SNS COLLEGE OF TECHNOLOGY

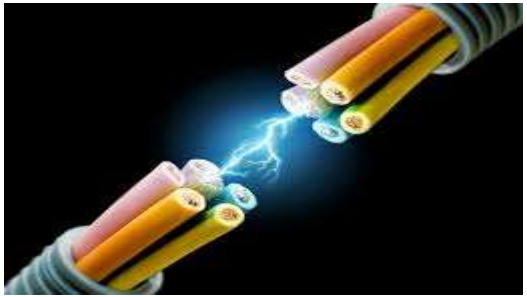
(An Autonomous Institution)
COIMBATORE-35
Accredited by NBA-AICTE and Accredited by NAAC – UGC with A++ Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai.

UNIT-1

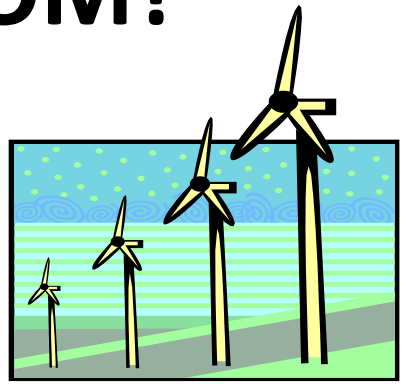
VOLTAGE ,CURRENTPOWER,ENERGY

TOPIC OUTLINE

- Electricity?
- Voltage, Current, Resistance
- Nature of Current
- Ohms Law



ELECTRICITY COME FROM?



- We buy it from Power Plants
- We can generate it ourselves
  - Diesel or gasoline generators
  - Generated in our Car
  - Generated by home Solar or wind power
- We can get it from Batteries
- Sometimes we get it when we don't want it
  - Lightning

VOLTAGE (V)

- It is the push or pressure behind current flow through a circuit, and is measured in (V) volts.
- Quantitative expression of the potential difference in charge between two points in an electrical field.

CURRENT (I)

- Current refers to the quantity/volume of electrical flow. Measured in Amps (A)
- Flow of Electrons

RESISTANCE (R)

- Resistance to the flow of the current. Measured in Ohms Ω
- It opposes an Electric Current

CHART

Quantity	Symbol	Unit of Measurement	Unit Abbreviation
Current	I	Ampere ("Amp")	A
Voltage	E *or* V	Volt	V
Resistance	R	Ohm	Ω

NATURE OF CURRENT

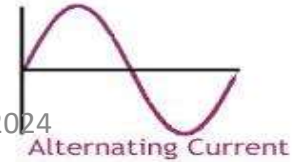
- Most power generated is Alternating Current (AC) power where the current and voltage varies Sinusoidal with time
- Direct Current (DC) power doesn't vary with time
- Most consumer products use both AC and DC

a. DC CURRENT

- DC current is used to power electronics
- DC current is easier to store (batteries)
- DC current is used in mobile applications
- Inverters conv

b. AC CURRENT

- AC current is easier to distribute
  - Higher voltage and smaller current yields same power distributed
  - Transformers make it easy to change voltage levels so smaller wire can used
- AC is used for most machinery, lights and appliances
- Power supplies convert AC to DC



BASIC LAWS

- OHMS LAW
- KIRCHOFF'S LAW

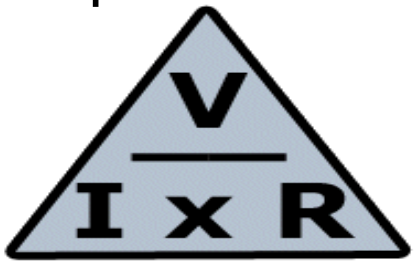
OHMS LAW

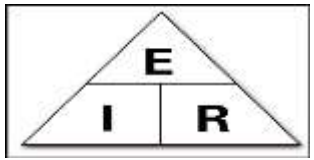
- Ohm's Law explains the relationship between Voltage (V), Current (I) and Resistance (R)

Definition:

States that the current through a conductor between two points is directly proportional to the potential difference across the two points

