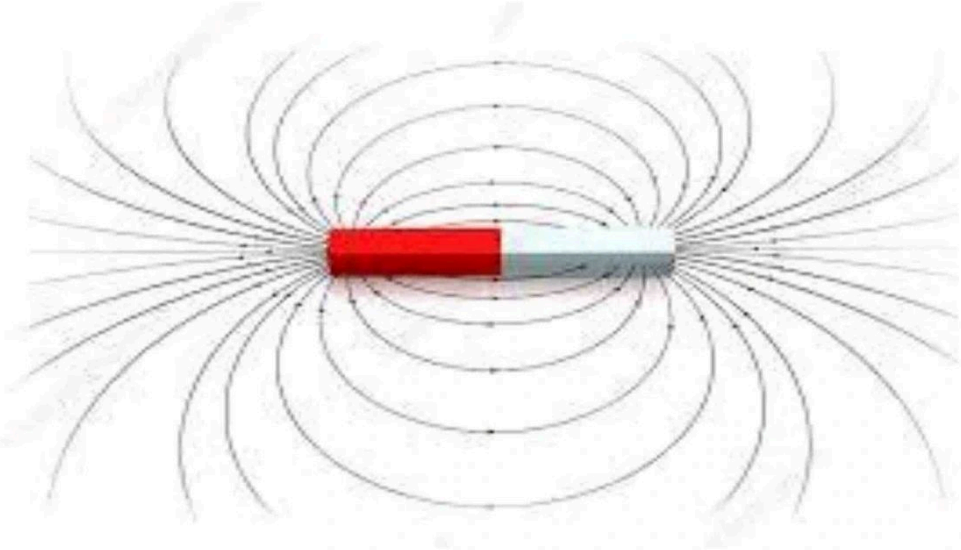
Class x science notes

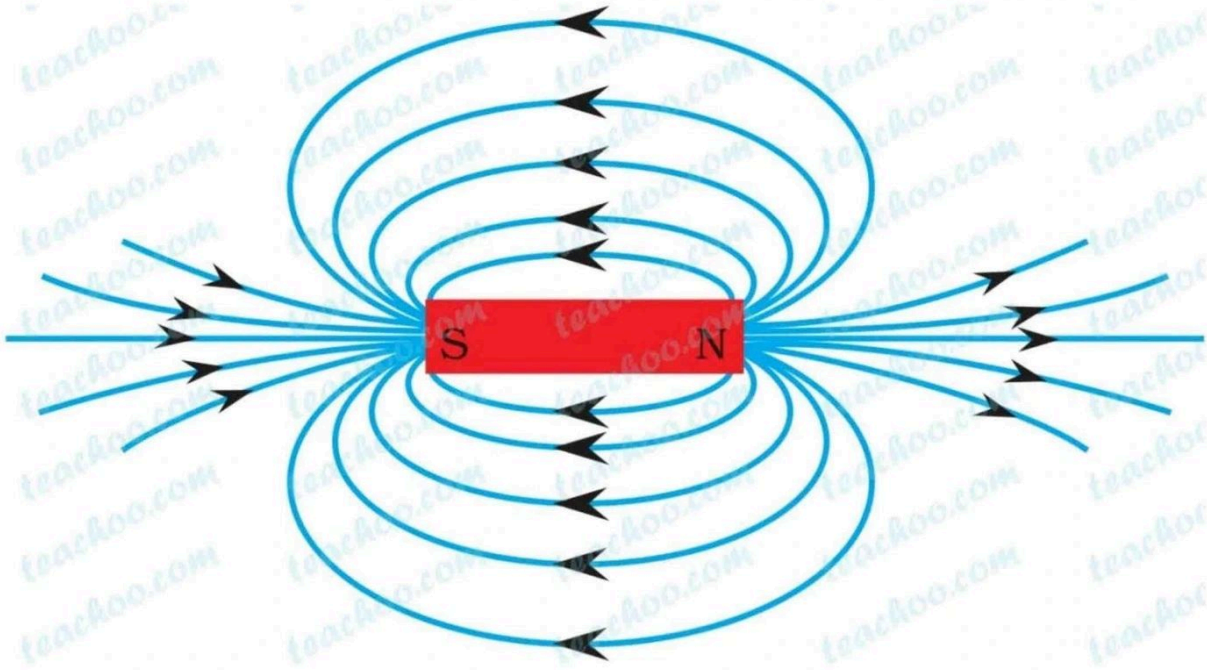
Magnetic current and its effects

Magnetic field -the space surrounding a magnet in which magnetic force is exerted is called a magnetic field.

