



**DARBHANGA COLLEGE OF ENGINEERING
DARBHANGA**

INSTRUMENTATION AND CONTROL (SEM-IV:ME)

Course Code- PCC-ME 207

Lecture 3

SENSOR AND TRANSDUCERS

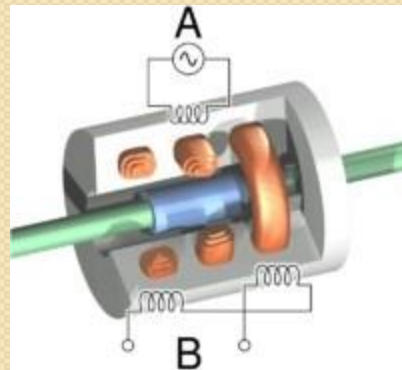
Faculty: Mr.Akhil Mohammed KK
Dept. of Electrical Engineering

Differential Transformer (LVDT)

Principle of LVDT:

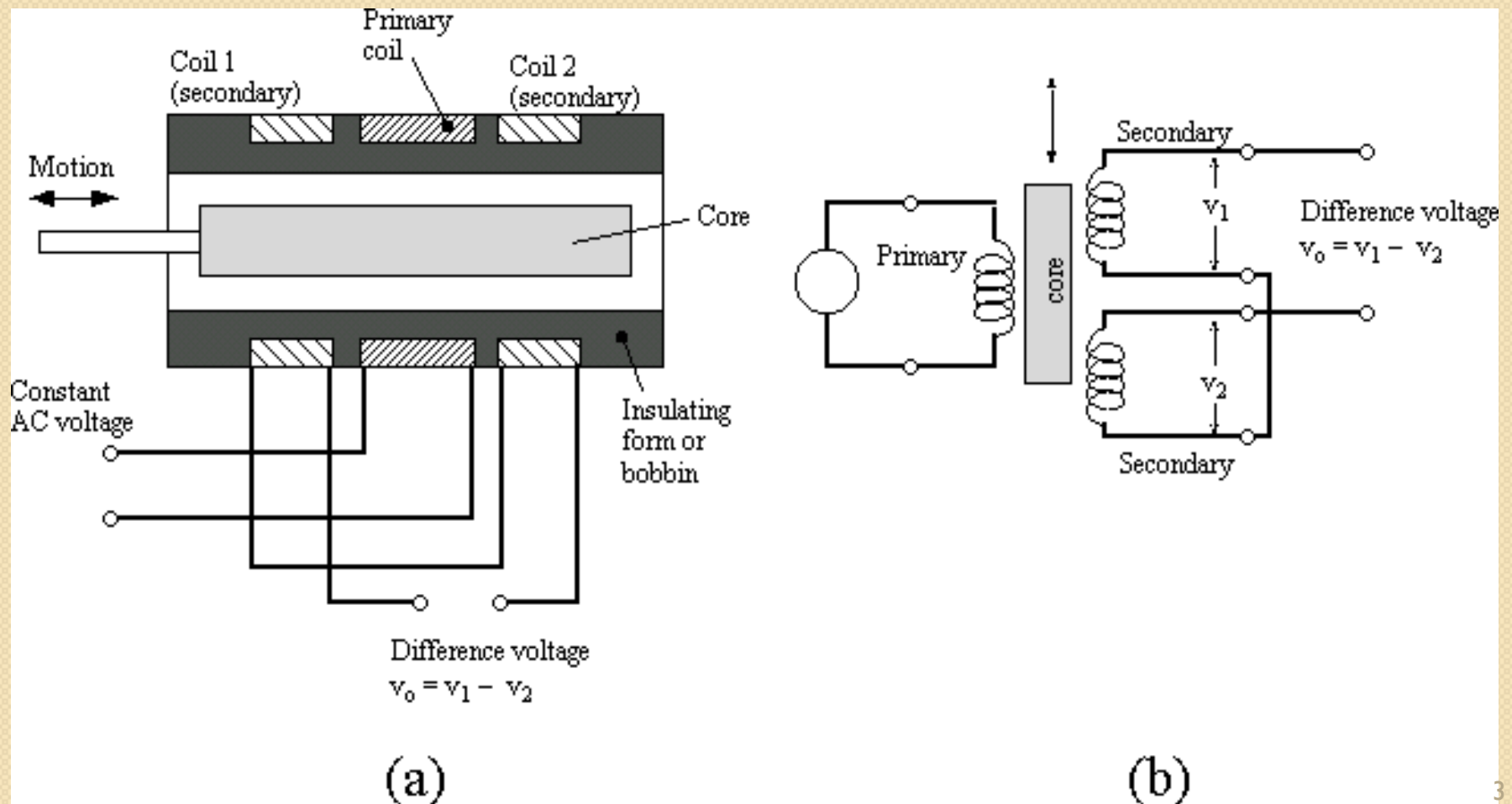
LVDT works under the principle of mutual induction, and the displacement which is a non-electrical energy is converted into an electrical energy.

