



VIT

Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

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	: E1+TE1
Duration	: 90 mins	Max. Marks	: 50
Class No	: 5879, 5830, 5771, 5801, 5765, 5852, 5868, 5875, 5815		

Part - A (5 x 10 = 50)

Answer ALL Questions

Sl. No	Questions	Max Marks
1	(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? (3+2) (b) A photon of initial energy 90 keV is scattered at an angle of 60° in Compton scattering experiment. Find the energy of the scattered photon. $E = \frac{hc}{\lambda}$	5 5
2	Arrive at Schrodinger's time-independent and time-dependent equation considering classical wave equations and de-Broglie concept of matter waves.	10
3	(a) Explain in brief the experimental verification of matter waves. (b) An electron beam is accelerated through a potential difference of 200 V. Calculate the wavelength of the associated matter waves of this electron beam.	5 5
4	(a) Explain how the three-dimensional analysis of conducting surfaces can be analyzed by quantum tunneling with neat sketch? (b) Explain the concepts of quantum well, quantum wire and quantum dot with suitable diagrams.	5 5
5	(a) Consider a particle trapped in an infinite potential well, obtain the expressions for its energy eigen values and eigen functions. (b) An electron is confined in a 1-D box of length 5 angstroms. Find its energy eigen values for the first three quantum states.	5 5