Magnetic field line- those line drawn in a magnetic field along which a north magnetic pole would move.



Magnetic field lines



Magnetic field line bar magnet

- Circular in nature
- Close at poles
- From north to south

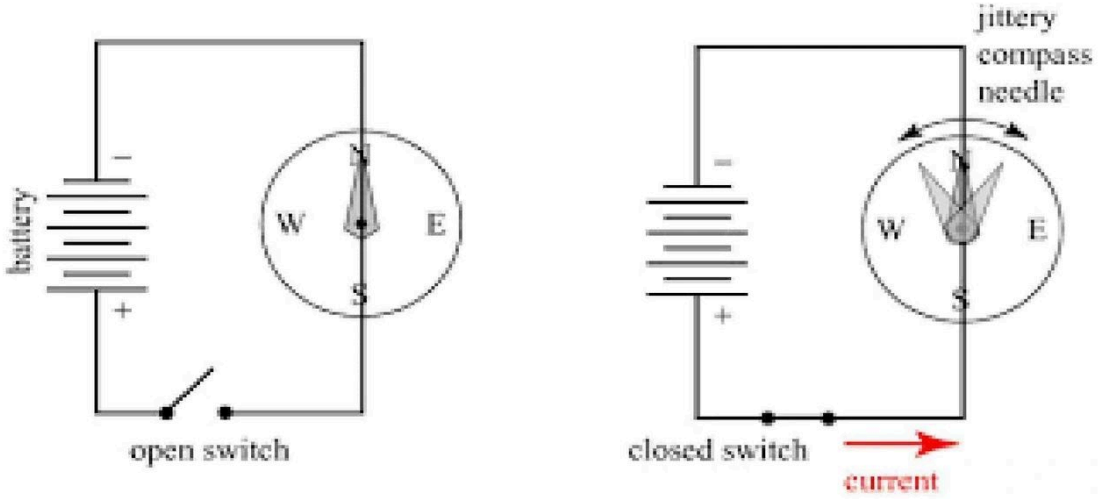
Properties

- Originated from north and end at south
- The magnet field line are close at pole and widely separated at other places.
- The magnetic field line do not intersect each other.
  It is due to the fact that the (resultant force) on the north pole at any point can only be in one direction if line intersect it will be in two different directions which is impossible.

Electromagnetism (magnetic field of current)

a current carrying conductor gives rise to a magnetic field around it.

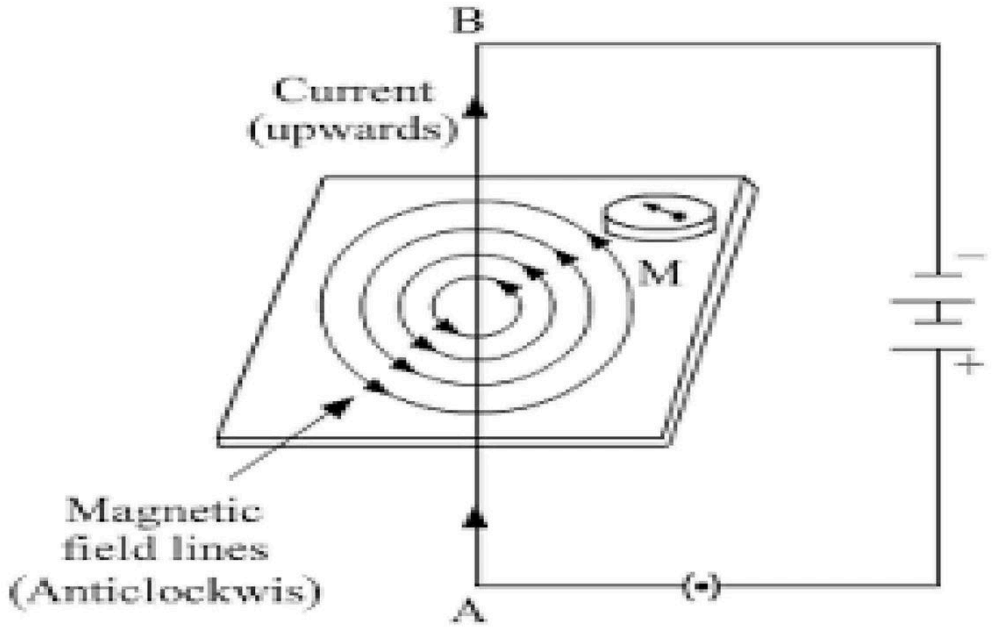
Eg. To demonstrate magnetic effect if current



