$$P = \frac{V^2}{R}$$

$$40 = \frac{(230)^2}{R}$$

$$R = 1322.5$$

Why resistances of bulb differ when it is not connected to the mains?

→Cold filament has a lower resistance while hot filament has higher resistance.

12 b

List the factors that affect the capacitance of a parallel plate capacitor

→ Area, distance apart, permittivity of electric

Plates → Common area of 40cm^2 and is 1 cm apart. The capacitor connected to a 12 V d. c supply

i). Capacitance

$$C = \frac{\varepsilon A}{d}$$

$$C = \frac{(8.85\times10^{-12})(40\times10^{-4})C}{(0.01)}$$

$$C = 3.54\times10^{-12}F$$

ii). Magnitude of the charge on each plate

$$Q = CV$$

$$Q = (3.54\times10^{-12})(12)$$

$$= 4.25\times10^{-11}C$$

What is net charge on capacitor? =0

Uses: blocks d.c, tuning circuits, flash on camera

<u>2005</u>

i). Potential difference

$V = \frac{w}{\theta}$ (w=work per unit charge, θ=charge)

ii). Resistance

$R = \frac{v}{1}$ (V=voltage, 1=current)

Two resistors of resistance $R_1 + R_2$ are considered in parallel.

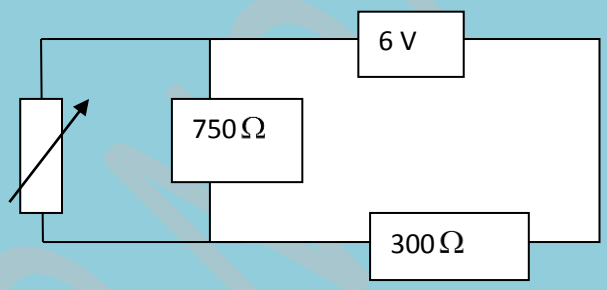
Derive an expression for the effective resistance of the 2 resistors

$1_T = 1_1 + 1_2$

Ohms law = $\frac{V}{R} = I$

$\frac{V_T}{R} = \frac{V_1}{R} + \frac{V_2}{R}$

$\frac{1_T}{R_T} = \frac{1_1}{R_1} + \frac{1}{R_2}$



A

Resistance of thermometer at room temperature=500

At room temperature, calculate,

i). Total resistance of the circuit

$\frac{1}{R_T} = \frac{1}{750} + \frac{1}{500}$

$RT = 300\Omega$

Total

$$R = 300 + 300$$
$$= 600\Omega$$

Current flowing through 750Ω resistor

Total V $I = \frac{V}{R} = \frac{6}{600} = 0.01A$

Voltage at 300Ω (1) V=RI V=(0.01)(300) =3V

(2) $\frac{V}{R} = \frac{3}{750}$ $= 4 \times 10^{-3} A$

A resistor is connected in fences with an ammeter and an ac power supply. A current flows in the circuit. Resistor replaced with coil. The resistance does not change. What is the effect on the current in the circuit, why?

→ Current is reduced

Lenz's law

→ The direction of an induced current is always such as to oppose the change causing it

→Back e m f induced in coil

Electric current

- This is the flow of charge (in a metal conductor it is a flow of electrons).
- A current of 1 Amp is a movement of 1 C per second.
- $I = \frac{\theta}{t}$
- Electrons flow from - to + but conventional current flow from + to - i.e. flow of +charge
- Current is same at every point in a series.
- Sum of I flow in a function =sum of I flowing out.

- Ammeter is used to measure current and is always connected in series (galvanometer =sensitive ammeter)

Current is split among the component in parallel

$I=I_1+I_2$

Potential difference – can also said to be the energy lost by 1 coulomb as it moves between 2 points in a circuit.

$$V=\frac{w}{\theta}$$

Power = current ×V

$$\theta = It$$

$$W = \theta V$$

$$W = ItV$$

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

$$P = IV$$

Voltage in series: $V = V_1 + V_2 + V_3$

Voltage in parallel: $V_1 = V_2 = V_3$

→ Voltmeter is used to measure V and is always connected in parallel with the part of the circuit to be measured.

