Ch-14-Electric Current and its Effects

Electric Components and Their Symbols

Heating Effect of Electric current

The Magnetic Effect of Electric Current

Electromagnet

Electric Bell

Electric Components and Their Symbols

An electric current is the movement of electric charges along a definite path. Current flows in a conductor when negatively charge (electrons) is transferred from one point to another in the conductor.

Some electric components can be represented as symbols in order to make it convenient to draw a circuit diagram. Electric components and their symbol are as follow:

S. No.	Electric component	Symbolic representation
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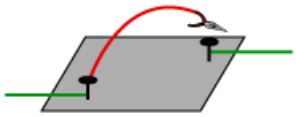
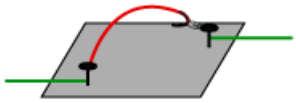
2.		
3.		
4.		
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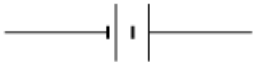
6.		

Heating Effect of Electric current

The electrical energy is converted into various forms of energy such as heat energy, light energy, chemical energy or mechanical energy. When an electric current is passed through a metallic wire like filament of an electric heater, oven or geyser, the filament gets heated up and here electrical energy is converted into heat energy. This is known as 'heating effect of current'.

Many electrical devices work on the phenomena of heating effect of electric current.

Electric bulb- The filament of the bulb heated on flowing current through it and hence produces light.

Electric Heater- The nichrome coil of the heater heats up rapidly as current flows through the heater and this heat is radiated to the surroundings to keep the room warm.

Electric Heater

Electric iron- The electric iron consists of thin metal plates which get heated on passing current through the iron. Thus it can be used to iron the clothes.

Electric fuse is a safety device in an electric circuit which prevents short circuits.

Working of Electric fuse:

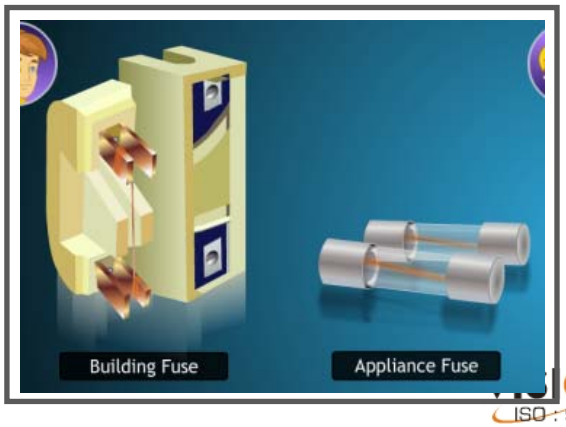
Electric Fuse

It consists of a very special material filament which melts on high heating.

When electric current flowing through the fuse exceeds the maximum limit, the filament of electric fuse melts due to excessive heating and breaks off. The circuit becomes incomplete and flowing of current in the house stops, thus preventing the burning of electric appliances.

Based on the usage, fuses are of two types

1. Fuse used in building
2. Fuse used in an appliance



Miniature Circuit Breakers (MCB)

Instead of fuses, MCBs are used nowadays because these are switches that turn off automatically when there is an overload or a short circuit. After solving the problem in the circuit, the switch can be turned back on, and then the current flows as usual.

CFLs

Compact fluorescent lamps (CFLs) are simply smaller versions of full-sized fluorescent lighting.

Advantages of CFLs

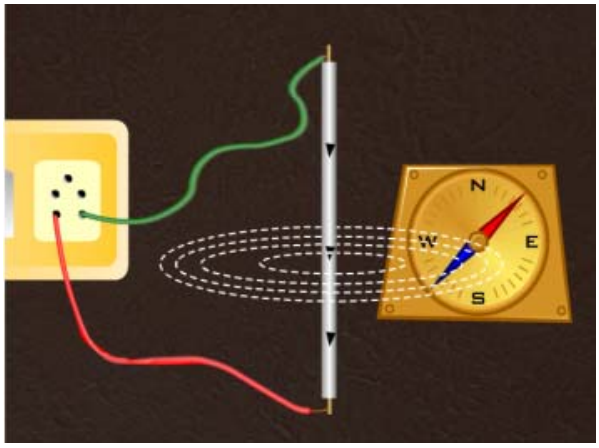
- Use less energy – up to 75% less than standard incandescent light bulbs.
- Produce less heat – by using energy more efficiently less heat is emitted with CFLs

Compact fluorescent lamps

- Protect the environment – using less energy decreases the amount of greenhouse gasses emitted into the atmosphere which is a contributor of global warming.

