



**GANDHI SCHOOL OF
ENGINEERING, BHABANDHA, BERHAMPUR**


**SUBJECT: ELECTRICAL ENGINEERING
MATERIALS
SEMESTER: 3RD**

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1ST CHAPTER- CONDUCTING MATERIAL

CONDUCTING MATERIAL



- Any material which allows electrical current to pass through it is called conductor.

OR


- The material which offers low resistance path to the flow of electrical current. All pure metals are good conductors of electricity
- Conducting material used for making wires or cables that will carry electricity or to making the conducting parts of electrical equipment, machines & Accessories etc.




Conductor –

Any material that allows electric current to pass through it


insulator



conductor



- copper
- any metal
- aluminum
- steel



Insulator –

Any material that does not allow electric current to pass through it

•like the protective coating on wires

- plastic
- cloth
- rubber
- wood
- glass







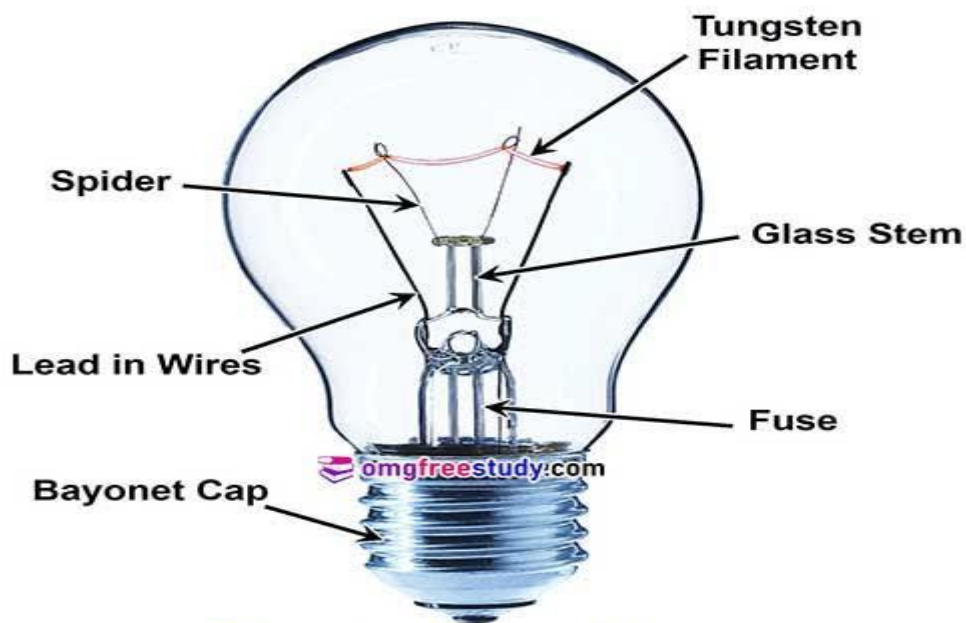
What is conductor ?

Conductor –

Any material that allows electric current to pass through it



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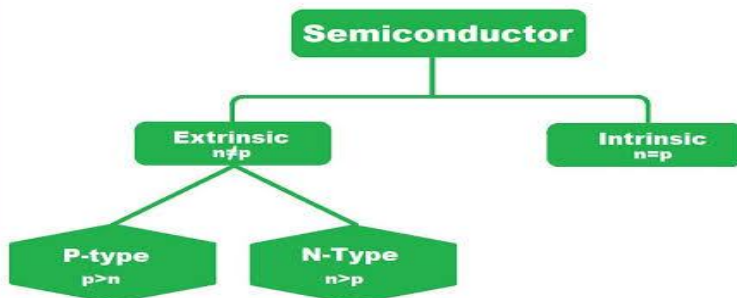


Tungsten Filament Lamp

2ND CHAPTER- Semiconducting material

What is a Semiconductor?

- ➔ A semiconductor is a material, whose conductivity properties lie between the conductor and insulator.
- ➔ Semiconductor Examples are: Silicon, Germanium, Gallium Arsenide etc.