Magnetic field of current carrying conductor different shapes

- Wire
- loop
- Solenoid

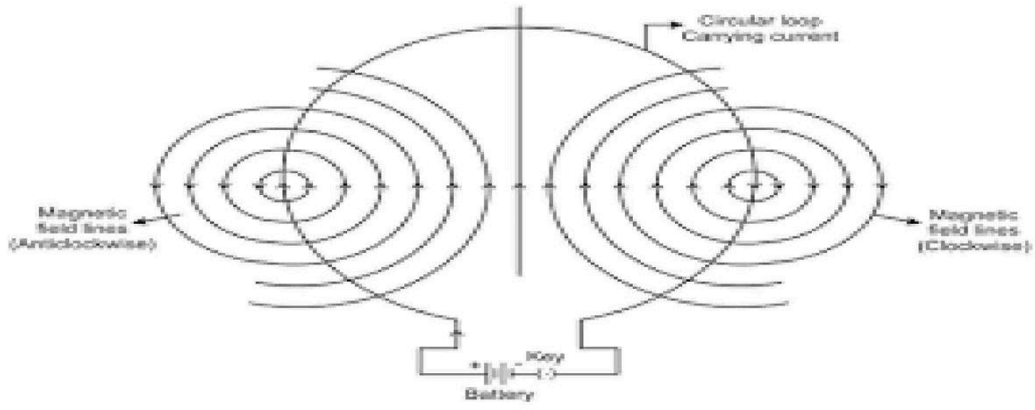
1)Straight current carrying conductor(wire)



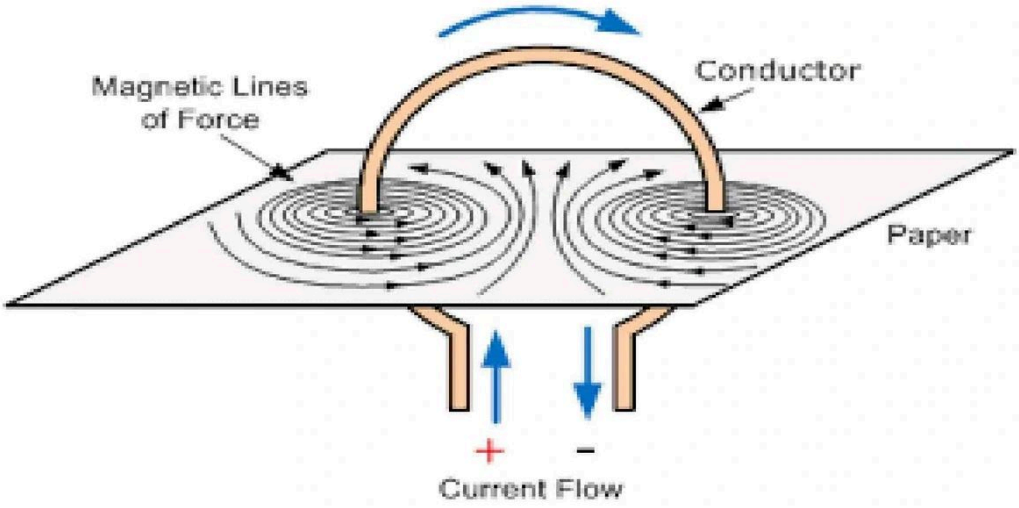
Magnitude of magnetic field depends on:-

- Directly proportional to current
- Inversely proportional to distance of the point from wire.

