



# **SNS COLLEGE OF ENGINEERING**

Kurumbapalayam (Po), Coimbatore – 641 107

**An Autonomous Institution**

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A' Grade

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

## **DEPARTMENT OF COMPUTER SCIENCE AND DESIGN**

**COURSE NAME : 19EE01 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**

**I YEAR /II SEMESTER - COMPUTER SCIENCE AND DESIGN**

**Unit 1 – Electrical Circuits and Measurements**

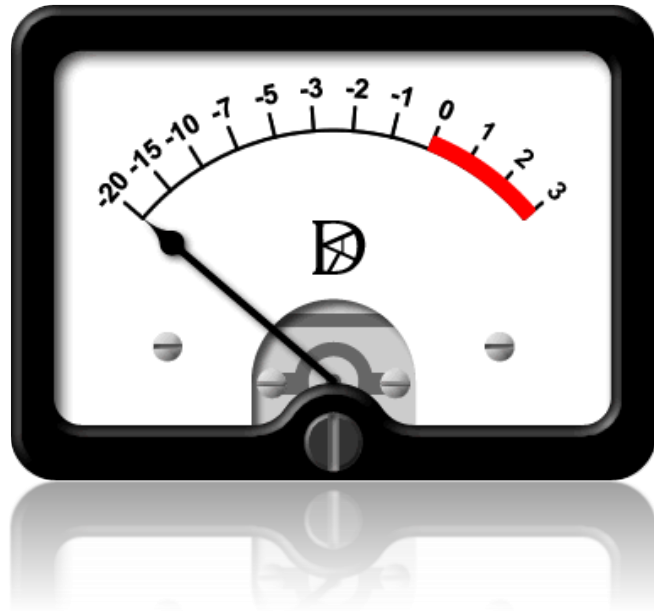
**Topic 6 : Principle of Moving coil instruments**

# 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



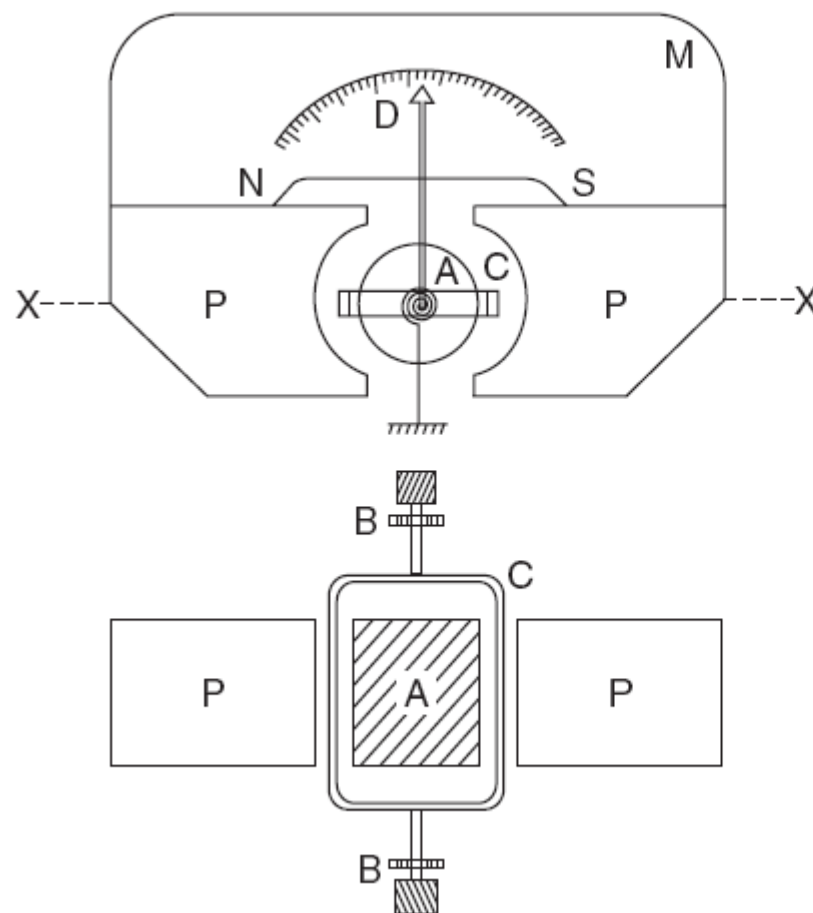
Moving coil  
instruments

Permanent magnet  
type  
DC only

Electrodynamometer  
type  
AC & DC

## 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.

$$F = BIl \text{ newton}$$

- $B$  = flux density in  $WB/m^2$ , and
- $l$  = length or depth of coil in metres.

