

CHARACTERISTICS OF LVDT [LINEAR, VARIABLE DIFFERENTIAL TRANSFORMER].

Aim :

To understand and simulate the relation between core displacement and output voltage.

APPARATUS REQUIRED :

Laptop with internet connection.

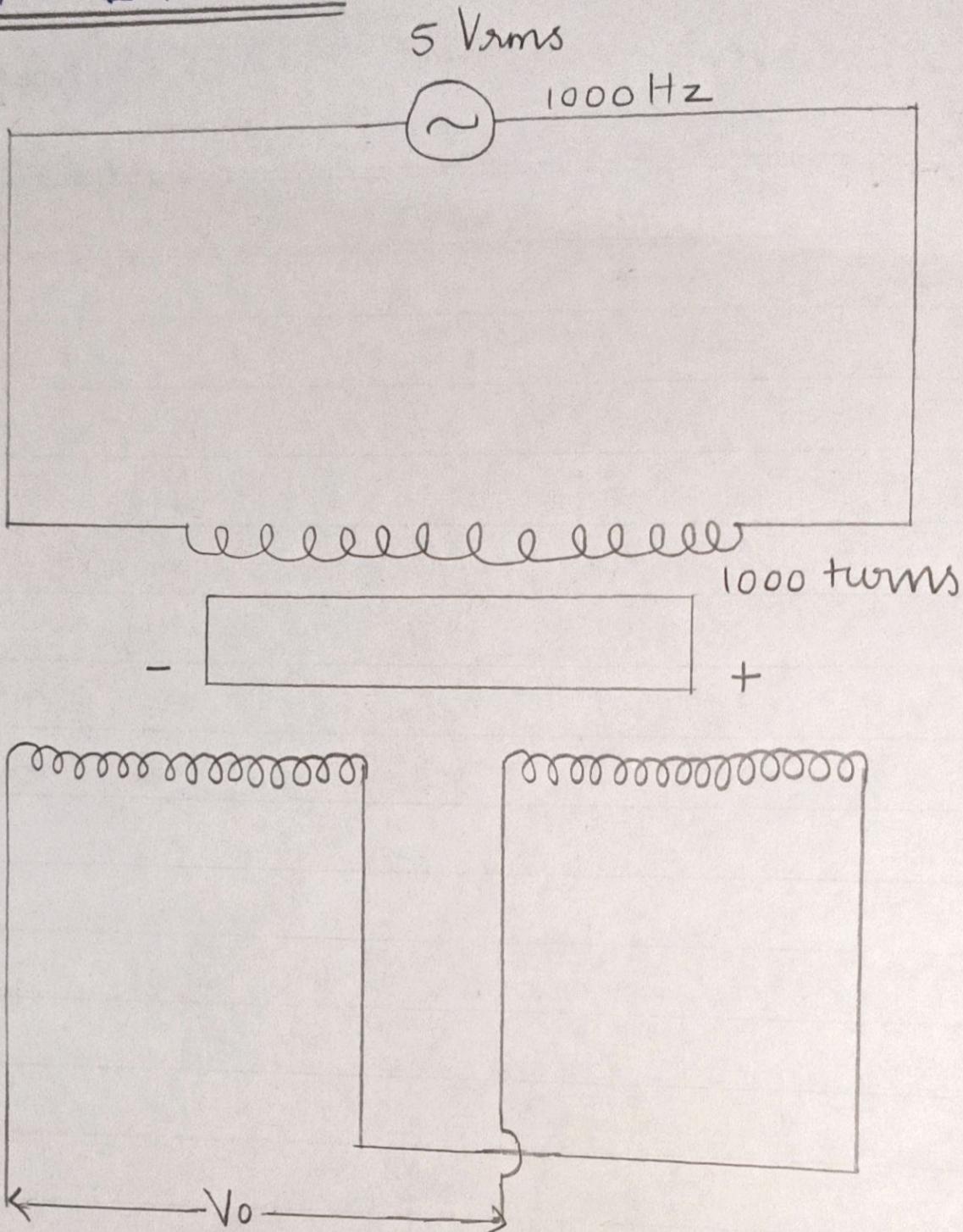
THEORY :

LVDT is an inductive transducer that converts linear displacement into a electrical signal. It consist of a transformer having primary winding and 2/ two secondary windings wound on a core. As the primary is connected to an AC source. The AC current and the voltages are produced in the secondary of the LVDT.

