

1.	If cubic structured Silicon doesn't have permanent dipoles, Find the total polarisation and derive the polarisability for that material?	2 M
2.	An isolated Te atom has the atomic radius 12×10^{-7} m. Calculate the α_e ?	1 M
3.	The relative dielectric constant of Ne gas is 1. If the gas contains 2.7×10^{25} atoms m^{-3} at 0°C and 1 atmospheric pressure, calculate its polarisability.	1 M
4.	If a NaCl is subjected to an electrical field of 1000 V m^{-1} and relative permittivity 5.86, calculate the resulting polarisation of NaCl.	1 M
5.	A Cu material has a magnetic field intensity of 10000 A m^{-1} . If the susceptibility of the material at room temperature is 2.7×10^{-3} , calculate the magnetisation and flux density of the material.	1 M
6.	If a material have $M/M_s=0.9$, What type material it is? and What is name of the that material?	1 M
7.	If a material susceptibility varies from 10^{-5} to 10^{-6} , what type of material it is? And derive the equation for susceptibility (Assume that the value of induced magnetic moment is very small, when there is an applied magnetic field)	2 M
8.	A material is subjected to a magnetic field of 10^3 A/m strength. If the magnetic magnetisation is $0.3 \times 10^{-3} \text{ A m}^{-1}$, calculate its susceptibility and magnetic flux density inside the material.	1 M

- 1 Ans: Derivation of Claussius–Mosotti equation.
- 2 Ans: Electronic Polarisability $1.926 \times 10^{-28} \text{ Fm}^{-2}$
- 3 Ans: Polarisability 0 (Zero)
- 4 Ans: $4.3 \times 10^{-8} \text{ C/m}^2$
- 5 Ans: Magnetization $M=27 \text{ A/m}$; Magnetic flux density $B=1.26 \times 10^{-2} \text{ Wb/m}^2$
- 6 Ans: The material exhibits Ferromagnetism (For $M/M_s=0.9$ value), the materials are ferromagnetic materials, Ex. Iron, Nickel, Cobalt.
7. Ans: Diamagnetic materials and derivation of Langevin's Theory of Diamagnetism
8. Susceptibility 3×10^{-7} and Magnetic flux density $B=1.26 \times 10^{-3} \text{ Wb/m}^2$