

UNIT 3
Electromagnetic Induction

13/08/2020 – Class 16

Assignment Answer


Sl. No	Experimental procedure	Observation (Galvanometer needle)	
		Deflects/ does not deflect	Direction to the left/ to the right
1	The magnet is stationary near the solenoid	<i>Does not deflect</i>	
2	North pole of the magnet is moved into the solenoid	<i>Deflects</i>	<i>To the left</i>
3	The magnet is stationary inside the solenoid	<i>Does not deflect</i>	
4	The magnet is moved out of the solenoid.	<i>Deflects</i>	<i>To the right</i>
5	The south pole of the magnet is moved into the solenoid	<i>Deflects</i>	<i>To the right</i>
6	Magnet and solenoid are moved in the same direction at the same speed	<i>Does not deflect</i>	
7	The solenoid is moved keeping the magnet stationary	<i>Deflects</i>	<i>To the left or right depends on the polarity of the magnet.</i>


Activity 1

Discussion

- Who was the first one to generate electricity from the magnetic field? **Michel Faraday.**
- Who is known as the father of electricity? **Michel Faraday.**
- Name the phenomenon of producing electricity in a coil due to the change in magnetic flux linked with the coil? **Electromagnetic Induction.**
- The current induced due to electromagnetic induction is called.....? **Induced current.**
- The voltage induced due to electromagnetic induction is called.....? **Induced emf.**

What are the factors affecting the induced emf?

Activity	Observation	Inference
Insert a stronger magnet into the solenoid. 	Galvanometer needle deflected more.	More current /emf is produced in the solenoid.

<p>Insert a weaker magnet into the solenoid.</p> 	<p>Galvanometer needle is deflected less.</p>	<p>Current / emf produced in the solenoid is less.</p>
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Discussion



- Why the galvanometer needle is deflected in the above experiments? **Current / emf is produced in the solenoid.**
- In which situation more emf is produced in the solenoid? **When stronger magnet is inserted into the solenoid.**
- Which is the factor that influence the induced emf produced in a solenoid? **Strength of the magnet.**

Inference

When the strength of the magnet is increased the induced emf produced in the solenoid is also increased.

Activity 2

Connect solenoids having different number of turns to the galvanometers.

Activity	Observation	Inference
<p>Insert the magnet into the solenoid, having more turns.</p> 	<p>Galvanometer needle deflected more.</p>	<p>More current / emf is produced in the solenoid.</p>
<p>Insert the magnet into the solenoid, having less turns.</p> 	<p>Galvanometer needle is deflected less.</p>	<p>Current / emf produced in the solenoid is less.</p>

Discussion

- Is the magnet used for the above activities are same? **Yes**
- Is the emf produced in the solenoids are equal? **No**
- In which solenoid, more emf is produced? **Solenoid having more turns.**



- Which is the factor that influence the induced emf produced in a solenoid? **Number of turns in the solenoid.**

Inference

When the number of turns in the solenoid is increased the induced emf produced in the solenoid is also increased.

Activity 3

Connect a solenoid to a galvanometer and following activities are done.

Activity	Observation	Inference
Insert the magnet into the solenoid with lesser speed. 	Galvanometer needle is deflected less.	Current /emf produced in the solenoid is less.
Insert the magnet into the solenoid with greater speed. 	Galvanometer needle deflected more.	More current / emf is produced in the solenoid.

Discussion

- In which activity galvanometer needle is deflected more? **When the magnet is moved with greater speed.**
- In which activity more emf is produced in the solenoid? **When the magnet is moved with greater speed.**
- Which is the factor that influence the induced emf produced in a solenoid? **Speed of motion.**

Inference

When the speed of motion of the magnet / solenoid is increased the induced emf produced in the solenoid is also increased.

Consolidation

Experiment	Deflection of the galvanometer needle	
	increases	decreases
Number of turns increased	<i>Increases</i>	
Strong magnet is used	<i>Increases</i>	
Magnet/solenoid moves with greater speed.	<i>Increases</i>	



Conclusion

Factors affecting the induced emf produced in a solenoid are,

- Number of turns of the coiled conductor.
- Strength of the magnet.
- Speed of motion of the magnet or coil.

Activity 4

Connect a solenoid to a galvanometer.

Activity	Observation	Inference
<p>The galvanometer is connected to a solenoid. A magnet is moved in and out continuously in the solenoid.</p> 	<p>Galvanometer needle is deflected on both sides.</p>	<p>Direction of the current produced in the solenoid is changing.</p>
<p>The galvanometer, cell, resistor, and switch are connected in series. Circuit is switched on.</p> 	<p>Galvanometer needle deflected towards one side and stays there.</p>	<p>Current flows only in one direction through the solenoid.</p>

Discussion

- In the first activity, what is peculiarity of the deflection of galvanometer needle?
Galvanometer needle deflects on both sides.
- Why the galvanometer needle is deflected on both sides? **The direction of current is changing.**
- This type of current is called.....? **Alternating current (AC)**
- In the second activity, what is peculiarity of the deflection of galvanometer needle?
Galvanometer needle is deflected towards one side and stays there.
- Why the galvanometer needle is deflected towards one side only? **Current flows only in one direction.**
- This type of current is called.....? **Direct current (DC)**

Inference

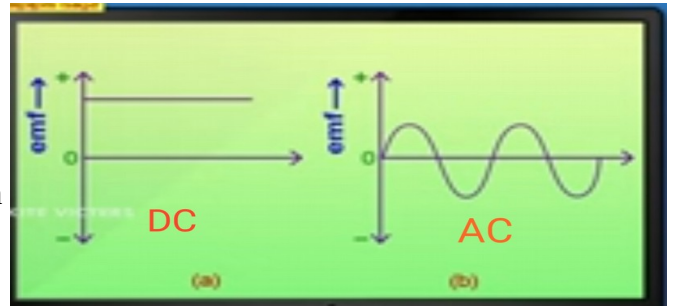
A current that flows only in one direction continuously is a direct current (DC). Current that changes direction at regular intervals of time, is an alternating current (AC).

Activity 5

Observe the graph of DC and AC

Discussion

- Which is the source of emf for the first graph? **Battery.**
- Does the direction and magnitude of emf in the first graph is changing? **No.**
- Which type of current is getting from the source of first graph? **Direct current (DC).**
- What are the peculiarities of the emf of second graph? **The magnitude and the direction of emf is changing continuously.**
- Which type of current is getting from the source of second graph? **Alternating current (AC).**



Assignment

- a) Draw the complete circuit of the experiment done in class room, to produce electric current using the components shown. 1) bar magnet, 2) Solenoid, 3) Galvanometer
- b) Which phenomenon causes the production of electricity through the circuit?
- c) Define this phenomenon?
- d) Write three factors that are helpful to increase the amount of electric current in this experiment?