When the core is at the center, the flux linking with both the secondary winding are equal so, the emf induced in both the windings are equal, this means there is no displacement.

When the core is at the right, the flux linking with the secondary winding S₁ is more. So, the emf induced

CIRCUIT DIAGRAM :-



Tabulation :-

	Input Voltage (Vm)	Output Voltage	Frequency (Hz)	Time = $\frac{1}{f}$ (ms)
Positive Displacement	7	2.2	1000	
Negative Displacement	7	2.2	1000	

CALCULATION :-

$$V_m = V_{rms} \times \sqrt{2} = 5 \times \sqrt{2} = 7V$$

$$4SD = 7V$$

$$1SD = \frac{7}{4} \checkmark$$

$$1.25SD = \frac{7}{4} \times 1.25 = 2.2V$$

$$f = 1000 \text{ Hz}$$

$$T = \frac{1}{f} = \frac{1}{1000} = 1 \text{ ms.}$$

in S_1 is more than S_2 . So, the net emf is positive.

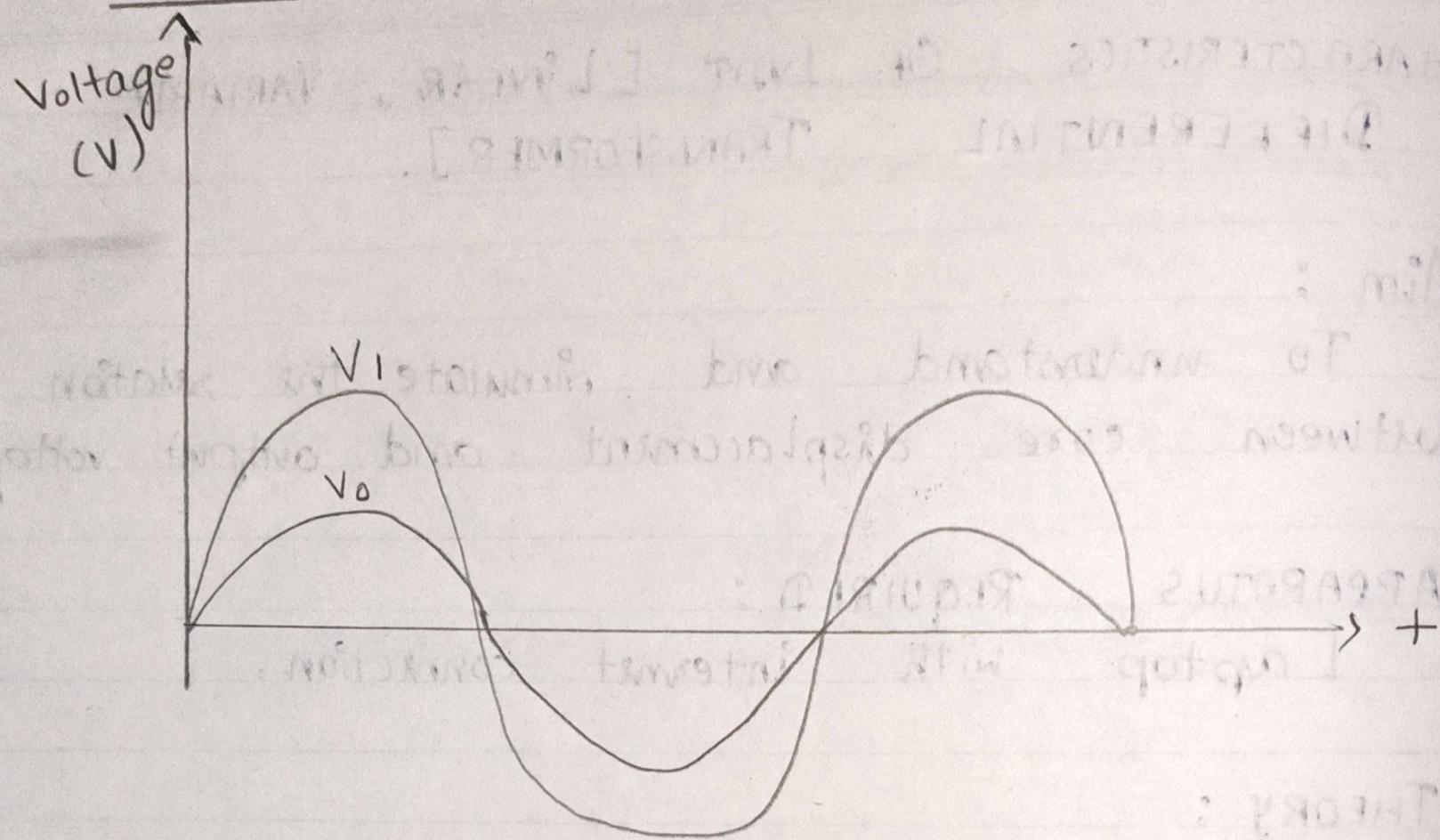
When the core is at the left, the flux linking and the emf in S_2 is more than ϕ_1 . So, the net emf is negative.

