

[4124] - 202
M.Sc. (Sem. - II)
PHYSICS

PHY UTN - 602 : Atoms, Molecules and Solids
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) Question No. 1 is compulsory. Solve any Four questions of the remaining.
- 2) Draw neat diagram wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of logarithmic tables and electronic pocket calculator is allowed.

Given

Rest mass of electron	= 9.109×10^{-31} kg
Charge on the electron	= 1.6021×10^{-19} coulomb
Plank's constant	= 6.626×10^{-34} Js
Boltzmann constant	= 1.38054×10^{-23} JK ⁻¹
Avogadro's number	= 6.02252×10^{26} (K mole) ⁻¹
Bohr magneton	= 9.27×10^{-24} amp-m ²
1eV	= 1.6021×10^{-19} J

Q1) Attempt any four of the following :

[16]

- a) Find the minimum magnetic field needed for Zeeman effect to be observed in a spectral line of 400 nm wavelength, when a spectrometer whose resolution is 0.010 nm is used.
- b) For Aluminium $C_v = 6.32 \times 10^3$ m/s and $C_s = 3.1 \times 10^3$ m/s. The density of Aluminium is 2.7×10^3 kg/m³ and atomic weight is 26.97. Calculate the Debye frequency for Aluminium.
- c) The concentration of Schottky defects in an ionic crystal is 1 in 10^{10} at temperature 300 K. Estimate the energy of the vacancy pair.
- d) In NMR of ¹⁴N with $I = 1$, how many spectral lines will be observed? Calculate the frequency required for NMR line at external field 1.4 Tesla ($\gamma_N = 0.403$)
- e) The Zeeman splitting of 500 nm spectral line when magnetic field of 0.4T is applied is observed as 0.016 nm find e/m.
- f) Determine Lande's g factor for $^2f_{5/2}$.

Odysseyware Physics Semester 2

M Tight



Odysseyware Physics Semester 2:

Odysseyware Physics Semester 2 Book Review: Unveiling the Magic of Language

In an electronic digital era where connections and knowledge reign supreme, the enchanting power of language has become more apparent than ever. Its ability to stir emotions, provoke thought, and instigate transformation is truly remarkable. This extraordinary book, aptly titled "**Odysseyware Physics Semester 2**," published by a highly acclaimed author, immerses readers in a captivating exploration of the significance of language and its profound effect on our existence. Throughout this critique, we shall delve into the book's central themes, evaluate its unique writing style, and assess its overall influence on its readership.

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