1.3 TORQUE

Figure 1.5.1 shows a coil carrying *I* and lying in a magnetic field of flux density *B*. it is seen that an upward force is exerted on the right hand conductor and a downward force on the left hand conductor.

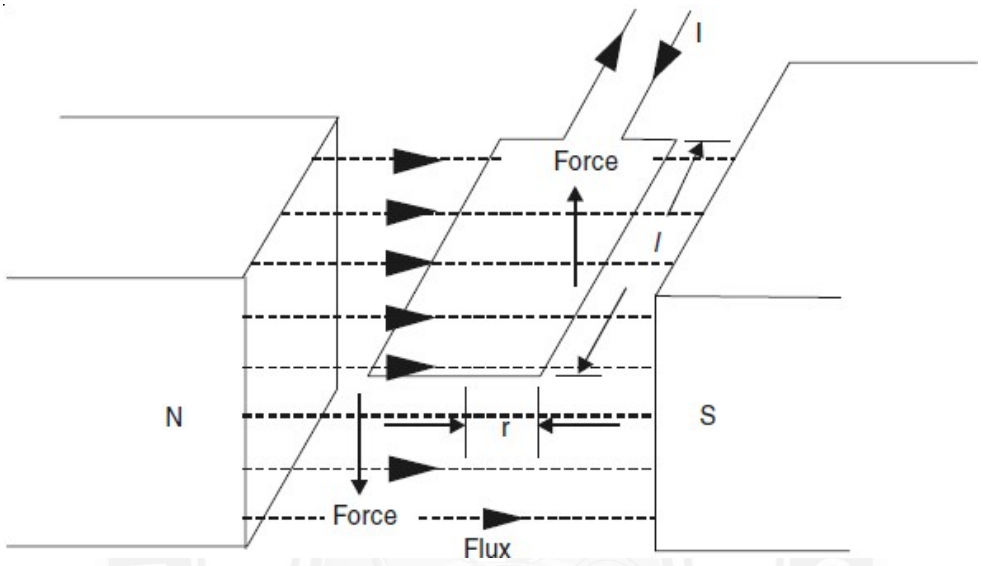

Figure 1.4.1 Torque on a coil in a magnetic field

[Source: "'Electric Machinery Fundamentals" by Stephen J. Chapman*, Page: 72]*

$$F = 2B\ I\ l \text{ newtons}$$

If the coil has N turns, the total force is

$$F = 2N\ B\ I\ l \text{ newtons}$$

The torque is acting at a radius of r metres and is given by

Torque = 2N BI lr newtons -metres

The configuration of Fig. 1.8 is the basic moving part in an electrical measuring instrument. An electric motor also works on this principle.

Properties of Magnetic Materials

Magnetic materials are classified based on the property called permeability as

1. Dia Magnetic Materials
2. Para Magnetic Materials
3. Ferro Magnetic Materials

1. Dia Magnetic Materials

The materials whose permeability is below unity are called Dia magnetic materials. They are repelled by magnet.

Ex. Lead, gold, copper, glass, mercury

2. Para Magnetic Materials

The materials with permeability above unity are called Para magnetic materials. The force of attraction by a magnet towards these materials is low.

Ex.: Copper Sulphate, Oxygen, Platinum, Aluminum.

3. Ferro Magnetic Materials

The material s with permeability thousands of times more than that of paramagnetic materials are called Ferro magnetic materials. They are very much attracted by the magnet.

Ex. Iron, Cobalt, Nickel.