And the way how the energy is getting converted is described in working of LVDT in a detailed manner.



Cont....

- Construction of LVDT:



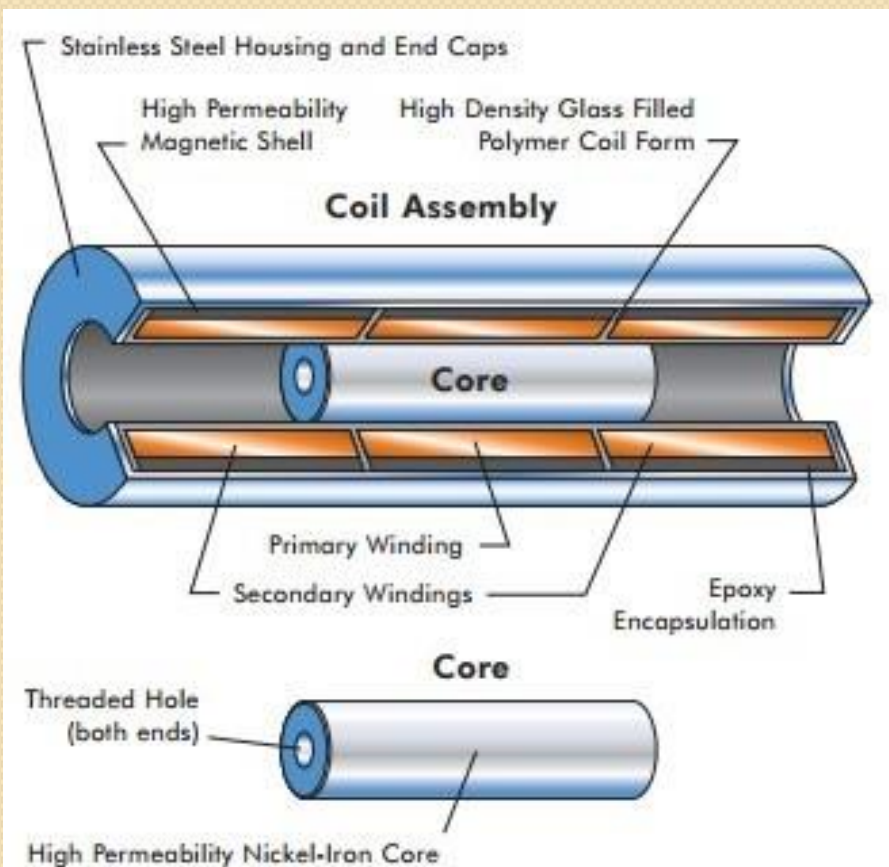
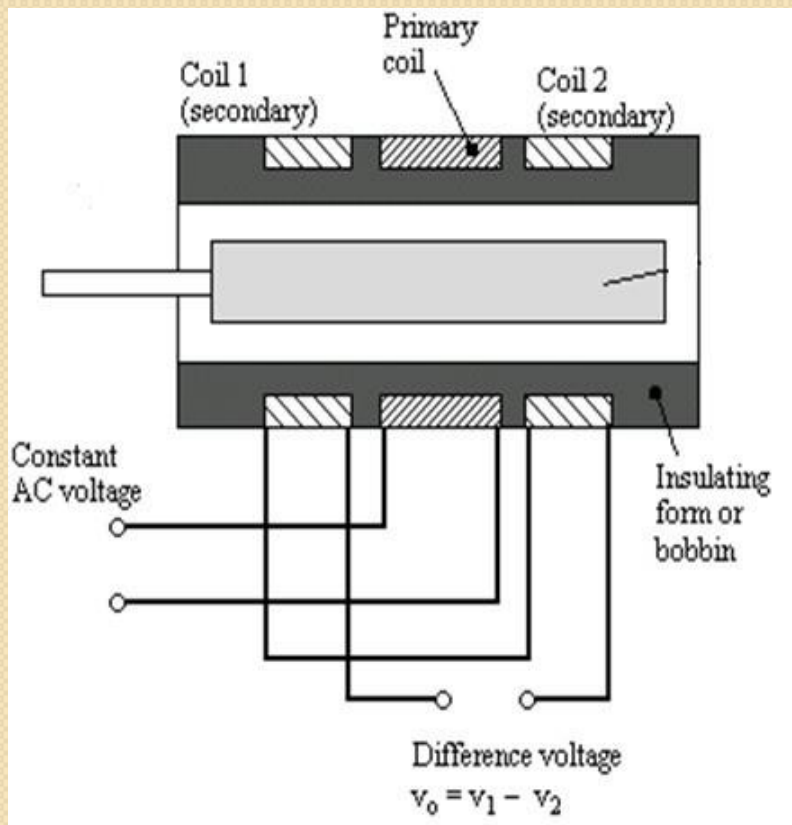


