



## Lecture No.1

### D.C motors

The structure of D.C motor has two major components , stator and rotor separated by the air gap.

#### Basic construction of D.C motors.

- Stator : This part of the motor does not move and normally is the outer frame of the motor.
- Rotor : This part of the motor is free to move and normally is the inner part of the motor and contain a commutator

#### D.C motor action.

Its action is based on the principle that, when a current- carrying conductor is placed in a magnetic field , a mechanical force ( f ) is generated whose magnitude is given by :

$$f = B I L \text{ Newton}$$

where:-

**B** =flux density

**L** =length of conductor

**I** =current pass through the conductor

When its field magnets are excited and its armature conductors are supplied with a current from the main supply , a mechanical force is generated tending to rotate the armature .This force produce a driving torque which sets the armature rotating.

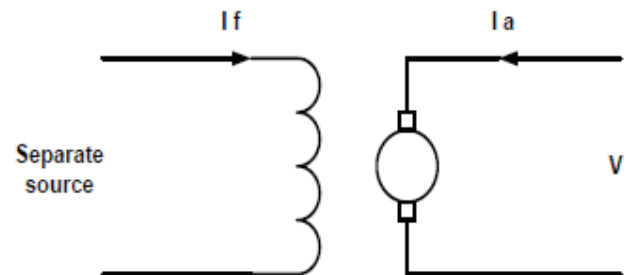
#### Classification of D.C motors :

The field and armature winding can be interconnected in various ways to provide a wide variety of performance characteristics Therefore there are many types of D.C motor.



## 1. Separately excited D.C motor :

The field winding is excited from a separate source as shown in fig .1.



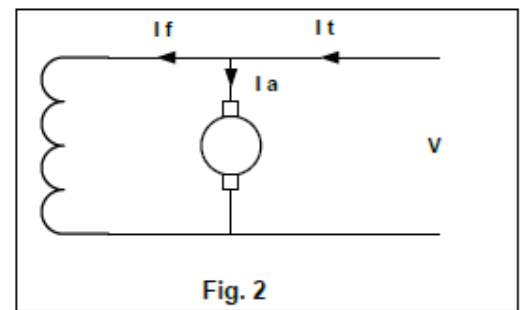
## 2. Self excited D.C motor:

**A- Shunt D.C motor :** The field winding is parallel connected to the armature winding as shown in fig .2 .

$$I_t = I_a + I_f$$

**B- Series D.C motor :** The field winding is connected in series with the armature winding as shown in fig .3.

$$I_t = I_a = I_f$$



**C – compound D.C motor :** In this type both shunt and series field winding are connected to the armature winding .

