Daffodil International University

Faculty of Science & Information Technology

Department of Computer Science and Engineering

Final Examination, Fall-2025

Course Code: PHY101, Course Title: Physics I

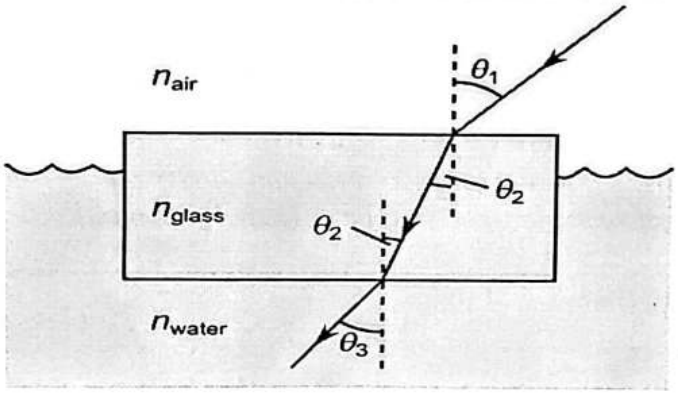
Level: 1 Term: 2 Batch: 69

Time: 2 Hour **Marks: 40**

Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1.	a)	**Recall** the concept of interference of light.	1	CO1
	b)	**State** the Zeroth Law of Thermodynamics.	1	
	c)	**List** the disadvantages and application of optical fibre.	2	
	d)	**Write** down difference between reversible and irreversible process.	2	
	e)	**Identify** the concepts of Isothermal, Adiabatic, Isochoric, and Isobaric thermodynamic processes.	2	
	f)	**Define** the plane of vibration and the plane of polarization, and illustrate with diagram.	2	
2.	a)	During a school laboratory demonstration, a Carnot engine is shown operating between two thermal reservoirs. **Describe,** using the Carnot cycle, how you would calculate the total work done by the engine.	4	CO2
	b)	During a field trip, using monochromatic light on a curved glass lens placed on a flat glass plate, you observe circular bright and dark rings on the surface. **Illustrate** the wavelength of the light using the Newton's Rings experiment, and explain the role of the thin air film between the lens and the plate in creating these rings.	3+1	
	c)	A fish inside an aquarium observes an object located outside the tank in air. **Demonstrate** Snell's law for the refraction of light, and **show** the refractive index condition for the bending of light when it passes from one medium to another.	3+1	
	d)	Compare the pressures of two containers of the same volume, one containing light molecules and the other heavy molecules, if both have the same total kinetic energy. **Interpret** the expression for the pressure of an ideal gas using kinetic theory and show that $$PV = \frac{1}{3}Mc^2$$	3	
3.	a)	In Young's double slit experiment the distance between two slits 0.3 mm. The distance of the screen from the slits is 1 m. In an experiment in ale medium the distance of the 8th bright fringe from the central bright fringe is 6.2 mm. Keeping the arrangement into water the observation was taken ($_a\mu_w = 4/3$) (i) **Find** the wavelength light used in the experiment. (ii) **Analyze** what change in the fringe will take place when the arrangement of the stem is kept into water.	3	

b)	**Find** the change in entropy in converting 0.50 kg ice at 0°C to water at 100°C. The specific latent heat of fusion of ice is 3.36×10^6 Jkg^{-1}	3	CO3
c)	A sample of air at 27°C is expanded to 2.5 times its original volume suddenly and adiabatically. (i) **Determine** the final temperature. (ii) **Determine** the final pressure if the initial pressure was 1 atm. (γ =1.40)	3	
d)	The efficiency of a Carnot engine is $\frac{1}{6}$. If on reducing the temperature of the sink by 65°C, the efficiency becomes $\frac{1}{3}$. **Find** the temperatures of the source and the sink between which the engine is working.	3	
e)	 A ray of light is incident from air on glass at an angle of $\theta_1 = 30°$. The light then enters a water medium. Given: the refractive index of air: n_{air} = 1.0 water: $n_{water} = 1.33$ and glass: $n_{glass} = 1.5$. Calculate the i)The angle of refraction in glass (θ_2) ii) The angle of refraction in water (θ_3)	3	