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SEMESTER 2ND
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SUB – BEEE LAB
BRANCH – CSE(B.TECH)

AIM :- To study working of Linear Variable Differential Transformer / Linear Variable Displacement Transducer (LVDT).

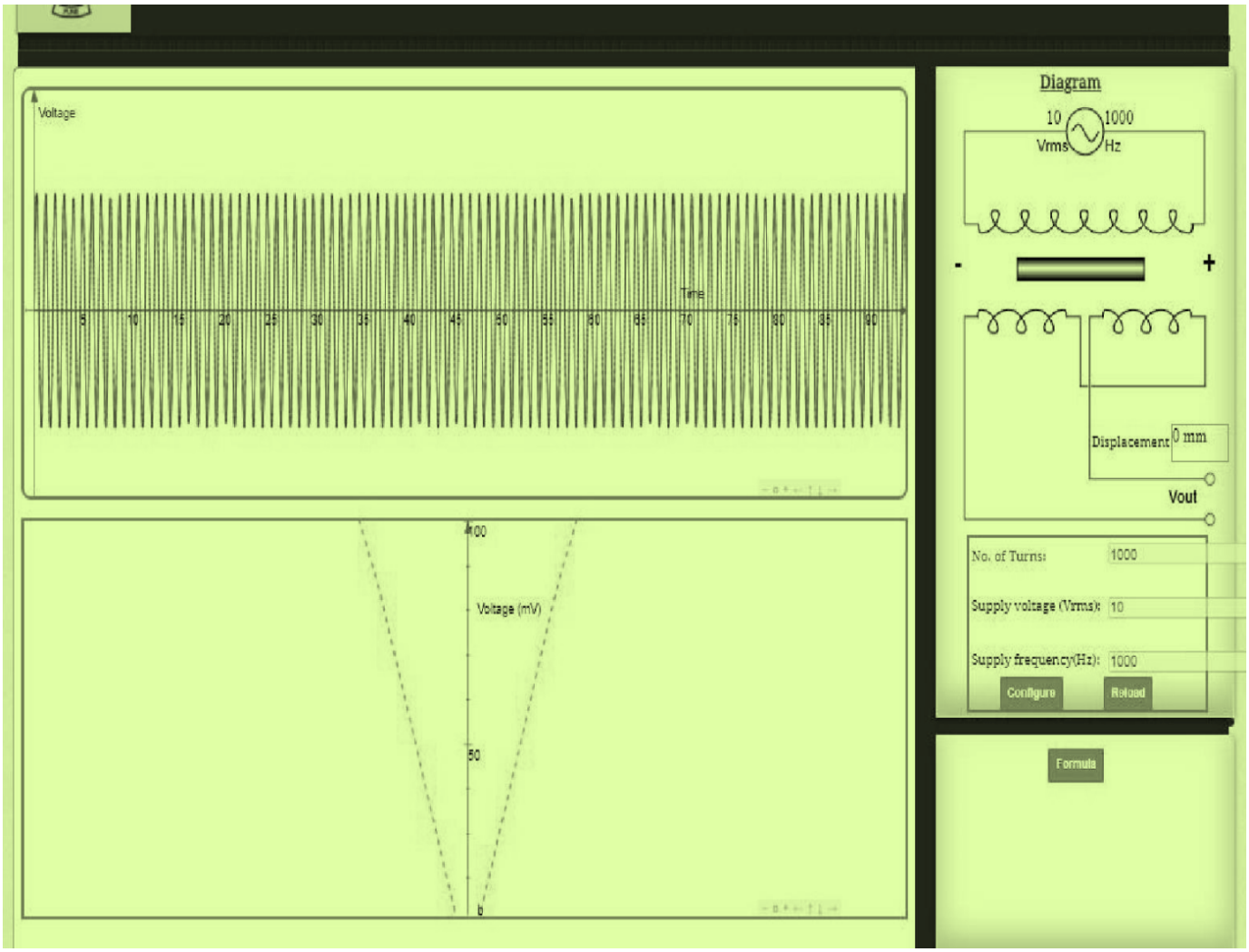
APPARATUS REQUIRED :-

Sr. No.	Equipment name	Specifications and range	Quantity in No.
1.	LVDT kit	0 – 230 V, ±10 mm	1
2.	CRO	0 – 230 V, 30 MHz	1
3.	CRO probes	---	2