2) **circular loop**



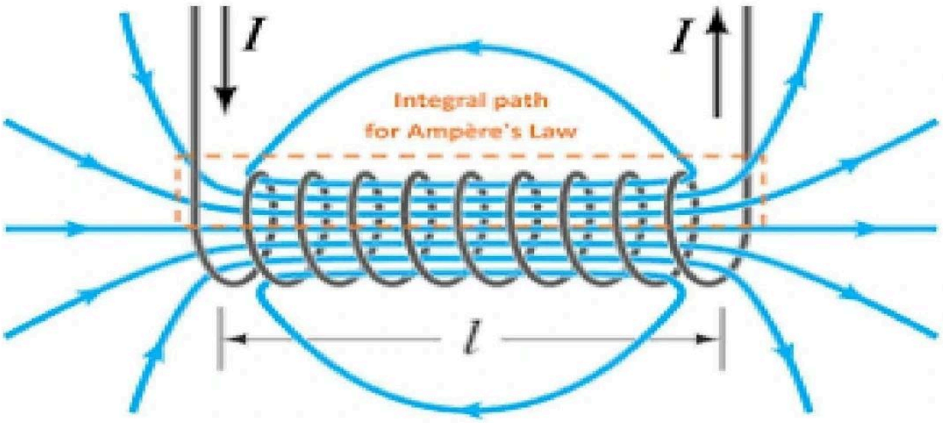
Magnetic field lines due to circular loop carrying current



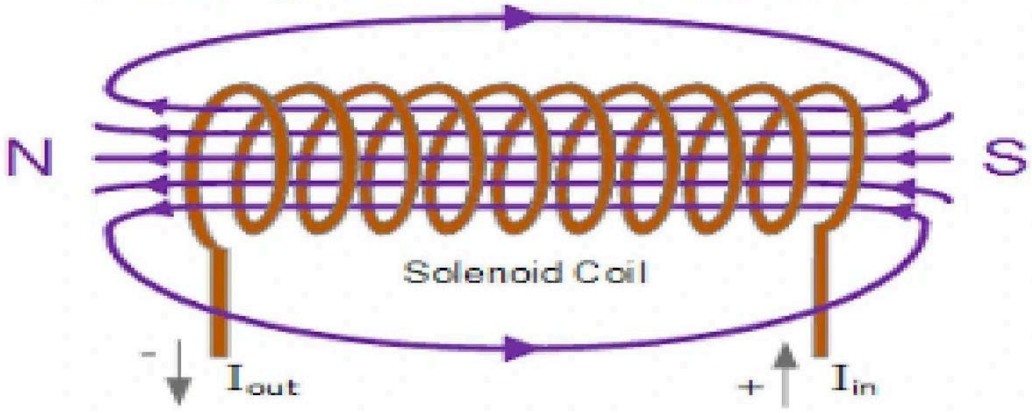
Magnitude of magnetic fields depends on:-

- Directly proportional to current.
- Inversely proportional to radius of circular loop.

3) solenoid



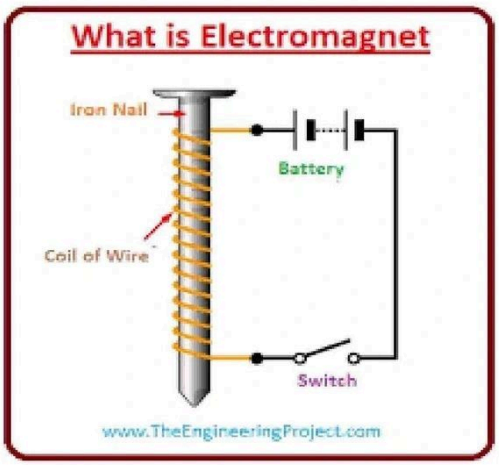
Electromagnetic field due to the flow of current



i. The no. of turns of solenoid
ii. The strength of current in the solenoid.
iii. The nature of "core material" used in making solenoid.

ELECTROMAGNET

Magnetic effect of current



An electromagnet is a magnet consisting of a long coil of insulated wrapped around a soft iron core that is magnetised only when current is passed through it.

Q:-What material in core is used in electromagnet and why?

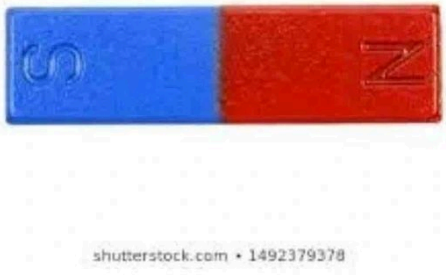
ANS- Soft iron core

Because iron core loses all its magnetism when current in the coil is switched off.

Steel becomes a permanent magnet even when the current is switched off.