PROCEDURE :

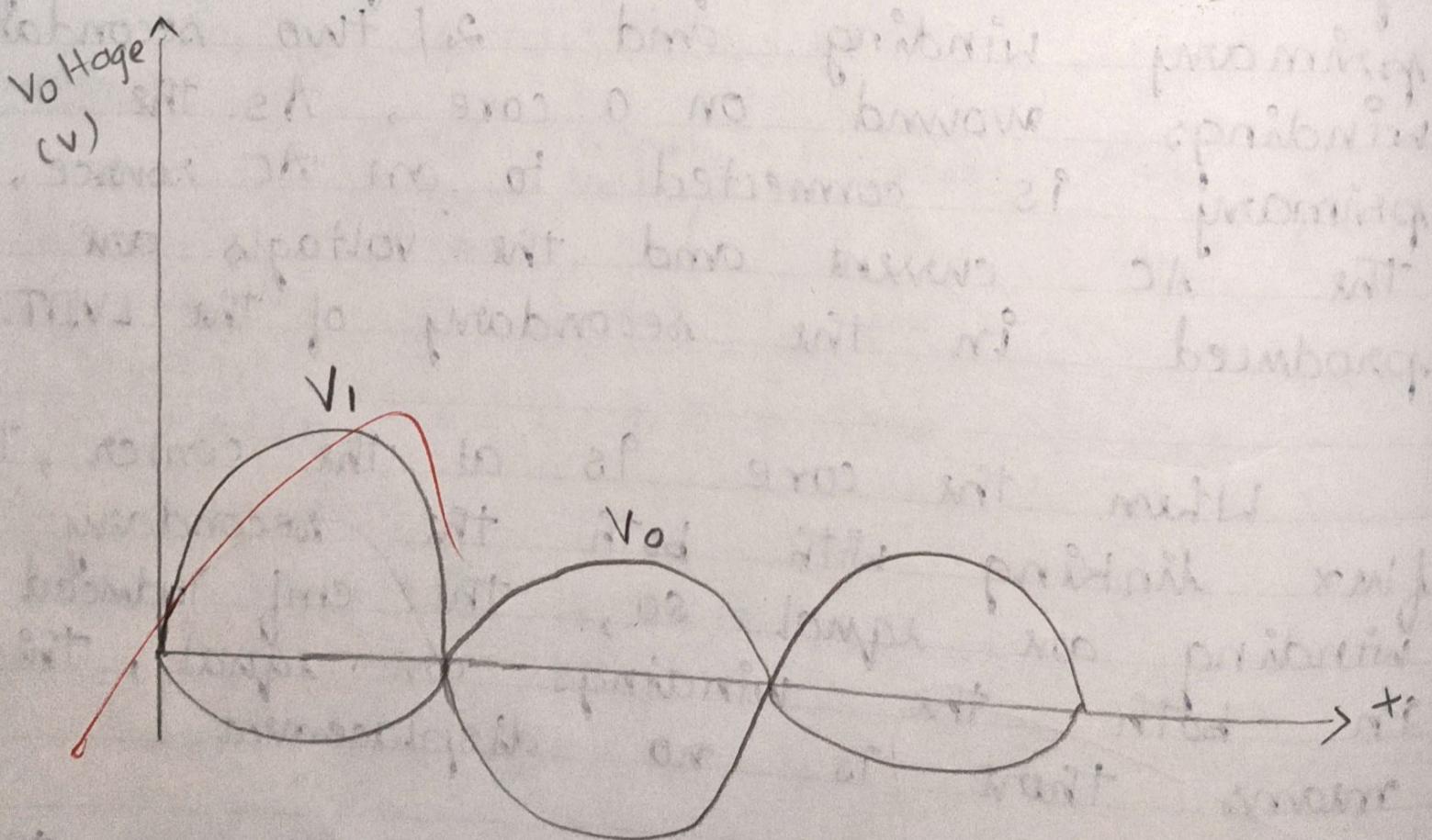
1. Connections are made as per the circuit diagram.
2. Set the number of turns, supplied voltage.
3. Configure the parameter.
4. Move the core to positive side and the negative side, and observe the input voltage and output voltage waveforms.
5. Plot the graphs between input and output voltage.