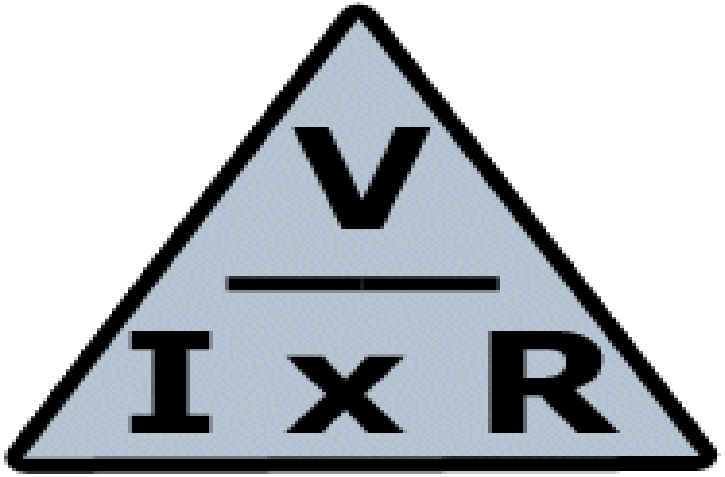
V = I x R





OHMS LAW TRIANGLE

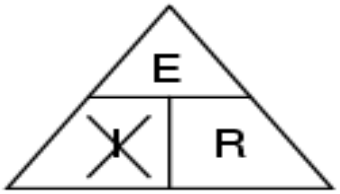
- V (E) = I x R



- $I = \frac{V}{R}$
- $R = \frac{V}{I}$

How do calculate?

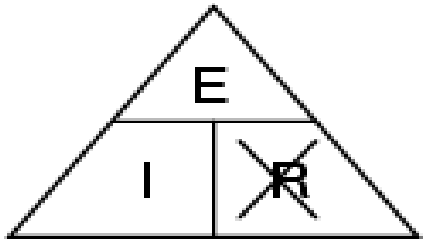
- Battery voltage is 12V
- Current is Amp ?
- Resistance 2 Ohm



$$I = \frac{E}{R}$$

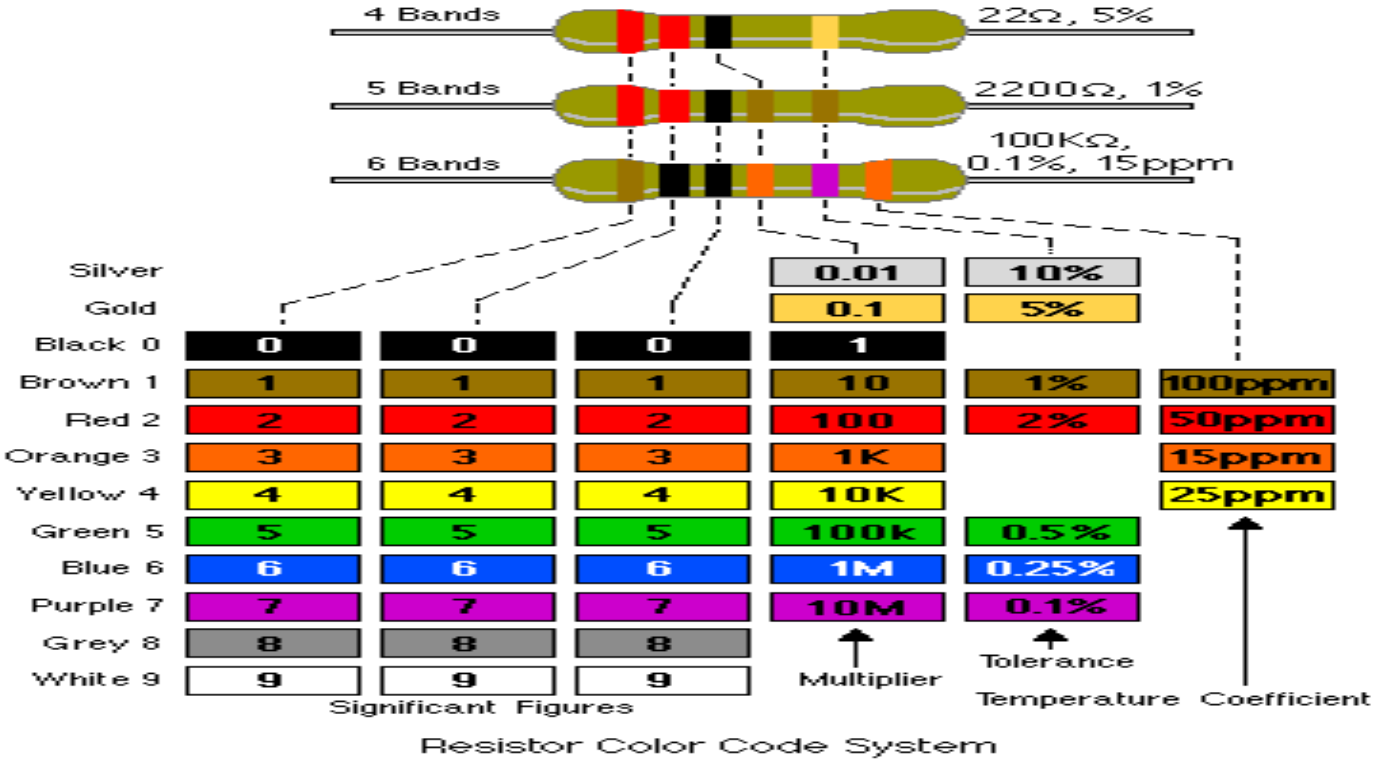
How to calculate?

