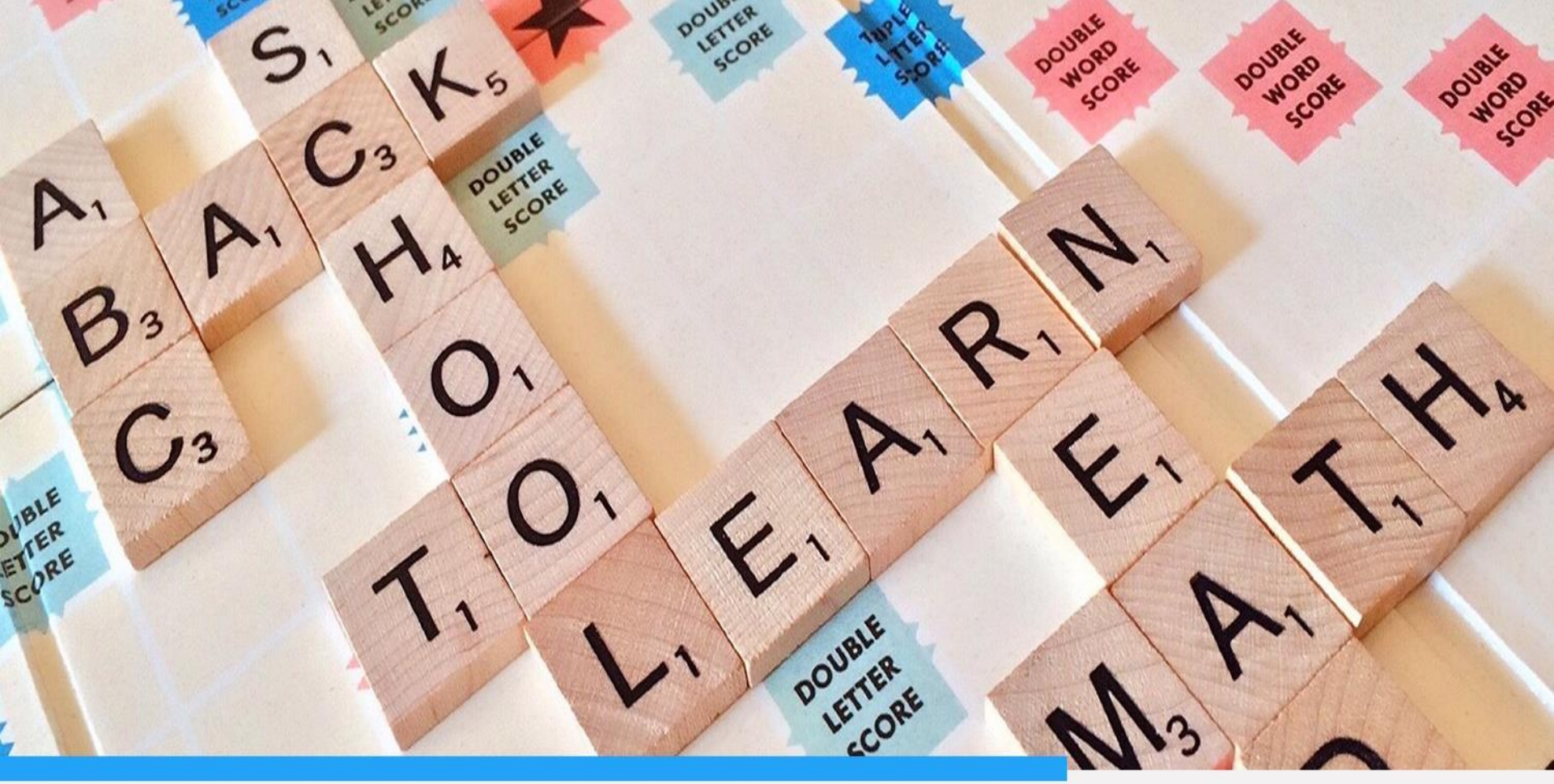

BACK TO LEARN MATH
DOUBLE LETTER SCORE
DOUBLE WORD SCORE
TRIPLE LETTER SCORE

DC MOTORS

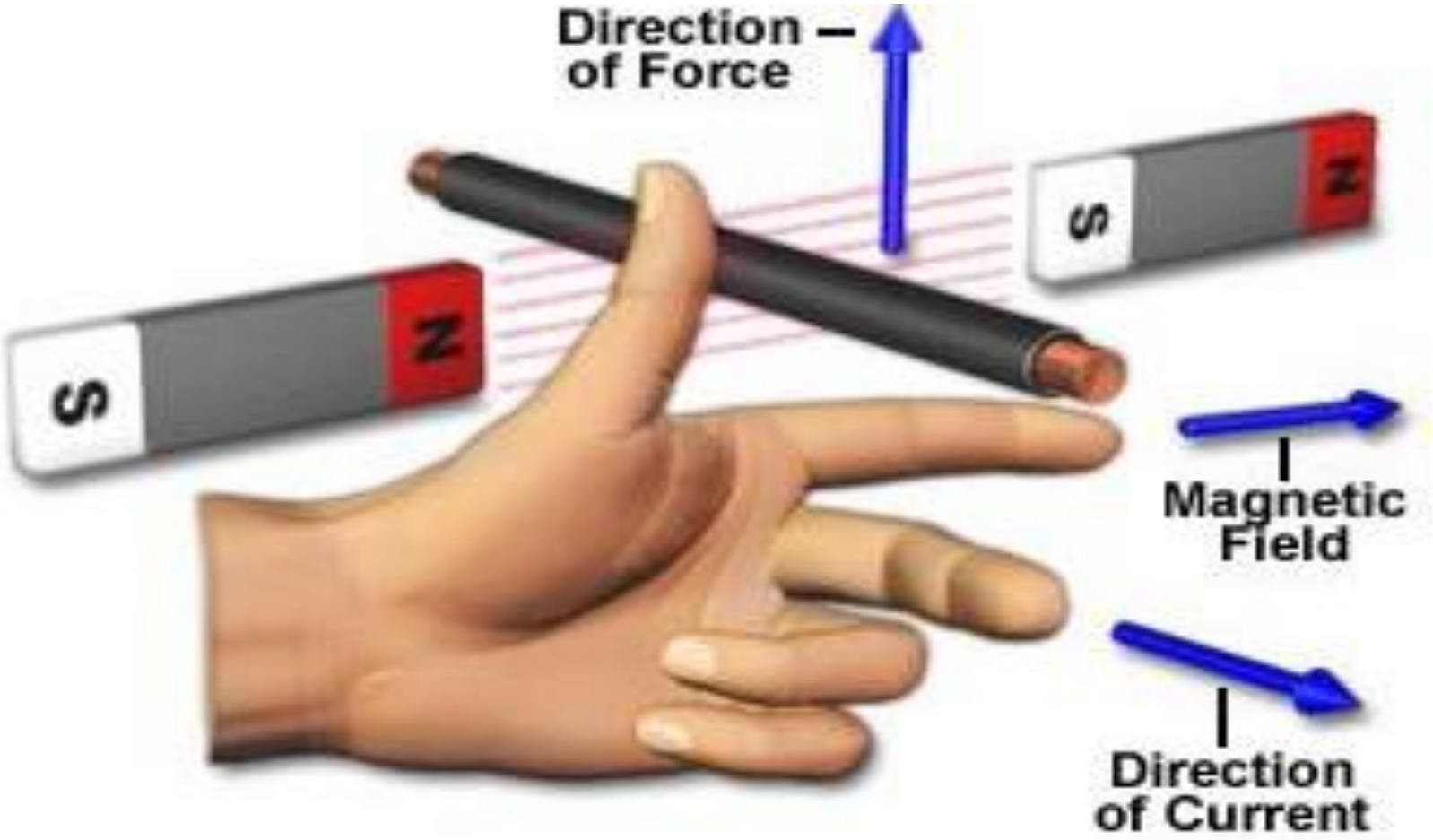
What is an electric motor?

- An electric motor is an electromechanical device that converts electrical energy into mechanical energy.

