JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2026

B.Tech-V Semester (CSE/IT/BT/ECE/CE)

COURSE CODE (CREDITS):18B1WPH532 (3) MAX. MARKS: 15

COURSE NAME: APPLIED MATERIALS SCIENCE

COURSE INSTRUCTOR: VSA MAX. TIME: 1 Hour

Note: (a) All questions are compulsory.

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

(c) Use of calculators is allowed

Q.No	Question	CO	Marks
Q1	What are dielectric materials? Classify the dielectric materials. Give examples of dielectric materials.	1	03
Q2	Obtain the *Clausius-Mossotti* relation, which correlates the dielectric constant with polarisability for a dielectric material.	1	03
Q3	For an inert gas dielectric, show that the static value of electronic polarizability depends on 'R' the radius of the electron cloud sphere.	2	03
Q4	Calculate the polarisation of Helium gas if it is placed in a field of **5×10^{5}**V/m. The atomic polarizability of He is **2×10^{-40}**Fm^2, and the concentration of atoms is **2.6×10^{25}** atoms/m^3. Also, calculate the dipole moment and the separation induced between the positive and negative charges in each atom. (Given: Atomic number of He=2; $\varepsilon_0=8.85\times10^{-12}$ $C^2/N/m^2$); charge on an electron = 1.6×10^{-19} C)	3	03
Q5	A dielectric material has a dielectric constant $\boldsymbol{\varepsilon_r = 5}$ and the square of the refractive index is $\boldsymbol{n^2 = 2.50}$. Calculate the ratio of electronic to ionic polarizability $\boldsymbol{\alpha_e/\alpha_i}$ for this material.	3	03

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