THEORY :-

LVDT is a differential transformer consisting of one primary winding P and two identical secondary windings S1 and S2 wound over a hollow bobbin of non-magnetic and insulating material as shown in Fig. 4.1. The secondary windings S1 and S2 have an equal number of turns which are arranged concentrically and placed on either side of primary winding P. A soft iron core, attached to the sensing element of which displacement is to be measured, in the shape of rod or cylinder slides freely in the hollow portion of the bobbing. The eddy current losses are reduced by using nickel iron alloy as core material and are slotted longitudinally. Primary winding is connected to an AC source of voltage varying from 5 – 25 V and frequency varying from 50 Hz to 20 KHZ

CIRCUIT DIAGRAM :-



Steps For Experiment:-

1. Connect LVDT kit into mains and switch ON the supply as shown in figure.
2. Connect 'X' channel of CRO to primary winding of LVDT and 'Y' channel of CRO to output of secondary winding in LVDT kit.
3. Adjust micrometer scale at "o" position in order to coincide with "o" of vernier scale.
4. If display of displacement is not showing "o" in LVDT, adjust scale error to have reading equal to zero.
5. Scroll micrometer on either sides to have displacement of soft iron core on right side and left side.
6. Note down the reading of amplitude of voltage by counting number of divisions and multiply it with volt/div from CRO for a particular displacement.
7. Take five set of readings for displacement on right side and left side.
8. Record the readings in table shown.

Calculations/Theorems /Formulas used etc

LVDT is an inductive transducer for translating the linear motion into an electrical signal. It is suitable for use in applications where displacements are too large ranging from a fraction of mm to few cm. For example, strain gauge, mechanical displacement greater than 25 mm etc.

LVDT can be connected with other transducers in cascade for measurement of other physical quantities such as force, weight, pressure etc.

Observations/Discussions:

For Positive Displacement:

Sr. No.	Meter scale reading	Positive displacement (mm)	Voltage Amplitude (V) Amplitude(mV)
1.			
2.	10 V 10 V	1 mm 3 mm	26.17 mV 77.73 mV

For Negative Displacement:

Sr. No.	Meter scale reading	Negative displacement (mm)	Voltage Amplitude (V) Amplitude(mV)
1.			
2.	10 V 10 V	-1 mm -3 mm	26.17 mV 77.73 mV

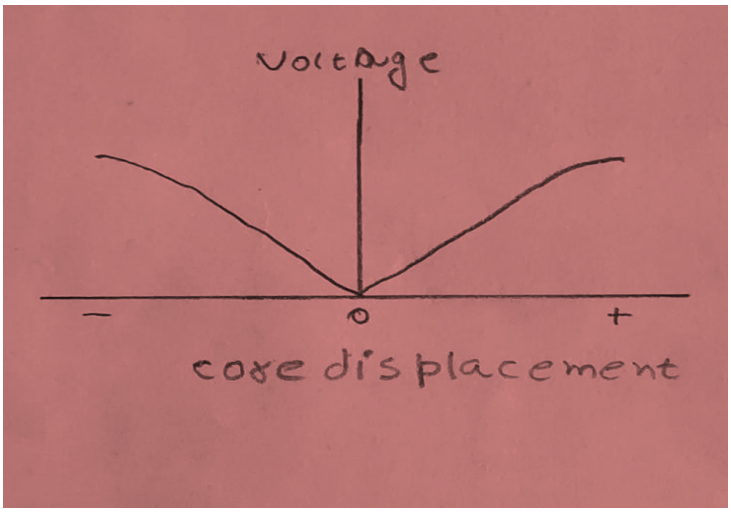
SOURCES OF ERRORS:-

- Internal resistance of LVDT kit.
- Residual magnetism of soft iron core in LVDT.
- Internal resistance of CRO leads.
- Effect of magnetic field surrounding the iron core.

Result/Output/Writing Summary:

The voltage amplitude at positive and negative displacement is compared. The graph of voltage amplitude vs. displacement of LVDT is a linear curve but it makes an intercept on Y – axis which signifies the concept of residual magnetism.

Graphs (If Any):-



Learning outcomes (What I have learnt):-

- Understand the concept of LVDT.
- Design interfacing of LVDT.
- Determine the voltage for both positive and negative displacement.
- Determine the effect of number coils.

CONCLUSION:-

The difference in comparison of voltage amplitude values at positive and negative displacement should be analyzed and resulting difference if any, in both sets of readings is likely due to various sources of error.

Evaluation Grid:

Sr. No.	Parameters	Marks Obtained	Maximum Marks
1.	Worksheet completion including writing learning objectives/Outcomes.(To be submitted at the end of the day).		10
2.	Post Lab Quiz Result.		5
3.	Student Engagement in Simulation/Demonstration/Performance and Controls/Pre-Lab Questions.		5
	Signature of Faculty (with Date):	Total Marks Obtained:	