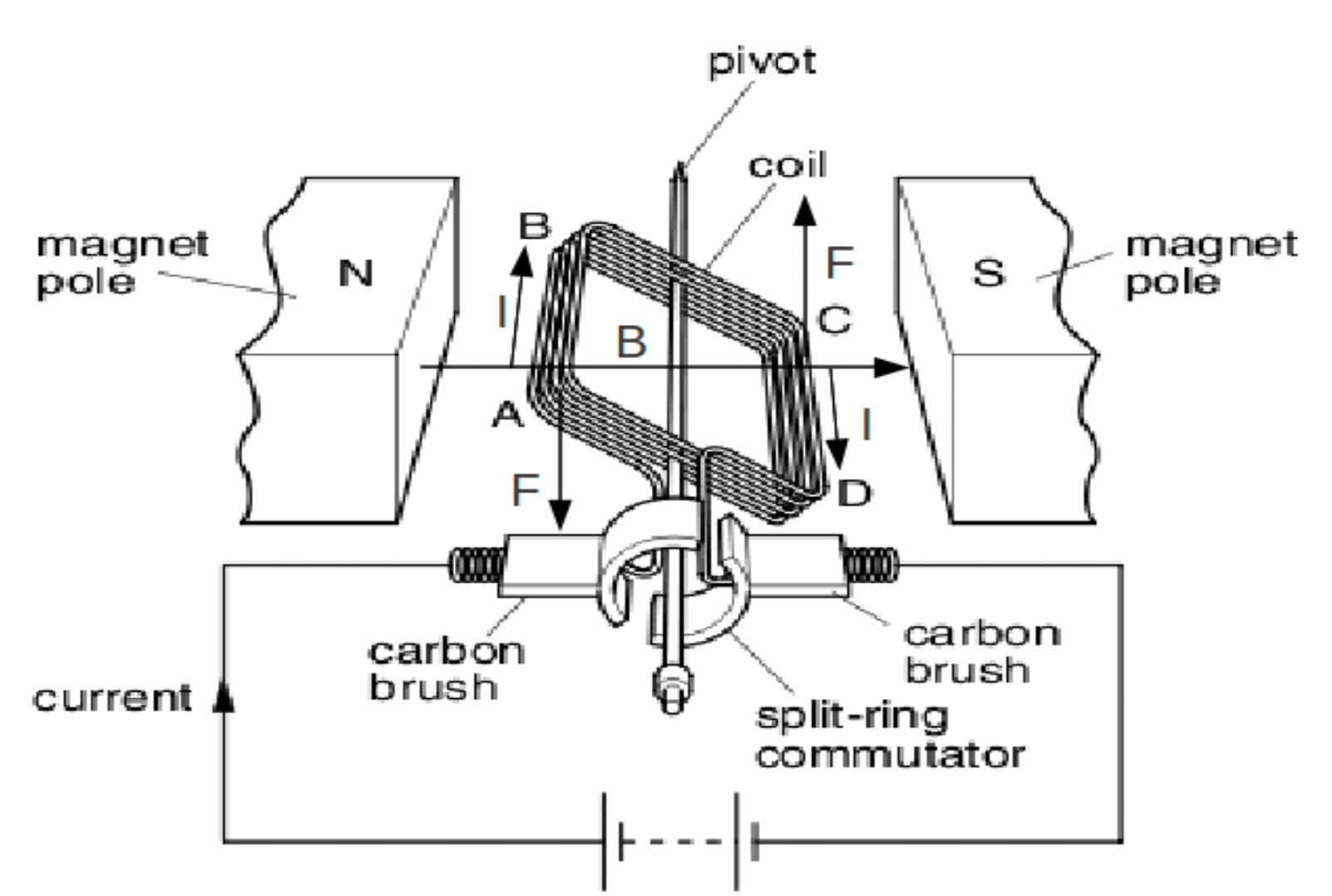
How to find the direction of Force acting the conductor

- According to the Faraday's laws of electromagnetic induction,
- whenever a current carrying conductor is placed in a magnetic field, it experiences a force.
- The direction of force acting on the conductor is found by Fleming's left Hand Rule.

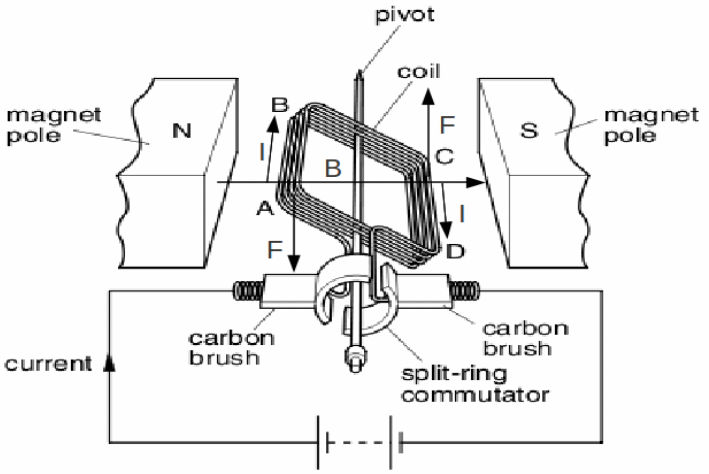
Flemings left hand rule



Principle of DC motor



Working of DC motor



- The force acting on the conductor side AB under North Pole can acts in downward direction by Flemings Left Hand Rule coil side CD under South Pole can acts in upward direction according to Fleming's Left hand Rule.
- So two forces can act simultaneously on the coil with same magnitude but in opposite directions such that the coil can start rotating in counter clock wise direction as shown in Figure above.
- In this way, the coil starts rotating. This is the basic operation of DC motor.

- The carbon **brushes transfer the electricity**.

- **The split ring commutator**

The split ring in the electric motor also known as a commutator. It always makes sure that current flow in one direction only.

Due to this the coil continues to rotate in the same direction.

