Practical No. 1: Demonstration of Faraday's law of electro-magnetic induction for statically and dynamically induced emf

I Practical Significance:

In industries measurements of static and dynamic 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 static 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 1 Use Faraday's law of electro-magnetic induction.

LLO 2 Classify types of induced emf.

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

Flux linkages = N* Φ

Induced emf a $N\frac{d\emptyset}{dt}$

Where

N= no. of turns on coil

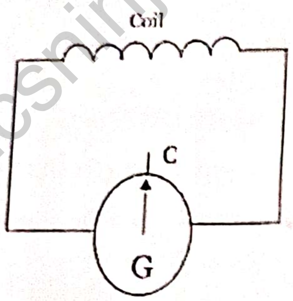
$\frac{d\emptyset}{dt}$ = rate of change of flux linkages

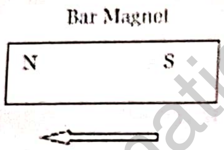
Statically induced emf: the emf generated due to the conductors or coil remain stationary and the flux linking these conductor is changed is called statically induced emf

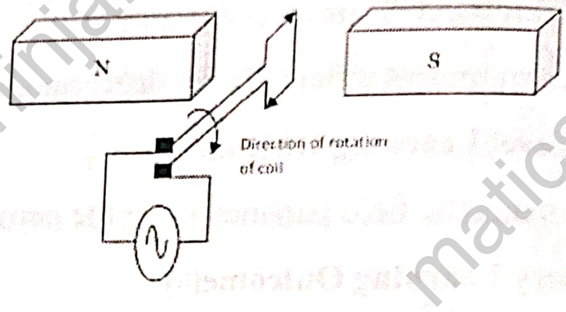
Statically induced emf divided as self-induced emf and mutually induced emf.

Dynamically induced emf: The emf generated due to motion of the conductor in stationary mag field or by the motion of the magnetic field and the conductor is stationary is called as dynami induced emf.

VII Actual Circuit diagram used in laboratory with equipment Specifications:







Circuit Diagram:

VIII Required Resources/apparatus/equipment with specification:

S. No.	Name of Resource	Suggested Broad Specification	Quanti
1	Bar magnet	Bar magnet of known polarity	1 No.
2	Galvanometer	Suitable range	1 No.
3	Inductive coil	Any suitable coil having large number of turns	1 No.

IX Precautions to be followed:

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

X Procedure

1. Connect two ends of the coil to the Galvanometer.
2. Take a bar magnet of known polarity.
3. Move the bar magnet in the coil as per the sequence given in observation table.
4. Observe the deflection of Galvanometer.

XI Required Resources/apparatus/equipment with specification:

S. No.	Name of Resource	Suggested Broad Specification	Quantity
1	Bar magnet	Bar magnet of known Polarity	1 No
2	Galvanometer	Suitable range	1 No
3	Inductive coil	Any suitable coil having large no. of turns	1 No

XII Actual Procedure Followed:

1. Connect two ends of the coil to the galvanom-meter.
2. take a bar magnet of known polarity.
3. move the bar magnet in the coil as per the sequence given in observation table.
4. observe the deflection of galvanometer.

XIII Observation table for statically induced emf

S.N.	Movement of Bar Magnet	Movement of the Magnet	Deflection of Galvanometer connected across coil	
			Forward / Reverse	Less/ More
1	Towards the coil	Slow	Forward	Less
2	Towards the coil	Fast	forward	More
3	Away from the coil	Slow	Reverse	Less
4	Away from the coil	Fast	Reverse	More

Observation table for dynamically induced emf

S.N.	Position of the Magnet	Movement of the Magnet	Deflection of Galvanometer	
			Forward / Reverse	Less/ More
1	N- Pole towards the coil	Slow	forword	Less
2	N- Pole towards the coil	Fast	forword	more
3	S- Pole towards the coil	Slow	forword	Less
4	S- Pole towards the coil	Fast	forword	more

XIV Result(s)

Hence in this practical definestrade of faraday low of electro magnetic motion for statically and dynomically indued

XV Interpretation of results

when n pole towards the coil slowly then deflection of galvanometer conected across the point in forword direction

XVI Conclusion and recommendation

from in this Practical conclusion that faraday's low of electro magnetic motion for statically and dynomically indued.

XVII Practical related questions (Provide space for answers)

1. Define magnetic flux.
2. Define flux linkages.
3. State Faraday's laws of electromagnetic induction.
4. State Lenz's law.
5. State Fleming's Right Hand Rule

1. The magnetic flux defined as the total number of line of force in magnetic field it is ~~denote~~ denoted by Ø and unit measured in weber.

2. flux linkage is amount of magnetic field that passes through coil of wire.

3. Faraday's First Low
Statement :- The first low State that when cable the magenetic line of force (flux line linking with a conductor or coil change and EMF in induse in coil or conductior)

Faraday's second low
Statement :- The magnetic of the indual element is directly propessionly to the rate of change of flux linkage.

• flux linkage = No of turn × fulx
Mathematicaly exprecation indual EMF given by

$$e = N \frac{d\phi}{dt}$$

4. Statement :- It is state induas EMF will always oppose the cause behind it's production

that means

$$e = -N \frac{d\phi}{dt}$$

Negative sign indicate that's induas EMF oppose this cause producing it.

XVIII References/Suggestions for further reading:

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

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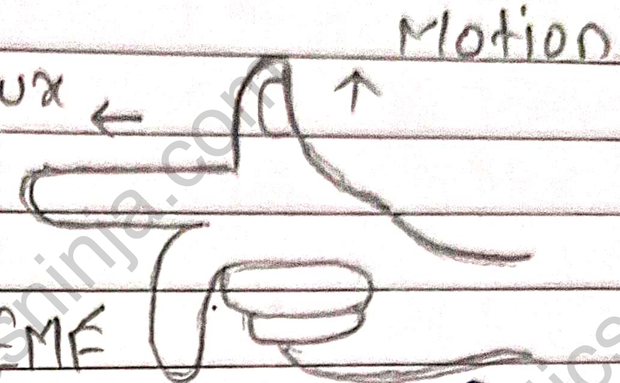

Good

Let the thumb and first two fingers of the right hand be arrang in right angle with each other as shown in fig ⓐ

- The first ~~figure~~ finger is indicate the direction of flux and the out streathed of conductor motion

- the second finger indicate the direction of induas EMF or current

This rule is used in generated.