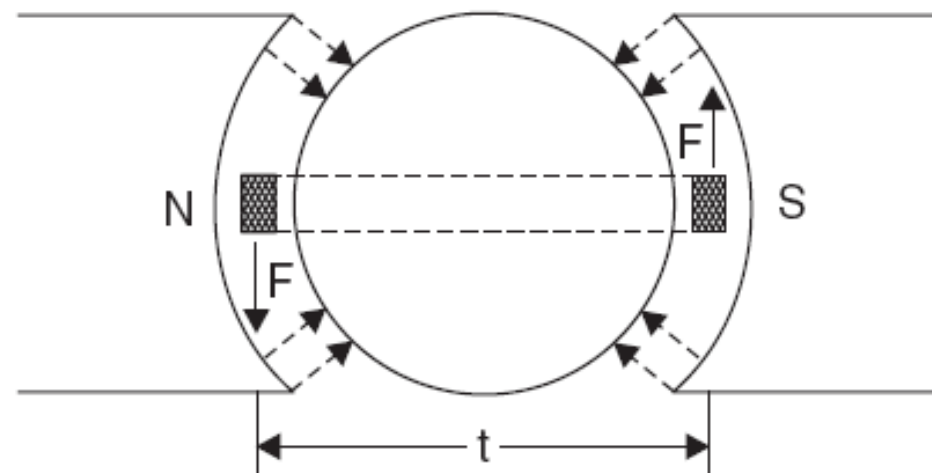
Deflecting torque ( $T_d$ )

= force  $\times$  perpendicular distance

$$= NBil \times b = NBI (l \times b) = NBI A \text{ Nm}$$

Controlling torque ( $T_c$ ) = deflecting torque ( $T_d$ )

$$\text{Hence } c\theta = kI$$





# 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.





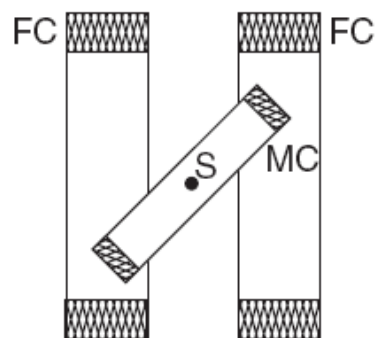
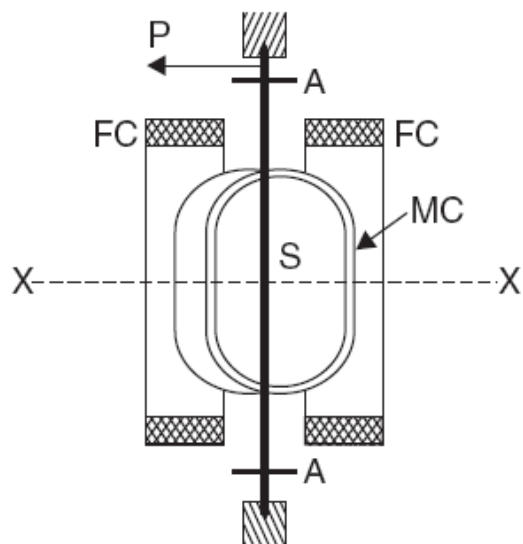
# ASSESSMENT 1

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”.

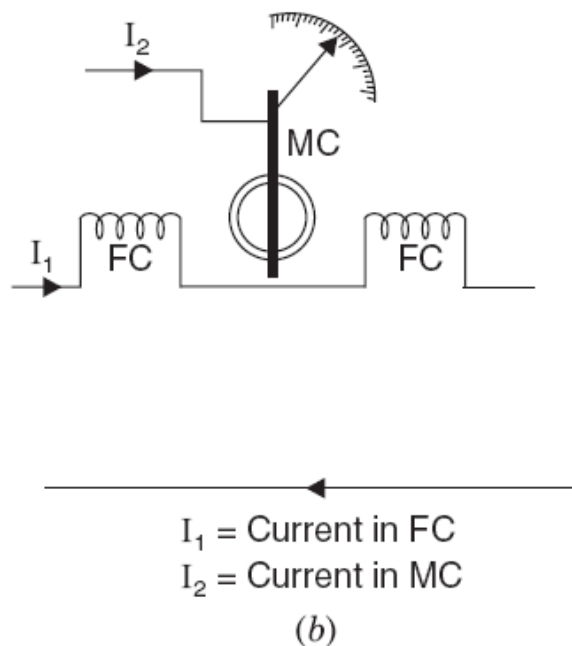
2. Mention the advantages and disadvantages of PMMC coil instrument