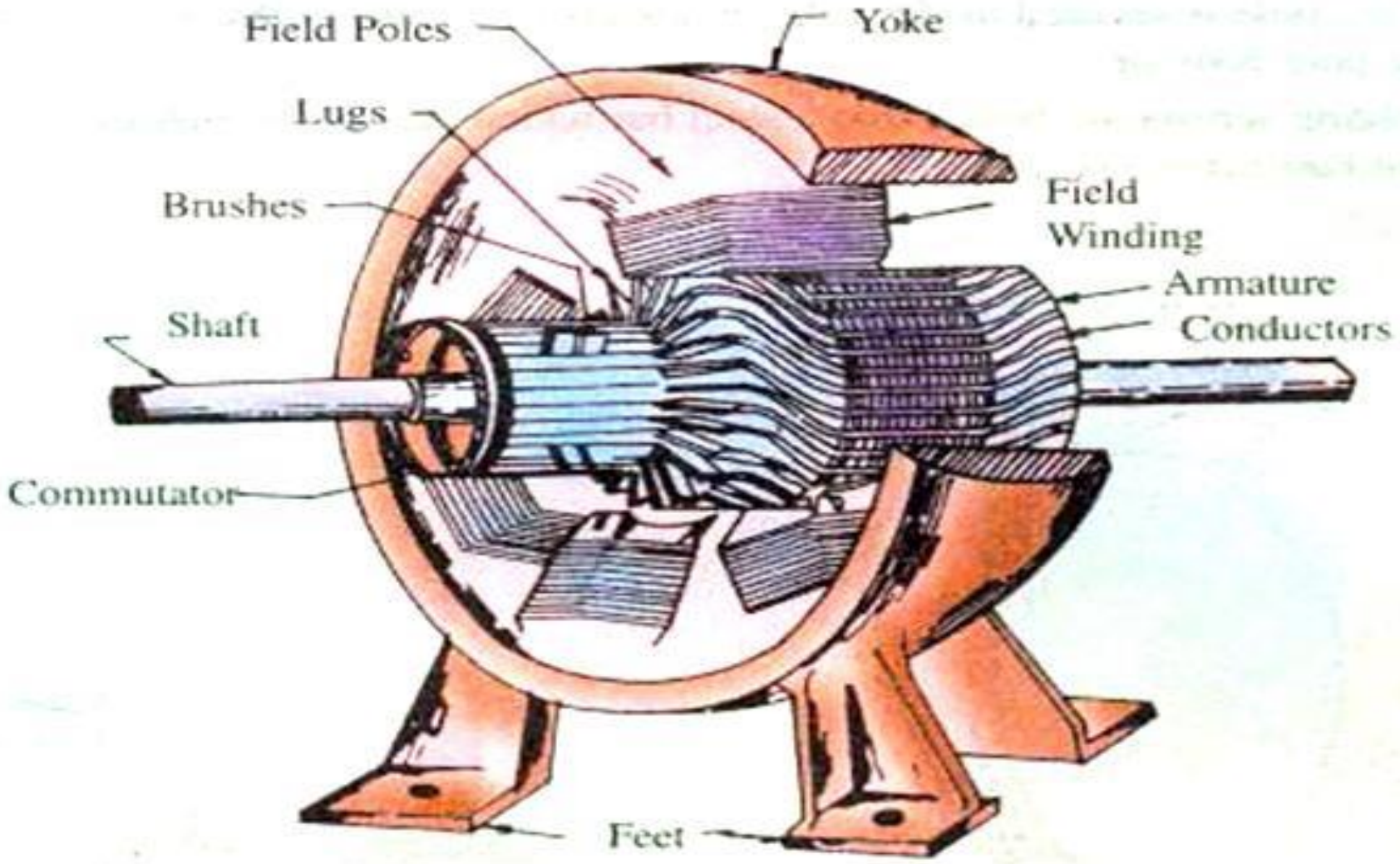
Magnitude of Force

- The magnitude of the force experienced by the current carrying conductor placed in the magnetic field is given by