Figure 1

The features that make an LVDT environmentally robust are evident in this cutaway view.

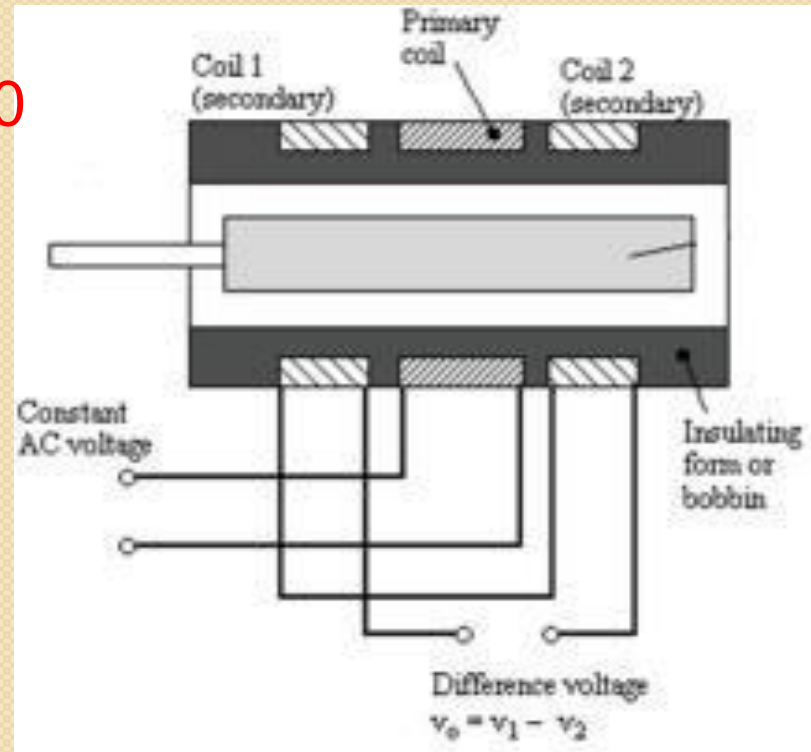
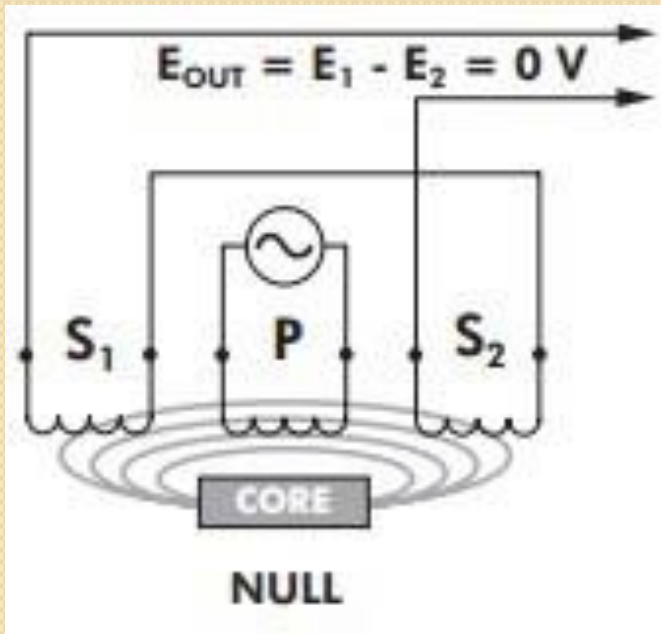
- LVDT consists of a **cylindrical former** where it is surrounded by **one primary winding** in the centre of the former and the **two secondary windings** at the sides.