- Voltage is 12V
- Current is 4 Amps
- Resistance Ohms ?



$$R = \frac{E}{I}$$

RESISTOR COLOR CHART



POWER

Power is restricted to mean the time rate of doing work. The average power is the worked
performed divided by the time required for the performance. Mathematically, this is expressed as:

$$P = W/t = VI$$

where:
P = the power in **watts**
W= the energy in **joules**
t = the time in **seconds**

Power and Energy

Power and Energy

The property of the body or system of bodies by virtue of which work can be performed is called **energy**.

Commonly defined as "ability to do work". Energy can exist in many forms and can be transformed from one form to another. One of these energy that we will considered here in **Electrical Engineering** is the heat.

Heat is defined as the energy transferred to or from an object because of a difference in its temperature and that of some other object in contacts in its environment.

Mathematically, this is expressed as:

$$Q = mc \text{ delta } T$$

where:

Q = heat in *kcal*

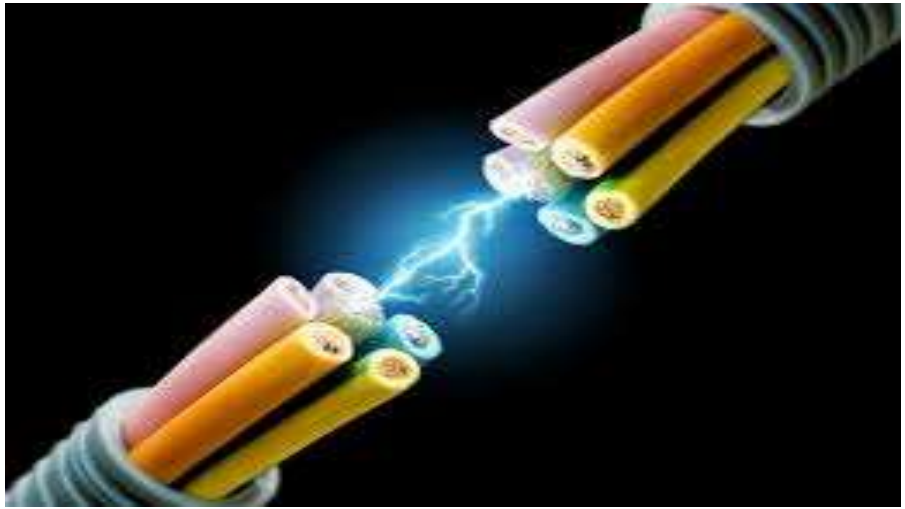
m = mass

C = specific heat

delta T = change in temperature

Always take note that, **1 kcal is the amount of heat required to raise the temperature of 1-kg of water by 1 degree celcius.**

RECAP….



…THANK YOU