Strength affecting factors

- No. of turns in coil (turns ↑ strength ↑)
- Current flowing in the coil (current ↑ strength ↑)
- The length of air gap btw its poles (airgap ↓ strength ↑)



(a) Bar magnet

(b)shoehorse magnet

Bar magnet	Electro magnet
➢ Permanent	➢ temporary
➢ Weak force	➢ strong force
➢ Strength cannot be changed.	➢ Strength can be changed
➢ Fixed polarity	➢ Can be changed by changing direction of current.

Force on current carrying conductor placed in a magnetic field.

Kicking wire experiment:-When a current carrying conductor is placed in a magnetic field. A force is exnted on the conductor which makes it move.

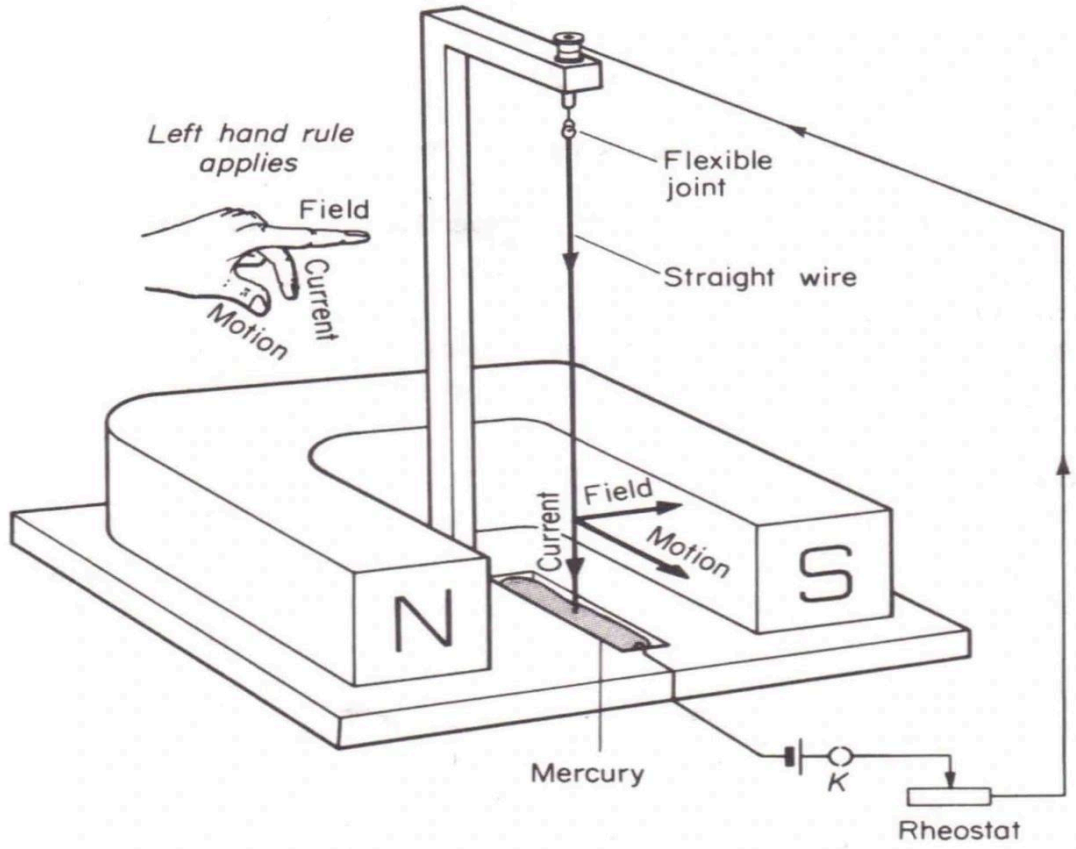
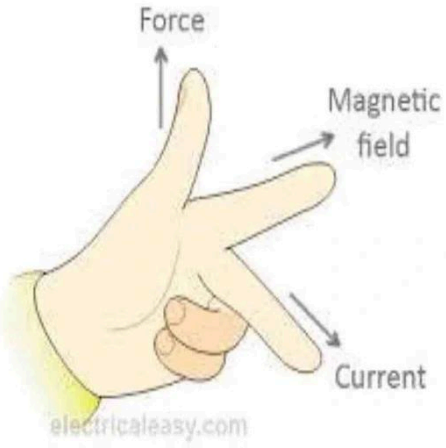
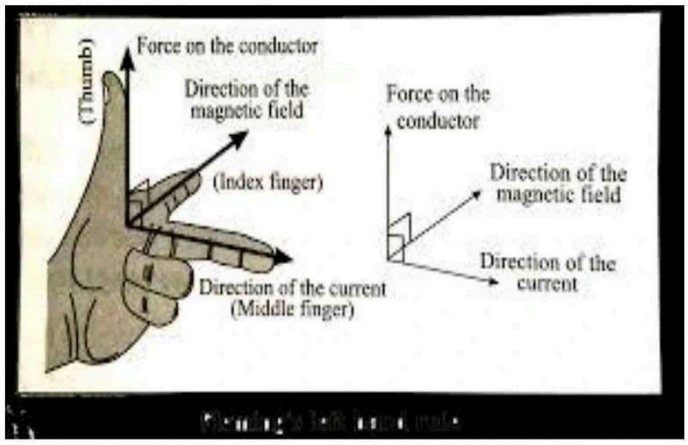