Working of LVDT:

Case

On applying an external force which is the displacement, if the core remains in the **null position** itself without providing any movement then the voltage induced in both the secondary windings are **equal** which results in net output is equal to zero

$$E_{sec1} - E_{sec2} = 0$$



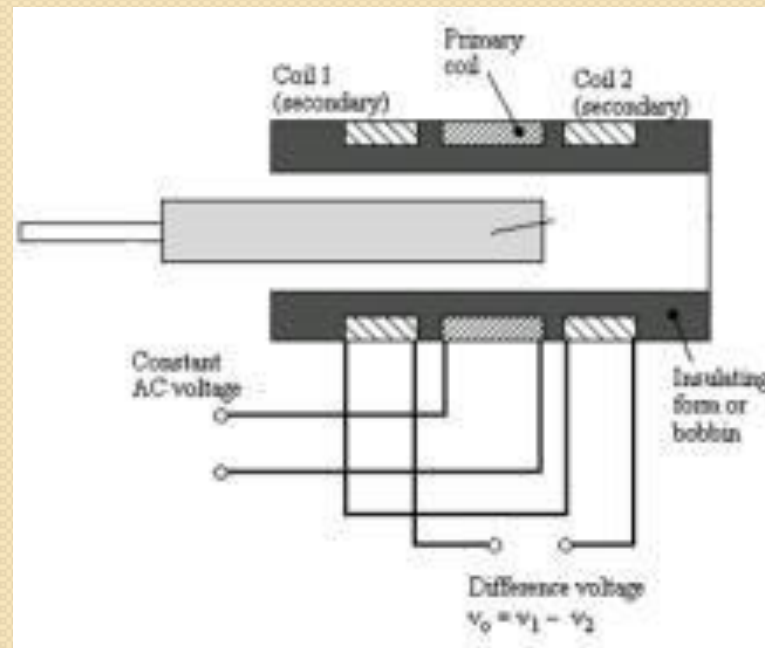
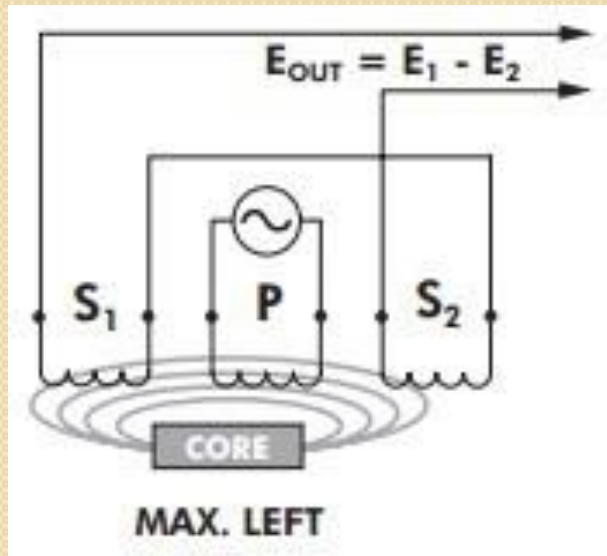
Working of LVDT:

Case

When an external force is applied and if the steel iron core tends to move in **the left hand side** direction then the emf voltage induced in the secondary coil is greater when compared to the emf induced in the secondary coil 2.

