

# 1. Effects of Electric Current

## NON FOCUS AREA

- Amperage
- Lighting effect of electric current
  - 1. Incandescent lamps (Filament lamps)
  - 2. Discharge lamps
  - 3. LED (Light emitting diode)
- LED Bulbs (Construction, repair, reuse and disposal)

## Amperage

\* Amperage (A) is the ratio of the power of an equipment to the voltage applied. Amperage increases with the thickness of the conductor.

$$\text{Amperage} = \frac{\text{Wattage}}{\text{Voltage}} = \frac{W}{V}$$

1. An appliance of power 540 W is used in a branch circuit. If the voltage is 230 V, what is its amperage?

Power            P = 540 W

Voltage         V = 230 V

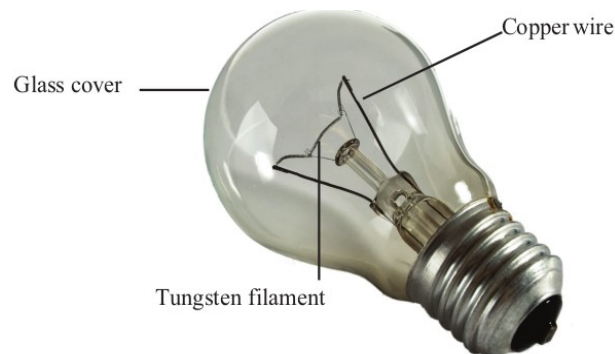
Amperage       = W/V

$$= 540 / 230 = 2.34 = 2.4 \text{ A}$$

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## Lighting effect of electric current

### 1. Incandescent lamps (Filament lamps)



#### The main parts of a filament lamp.

- \* Tungsten filament
- \* Glass cover
- \* Copper wire
- \* Gas filled at low pressure inside the bulb

#### The working of a filament lamp.

- \* Electricity passes through the Tungsten filament



- \* The filament becomes white hot



- \* Gives out light

#### 1. Which material is used to make filament?

- \* Tungsten

#### 2. What properties of tungsten make it suitable for being used as a filament?

- \* high resistivity
- \* high melting point
- \* high ductility
- \* ability to emit white light in the white hot condition

#### 3. Why is the bulb filled with an inert gas/ nitrogen?

- \* Vaporisation can be reduced by filling some inert gas at low pressure inside the bulb.

4. Why is the bulb evacuated?

\* In order to avoid oxidation of tungsten.

5. Nichrome is not used as filament in incandescent lamps. Why?

\* It can remain only in red hot condition but it can't give light.

5. What is the disadvantage of the incandescent lamps?

\* A major part of the electrical energy supplied to an incandescent lamp is lost as heat. Hence the efficiency of these devices is less.

## 2. Discharge lamps

The main parts of a Discharge lamp.

- \* Glass tubes
- \* Two electrodes
- \* Gas molecules



The working of a Discharge lamp.

When a high potential difference is applied to the electrodes



The gas molecules get excited



Excited atoms come back to their original states for attaining stability



The energy stored in them will be radiated as light

1. What are the advantages of using discharge lamps instead of incandescent lamps?

- \* Loss of electricity in the form of heat is less
- \* More life span
- \* More light is obtained
- \* Less consumption of electricity

2. What are the factors to be considered when you select a bulb?

- \* Efficiency
- \* Energy consumption
- \* Low energy loss
- \* Less environmental pollution

### 3. LED (Light emitting diode)



LED Bulb



1. Which are the lamps that are mostly used? Why?

LED lamps, because

- \* As there is no filament, there is no loss of energy in the form of heat.
- \* Since there is no mercury in it, it is not harmful to environment.
- \* Very low power consumption.
- \* More life span.
- \* Different coloured LEDs can be manufactured.

LED Bulbs (Construction, repair, reuse and disposal)

\* Parts of the LED bulb.

Part of on LED bulb	Use	Part of the LED bulb	Use
<p><b>Base unit E22</b></p>  <p style="text-align: center;">BASE UNIT</p>	<p>This is the metallic part that connects the bulb to the holder</p>	<p><b>Power Supply board (LED driver)</b></p>  <p style="text-align: center;">POWER SUPPLY BOARD</p>	<p>Function of this is to convert AC into DC and supply necessary output voltage ( The same board can be used for 5W, 7W and 9 W bulbs.)</p>
<p><b>Heat sink</b></p>  <p><b>Base plate</b></p> 	<p>The part close to the base unit of the bulb. It is an arrangement for absorbing heat from the base.</p> <hr/> <p>Metal plate that fixes it to the holder.</p>	<p><b>Printed Circuit Board (LED Chip Board)</b></p>  <p style="text-align: center;">PRINTED CIRCUIT BOARD</p>	<p>LEDs are fixed on this board. In this the positive and negative polarities are marked.</p>
<p><b>Back conductor Screws.</b></p> 	<p>Screws for fixing wires from LED drive to the base unit.</p>	<p><b>Diffuser cup</b></p>  <p style="text-align: center;">DIFFUSER</p>	<p>This is the part from which light comes out of the bulb.</p>

\* The Main Components of an LED bulb

1. Rectifier,
2. Load resistor,
3. Filter capacitor,
4. LED Chip,
5. Heat Sink

\* How can the LED bulbs be disposed of scientifically?

1. Segregate the plastic, electronic and metal components of LED bulb and transfer them to their respective disposal units.