ODM EDUCATIONAL GROUP
Changing your Tomorrow

ELECTRICITY

CHAPTER NO.12

SUB: PHYSICS

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LEARNING OUTCOMES

- **Students will be able to** :
- Define Ohm's law
- Experimentally verify Ohm's law.
- Solve numerical problems on Ohm's law.

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POINTS TO BE COVERED

Ohm's Law.

Experimental verification of Ohm's law.

Solve numerical problems on Ohm's Law.

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INTRODUCTION

https://youtu.be/ldNPl67x-E8

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OHMS LAW.

The electric current flowing through a conductor is directly proportional to the potential difference applied across its ends providing the physical conditions such as temperature remains unchanged.

$V \alpha I$

$V = IR$. Where R is a constant called resistance.

Ohmic conductors

The conductors which obey ohms law are known as Ohmic conductor.

Non ohmic conductors

The conductors which donot obey Ohms law are known as non ohmic conductors.

https://youtu.be/ldNPl67x-E8

RESISTANCE

https://youtu.be/4UAe_sXFH4A

TERMS RELATED TO RESISTANCE

Resistor: A component in an electric circuit which offers resistance to the flow of electrons constituting electric current is known as resistor.

Rheostat: It is a variable resistor which is used to control the flow of electric current by manually increasing or decreasing the resistance.

Good conductor: A material which offers low resistance to the flow of electrons or electric current in a circuit . ex: silver, copper

Poor conductor: A material which offers higher resistance than conductors to the flow of electric current in an electric circuit.

Insulator: A material which offers very high resistance to the flow of electrons or electric current in an electric circuit . ex: Rubber, Dry wood , plastic

FACTORS ON WHICH THE RESISTANCE OF A CONDUCTOR DEPENDS

The resistance of a conductor depends upon its:-

i) Length

ii) Area of cross section

iii) Material of the conductor.

Resistance is directly proportional to the length of the conductor and inversely proportional to the area of cross section of the conductor.

$$R \alpha l$$

$$R \alpha l / A$$

$$\text{or} \quad R \alpha \frac{l}{A}$$

$$\text{or} \quad R = \rho \frac{l}{A}$$

Where ρ (rho) is a constant of proportionality called Resistivity of the material of the conductor.

The SI unit of resistivity is ohm meter (Ωm).

NUMERICALS

Q1.The pd between the terminals of an electric heater is 75 volt when it draws a current of 5A from the source. What current will the heater draw, if the pd is increased to 150 V.

Answer: V = 75 V.

I = 5A R = V/I = 75 / 5 = 15Ω

R = 15Ω. V2 = 150 V. I2 = V2/R = 150 / 15 = 10A.

Q2. A wire of given material having length l and area of cross-section A has a resistance of 10 Ω. What would be the resistance of another wire of the same material having length l/4 and area of cross-section 2.5 A?

Answer: Length = l

Area of cross section = A.

R1 = p l/A = 10Ω.

P = 10 A/l.

For second wire length = l/4.

A = 2.5 A.

R2 = p l/4 ÷2.5A = 10 A/l X l/ 4X2.5 A=1Ω.

THANKING YOU

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