Date
16/10/2025
Sem III - Unit 2 MM4

Electrical Susceptibility

Electrical susceptibility is a dimensionless quantity that measures how much a dielectric material polarizes when a electric field is applied. It indicates how easily a material can be polarized with a higher susceptibility meaning the material will have a stronger polarization response to a given electric field. The relationship is expressed as $P = \chi E$, where P is the polarization, χ is the electric susceptibility and E is the electric field. Expressed the formula $\chi = \frac{P}{E}$ A higher susceptibility indicates that a material can be polarized more easily and will have a greater response to the field. and electrical susceptibility's symbol is χ_e.

Some aspects of electrical susceptibility →:

(a) Polarization → When an electric field is applied, it causes positive and negative charge with in a dielectric material to shift slightly, creating temporary electric dipoles. The material is said to be 'polarized' once these dipoles are created.

(b) → Relationship (Bonding) with electric field → χ_e is the constant of proportionality between the ~~polar~~ polarization of the material and the applied electric ~~&~~ field.

(c) → Dielectric constant → Electrical susceptibility is related to the dielectric constant (ε_r) by the formula $\chi = \varepsilon_r - 1$. The dielectric constant is a measure of how much a material reduces the electric field inside it.

(d) → Vacuum susceptibility is zero since a vacuum cannot be polarized.

(e) → Property of material → The susceptibility depends on the material's specific properties (conductor or an insulator)