- ➔ "n" stands for negative (free electrons)
- ➔ "p" stands for positive (holes)

Semiconductor Components



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Silicon



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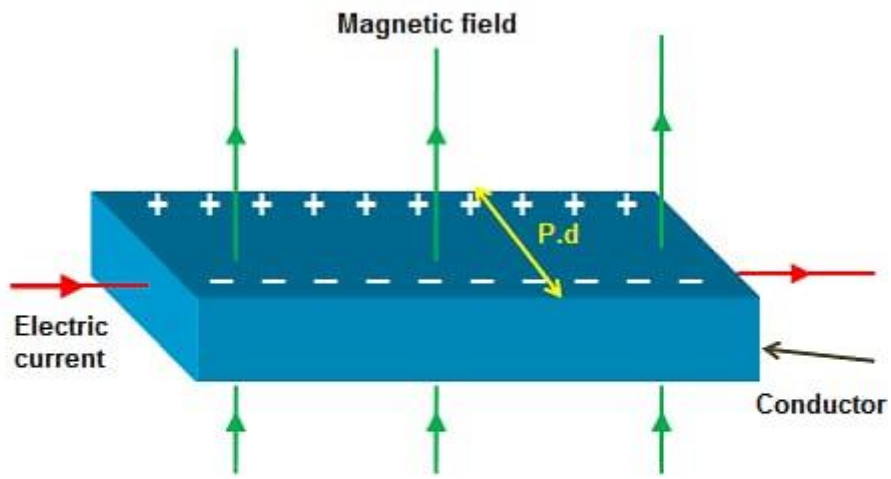
SEMICONDUCTOR MATERIALS

<u>Material</u>	<u>Example</u>	<u>ρ (Ω m)</u>
Conductor	Copper	10^{-6}
Semi-conductor	Germanium	0.5
Semi-conductor	Silicon	500
Insulator	Mica	10^{10}

UNITS

Resistivity, ρ is given by: $\rho = (RA)/L = \Omega \text{ m}^2 / \text{m} = \Omega \text{ m}$

Conductivity, G is given by: $G = 1/\rho = \Omega^{-1}\text{m}^{-1} = \text{S (Siemens)}$



