



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

COIMBATORE-35

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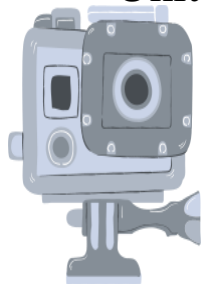
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

**COURSE NAME: 19EET205/ MEASUREMENTS AND
INSTRUMENTATION**

II YEAR / IV SEMESTER

Unit 1 –MEASUREMENT OF VOLTAGE AND CURRENT

Topic : MOVING IRON INSTRUMENTS



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01/12



Course outcome



Compare AC and DC meters along with its internal construction



Moving Iron (MI) instruments



- Where ruggedness is more important than high degree of accuracy, moving iron instruments are used.
- **Types of moving iron instruments:**
 1. Attraction type
 2. Repulsion type



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1. Attraction type moving iron instrument:

- Construction of the attraction type moving iron instrument is as shown in the given figure (1).
- The moving iron, i.e. the disc of soft iron, is eccentrically mounted. Coil is situated around the disc. When the coil is excited it produces magnetic field.
- Due to magnetic field the moving iron moves from the weaker field outside the coil to the stronger field inside the coil. Thus moving iron gets attracted inwards and thus the name attraction type.



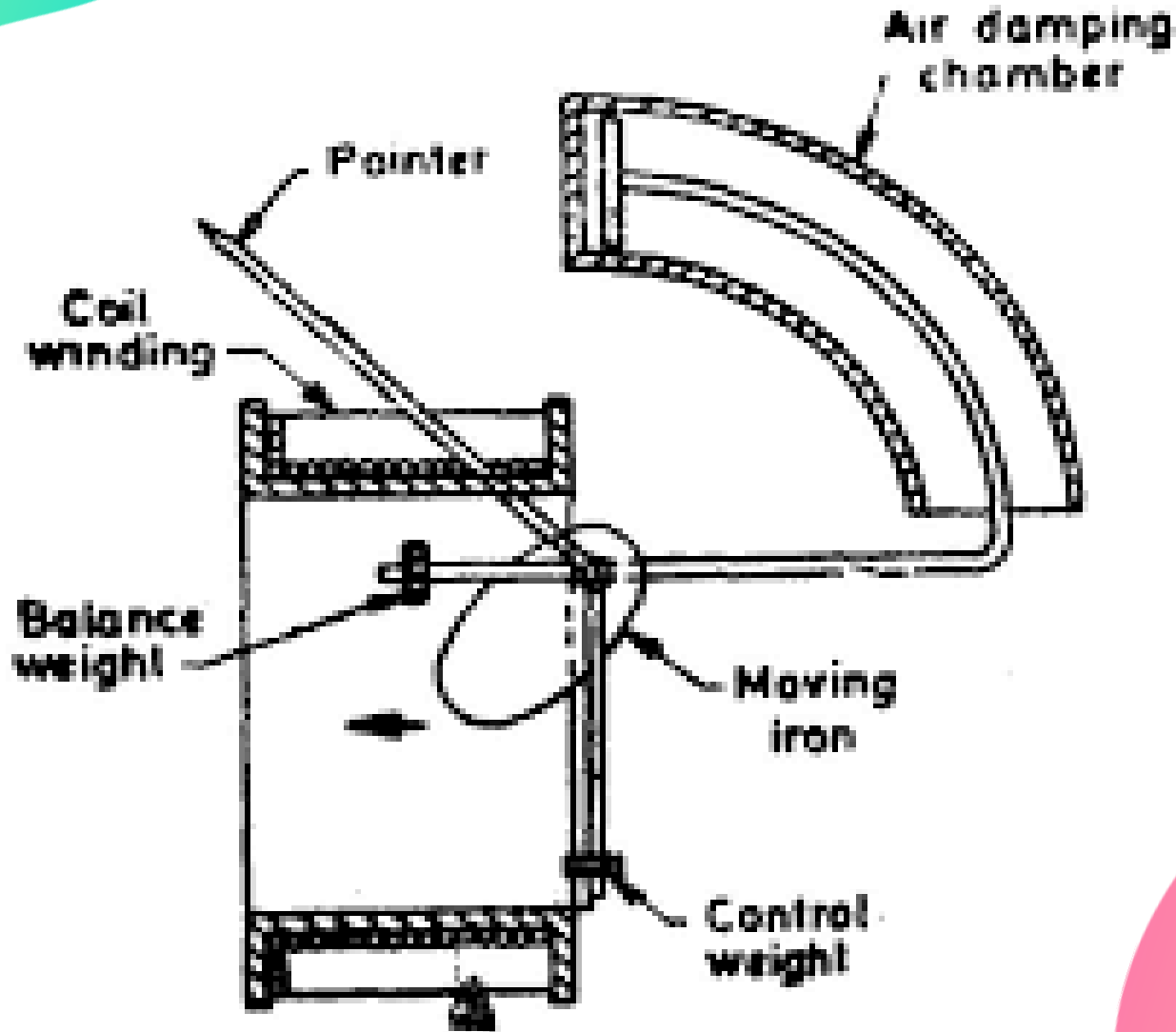
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- The controlling torque is provided by the balance weights attached to the moving iron. Spring also can be used to provide controlling torque.
- Damping is provided by air friction in which aluminum piston is attached to the moving system and moves in a closed air damping chamber.