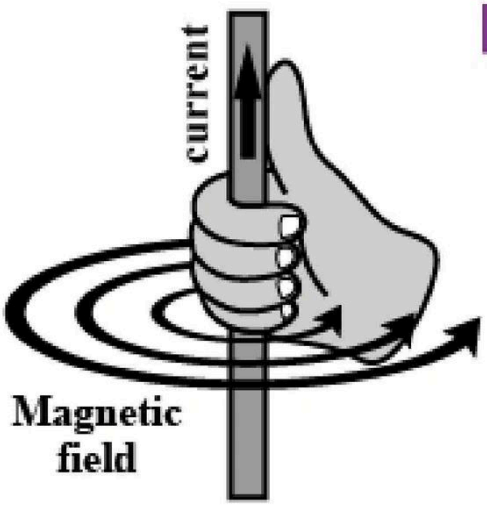
Fig. 38.2. Force on a conductor in a magnetic field (kicking wire experiment)

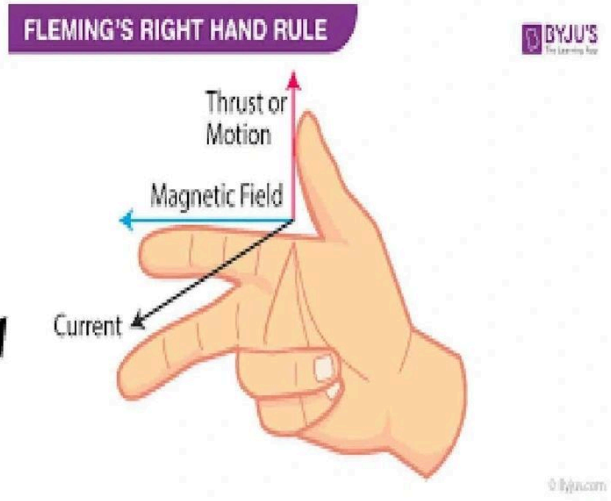
Fleming left hand rule for the direction of force





According to fleming's left hand rule: - hold the forefinger, the centre finger and the thumb of your left hand at right angles to one another. Adjust your hand in such a way that the forefinger points in the direction of magnetic field and centre finger points in the direction of current, then the direction in which thumb points, gives the direction of force acting on the conductor.



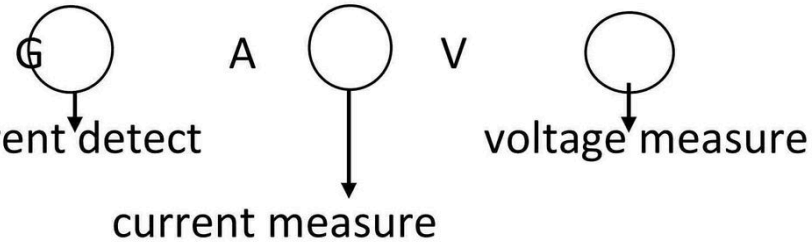


According to fleming's right hand rule: -Right hand rules states that "If the current carrying conductor is held in the right hand

by pointing thumb finger towards the direction of current flow and the other fingers curled around the conductor then the curled fingers indicate the direction of the magnetic field due to the current carrying conductor". This rule only gives the direction of the magnetic field of the current carrying conductor

Emi (electric magnetic induction)

Production of electricity from magnetism electromagnetic induction.



Generator

1)Force on current -carrying Conductor placed in magnetic Field.	1)Electromagnetic induction
2)Current -force/motion	2) force/motion-current.
3)Left hand rule for direction of Force.	3) Right hand rule for Direction of induced current.