MODEL GRAPH :

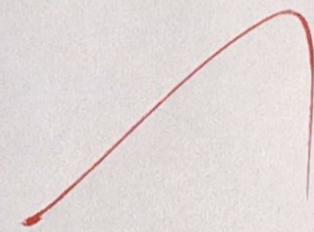
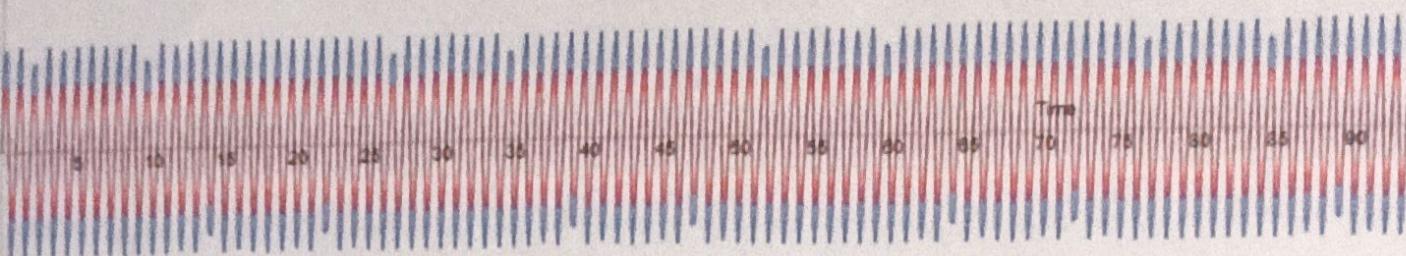
Positive Displacement :



