

SCHOOL OF ADVANCED SCIENCES
CONTINUOUS ASSESSMENT TEST - I
FALL SEMESTER 2025-2026

Programme Name & Branch : M.Tech. (Int.) - Computer Science and Engineering
Course Code and Course Name : IAPHY101 & Engineering Physics
Faculty Name(s) : V. Ramasubramanian, C. Anuradha, R. Murali
Class Number(s) : VL2025260105436, 5445, 5961
Date of Examination : 21-08-2025
Exam Duration : 90 minutes

Maximum Marks: 50

General instruction(s):

- Answer All Questions
- M - Max mark; CO - Course Outcome; BL - Blooms Taxonomy Level (1 - Remember, 2 - Understand, 3 - Apply, 4 - Analyze, 5 - Evaluate, 6 - Create)
- Course Outcomes:
CO1. Explain wave-particle duality by applying basic quantum principles.
CO2. Apply quantum mechanical ideas to microscopic systems.

Q. No	Question	M	CO	BL
✓1.	What is a blackbody? Draw the black body spectrum for different temperatures and discuss their characteristics. Discuss Wein's radiation law and Rayleigh-Jeans law. Explain the failures with the relevant diagram.	10	1	2
✓2.	State Compton effect. Derive the Compton shift formula with necessary diagram. Compute the wavelength shift for different scattering angles.	10	1	2
3.	a) State Heisenberg uncertainty principle. Prove that the electron does not exist in the nucleus using the uncertainty principle.	5	1	3
	b) The electron and proton are accelerated with a potential difference of 1.25 kV. Calculate the de-Broglie wavelength produced by these accelerated particles. Given $q_e = q_p = 1.6 \times 10^{-19}C$, $m_e = 9.1 \times 10^{-31}kg$ and $m_p = 1.672 \times 10^{-27}kg$. What is your comment?	5		
✓4.	Obtain the energy and wave function of the electron which is trapped in an infinite height of potential box of width 'L'. Sketch the energy, wave function and probability density for first three allowed states.	10	2	2
✓5.	Why are properties of nanomaterials enhanced when compared to bulk materials? Explain with an example.	5	2	3
	A particle is trapped in an infinite potential box of width is 1.2 Å. Calculate the energy of first three allowed state of the particle in electron volt.	5		