S.No	Advantages	Dis-advantages

# Dynamometer Instruments

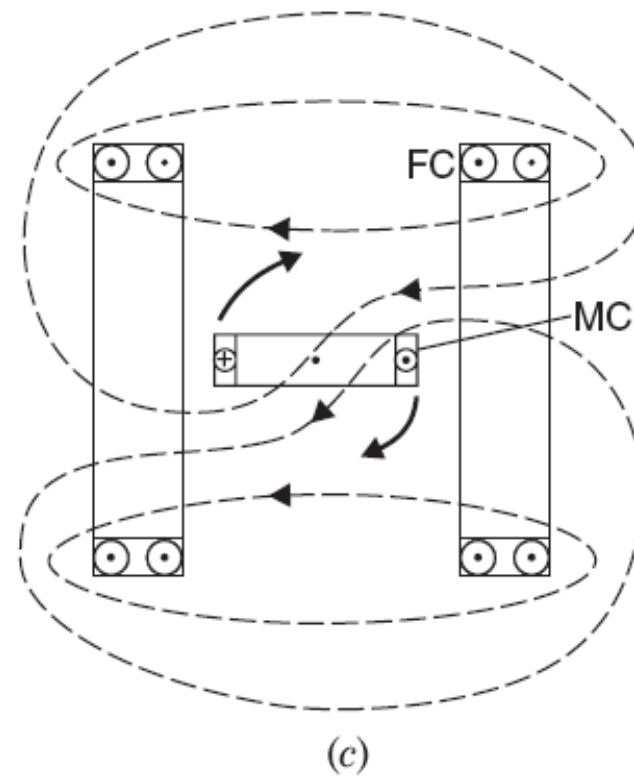
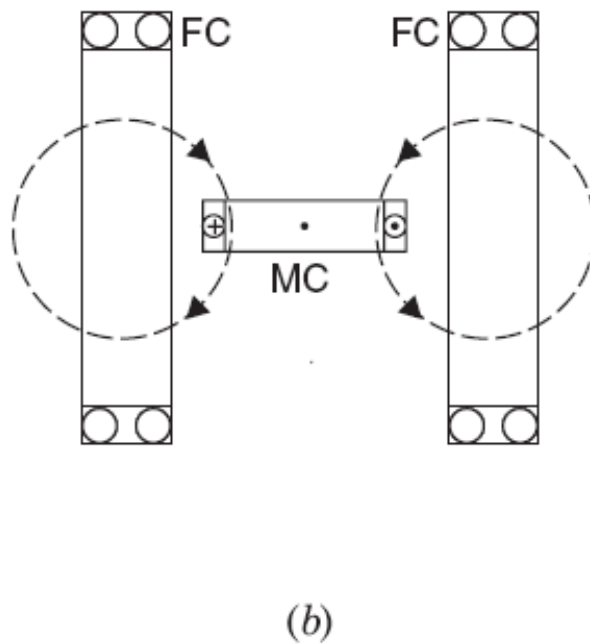
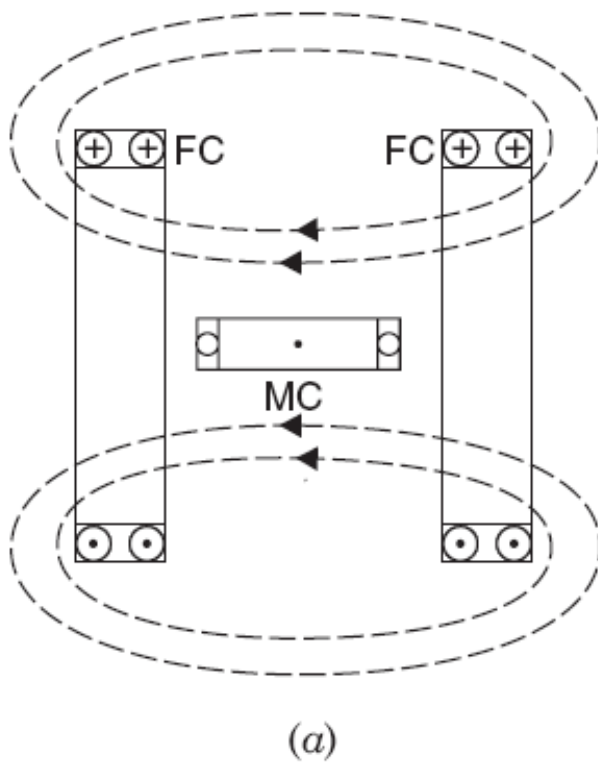


FC = Field coils (divided into two halves)  
 MC = Moving coils  
 S = Spindle  
 A = Spiral hair springs



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







# COMPARISON 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

1. Bhattacharya. S.K, “Basic Electrical and Electronics Engineering”, Pearson Education , (2017)
2. Muthu Subramanian R, Salivahanan S,“ Basic Electrical and Electronics Engineering”, Tata McGraw Hill Publishers, (2009)
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4. Nagrath. I.J, “Electronics: Analog and Digital”, Prentice Hall India Pvt. Ltd., (2013)

## THANK YOU