National Institute of Technology, Durgapur
Department of Electrical Engineering
<u>Experiment No: 4</u>

Measurement of Displacement by Using LVDT

Objective: Determining the sensitivity of LVDT by plotting Output voltage Vs displacement using LVDT sensor.

Apparatus Required: It consists of following instruments

Sr No	Instrument Name	Specification	Quantity	Makers Name

Theoretical Concept:

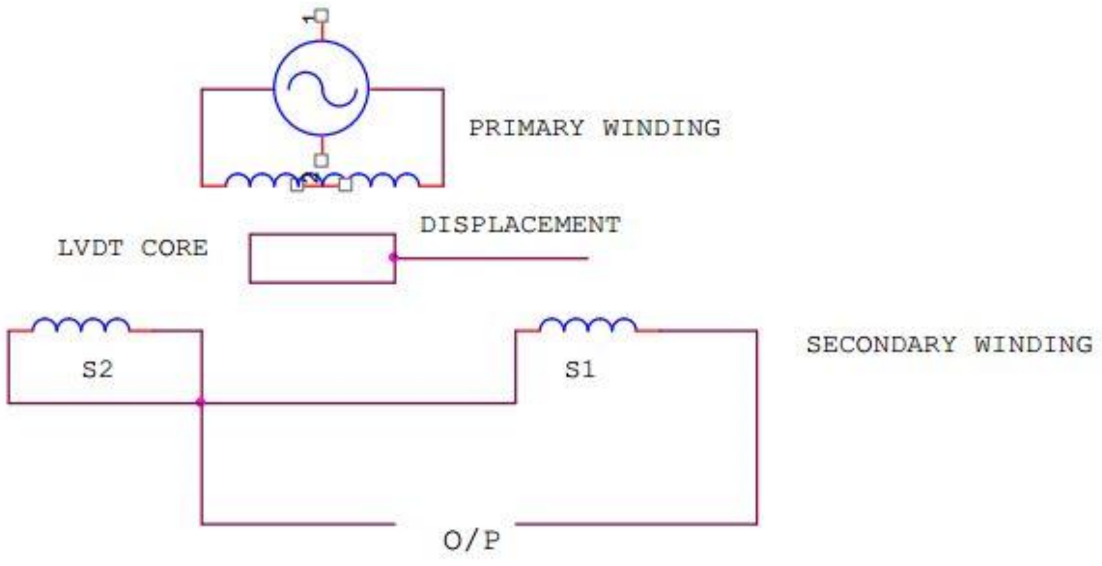
The **linear variable differential transformer** (LVDT) is a type of electrical transformer used for measuring linear displacement. The transformer has three solenoidalcoils placed end-to-end around a tube. The centre coil is the primary, and the two outer coils are the secondaries. A cylindrical ferromagnetic core, attached to the object whose position is to be measured, slides along the axis of the tube.

An alternating current is driven through the primary, causing a voltage to be induced in each secondary proportional to its mutual inductance with the primary. The frequency is usually in the range 1 to 10 kHz.

As the core moves, these mutual inductances change, causing the voltages induced in the secondaries to change. The coils are connected in reverse series, so that the output voltage is the difference (hence "differential") between the two secondary voltages. When the core is in its central position, equidistant between the two secondaries, equal but opposite voltages are induced in these two coils, so the output voltage is zero.

When the core is displaced in one direction, the voltage in one coil increases as the other decreases, causing the output voltage to increase from zero to a maximum. This voltage is in phase with the primary voltage. When the core moves in the other direction, the output voltage also increases from zero to a maximum, but its phase is opposite to that of the primary. The magnitude of the output voltage is proportional to the distance moved by the core (up to its limit of travel), which is why the device is described as "linear". The phase of the voltage indicates the direction of the displacement.Because the sliding core does not touch the inside of the tube, it can move without friction, making the LVDT a highly reliable device. The absence of any sliding or rotating contacts allows the LVDT to be completely sealed against the environment.LVDTs are commonly used for position feedback in servomechanisms, and for automated measurement in machine tools and many other industrial and scientific applications.

Circuit Diagram:



<u>Procedure:</u>

Draw the circuit diagram from the trainer kit.

i) Study the working of LVDT as per theory.
ii) Switch on the supply of the trainer kit.
iii) Adjust the shaft of the micrometer (say; at 5mm) to get the output of the system minimum.
iv) Now displace the shaft both in both the direction in steps of 0.5mm.
v) Note down the corresponding output voltage.
vi) Plot the graph; output voltage vs displacement.

Experimental Results

SL.NO	DISPLACEMENT (mm)	OUTPUT (volt)

Suggested Reading:

1. Meaurement Systems, Application & Design by E.O.Doebelin.