SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE NAME : 23EET01 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

I YEAR /II SEMESTER ARTIFICIAL INTELLIGENCE & DATA SCIENCE

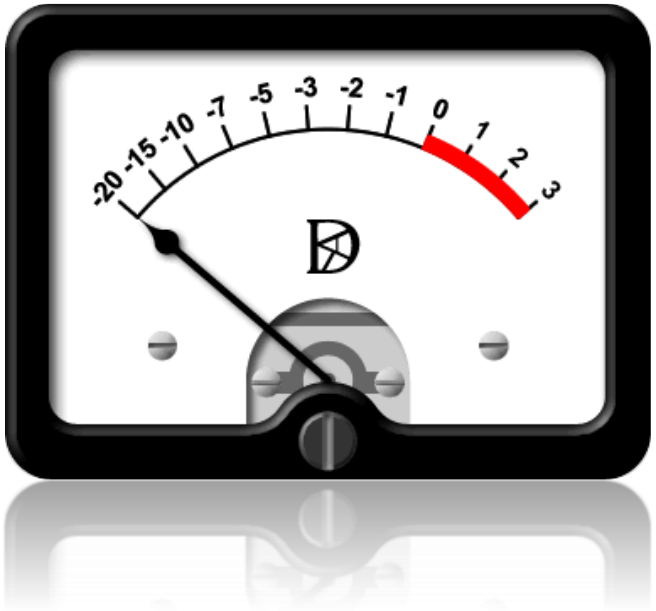
Unit 1 – Electrical Circuits and Measurements

Principle of Moving coil instruments

MEASURING INSTRUMENTS

I have two electrical supply as Alternating current and Direct current. Can I use same instrument for measuring the two supply?

TYPES OF MOVING COIL INSTRUMENTS



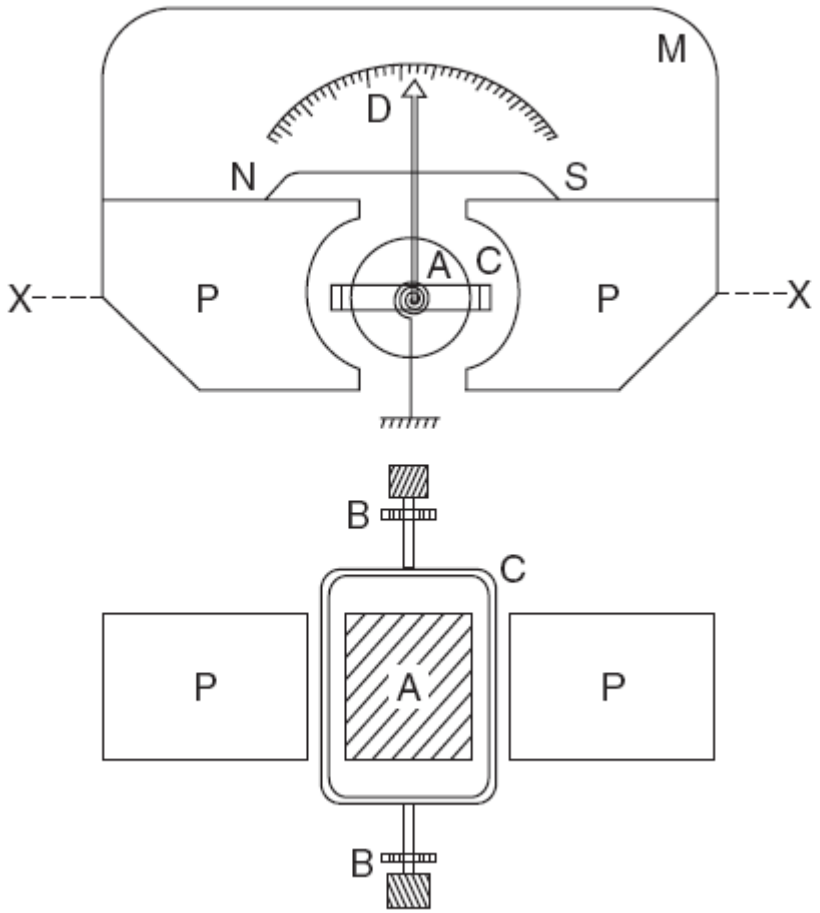
Moving coil instruments

- Permanent magnet type
  - DC only
- Electrodynamometer type
  - AC & DC

PMMC Instruments

Principle

"when a current-carrying conductor is placed in a magnetic field, it is acted upon by a force which tends to move it to one side and out of the field".

