MAGNETIC EFFECT OF ELECTRIC CURRENT
Electromagnet

Electromagnet:

An electric current can be used for making temporary magnets known as electromagnets. As electromagnet works on the magnetic effect of current. When current is passed through a long coil called solenoid, a magnetic field is produced. It has been found that if a soft iron rod called core, is placed inside a solenoid then the strength of magnetic field becomes very large because the iron core gets magnetised by induction. This combination of a solenoid and a soft iron core is called an electromagnet.
Electromagnets can be made in different shapes and sizes depending on the purpose for which they are to be used.
Factors affecting the strength of an electromagnet are:

(i) The number of turns in the coil:
If we increase the number of turns in the coil, the strength of electromagnet increases.

(ii) The current flowing in the coil:
If the current in the coil is increased, the strength of electromagnet increases.

(iii) The length of air between its poles:
if we reduce the length of air gap between the poles of an electromagnet, then its strength increases.

For example, the air gap between the poles of straight bar type electromagnet is quite large, so a bar type electromagnet is not very strong.
One the motherland the air gap between the poles of a U-shaped electromagnet is small, so it is a very strong electromagnet.
Electromagnets are used in electric bells, telegraphs, telephones and several other instruments. Since the magnetization depends on the current flowing through the coil, it is possible to obtain very powerful electromagnets by increasing the current.
Soft iron can be easily magnetised every by a weak magnetic field, whereas steel can be magnetised only by strong magnetic field.
Less energy is required for magnetizing soft iron. Soft iron loses its magnetism immediately, whereas steel retains it magnetism.

(b) Difference between a Bar Magnet (or Permanent Magnet) and an Electromagnet:

S.No.	Bar magnet (or permanent magnet)	Electromagnet
(1)	The bar magnet is a permanent magnet.	An electromagnet is a temporary magnet. Its magnetism is only for the duration for which current passes through it, so the magnetism of an electromagnet can be switched on or switched off as desired.
(2)	A permanent magnet produces a comparatively weak force of attraction.	An electromagnet can produce very strong magnetic force.
(3)	The strength of a permanent magnet cannot be changed.	The strength of an electromagnet can be changed by changing the number of turns in its coil or by changing the current passing through it.
(4)	The (north-south) polarity of permanent of manget is fixes and cannot be changed.	The polatiry of an electromagnet can be changed by changing the direction of current in its coil.

Permanent magnets are usually made of alloys such as carbon-steel, chromium-steel, cobalt-steel, tungsten-steel, nipermag and alonico. Nipermag is an alloy of iron, nickel, aluminum and titanium whereas ALNICO is an alloy of aluminum, nickel and cobalt. Permanent magnets of these alloyws are much more stronger than those made of ordinary steel, such strong permanent magnets are used in microphones, loudspeakers, electric clocks, ammeters, voltmeters, speedometers and many other devices.

(c) Methods of Demagnetising a Permanent Magnet :

(i) Magnet can be demagnetised by :

(A) Self - demagnetisation, if the magnet is strode without using magnetic keepers.

(B) Dropping it from a height or by rough handling.

(C) Heating or hammering the magnet.

(ii) Magnet can be demagnetised by placing it within a solenoid and passing high frequency AC through it.