

PMMC \rightarrow Permanent magnet moving coil

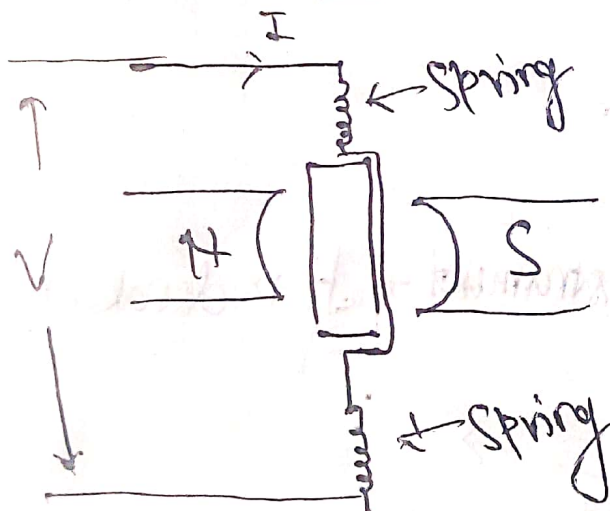
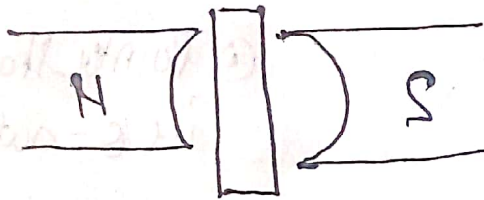
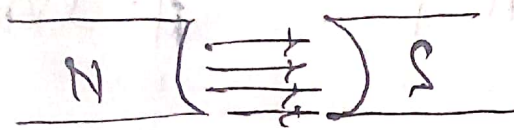
\hookrightarrow Indicating type instrument which indicates electrical quantity

Example: Ammeter \rightarrow measure current

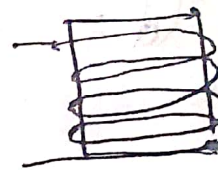
Voltmeter \rightarrow measure voltage

Wattmeter \rightarrow measure Active Power

Arrangement of magnet



Coil - Shape



Al
or
Cu/Ni
wire

Lorentz force

When current carrying conductor placed in magnetic, it experience a force. This force is called as Lorentz force.

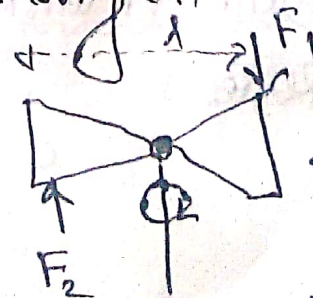
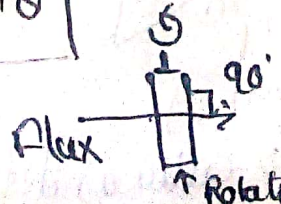
$I = ?$ (to be measure) \rightarrow Permanent moving coil

Deflecting Torque:

Lorentz force

$$F = n B i l \sin \theta$$

$$F = n B i l \sin 90^\circ$$



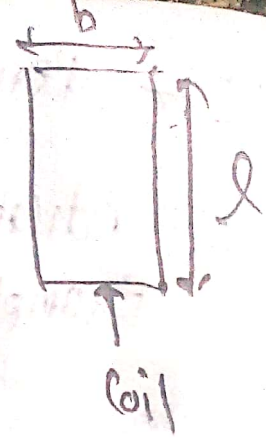
$$F_1 = F_2$$

$$\tau = F \times l$$

Torque

$$F = n B i l$$

Lorentz force

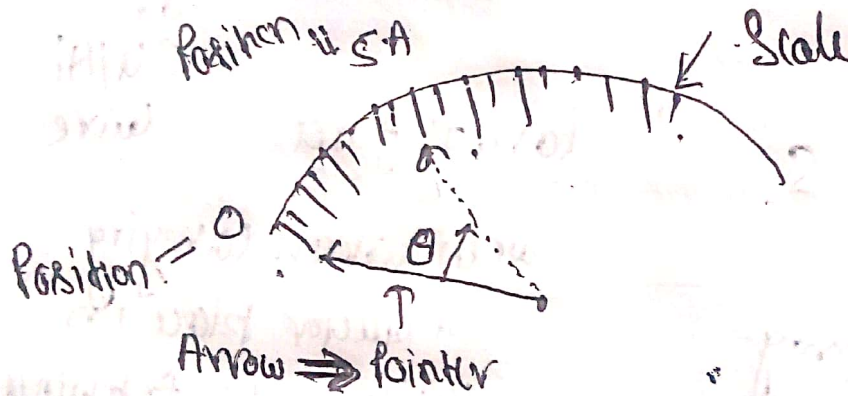


So deflection Torque $\rightarrow T_d$

$$T_d = b \times F = n \cdot B \cdot i \cdot l \times b$$

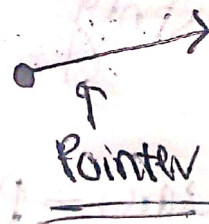
$$T_d = n \cdot B \cdot i \cdot A$$

$$A = l \times b$$

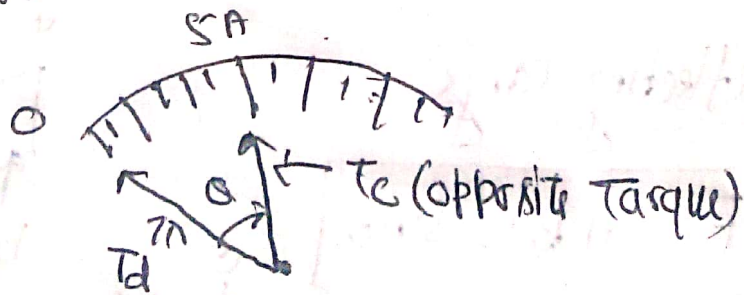


① Pointer shows deflection
i.e. $\theta = \text{output}$

Output of indicating type instrument \rightarrow It is denoted by a pointer.



