1. If $\theta = 0°$
   We have,

$$\tau = BINA\cos\theta$$

$$\text{Or, } \tau = BINA\cos 0°$$

$$\text{Or, } \boldsymbol{\tau = BINA \text{ (Max. torque)}}$$

The above result shows that if plane of coil is parallel to the direction of magnetic field, it experiences maximum torque.

2. If $\theta = 90°$,

$$\tau = BINA\cos\theta$$

$$\text{Or, } \tau = BINA\cos 90°$$

$$\text{Or, } \boldsymbol{\tau = 0 \text{ (No torque)}}$$

The above result shows that if plane of coil is perpendicular to the direction of magnetic field, it experiences no torque.

## Moving Coil Galvanometer:

It is a device used to detect currents and measures very small current.

Principle: Its operation is based on the principle that when a current carrying loop is a uniform magnetic field, the coil experiences a torque.

**Construction:**

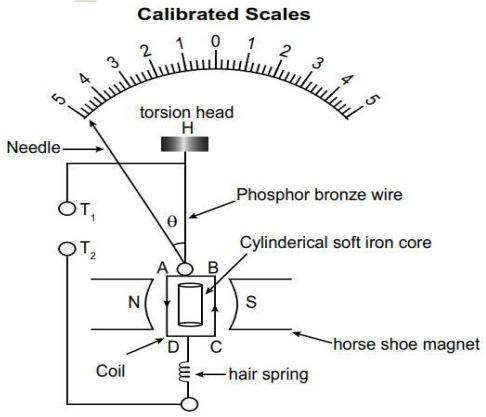
Cylindrical Magnets (Produce radial Magnetic field)

Soft iron core (Ferro magnet) (It can attract maximum no. of field lines)

Radial Magnetic field: Field is always at same angle.

Therefore, torque is always maximum and constant.

Springs (Phosphor Bronze strip): - It applies restoring Torque




**Working:** When current is passed through the rectangular coil ABCD suspended in radial magnetic field with the help of phosphor bronze stripe experience deflecting torque due to which the coil gets deflected. As the coil deflected the phosphor bronze strip twisted from its original position. When the phosphor bronze strip twisted, a restoring torque develop in it, which tries to bring the strip towards its original position. The twisting of phosphor bronze strip takes place until an equilibrium is established between restoring torque and deflecting torque.

Theory: The deflecting torque experienced by the rectangular coil of total number of turns N, area A, carrying current I suspended in radial magnetic field B is,

Deflecting torque

$$\tau_d = BINA \text{---------- (1)}$$

Since, the angle between area vector and magnetic field is $90^0$.

The torque in equation (1) tends to rotate the coil.

Suppose at equilibrium condition the strip twisted by an angle $\theta$ . Now, the restoring torque on the strip is

Restoring torque

$$\tau_r = k\emptyset \quad \ldots\ldots\ldots\ldots\ldots \text{ (2) Where c is torsion constant.}$$

At equilibrium condition, $\tau_d = \tau_r$

$$\text{Or, BINA} = k\emptyset$$