

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2025

B.Tech-V Semester (ECE)

COURSE CODE (CREDITS): 3

MAX. MARKS: 15

COURSE NAME: SCIENCE AND TECHNOLOGY OF MATERIALS (18B1WPH531)

COURSE INSTRUCTORS: Haresh Raval

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

Q.No	Question	CO	Marks
Q1	A) What are Dielectrics? Differentiate between polar and non-polar dielectrics. B) Define Polarization. What are the types of Polarization in a single phase dielectric materials?	CO - 1	3
Q2	A) A dielectric material with density $3 \times 10^{28} \text{ atoms/m}^3$ exhibits an electronic polarizability of $2 \times 10^{-40} \text{ C}^2 \text{ s}^2 \text{ kg}^{-1}$. Calculate the dielectric constant of material. B) If an ionic crystal is subjected to an electric field of 2500 V/m and resulting polarization is $6.4 \times 10^{-8} \frac{\text{C}}{\text{m}^2}$. Calculate the dielectric constant of the material.	CO - 2	3
Q3.	Derive the expression of internal electric field due to long one dimensional array of atomic dipoles at the location an atom in the array.	CO - 2	3
Q4.	Derive Clausius-Mossotti Equation.	CO - 3	3
Q5	Calculate the percentage of ionic polarizability in sodium chloride which has the refractive index and static dielectric constant 1.5 and 5.6 respectively.	CO - 4	3