Therefore the net output will be

$$E_{sec1} - E_{sec2}$$



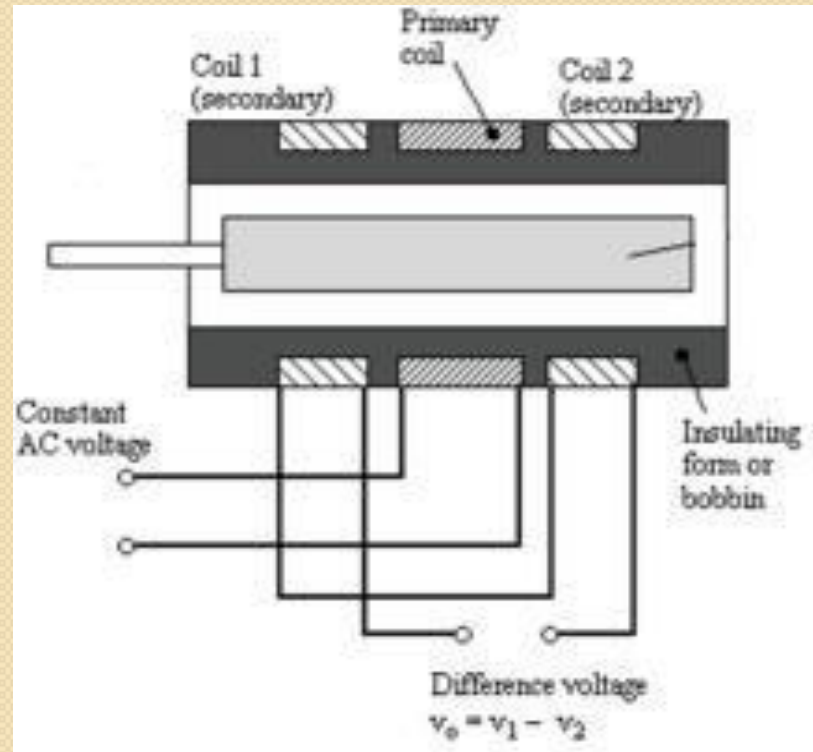
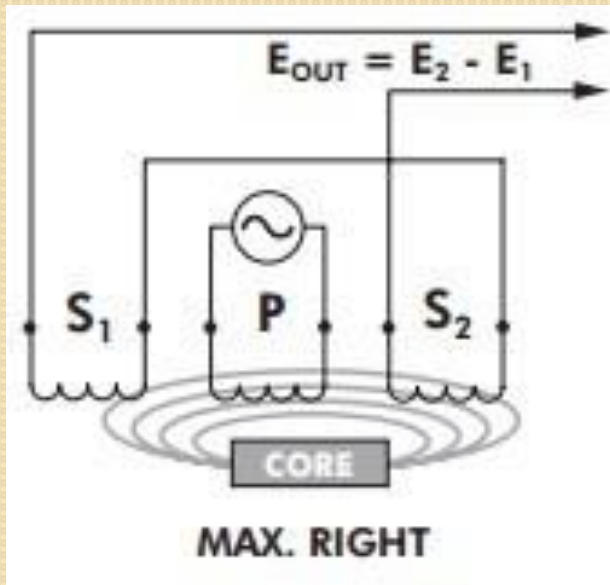
Working of LVDT:

Case

3:

When an external force is applied and if the steel iron core moves in the **right hand side direction** then the emf induced in the secondary coil 2 is greater when compared to the emf voltage induced in the secondary coil 1.

The net output voltage will be **$E_{sec2} - E_{sec1}$**



Advantages of LVDT:

- 1) Infinite resolution is present in LVDT
- 2) High output
- 3) LVDT gives High sensitivity
- 4) Very good linearity
- 5) Ruggedness
- 6) LVDT Provides Less friction
- 7) Low hysteresis
- 8) LVDT gives Low power consumption.

Applications of LVDT:

- 1) LVDT is used to measure displacement ranging from fraction millimeter to centimeter.
- 2) Acting as a secondary transducer, LVDT can be used as a device to measure force, weight and pressure, etc..

Characteristics of LVDT:

