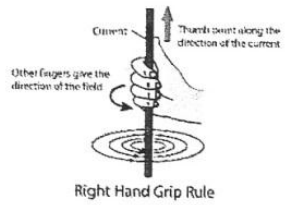
GRADE : X

**OUR OWN HIGH SCHOOL, AL WARQA'A, DUBAI**
PHYSICS – REVISION – MAGNETIC EFFECT OF ELECTRIC CURRENT

**The magnetic field strength**

| Near a Straight conductor carrying current | At the center of a Circular loop carrying current | Inside a current carrying solenoid |
|---|---|---|
| • Increases with increase in current.<br>• Decreases as the distance from the conductor increases. | • Increases with increase in current<br>• Decreases as the radius of the coil increases.<br>• Increases as the number of turns of the coil increases. | • Increases with increase in current<br>• Increases as the number of turns of the coil increases.<br>• Increases when a soft iron bar is placed inside the solenoid. |

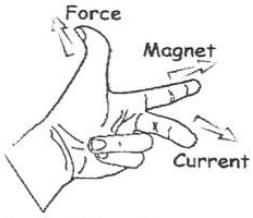
**Right Hand Thumb Rule**



Right Hand Grip Rule

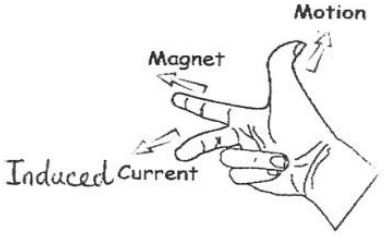
To find the direction of the magnetic field due to a current carrying conductor.

**Fleming's Left Hand Rule**




To find the direction of the force experienced by a current carrying conductor placed in a magnetic field.

**Fleming's Right Hand Rule**



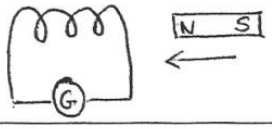
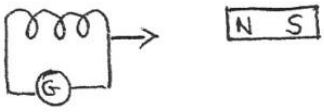

To find the direction of the induced current flowing in a closed loop due to electromagnetic induction.

| Electromagnet | Permanent magnet |
|---|---|
| • The polarity of an electromagnet can be changed by changing the direction of current.<br>• The electromagnet can be readily demagnetized by switching of the current.<br>• The strength of an electromagnet can be changed by changing the strength of the current. | The polarity of a permanent magnet cannot be changed.<br><br>They cannot be demagnetized.<br><br>The strength of a permanent magnet cannot be altered. |

| Direct Current | Alternating Current |
|---|---|
| • Current which flows in the same direction and of constant magnitude.<br>• It is generated by a battery or a cell.<br>• Electric power is not transmitted in DC form due to energy loss during transmission. | Current which keeps on changing its direction and magnitude in regular intervals of time.<br>It is generated by a generator or a dynamo.<br><br>Electric power is transmitted over long distances in AC form as the loss of energy is less during transmission. |

| Electric Motor | Electric Generator |
|---|---|
| • It works on the principle that a current carrying conductor when placed in a magnetic field experiences a force and rotates.<br>• A split ring type commutator is used.<br>• It converts electrical energy into mechanical energy. | It is based on the phenomenon of electromagnetic induction.<br>A slip ring type commutator is used.<br>It converts mechanical energy into electrical energy. |

**Electromagnetic induction takes place when**

| | |
|---|---|
| 1. When a magnet moves near a closed coil. |   |
| 2. When a closed coil moves near a magnet. |   |
| 3. When the current near a closed coil changes |   |

**Domestic Electrical Circuit**

**Live wire** – Cable with red insulation.
**Neutral wire** – with black insulation
**Earth wire** – green insulation.
p.d. between live and neutral wire is 220 V

**Fuse wire :** A safety device used to protect electrical circuit and appliances from high current passing through the circuit.
**Earth wire :** protects user from severe electrical shock due to leakage of charges from appliances . It provides low resistance conducting path for the excess charge to flow to the earth.

**Short circuiting** : When live and neutral wire comes in contact, due to insulation being worn out the current increases abruptly resulting in fire accidents.
**Overloading :** Too many appliances connected to a single power socket.

**Force experienced by a current carrying conductor placed in a magnetic field** = B I l
B- strength of the magnetic field, I – current flowing, l – length of the conductor.

**Electromagnetic induction :** The motion of a magnet, with respect to a coil or a changing magnetic field, produces an induced potential difference (electromotive force, emf) which sets up an induced electric current in the coil. Scientist who introduced the phenomena is Michael Faraday.