VIT

Vellore Institute of Technology

Continuous Assessment Test (CAT - II), December 2022

Programme	:	B.Tech	Semester	:	Fall 2022-2023
Course Title	:	Engineering Physics	Course Code	:	BPHY101L
School	:	School of Advanced Sciences	Slot	:	C1+TC1
Duration	:	90 mins	Max. Marks	:	50
Class No	:	5670, 5703, 5690, 5885, 5724, 5742, 5750, 5716, 5729			

Part – A (5 x 10 = 50)

Answer ALL Questions

Sl. No	Questions	Max Marks
1	What are the implications and properties of wave function? Obtain the one dimensional steady-state wave equation in quantum mechanics? [4+6]	10
2	How matter waves are different from the electromagnetic wave? Demonstrate the wave nature of electrons with a suitable experiment. [3+7]	10
3	(a)Why visible light does not show Compton effect? Experimentally verify the Compton's wavelength shift according to the scattering angle. [5] (b) Determine the minimum uncertainties in the position of the following objects. If their speeds are known with the precision of 1×10^{-3} m/s. a)an electron b)a bowling ball of mass 6.0kg [5]	5 5
4	Show that a particle bound to a one-dimensional box can only have certain discrete values of energy. Explain the normalized wave function with necessary diagram. [7+3]	10
5	(a)How the structure of nanomaterials varies based on the dimension? Discuss the same with necessary diagrams. [5] (b) The normalized wavefunctions for the various levels in the potential well are $\Psi_z = \sqrt{2}/Lz \sin(n\pi z/L_z)$. Find out the probability of finding the electron between 0.1 and 0.2 nm from one side of the well. Given n=1 and L_z=1. [5]	5 5