

UNIT 3

Electromagnetic Induction

18/11/2020 – Class 30

Activity 1

Observe an electric iron.

Discussion

- What is the use of this device? **For ironing clothes.**
- What is the energy change taking place in this device?
Electrical energy is converted to heat energy.
- What are the things to be remember, while using the electric iron in our home, for reducing the electric bill?

Make sure to set one day a week for the ironing. Electric iron cannot be used during the peak hour of electricity (6 pm to 10 pm)



When we use electric iron in our home,

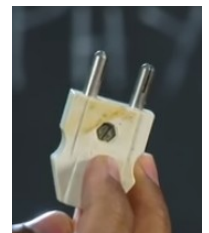
- Make sure to set one day a week for the ironing.
- Electric iron cannot be used during the peak hour of electricity (6 pm to 10 pm).

Activity 2.a

Observe the inside of an electric iron.

Discussion

- Which material is used as the heating coil of an electric iron? **Nichrome.**
- How many wires are needed for the flow of electric current through a device? **Two (Phase line and neutral line)**
- Which type of plug is used for glowing an electric bulb? **Two pin plug.**
- When we use a two pin plug in the circuit, the pins are connected to which wires?
One pin is connected to the phase line and the other to the neutral line.



Activity 2.b

Observe a three pin plug and three pin socket.



Three pin plug

Three pin socket

Discussion

- Which type of plug is used in an electric iron? **Three pin plug.**
- Two similar pins in the three pin plug are connected to which wires in the circuit? **One is connected to the phase line (red wire) and the other to the neutral line (black / blue wire)**
- Which is the third pin in the three pin plug? **Earth pin.**
- How does the earth pin differ from the other pins? **Earth pin is thicker and longer.**
- When the thickness of a conductor is increases, what happens to its resistance? **Resistance decreases.**

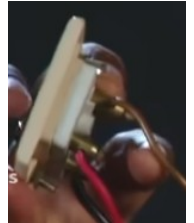
- Why the earth pin is made thicker? **To reduce resistance, and it also ensure that earth pin is connected to the earth socket only.**

Earth pin is made thicker,

- To reduce resistance.
- It ensure that earth pin is connected to the earth socket only.

Activity 2.c

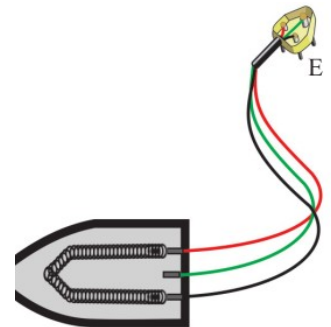
- When a three pin plug is inserted into a socket, the three wires coming from the appliances are connected to which are the lines in the circuit? **Phase, neutral and earth.**
- Which type of wire is used as the earth line? **Thick copper wire. (for reducing resistance)**



Thick copper wire is used as earth wire. Why?

- To reduce the resistance of the earthing.

- Earth line in the circuit is connected to.....? **The earth.**
- What is the potential of earth? **0**
- Which type of devices are used three pin plug? **Devices having metal body.**
- Why three pin plug is used for such devices? **For safety (To avoid electric shock)**
- Phase line and neutral lines are connected to which parts of the iron box? **Heating coil.**
- Earth wire is connected to which part of the appliance? **To the metal body of the appliances.**
- If there is an insulation failure in the phase wire, what may happens? **Phase line is in contact with the metal body of the appliances.**
- Then, if we touches the metal body of the appliances, what happens (If there is no earthing)? **We felt electric shock.**
- If earth wire is connected to the metal body of the appliances, what happens? **Electricity will flows to the earth, through the earth wire.**
- The resistance of the earth wire is more or less? **Less.**
- Then, what happens to the current in the circuit? **Increases.**
- Then, what happens to the fuse in the circuit? **Fuse wire melts and circuit is broken.**



How can safety be ensured using a three pin plug?

The pin E of a three pin plug comes into contact with the earth line. This pin is now connected to the body of the appliance. If at all the body comes into contact with an electric connection, electricity flows to the earth through the earth wire. The flow of current to the earth through a circuit of low resistance increases the current. As a result heat generated in the fuse wire increases and the circuit gets broken. This ensures the safety of instrument and the person handling it

Activity 2.d

Why earth pin is made longer?

- When we introduced the three pin into the socket, which pin comes into contact with the circuit first? Earth pin.
- When the three pin is pulled out of the socket, which pin will be the last to break the contact? Earth pin.

Earth pin is made longer, why?

When the three pin is introduced into the socket, the earth pin comes into contact with the circuit first. When the three pin is pulled out of the socket, the earth pin will be the last to break the contact. Hence complete safety is ensured by the three pin plug.

Activity 3

Why some devices use two pin plug and some other use three pin plug?

Discussion

- Which type of plug is used in a TV, two pin plug or three pin plug? **Two pin plug.**
- Why? **The body of a TV is plastic or fibre. So there is no chance of electric shock from the TV.**
- Does earthing is necessary for a fan? Why? **No. In fan there is no chance of contact with our body.**
- In an electric bulb, we use two pin plug. Why? **Holder of the bulb is plastic.**
- Some iron box uses two pin plug. Why? **The body of such iron box is fibre.**



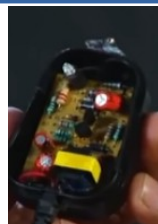
Normally, devices with metal body uses three pin plug.

Activity 4

The electricity we get in our homes is AC. But many devices are working on DC. How AC is converted to DC?

Discussion

- Can you say the names of some devices, which working on alternating current (AC)? **Fan, Electric iron, Motor used for pumping water.**
- Which type of current is needed for the working of a mobile phone? **Direct current (DC).**
- Which type of current is needed for charging the battery of mobile phone? **DC**
- Our mobile phone charger is connected to which source of current for charging? **AC.**
- Then, how the battery of our mobile phone is charging with DC? **In a mobile phone charger AC is converted to DC.**
- The process of converting AC to DC is called? **Rectification.**
- The devices, which converts AC to DC are called? **Rectifiers.**
- Which is the main component of a rectifier circuit? **Diode.**



Inside of a mobile charger



Diode

- What is the voltage of electricity reaches our home? **230 V**
- What is the voltage needed for charging the battery of our phone? **4 V to 5 V**
- Which component in the mobile charger reduce the voltage? **Step down transformer.**

The process of converting AC to DC is called **rectification**.

The device which converts AC into DC is called **rectifier**.

The main part of a rectifier circuit is **diode**. (This conducts currents only in one direction)

Assignment

1. Classify the devices in your home as those working in AC and DC?