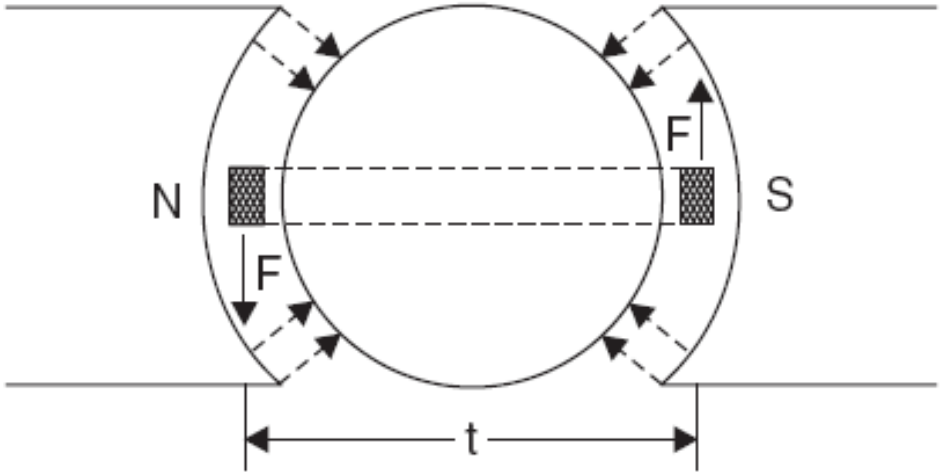


M = Permanent magnet
PP = Soft iron pole pieces
A = Soft iron cylinder (central core)
C = Rectangular coil
B = Spiral springs
D = pointer

Deflecting torque.

F = BIl newton

- B = flux density in WB/m2, and
- l = length or depth of coil in metres.



Deflecting torque (Td)

= force × perpendicular distance

= NBIl × b = NBI (l × b) = NBIA Nm

Controlling torque (Tc) = deflecting torque (Td)

Hence cθ = kI

COMPARISION

ADVANTAGES

(i) Low power consumption.

(ii) Their scales are uniform.

(iii) No hysteresis loss.

DISADVANTAGES

(i) Somewhat costlier as compared to moving-iron instruments.

(ii) Cannot be used for A.C. measurements.

(iii) Friction and temperature might introduce errors as in case of other instruments.

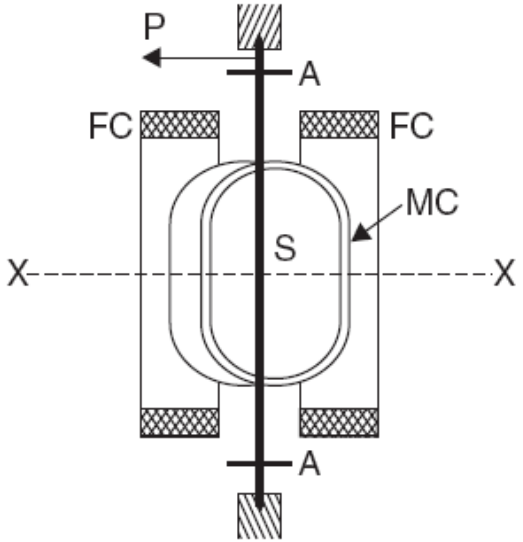
ASSESSMENT 1

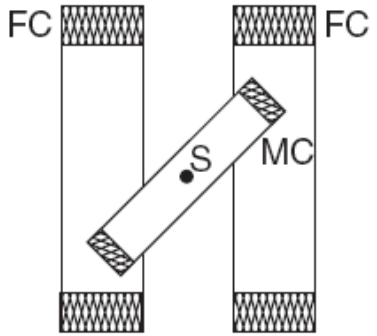
1. when a current-carrying conductor is placed in a _____, it is acted upon by a force which tends to move it to one side and out of the field".

