

Practical No. 2: Demonstration of Mutually induced EMF by using single-phase transformers.

I Practical Significance:

In industries measurements of mutually induced emf with utmost accuracy and precision is a prime requirement. Such kind of measurements are possible using measuring instruments like voltmeter, ammeter etc. In this practical we use voltmeter, ammeter to measure the mutually induced emf.

II Industry/Employer Expected Outcome(s)

Use electrical equipment efficiently for different electronic engineering application.

III Course Level Learning Outcome(s)

Interpret the magnetic field parameters for the particular magnetic circuits.

IV Laboratory Learning Outcome(s)

LLO Use Faraday's law of electro-magnetic induction.

LLO Observe mutual induced emf in transformer

V Relevant Affective Domain related outcome(s)

Follow safety electrical rules for safe practices.

VI Relevant Theoretical Background (With diagrams if required)

Faraday's first law: when the flux linking the conductor or coil changes an emf is induced in it.

Faraday's second law: the magnitude of induced emf in a coil is directly proportional to the rate of change of flux linkages.

Flux linkages: the product of number of turns (N) of the coil and magnetic flux (Φ) linking the coil is called flux linkages

$$\text{Flux linkages} = N * \Phi$$

$$\text{Induced emf} = N \frac{d\Phi}{dt}$$

Where

N= no. of turns on coil

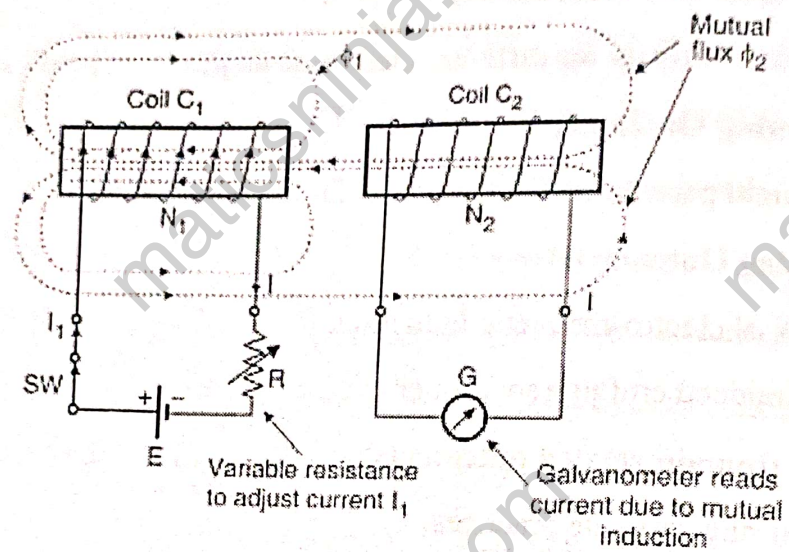
$$\frac{d\Phi}{dt} = \text{rate of change of flux linkages}$$

Statically induced emf: the emf generated due to the conductors or coil remain stationary and the flux linking these conductor is changed is called statically induced emf

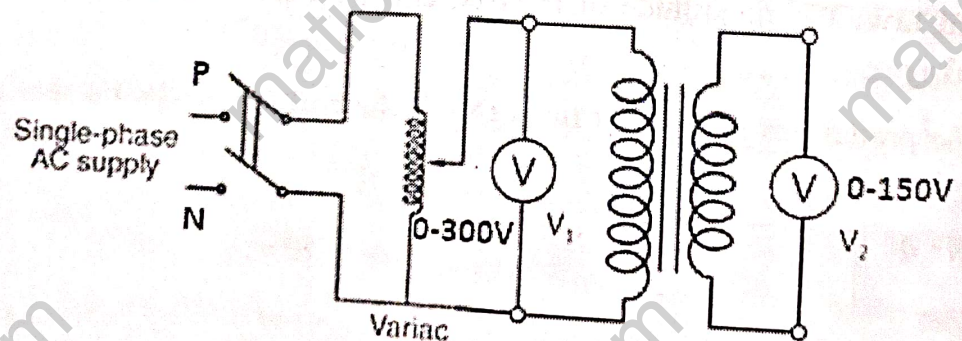
Statically induced emf divided as self-induced emf and mutually induced emf.

Self induced emf: The emf induced in a coil due to the change of its own flux linked with it is called self induced emf.

Mutually induced emf: the emf induced in a coil due to the changing current in the neighboring coil is called mutually induced emf.



VII Actual Circuit diagram used in laboratory with equipment Specifications:



VIII Required Resources/apparatus/equipment with specification:

S. No.	Name of Resource	Suggested Broad Specification	Quantity
1	Voltmeter	0-300 V AC	1
2	Voltmeter	0-1500 V AC	1
3	Single phase Transformer	1 kVA 230/115 V single phase transformer.	1
4	Single phase autotransformer	1 kVA, 0-270V, 10Amp	1

IX Precautions to be followed:

1. Avoid loose connections.
2. Don't touch wire with wet hands.

X Procedure

1. Connect the circuit as shown in the diagram.
2. By using autotransformer apply voltage to the primary winding of the transformer.
3. Observe the readings of primary winding and secondary winding.

XI Required Resources/apparatus/equipment with specification:

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5			

XII Actual Procedure followed:

1. Connect the circuit as shown in the diagram
2. By using auto transformers apply voltage to Primary winding of the transformer
3. observe the readings of primary winding and secondary winding

XIII Observation table

Sr. No.	Primary Voltage (V_p)	Secondary Voltage (V_s)
1	3v	
2	5v	6v
3	7v	10v
		14v

XIV Result(s)

The primary voltage of transformer induced by secondary winding of transformer

XV Interpretation of results

According to mutual induction the primary side of winding is excited when the secondary side winding voltage get induced.

XVI Conclusion and recommendation

Hence this practical on we studied mutually induced EMF. By using single phase transformer

XVII Practical related questions (Provide space for answers)

1. Define statically induced emf.
2. Define self induced emf. Give one example of self induced emf
3. Define mutually induced emf. Give one example of mutually induced emf.

Elements of Electrical Engineering (312315)

1. Statically induced EMF is defined as the EMF induced due to the changing flux associated with due to changing in current flowing through it induced EMF.
2. Self induced EMF is defined as the EMF induced in a coil due to changing flux linkage ~~and due to~~ changing with the coil as per the Faraday's this phenomenon is called as self induced EMF.

e.g. A coil of wire with a changing current.

3. If the flux produced by 1 coil get link with another and due to the change in this flux produces by the coil & if their induced EMF in second coil the such as EMF is known as mutual induced EMF.

e.g. transformer.

XVIII References/Suggestions for further reading:

1. www.electrical4u.com
2. www.howstuffworks.com
3. www.electricaltechnology.org