P.d = Potential difference

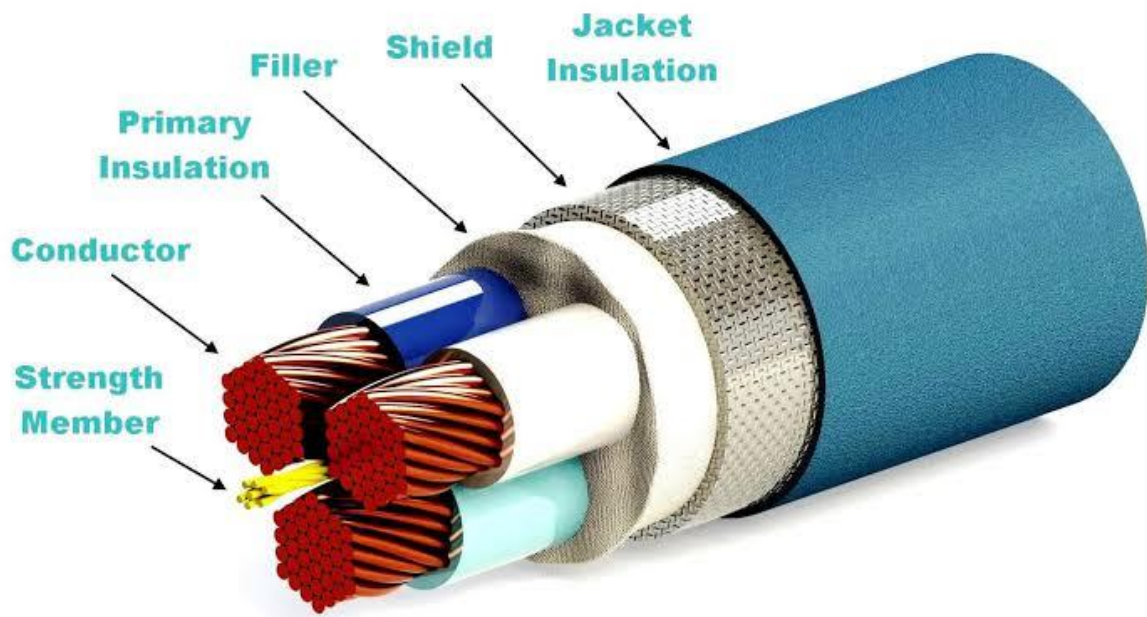
Hall Effect



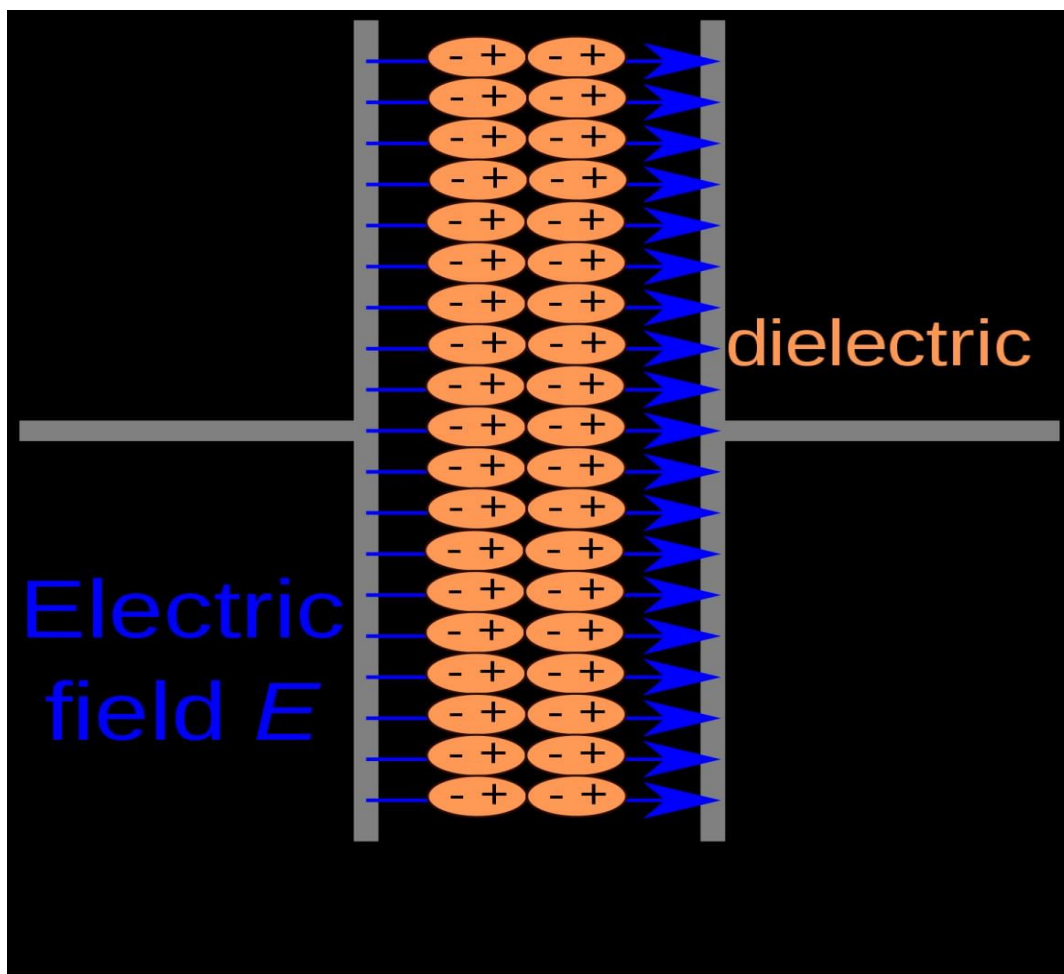
3RD CHAPTER-Insulating material

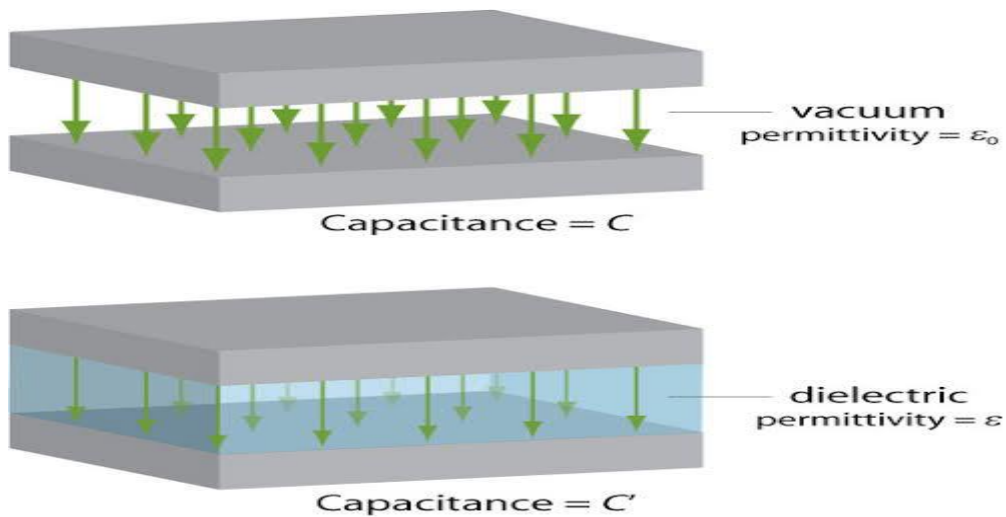


Insulating Materials



