VIT

Vellore Institute of Technology

SCHOOL OF ADVANCED SCIENCES
CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER 2024-2025

SLOT: B2+TB2

Programme Name & Branch	: B. Tech.,
Course Code and Course Name	: BPHY101L, Engineering Physics
Faculty Name(s)	: Dr. P Ramesh Babu, Dr. Ravi Shanker Babu, Dr. S P Vijaya Chamundeeswari, Dr. Suresh Kumar Vandrangi
Class Number(s)	: VL2024250105969, 5993, 6897, 7898
Date of Examination	: 14 – 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 : To apply quantum mechanical ideas to microscopic systems.

Q. No	Question	M	CO	BL
1.	In Compton effect what happens (i) when photon collides with free electron in the material (ii) when photon collides with bound electrons in the material? Discuss the relevant experiment in detail.	10	CO3	BL3
2.	a) Discuss how did classical physics laws fail to explain blackbody radiation spectrum curve? How did Planck's radiation law overcome the shortcomings of classical physics laws?	5	CO3	BL3
	b) Obtain a second order partial differential equation that describes de Broglie waves.	5		
3.	a) Photon of initial energy 90 keV undergoes Compton scattering at an angle 60°. Find: i) the energy of the scattered photon (ii) the recoil energy of the electron	5	CO3	BL3
	b) Find the de Broglie wavelength of i) an electron accelerated through a potential difference of 182 V, and ii) a 1 kg object moving with a speed 1 m/s. Comparing the results explain why the wave nature of matter is not apparent in daily observations.	5		
4.	a) What would be the energy required by an electron to jump from ground state to the second excited state in an infinite potential well of width L.	5	CO3	BL3
	b) A stream of electrons, each of average energy E = 3 eV, is incident on a potential barrier of height 4 eV. The width of the barrier is 20 Å. Calculate the percentage transmission of the beam through this barrier.	5		
5.	Obtain the expressions for energy eigen values and eigen functions of a particle confined in an infinite one-dimensional potential well. Explain with a neat sketch how the three-dimensional analysis of a conducting surface can be performed using the principle of quantum mechanical tunnelling.	10	CO3	BL

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