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Daffodil International University

Department of Software Engineering

Faculty of Science & Information Technology

Final Examination, Summer 2025

Course Code: PHY 101, Course Title: Physics-I

Sections & Teachers: (A-D)SH, (E-H, L)AEE, (I,J)MAM, (K)JB

Duration: 2:00 Hrs **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.]

			Marks	
1.	a.	**Recall** Coherent light source and types of interference.	[4]	CLO-1, C1
	b.	**Review** Brewster's law and specific rotation of light.	[3]	
	c.	**Recall** Satellite positioning and Einstein's two theories of relativity.	[3]	
2.	a.	In today's world, traditional telecommunications systems are being rapidly replaced by optical fiber technology due to its numerous advantages. With the help of a diagram, **explain** how optical fibers, as a dielectric medium, make secure long-distance communication possible.	[5]	CLO -2, C2
	b.	When sunlight passes through two tiny holes or gaps, we see light and dark lines on the wall. **Estimate** the intensity of the bright and dark fringes formed, and **compute** how changing the distance between the slits affects the spacing between the fringes in Young's double-slit experiment.	[5]	
	c.	How can you **interpret** the principles of the photoelectric effect, using relevant equations and diagrams, to explain its role in demonstrating the particle nature of light and its real-world applications, such as in solar panels, while highlighting its significance in the development of modern physics?	[5]	
3.	a.	In Young's double-slit experiment, the distance between the centers of two consecutive bright fringes is 50 mm. The screen is placed at 40 cm from the slits. The frequency of the light used is 4.0×10^{14} Hz. i. **Find** out the separation between the slit. 6×10^{-6} ii. **Calculate** the width of dark fringes. iii. **Calculate** the distance of 5th bright and dark fringes respectively from the central bright fringe?	[5]	CLO -3, C3
	b.	A light beam of wavelength 450 nm is incident on a metallic plate of Sodium. The stopping potential is found to be 2.8 V. i. **Calculate** the maximum velocity of photo electron. ii. **Find** the energy of incident light in keV. iii. **Calculate** the value of work function and threshold frequency.	[5]	
	c.	A telecommunications engineer is installing a fiber-optic link for a smart-city network. The optical fiber has a refractive index of **1.6**, while air has a refractive index of **1.0**. To ensure reliable transmission, she needs to know how the light will behave at the fiber entrance. i. A light ray enters the fiber at an incident angle of 45° relative to the normal. **Calculate** the angle of refraction inside the fiber. ii. **Calculate** the velocity of light inside the optical fiber. iii. Based on the refraction result, **calculate** the incident angle to the core clad boundary and **decide** whether the light will propagate through the fiber core or risk significant loss at the interface. Justify your answer.	[5]	