4TH CHAPTER-Dielectric material

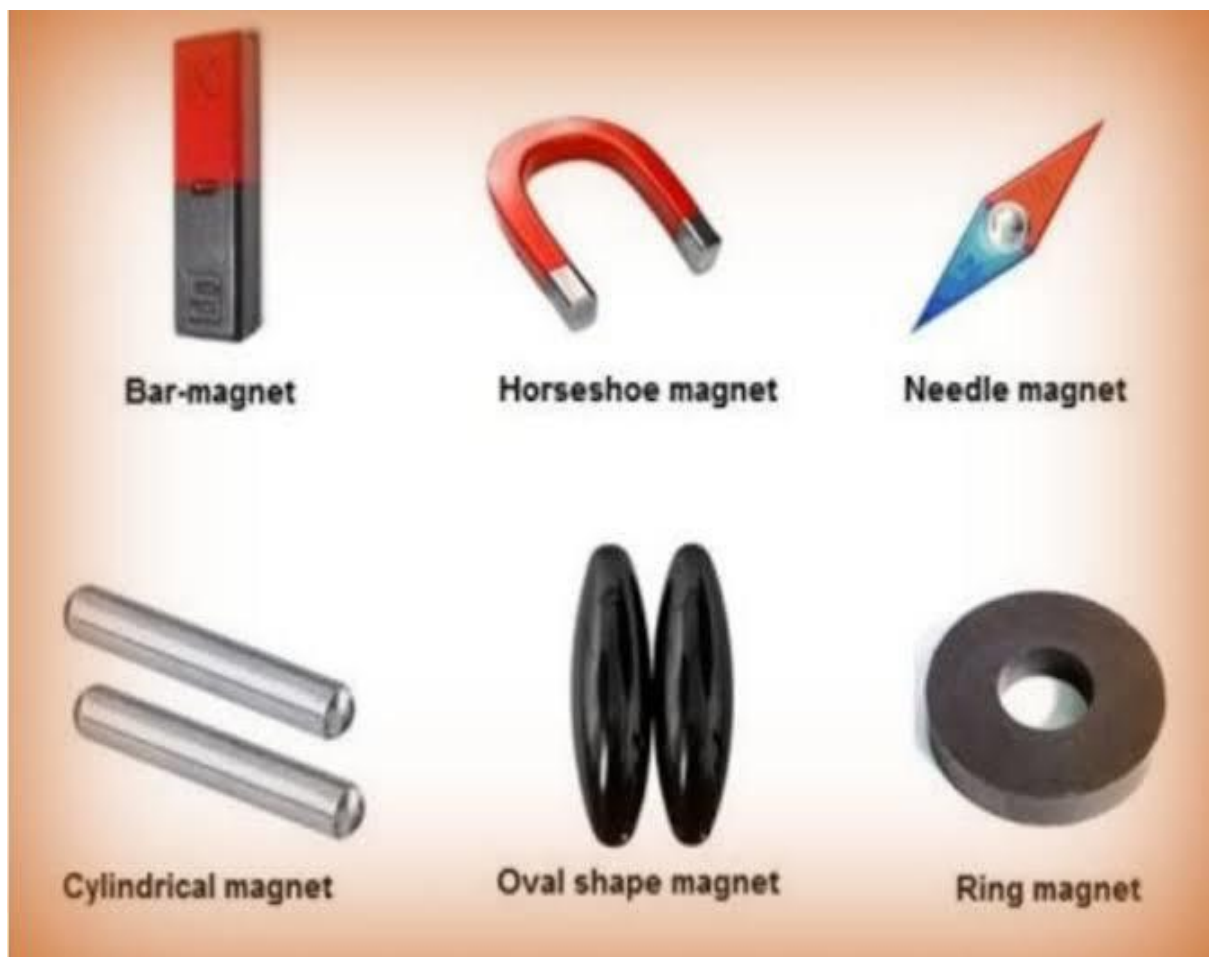


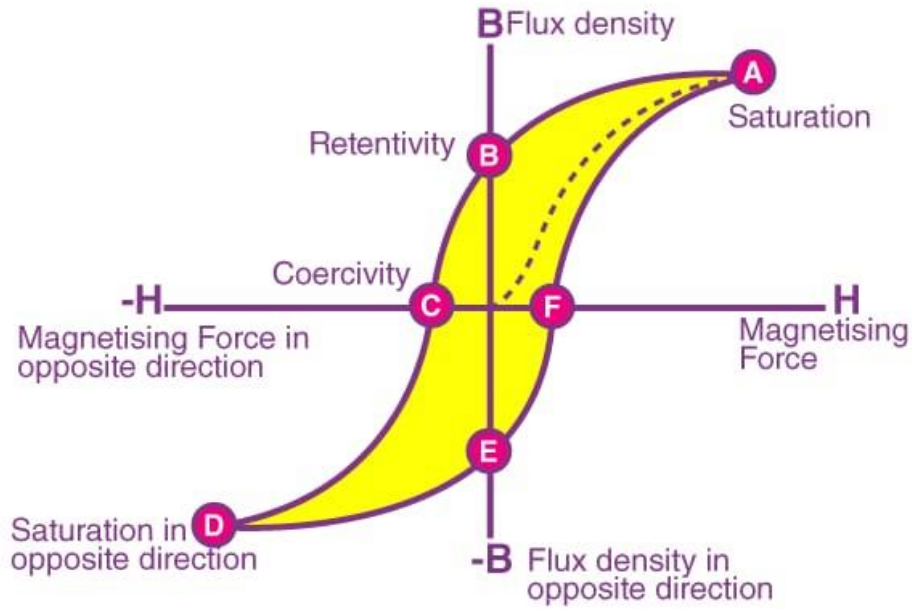


$$\kappa = C'/C$$

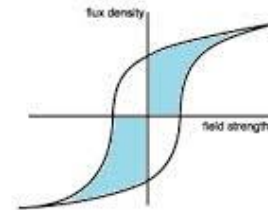
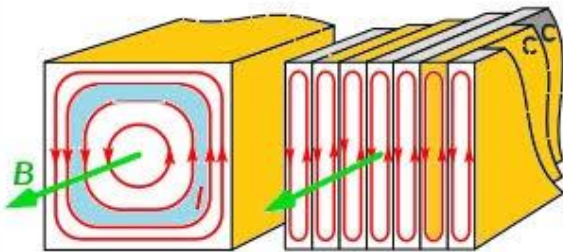
$$\kappa = \epsilon/\epsilon_0$$

