



Daffodil International University

Faculty of Science & Information Technology

Department of Computer Science & Engineering

Final Semester Examination, Fall 2024

Course Code: PHY102, Course Title: Physics II

Level: 1 Term: 2 Batch: 66

Time: 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.]

1.	a)	Define nuclear binding energy.	1	CO1
	b)	Identify what occurs during alpha decay in a radioactive atom.	1	
	c)	Distinguish between nuclear fission and fusion reactions.	2	
	d)	Describe Heisenberg's uncertainty principle.	2	
	e)	Outline the Compton effect with a proper diagram.	2	
	f)	Write down the postulates of the theory of relativity.	2	
2.	a)	Demonstrate why an electron cannot exist within the nucleus.	3	CO2
	b)	Explain the significant observations from various atomic models that illustrate the structure of the atom.	4	
	c)	State Lorentz transformation and calculate time dilation using Lorentz transformation.	4	
	d)	From radioactive decay law show that $N = N_0 e^{-\lambda t}$, where the symbols have their usual meanings.	4	
3.	a)	Find the mass defect, binding energy and binding energy per nucleon of $^{62}_{28}\text{Ni}$ nucleus. Given that, atomic mass of hydrogen = 1.007825u. Mass of a neutron = 1.008665u and atomic mass of nickel = 61.928348u.	3	CO3
	b)	Calculate the maximum kinetic energy of the electron emitted from a metal surface when light of wavelength 2400Å incident on it. The work function of metal surface is 2.3eV.	3	
	c)	An astronaut, at the age of 30 years, went to investigate the Milky Way by a spaceship moving with a speed of $2.4 \times 10^8 \text{ ms}^{-1}$ and returned after 50 years (according to the calendar of the earth). What will be his age?	3	
	d)	The half-life of a radioactive material is 15 hours. If the initial mass of that material is 4g then after 60 hours how much of that material will remain unchanged?	3	
	e)	Determine the de Broglie wavelength of an electron moving with a velocity of $v = 1.8 \times 10^7 \text{ m/s}$.	3	