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2. Repulsion type moving iron instrument:

- In these type of instruments there two vanes present inside the coil in which one is fixed while other is movable. These both vanes gets similarly magnetized when coil is excited. Thus there is a force of repulsion between both vanes causing movement in movable vane. There are further two different designs of repulsion type moving iron instruments.

i. Radial vane type:

- In radial vane type radial strips of iron are used as moving vanes. The fixed vane is attached to the and moving is attached to the moving spindle.



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ii. Coaxial vane type:

- In coaxial vane type the fixed as well as moving vanes are the sections of coaxial cylinders as shown in above figure.

The controlling torque is provided by the springs or balancing weights (in vertically mounted instrument). The damping is provided by air friction damping same as in attraction type moving iron instruments.



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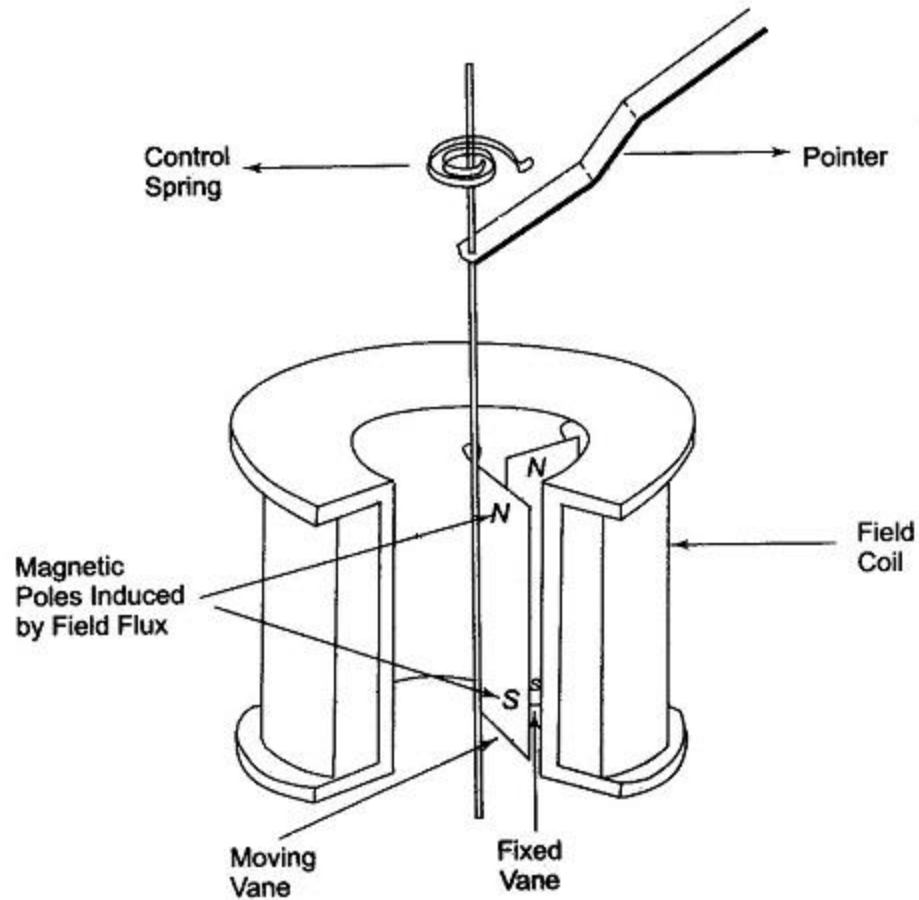