5TH CHAPTER-Magnetic material

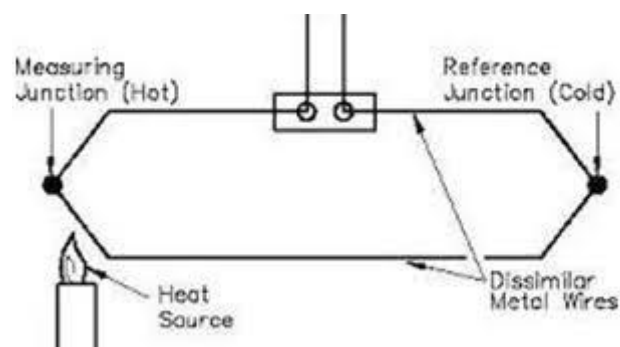


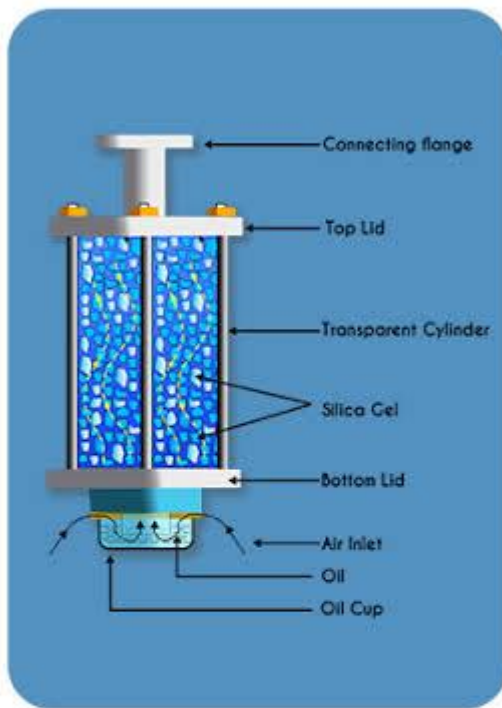


Difference Between Eddy Current & Hysteresis Loss



6TH CHAPTER-Material for special purpose





BEFORE



AFTER