➢ $F = I\ L\ X\ B$ Or in scalar terms: $F = I\ L\ B\ Sin\Theta$

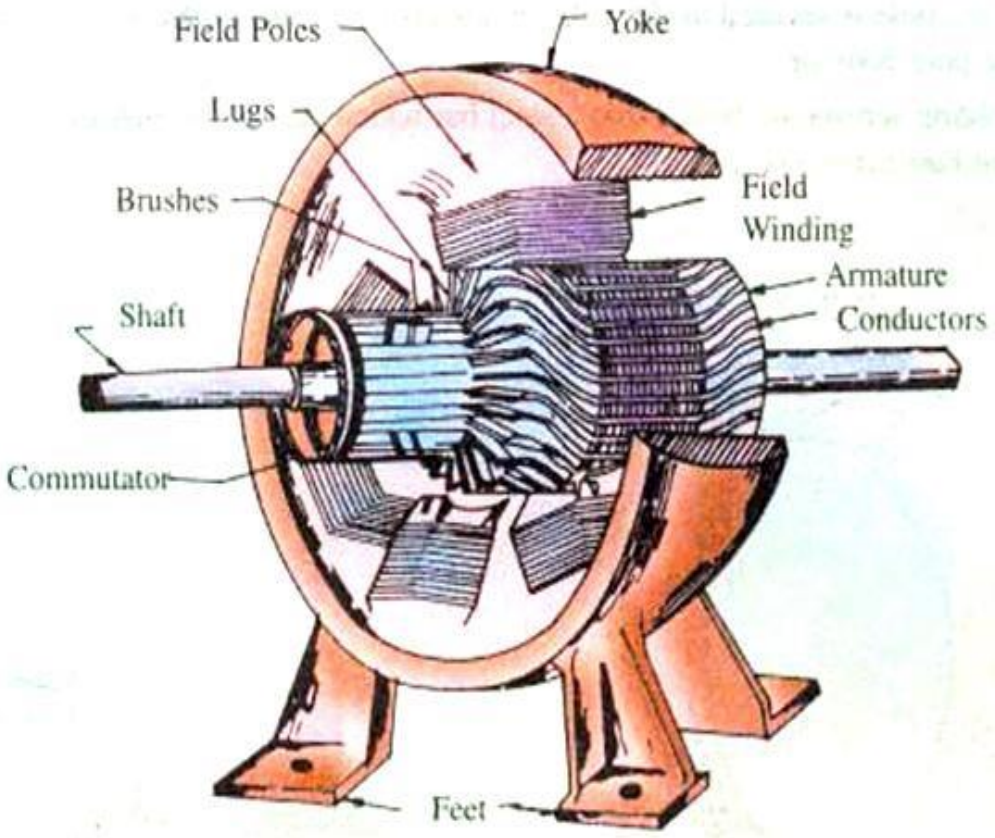
- Where,
- B = Flux density (Wb)
- I = Current flowing through the conductor (A)
- L = Length of the conductor (m)

Construction of DC machine.



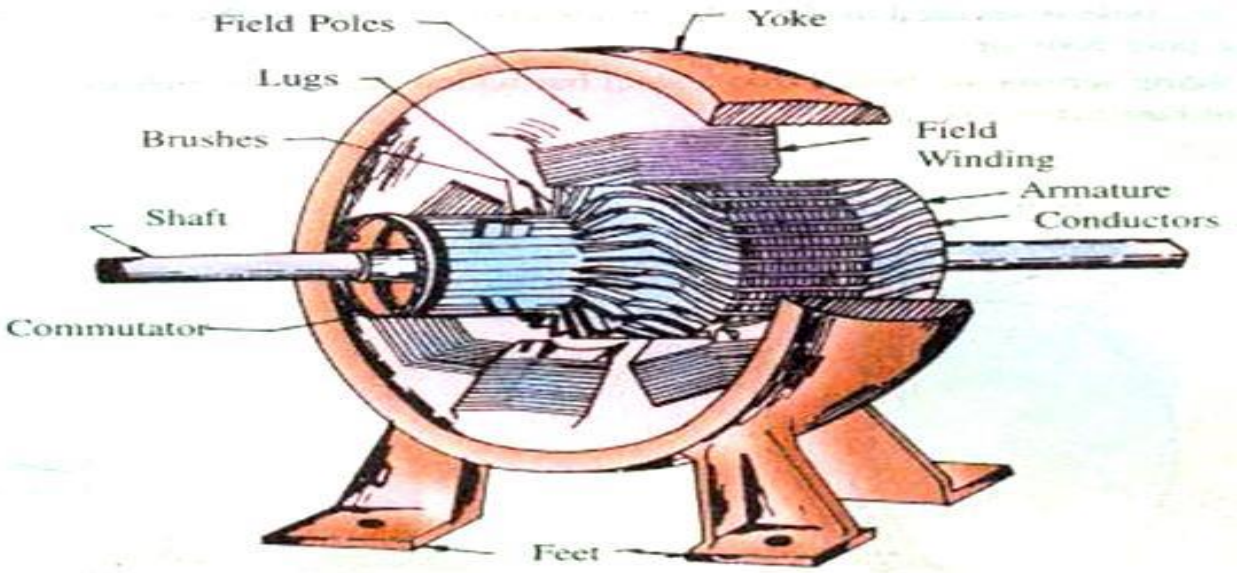
DC MACHINE CONSISTS

- Magnetic frame or Yoke
- Pole-cores and Pole shoes
- Pole coils or field coils
- Armature core
- Armature windings or conductors
- Commutator
- Brushes