2. Mention the advantages and disadvantages of PMMC coil instrument

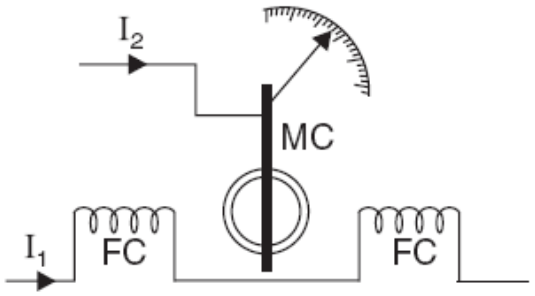
S.No	Advantages	Dis-advantages

Dynamometer Instruments





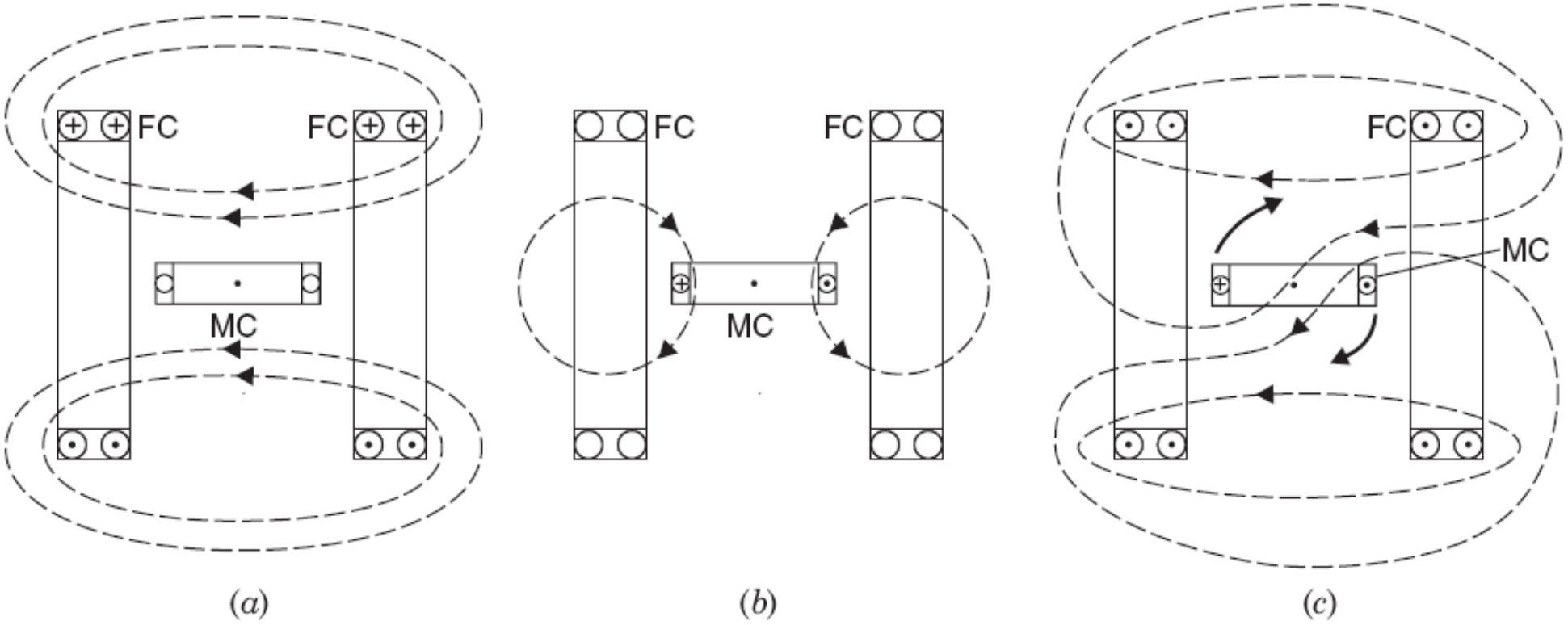
FC = Field coils (divided into two halves)
MC = Moving coils
S = Spindle
A = Spiral hair springs



I_1 = Current in FC
I_2 = Current in MC
(*b*)

In an electro-dynamic instrument the operating field is produced by another fixed coil and not by permanent magnet.

MAGNETIC FIELDS



COMPARISION OF DYNAMOMETER TYPE

Advantages :

- Can be used on both D.C. as well as A.C. systems.
- They are free from hysteresis and eddy current errors.

Disadvantages :

- Since torque/weight ratio is small, such instruments have low sensitivity.
- The scale is not uniform because $\theta \propto I$.
- Cost of these instruments is higher in comparison to those of moving iron instruments.

Assessment 2

1. List down the parts of Dynamometer type moving coil instrument.
   - _____
   - _____
   - _____

2. List the Advantages and Dis-advantages of Dynamometer type moving coil instrument.

S.No	Advantages	Dis-advantages

REFERENCES

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THANK YOU