spacing is 0.031 mm at a distance of 1 meter from the slits. Calculate the wavelength of light. 2

6. a) What is angle of polarization? 2
   b) Derive an expression for diffraction of light for double slit. 5
   c) A light ray is incident of glass surface and part of this reflected and refracted as well where reflected ray is polarized. If the refractive index of the medium is 1.52 then find the angle of polarization. 3

7. a) Define adiabatic and isothermal process. Obtain expression for work done in adiabatic process. 5
   b) State and explain 2nd law of thermodynamics. 3
   c) Calculate the efficiency of a Carnot engine working between the steam point and the ice point. 2

International Islamic University Chittagong
Department of Computer Science and Engineering

Special Final Examination Autumn-2018 | Program: B.Sc. in CSE
Course Code: PHY-1101 | Course Title: Physics-I
Time: 2 hours 30 minutes | Full Marks: 50

Part A

[Answer any ***two*** questions from the followings; figures in the right margin indicate full marks.]

1(a). What is wave? Define beat in wave. **2**

1(b). Explain standing wave mathematically. **5**

1(c). Show the whether it is nodes or antinodes for wave length λ And $3\lambda/2$ **3**

2(a). What is simple harmonic oscillation? **2**

2(b). Write the differential equation of simple harmonic motion and find the solution for it. **5**

2(c). Determine the angular frequency and initial phase of the simple harmonic motion described by the equation, $y = 10 \sin(\omega t+\delta)$
In which time period is 30s and displacement is 0.05m initially. **3**

3(a). Explain damped and forced oscillation. **3**

3(b). Explain Doppler's effect for moving source and stationary observer. **4**

3(c). A person is standing near a railway track and a train moving with a speed of 36km/hr is approaching him. The apparent pitch of the whistle as heard by the person is 700 Hz. Calculate the actual frequency of the whistle. Velocity of sound is 350m/s. **3**

Part B

[Answer any ***three*** questions from the followings; figures in the right margin indicate full marks.]

4(a). What are coherent sources? **2**

4(b). Explain Young's double slit experiment for interference of light to produce bright and dark fringes. **5**

4(c). The straight and narrow parallel slits of 1mm apart are illuminated by monochromatic light. Fringes formed on the screen held at a distance of 1m from the slits are 0.50mm apart. Calculate the wavelength of light used. **3**

5(a). What is superposition of light? **2**

5(b). Explain analytical treatment of interference of light in case of Young double slit experiment. **5**

5(c). In Young double slit experiment the slit width is 0.1 mm and the fringe spacing is 0.05cm at a distance of 1m from the slits. Calculate the wavelength of light. **3**

6(a).	State first law of thermodynamics.	**2**
6(b).	Deduce the expression, $C_p - C_v = R$, where, the symbols have their usual meaning.	**5**
6(c).	Calculate the molar specific heat at constant volume and constant pressure for carbon-dioxide gas.	**3**
7(a).	What do you mean by entropy?	**2**
7(b).	Distinguish between Fresnel and Fraunhofer diffraction.	**3**
7(c).	What is isothermal and adiabatic process?	**3**
7(d).	Find the efficiency of the Carnot's engine working between the steam point and the ice point.	**2**

International Islamic University Chittagong

Department of Computer Science and Engineering

B. Sc. in CSE

Semester End Examination, Autumn 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 Learning Outcomes (COs) of the Questions	
CLO1	**Understand** the basic knowledge of mechanics, optics and thermodynamics in the context of engineering.
CLO2	**Apply** mathematical knowledge of mechanics, optics and thermodynamics to formulate and solve basic engineering problems.

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

Part A

[Answer the questions from the followings]

1.	a)	Discuss the conditions for the production of beats.	CLO1	U	2
1.	b)	With a neat diagram explain the Doppler effect for a moving source and a moving observer.	CLO1	R	5
		OR			
		Derive the expression "the apparent frequency of the note when the stationary source moves towards and away from an observer"			
1	c)	Two tuning forks are sounded together, and producing 12 beats in 3 s. The frequency for the first tuning fork is 333 Hz, what will be the frequency of the seconds? The loaded mass in the first tuning fork, or the reduced mass in the second tuning fork result same, i.e. the reduction in the beats.	CLO2	A	3
2.	a)	Why all periodic motions are not simple harmonic motion?	CLO1	U	2
2.	b)	Derive the differential equation for simple harmonic motion, and show it's graphical representations.	CLO1	R	5
		Or,			
		Show that the total energy for a simple harmonic body is twice as of the average kinetic energy of that body.			
2	c)	The equation of a particle executing simple harmonic motion is, $y = 10\sin(wt + \delta)$.If time period is 30 sec, find out the angular frequency.	CLO2	A	3

Part B

[Answer the questions from the followings]

3. a)	Write down all statements (four) for the second law of thermodynamics.	CLO1	U	2
3. b)	Define molar specific heat and with detailed calculation show that Cp is greater that Cv.	CLO1	R	5
3. c)	Find the efficiency of a Carnot engine working between 127^0c and 27^0c. It absorbs 80 calories of heat, how much heat it will be rejected?	CLO2	A	3

OR

Find the efficiency of a Carnot's engine working between 137^0C and 37^0C.

4. a)	What is interference of light? State the fundamental conditions for the interference.	CLO1	R	2
4. b)	Explain the Young`s double slit experiment and determine the condition of the bright and dark fringe.	CLO1	R	5
4. c)	Green light of wavelength 5100 Å from a narrow slit is incident on a double slit. If the overall separation of 10 fringes on a screen 300 cm away is 2 cm, find the slit separation.	CLO2	A	3

Or,

In a Newton's rings experiment the diameter of the 17^{th} ring was found to be 0.577 cm and that of the 9^{th} ring was 0.337 cm. If the radius of the plano-convex lens is 97 cm, calculate the wavelength of the light used.

5. a)	Define Polarization of light, and mention its three practical uses.	CLO1	R	2
5. b)	State and explain Brewster's law.	CLO1	U	5

OR

Explain the intensity of diffraction pattern by single slit.

5. a)	A screen is placed 2 m away from a narrow slit, which is illuminated by a light of wavelength 5100A0. If the first minimum lies 4.5 mm on or either side of the central maximum, calculate the slit width.	CLO2	A	3