Functions of various parts of DC machine**

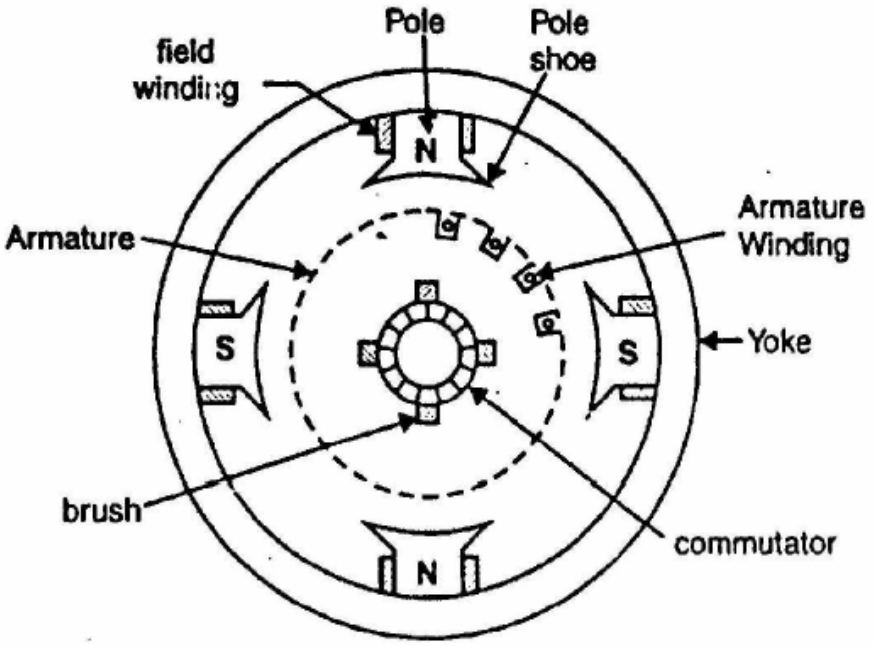
- Yoke
  - The outer frame



- It acts as a protecting cover for the whole machine and It carries the magnetic flux.

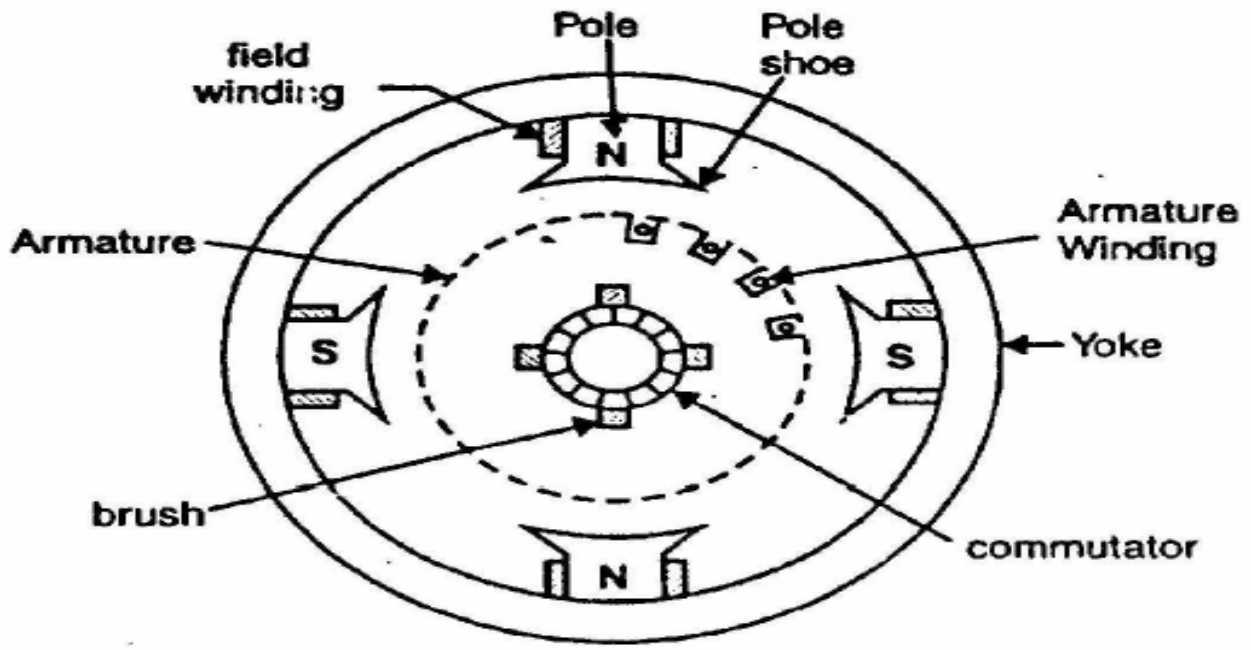
Pole cores/shoes

- The pole core is fixed to the inner periphery of the yoke.
- The field magnets consists of pole cores and pole shoes.
- The **pole shoes** spread out the flux in the air gap