Let measure SA when
 \rightarrow Resting



Initial position of

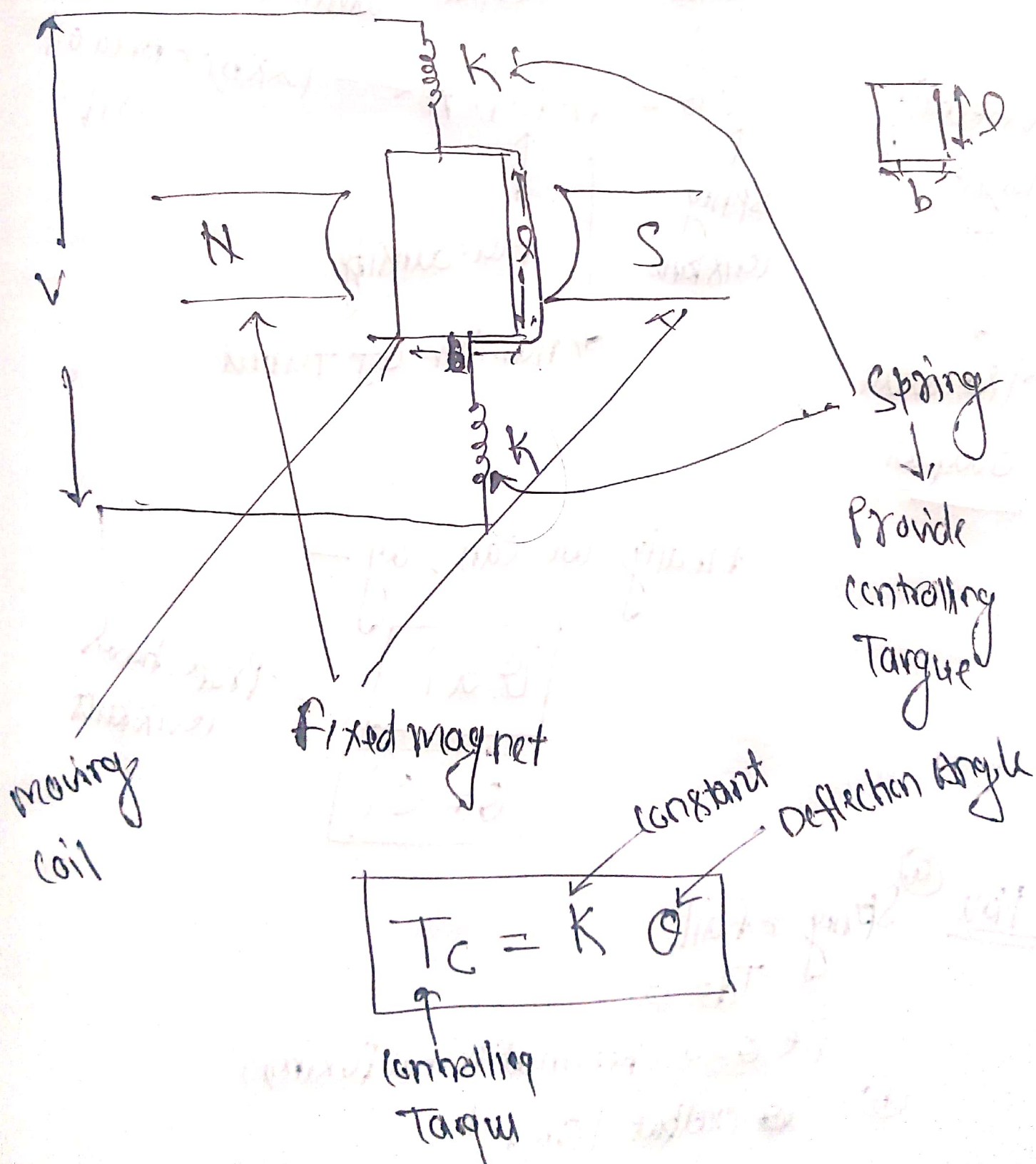
pointer \rightarrow called as deflecting Torque (T_d)

$T_d \rightarrow$ deflection Torque \rightarrow initial position i.e. starting i.e. $\theta = 0$

$T_c \rightarrow$ controlling Torque \rightarrow i.e. control the deflection Torque.

Suppose - we want to stop pointer at 5 Ampere.

So at position 5 Ampere $T_d = T_c$



At equilibrium position

$$T_c = T_d$$

↑
Controlling
Torque

↓
Deflection
Torque

Current flow (Input is to meter)

Deflection
Angle

$$k \cdot \theta =$$

↑
Spring
constant

$$n \cdot B \cdot i \cdot A$$

↑
Flux density

↑
number of turns

$(L \times b) \rightarrow$ Area of coil

also called
output

Finally we can say -

$$\theta \propto i$$

$$\theta = c i$$

Proportional
constant

Note (a) Spring \rightarrow fail
 $T_d = 0$

i.e. $\theta = 0$ (Return at initial position)

(b) Output $\boxed{\theta \propto I}$

\hookrightarrow gives Ammeter value