Fig. 2.8 ■ Repulsion Type AC Meter (Radial Vane Type)



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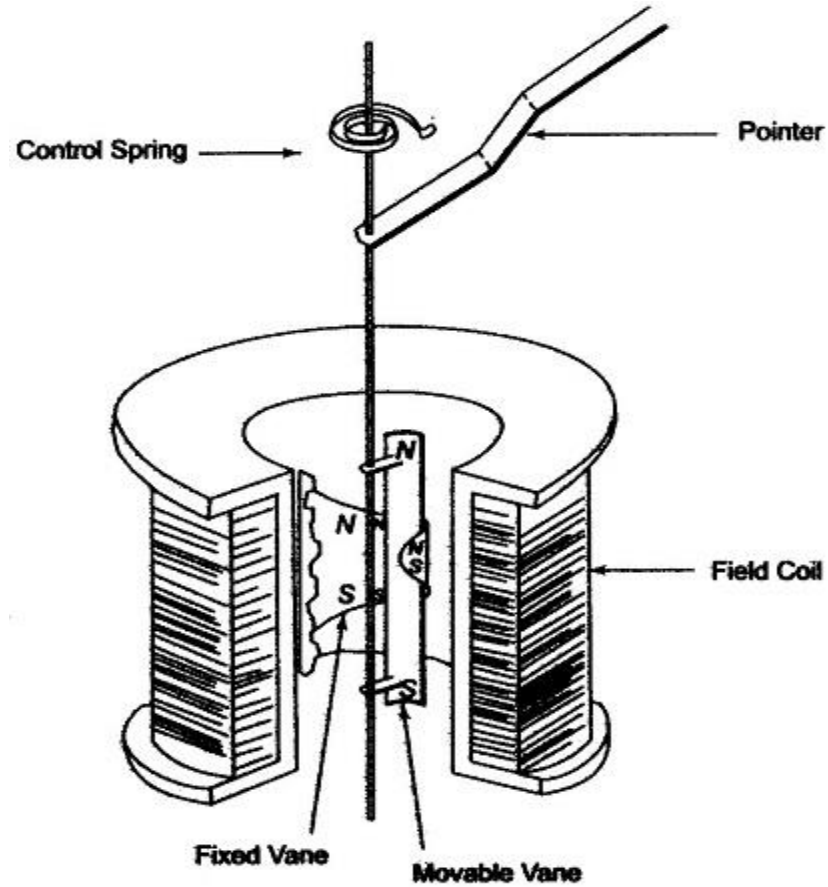


Fig. 2.9 Concentric Iron Vane (Repulsion Type)



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- Advantages of Moving iron Instruments:
 1. Suitable of a.c. as well as d.c. measurements.
 2. Good accuracy.
 3. Cheaper in cost as compared to permanent magnet moving coil instruments.
 4. The instrument has high torque to weight ratio.
 5. The instrument can be used for low frequency measurement also.



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- Disadvantages of Moving iron instruments:
 1. Power consumed by the instrument is high as compared to that of the permanent magnet moving coil instrument.
 2. The scale is non-uniform.
 3. Due to the presence of iron part in the operating system, error due to the hysteresis effect is introduced. To reduce this effect nickel iron alloys are used.