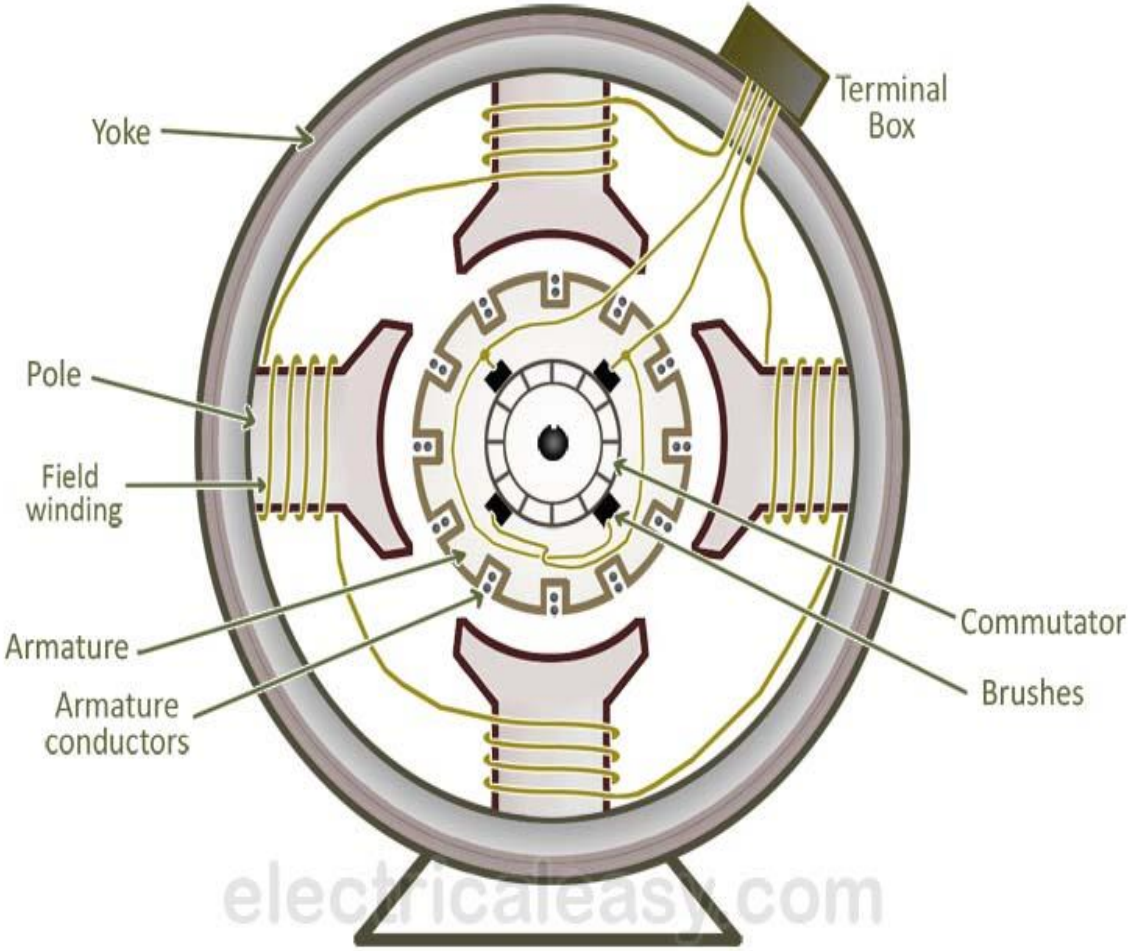


Pole coils or field coils

The field coils or pole coils, which consist of copper wire when current is passed through these coils, they electromagnetise the poles which produce the necessary flux that is cut by revolving armature conductors.

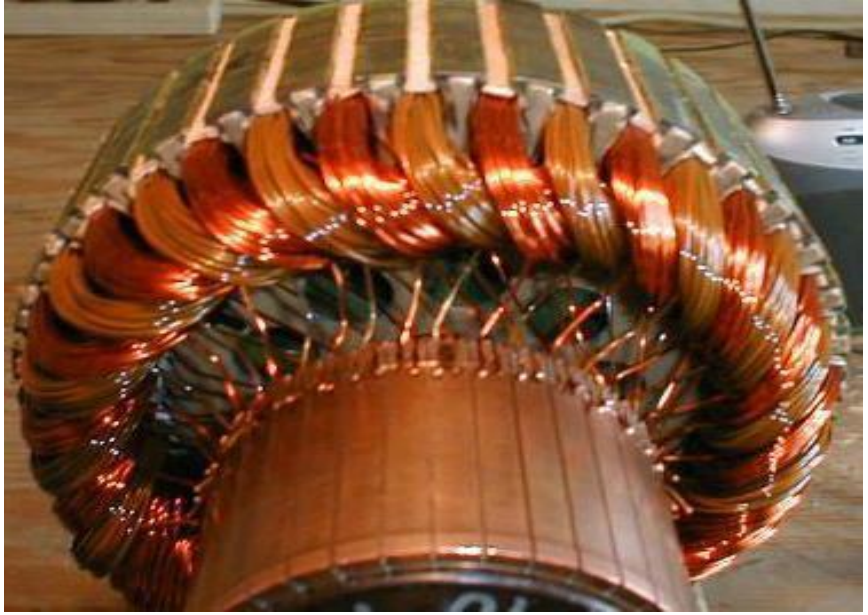


Armature core**



The armature core consist of the armature conductors or coils and it is provided with slots.

