VIT
Vellore Institute of Technology

REG.NO.:

School of Advanced Sciences
CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER 2024-2025

SLOT:C1+TC1

Programme Name & Branch : BTech
Course Code and Course Name : BPHY101L, Engineering Physics
Faculty Name(s) : Dr. MURALI R; Dr. SENTHUR PANDI R; Dr. EZHIL VIZHI R; Dr. ANURADHA C; Dr. MOMEEN M; Dr. VASU; Dr. RAJAN BABU; Dr. JITENDRA; Dr. JOSEPH
Class Number(s) : 6234; 5995; 6901; 5979; 6231; 6244; 5971; 6002; 8074
Date of Examination :15-10-2024
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 – Analyse, 5 – Evaluate, 6 – Create)
- Course Outcomes
  CO3- Apply quantum mechanical ideas to microscopic systems.

Q. No	Question	M	CO	BL
1.	Is an electron a particle or a wave? Support your answer by providing the appropriate experimental description and details.	10	CO3	BL3
2.	(a) Why we cannot observe the effects of the uncertainty principle in everyday life. Justify your answer with suitable examples.	10	CO3	BL3
	(b)What is an Ultraviolet catastrophe in the black body spectrum? Explain how it is being resolved by introducing the Planck radiation formula.			
3.	(a) What is the ratio of the kinetic energy of an electron to that of a proton if their de Broglie wavelengths are equal?	5	CO3	BL3
	(b) X-rays of wavelength 20 pm are scattered from a target. (i) Find the wavelength of the X-rays scattered through 45°. (ii) Find the maximum wavelength present in the scattered X-rays. (iii) Find the maximum kinetic energy of the recoil electrons.	5		
4.	(a) Electrons with energies of 0.5 eV are incident on a barrier 5 eV high and 0.50 nm wide. (a) Find their respective transmission probabilities. (b) How are these affected if the barrier is doubled in width?	5	CO3	BL3
	(b) Normalize the wave function, $\psi(x) = D e^{ikx}$; given that interval of x as $-L \leq x \leq L$.	5		
5.	Give the pictorial representation of ground, first, and second excited states of energy eigenvalues, eigenfunctions, and corresponding probability densities of a particle trapped in a 1-D box. Explain how the size reduction affects the properties of nanomaterials.	10	CO3	BL3

****