1. Effects of Electric Current

Resistors

Connecting methods

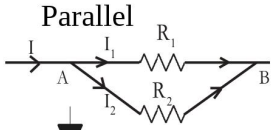
Series

Effective resistance
$R = R_1 + R_2$

Voltage is different and current is same in each resistors
[Tips: VS different]
Resistance increases.

If all the resistors are with same Resistance, then
Effective resistance
$R = r \times n$ (Series)
$R = \frac{r}{n}$ (Parallel)

Parallel



Effective resistance
$\frac{1}{R} = \frac{1}{R1} + \frac{1}{R2}$ or $R = \frac{R1R2}{R1+R2}$

Voltage is same and current is different in each resistors.
Resistance decreases.

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Heating Effect

Nichrome heating coil is the main part of heating instruments
(Eg: Iron box, Kettle, Heater, Oven etc.)
Nichrome has **high resistivity**, **high melting point** and **ability to remain in red hot condition for long time without oxidised.**

Safety Fuse
It protects electric circuit from excess current due to **short circuit** and **overload.**
Fuse wire with **Tin** and **Lead** is the main part of fuse. It has **High resistance** and **low melting point**

Joule's Law
Heat produced can be calculated by

$H = I^2Rt$
$H = VIt$
$H = \frac{V^2t}{R}$
$R = \frac{V}{I}$
$H = P \times t$

[I=intensity of current in A, R=resistance in Ω, V=voltage in V, t=time in sec]

Short circuit: The two wires from the mains come into contact without the presence of insulation.
Overload: The total power of all appliances connected to it is more than what the circuit can withstand.
Amperage: Ratio between power and voltage. **Amperage** = $\frac{P}{V}$

Lighting Effect

Incandescent Lamp:
Produces light when **tungsten** filament is heated. Tungsten has **high resistivity**, **high melting point** and **ability to emit white light in hot condition. Nitrogen** is used in the bulb to increase the life time.
- Disadvantage: Energy loss

Power(P): Amount of energy consumed in unit time

$P = \frac{H}{t}$

$P = I^2R$ (because $H = I^2Rt$)
$P = VI$ (because $H = IVt$)
$P = \frac{V^2}{R}$ (because $H = \frac{V^2t}{R}$)

Discharge Lamp:
These have a gas filled glass tube fitted with two electrodes. When a high voltage is applied the gas gets excited. During the process the energy stored in them will be radiated as light. Sodium vapour lamp, Fluorescent lamp, CFL, Arc Lamp etc. are types of discharge lamp.
- Advantages: More lifetime, Low energy usage, Shadow minimised.
- Disadvantages: The gases inside the bulb is harmful to environment

LED(Light Emitting Diode):
No filament: No loss of energy
No gases: Not harmful

Parts of **LED**
- Base Unit: connects the bulb to holder
- Heat sink: absorbs heat from the base unit
- Base plate: LED board fixes with plate
- Driver board: It converts AC to DC and provide sufficient voltage
- LED board: All LEDs are fixed on this
- Diffuser cup: Light comes out from this

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