Armature windings



- the armature winding made with several turns of copper wire distributed uniformly over the entire periphery of the core.

DC GENERATOR

1. A **dc generator** is an electrical machine which converts mechanical energy into direct current electricity.

2. According to **Faraday's laws of electromagnetic induction** a conductor is moved in a magnetic field, an emf (electromotive force) gets induced in the conductor.

3. If the conductor is provided with the closed path, the induced current will circulate within the path.

According to the **Fleming's right hand rule**, the thumb, index finger and second fingerof the right hand are stretched to be perpendicular to each other.

a) if the **thumb** represents the direction of the **movement of conductor,**

b) **index finger** represents direction of the **magnetic field,**

c) **then** the second finger represents **direction of the induced current.**

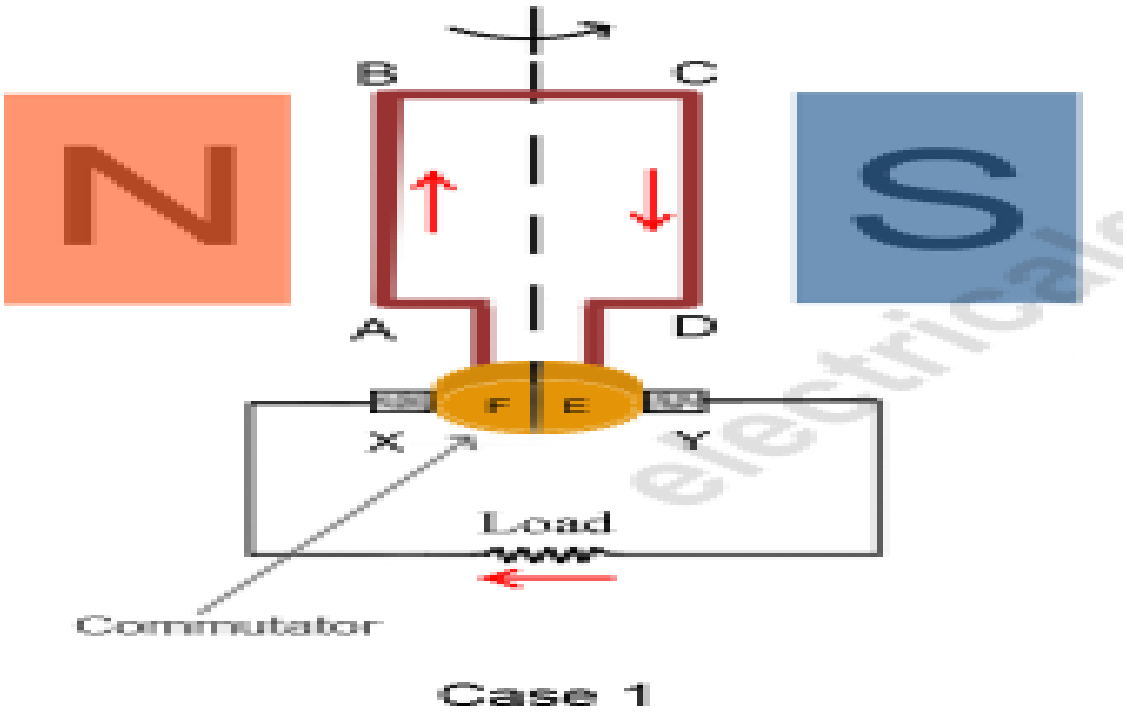


Fig. DC Generator

4. In a DC generator, the armature conductors are rotated into the field.

5. An electromagnetically induced emf is generated in the armature conductors. The direction of induced current is given by **Fleming's right hand rule.**

6. With the help of split ring commutator, we get dc current at the terminals.

Types of DC Generator

- **Permanent magnet Generator**

1. These generators offer less efficiency.
2. They are small in size and low cost

- **Separately Excited Generator**

The field coils are excited from a separate **dc source.**

Applications of Electric motors

- Automotive windscreen wipers
- Fans
- Cranes
- Sewing machine
- Pumps
- Conveyors
- Lifts

TYPES OF MOTORS

1. Shunt motor

Characteristic: Medium starting torque
Application: fan, pumps

2. Series Motor

Characteristic :High starting torque
Application :Trolley, Cranes