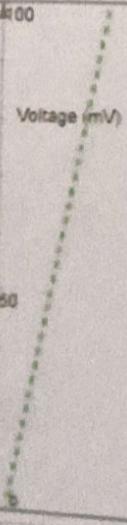
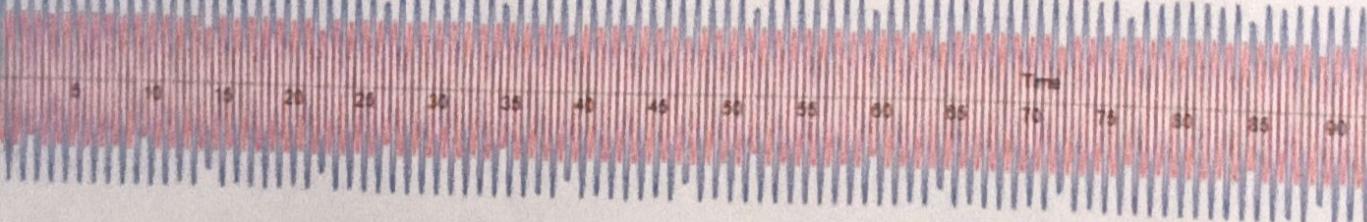
Negative Displacement :



Voltage

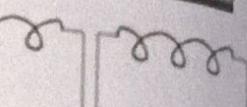
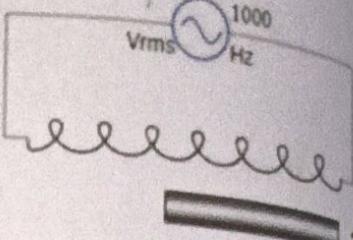


Voltage



Diagram

7 Vrms 1000 Hz



Displacement: 10 mm

Vout

No. of Turns:

1500

Supply voltage (Vrms): 7

Supply frequency(Hz): 1000

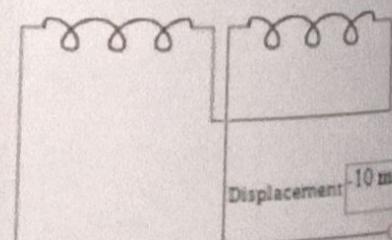
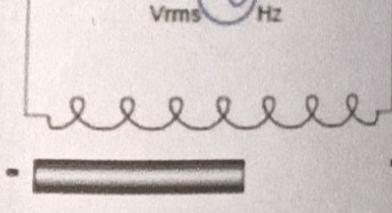
Configure

Reload

Formula

Diagram

7 Vrms 1000 Hz



Displacement: 10 mm

Vout

No. of Turns:

1500

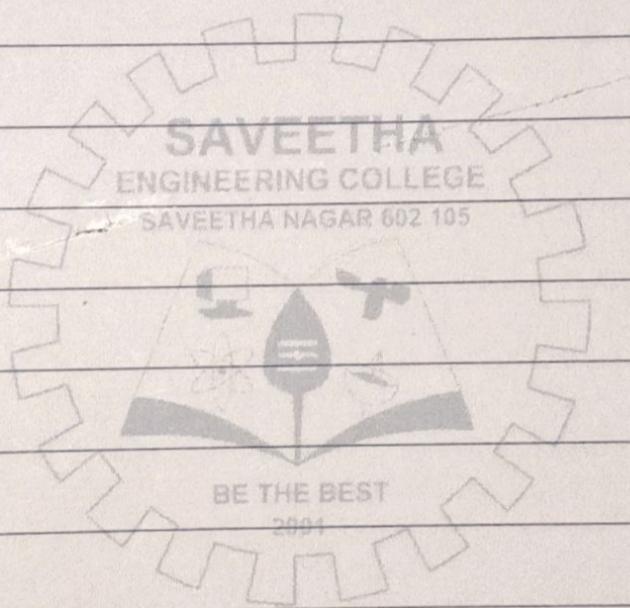
Supply voltage (Vrms): 7

Supply frequency(Hz): 1000

Configure

Reload

Formula



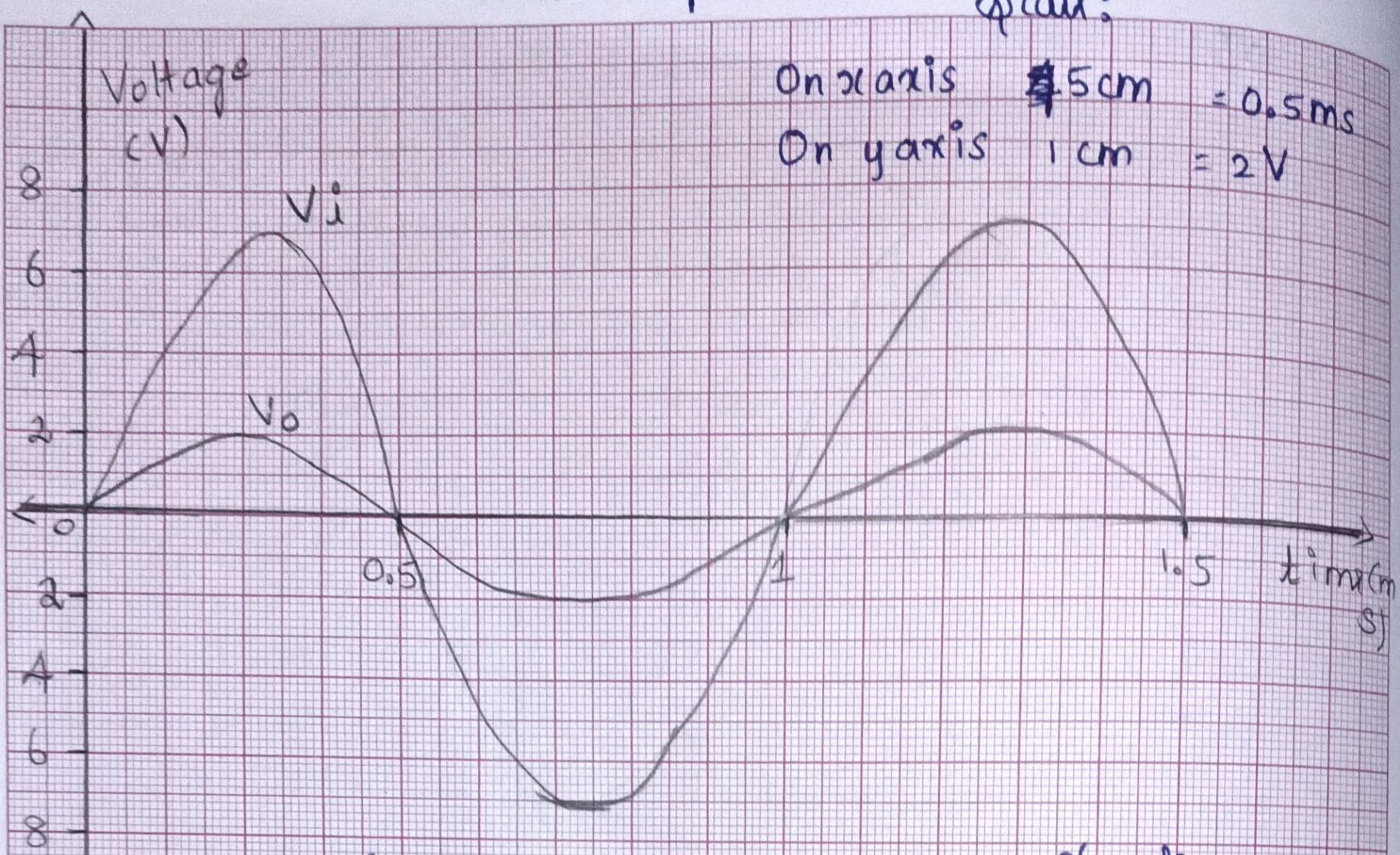
~~Ques.~~ ~~RESULT :~~

The relation between core displacement and output voltage is simulated successfully.

Positive Displacement

$\phi_{cal}:$

$$\begin{aligned} \text{On x axis } 5\text{ cm} &= 0.5\text{ ms} \\ \text{On y axis } 1\text{ cm} &= 2\text{ V} \end{aligned}$$



Negative Displacement

$\phi_{cal}:$

$$\begin{aligned} \text{On x axis } 5\text{ cm} &= 0.5\text{ ms} \\ \text{On y axis } 1\text{ cm} &= 2\text{ V} \end{aligned}$$

