VIT

Vellore Institute of Technology

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

Continuous Assessment Test -I, January 2020

Programmes	: **B.Tech & Int. M.Tech**	Semester	: **Winter 2019-20**
Course Title	: **Engineering Physics**	Course Code	: **PHY1701**
School	: **School of Advanced Sciences**	Slot	: **G1+TG1**
Duration	: **1 Hour 30 minutes**	Max. Marks	: **50**

Answer all the questions (5 x 10 = 50 Marks)

1a	Was UV Catastrophe experimentally observed? If Yes/No, support your answer with valid arguments/observations.	**5**
1b	Calculate the average energy of Plank's oscillators for $h\nu/kT = 0.01$, 0.1 and 1 for a black body radiation.	**5**
2	Derive the equation for Compton shift and Discuss the importance of Compton shift with neat diagrams.	**10**
3a	A photon of violet light ($\lambda = 4000$ Å) is backscattered in a Compton collision with an electron. How much energy is transferred to the electron in this collision?	**5**
3b	Write (with neat diagram and schematic) the working principle and applications of Scanning Tunneling Microscope (STM).	**5**
4	Using the time-independent Schrodinger equation, derive the expression for energy E and wave function $\Psi(x)$ of a particle, when it is confined in an infinitely deep potential. Sketch the energy levels and probabilities.	**10**
5a	When do you call a material nanomaterial? Compare Electrical and Mechanical properties of nanomaterials with their bulk counterparts	**5**
5b	Explain the consequences of quantum confinement in nanoparticles.	**5**