

# Continuous Assessment Test-2 (CAT - 2), December 2022

Programme	: B.Tech	Semester	: Fall 2022-23
Course Title	: Engineering Physics	Course Code	: BPHY101L
School	: School of Advanced Sciences	Slot	: D2+TD2
Duration	: 90 min.	Max. Marks	: 50
Class Nos.	: VL2022230105799, 5812, 5827, 6279, & 6315		

Answer ALL Five Questions (5 Qs x 10 Mark = 50 Marks)

Sl.	Questions	Ma Mar
1	<p>(a) Draw black body spectral distribution curves as a function of frequency at temperatures <math>T_3 &gt; T_2 &gt; T_1</math>. And, write down three important observations from the curves. [Marks: 5]</p> <p>(b) Differentiate the quantization hypothesis of Planck's with that of Einstein's. [Marks: 5]</p>	10
2	<p>State the hypothesis which connects the wave-characteristics and particle-characteristics of an electron. To support this hypothesis, describe an experiment, with figures and equations that can conclusively validate this hypothesis. [Marks: 3 + 7 = 10]</p>	10
3	<p>(a) Compare with proper justification the mechanical wave equation and the electron wave equation. [Marks: 5]</p> <p>(b) The decay energy of a short-lived nuclear excited state has an uncertainty of 2.0 eV due to its short lifetime. What is the smallest lifetime it can have? [Marks: 5]</p>	10
4	<p>(a) Derive an eigen wavefunction for motion of a particle in a confinement length L. [Marks: 6]</p> <p>(b) Show that a motion confined free subatomic particle has wider energy levels separation at higher quantum states. [Marks: 4]</p>	10
5	<p>(a) Write down four important parameters of materials which influence physical, chemical, optical and mechanical properties of nanomaterials. [Marks: 5]</p> <p>(b) Calculate the specific surface area of 50 nm &amp; 10 Å diameter spherical particles. Write your observations on the results. [Marks: 2+2+1]</p>	10