The Magnetic Effect of Electric Current

The magnetic effect of electric current was first observed by a scientist called Hans Christian Oersted. He observed that when current passes through a wire, it behaves like a magnet. This is explained as the magnetic effect of electric current.



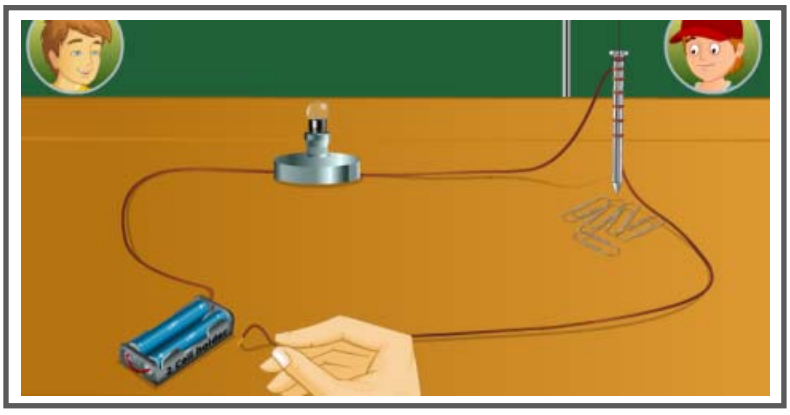
Make an electric circuit which consists of a battery, a switch and keep the switch in off position. Take a magnetic compass near to the wire tied in between nails. Now turn on the switch and look at the needle of the compass. As we switch ON the circuit, magnetic compass needle changes its direction. It is because when we switch ON the circuit, current flows through the circuit a magnetic field is created around the wire which causes change in direction of needle of magnetic compass**. It means the current carrying wire behaves as a MAGNET.**

Electromagnet

When an electric current is passed through a wire wound around an iron bar, the bar behaves as a magnet, and this magnet is called **electromagnet**.

Construction of an electromagnet

- To make an electromagnet we need some insulated copper wires, a bulb, a nail, battery, and some paper clips of iron.
- Remove the plastic coating from the copper wire at both the ends and wound one copper wire on the nail in one direction.
- Make sure that the copper wounding does not overlap.
- Now connect one end of copper with the one terminal of the battery. And the other end of the copper wire with the terminal of bulb.
- Connect other terminal of the bulb to the battery. Our electromagnet has been made.
- Now let's place the paper clips near the iron nail. You will find that the iron made paper clips gets clanged on the iron nail. If we disconnect the battery the nail is no more an electromagnet.
- That means an electro magnet is not a permanent magnet. This is the principle used in electromagnet.



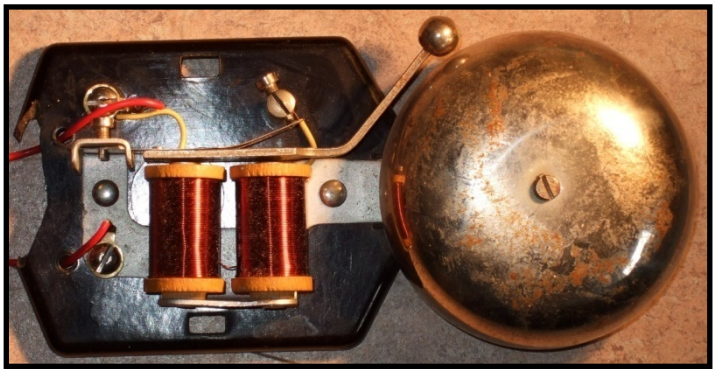
Applications of Electromagnet

1. Very strong electromagnets are used to carry heavy loads.
2. They are also used to collect iron from scrap.
3. They are also used in toys.

Electric Bell

Electric bell is a device which works on principle of electromagnet.

When the switch is 'ON' electric current flows through the coil and the iron core behaves as an electromagnet. Now this iron core or electromagnet attracts the hammer towards it. The hammer hits the bell and produces a sound. When the hammer moves towards the iron core, the circuit breaks at the screw contact. At this point, the iron core stops behaving like an electromagnet. The spring action of the steel rod pulls the hammer back to its original position and then the contact screw again to complete the circuit. Current flows through the coil again, and hammer strikes the bell again. The process continues over and over again, until switch is released.



Electric bell