

Continuous Internal Assessment -2

Name of the Programme : B Tech AI & DS & CSE (Cybersecurity)	Semester: I
Course code & Name: PH1001T Engineering Physics	Date: 22.11.23
Time: Answer all questions	Maximum Marks: 25

Q.No	Answer all questions	Marks	CO	KL
1	As per quantum theory, an electron moves in (a) constant potential (b) periodic potential (c) zero potential (d) a potential well	2	CO2	K2
2	CO ₂ molecule has a peak absorption at 4.2 microns. A CO ₂ sensor that quantifies CO ₂ through the absorption loss at this 4.2 micron is to be made using blackbody as the source with peak emission at this wavelength. What should be the temperature at which the blackbody should be kept for detecting CO ₂ ? (The peak emission of blackbody at 5000 K is observed at 560 nm)	2	CO2	K3
3	What is the ratio of the energy radiated at frequency of 193 THz at 500 K as per Planck's theory to that given by Rayleigh-Jeans? (Given $h = 6.63 \times 10^{-34}$ J-s and $k = 1.38 \times 10^{-23}$ J/K.	3	CO2	K2
4	An electron is accelerated by a potential of 800V. It will exhibit wave nature when it interacts with structures of dimension close to _____.	2	CO2	K2
5	An electron is confined in an infinite 1 D potential well of length 15 \AA . If its de Broglie wavelength is 10 \AA , the electron is in its _____ excited state within the potential well.	2	CO2	K2
6	What are degenerate states? Illustrate the concept of degeneracy by writing the wavefunctions and energy of the lowest triply degenerate state of a free particle of mass m confined in an infinite 3D cubical potential well of side L .	3	CO2	K2
7	A free electron is confined in an infinite 1 D potential well of length L . Find the probability of locating it between $0.3L$ and $0.5L$ if it is in its first excited state.	6	CO2	K2
8	What is the physical significance of wavefunction associated with a moving particle. What are the properties that make this wavefunction an acceptable solution to Schrodinger's equation.	5	CO2	K2