

UNIT-VI - ENGINEERING MATERIALS

Dielectric Materials:

The dielectric material is an insulating material in which all the electrons are tightly bound to the nucleus of the atom. There is no free e available for the conduction of current, Therefore, the electrical conductivity of such materials is very low. The E.C. of ideal Dielectric is o.

on the basis of band throng the forbidgen gap (Eg) is Nery large materials such as glass, Polymers are dielectric in mature

The basic diff. blw. dielectric & insulators 12
that dielectric can store charge.

when the Ext is applied the the Exp. & -NE charge separating and polarisation occurs, cz of internal Exp. such materials opposes the

applied E.F.

The dielectric constant of a material is the

Folled with dielectric material to the capacitence

of same capacitor in Free space of Naccum

In other words it is the ratio of permittivity of a medium to Permittivity of Pres space.

Denoted by Symbol -K ξ : Eγ., where E. is the permitte of medium Eo 11 11 11 11 0+ Free Space Er relative permittivity In basic terms the dielection constant by the measure of the about of any make that how easily it will get polarized. Magnetic Materials -> The M.M are the substance that exhibits magnetic properties either naturally or in the presence of applied magnetic field . In materials get magnetised in the presence of applied magnetic field, Such materials have domains, that are the regions where the magnetic momento individuals atoms or group of atoms alling in a particular dir, resulting in net Magnetic Feld

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Important Parameters of Magnetic materials.

· Magnetic susceptibility (Xm), it is the measure of how much a material will get magnetise in the presense of applied M.F. It is given as

7 m; T H.

T = Intensity of Magne Hisabon H = Intensity of applied field.

· Permiability. The permiability of a material

13 the capability of magnetic Cines of Force to

penetrate the materials 1 it is denoted by symbol

(M) Si it is giner as B= MH

or (M=B)

B= Magnette Flux density.

The relative permiability is given as Mr = M

u= Permiabilin of medium

402 Per " . of Free space.

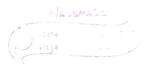
Relationship between Magnetic susceptibility &

Cur: 1+ Xm

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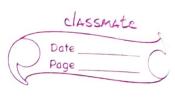


classification of Magnetic materials. on the bases of magnetic properties diff. material 1. Diamagnetic. materials. a. Paramagnetic materials. Ferromagnetic materials. i. Digmagnetic materials Dig magnetism occurs in those material: in wi individuals atoms do not have any magnet moment, as their orbital & spin moment add rectoring to become Zero. on placing such materials in External magnetic Reld, the will get repelled, Such properties are found in the materials whose obtermost - shells has even no. of electrons, since, the e have spine opposite to each other, the net magnetic moment will be zero, **←**> such types of materials are Type I sull' - conductors as they ethobits perfect conductivity & perfect diamagnetism when evoled at very low temps



* Magnetication is independent for ex, The - copper - bis muth. on temperature a. Paramagnetic materials -> Paramagnetism occurs in these materials in which the outermost orbit has an odd no of electrons such materials are highly attracted by the magnet in Hally the dipole moments are gandomy oriented when such materials are kept in M.F. the magnet momente get alligned is the direction of applied field such materials have the sussecipitibility q the permiability greater than 1. The Magnetisation decreases with increase in temperature because of thermal motion which disturbs , the magnetic moment. For ex. Aluminion chromium etc. 3- Ferromagnetic materials 11 occurs in such materials in which the atoms have permanent dipole momente. The strong interaction blw neighbouring atomic dipole moments keep them alligh even in the absense of magnetic field.

The magnetic sussepi... Is always the G the value of permiability is of few thousands.



The magnetisation varies inversing with temp.



Super conductive Materials

-> When certain materials are cooled below a particular temperature then there electrical Resistivity suddeny drops to zero, El also act as pure diamagnetic materials, such materials are known as super-

conductive materials.

(1) S=0 (Electrical con

(ii) Xm = -1 (iii) Mr = 0

Proper Hes 3-

(iv) B = 0

Meissner Effect

When super-conductors are control below it's critical temperature in the presense of applied M.F then it expelled out the Magnetic flux then act Like a pure diamagnetic material , this is known as Meissner effect.

TYPE - I SUPER CONDUCTORS

Such materials strictly follow Meissner effect which means, the transition of normal state to super conductive state will be sudden

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	strictly which preaks it will take som
	time to shift from normal state to
	cuper - conductive state.
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