emf

Voltage applied to the circuit in the emf

Measuring d.c → ammeter

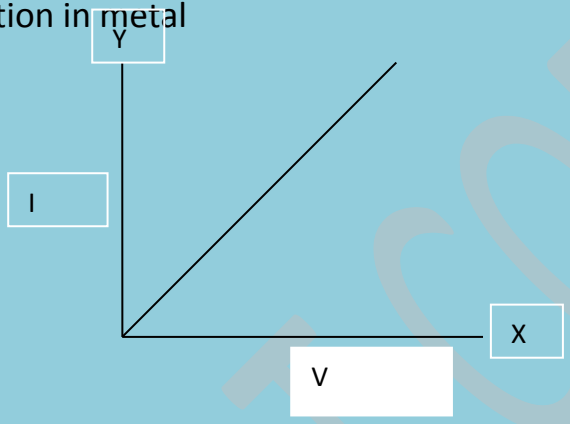
Sources of emf

- Main supply (230V)
- Thermocouple

- Simple cell – cannot be recharged; electrodes in dilute sulfuric acid
- Lead acid accumulator - can be recharged e.g. car battery
- dry cell e.g. 15 v 6 V, 9 V batteries have paste not a liquid mode→cannot be charged.
-

Voltage currency graph

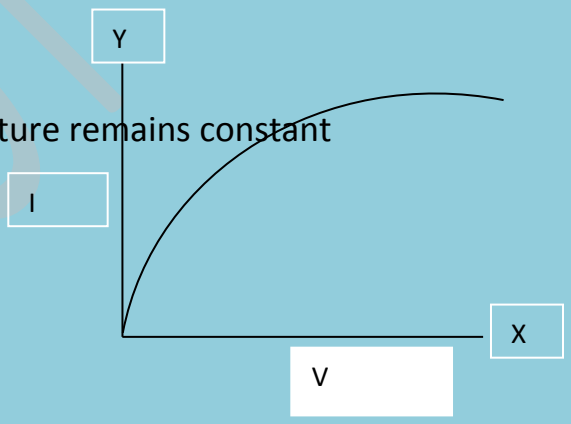
1. γ Conduction in metal



Electrons carry current

Obey ohms law provide d the temperature remains constant

2. Filament bulb



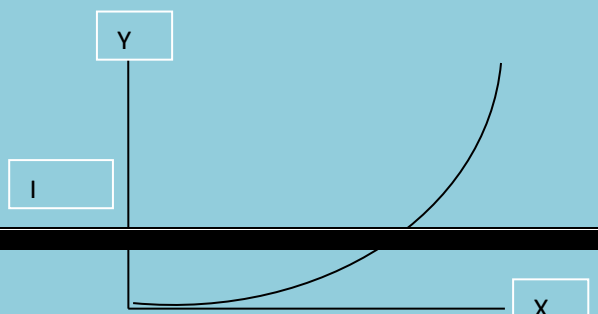
<u>Electrons carry current</u>

When cold, obeys ohms law $I \alpha V$

At higher voltage, the increased heat increases resistance and lesser the current

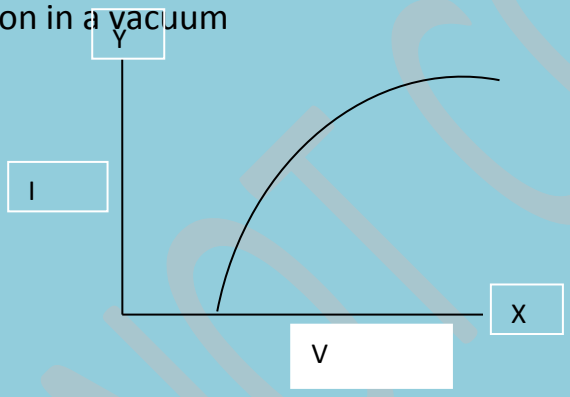
→V not α to I when hot.

3. Conduction of a semiconductor



- Current is carried by electrons and positive holes e.g. semiconductor diode
- As p.d increased, current increased and gets hotter more electrons and holes created →
- Resistance drop

4. Conduction in a vacuum



- Vacuum will not conduct electricity because there are no charge carriers present
- Cathode must be warmed