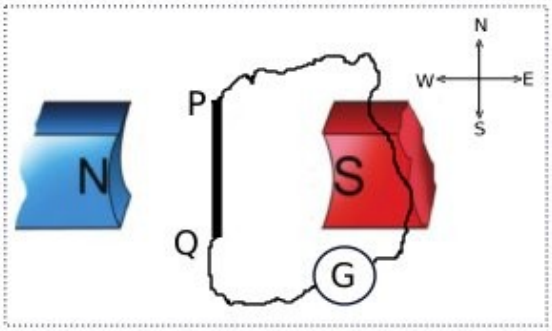
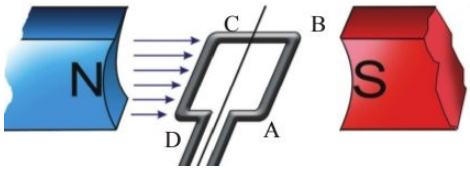
CHAPTER.3: ELECTROMAGNETIC INDUCTION: SELF ASSESSMENT TOOL

1. It was Michael Faraday who generated electric current from magnetic field.
a. Name the phenomenon related to this?
b. List out the materials required for the experimentation of this?
c. Suggest three methods to get better result of this experiment.
2. Name the law used to find direction of induced current.
3. According to Fleming's right hand rule, which are the directions to which forefinger and thumb are to be stretched?
4. See the figure. Two magnetic poles areplaced along East – West direction and a conductor PQ is in between the poles along north – south direction.

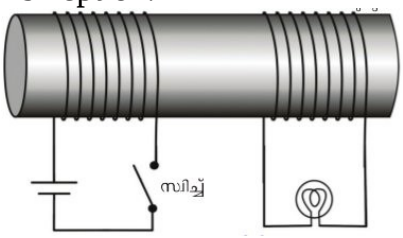


a. Identify the direction of magnetic field here?
(From east to west/ from west to east)
b. If the conductor is vertically lifted up, what will be the direction of current through the conductor PQ?
(From Q to P/ From P to Q)
c. Name the law that helped you to predict the direction of current?
d. In this arrangement, identify the device marked G.
5.a. Name the device that can produce continuous current using electromagnetic induction.
b. What are its major parts? .
c. Identify energy conversion taking place in this device.
6. It is pictured the location of a rotating armature at a particular instant.



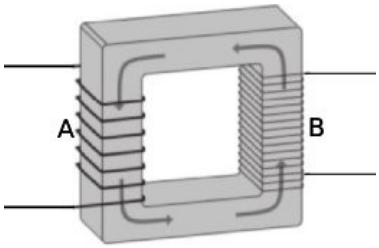
a. In this position, magnetic flux passing through the plane of the armature is ..... (minimum/ maximum)
b. "This is the position at which maximum current is induced in the armature." Comment to this statement.
c. If the rotation of the armature is supposed to start from the location seen in the picture, draw the graph of induced current.
d. If speed of armature is increased keeping strength of the magnet remains constant, which of the following in respect of induced current is correct?
(Only frequency increases /Increase both frequency and intensity./ no any change in frequency and intensity)
7. What is the frequency of AC distributed in our country?
8. Explain rotor and stator in respect of an electric generator?
9.In a power generator, which are used as *rotor* and *stator*?
10. What is the benefit of using armature as stator?
11. Usually armature is not used as *rotor* in power generators. Why?
12.Electromagnets are used in power generator as field magnet. What are the benefits of this?
13. Permanent magnets are not used in power generators. Why?
14. Name the device used for providing DC for field magnet in power generators?
15. What is the structural difference between single phase generator and three phase generator?
16. In a three phase generator, the maximum current from each coil is equal and phase difference of current between each coil is same. How is it made possible?
17. Some hints related to a device is given.
* Sound is converted into electrical energy. * Voice coil is one of its major parts.
a. Identify the device.
b. What is its working principle?
c. Briefly explain its working.
18. The electric signal (audio signal) obtained from a microphone is sent to the loud speaker only after the amplification. Why?

19. See the picture. The bulb in the arrangement doesn't glow if the switch is kept on.



a. "The bulb doesn't glow because of the absence magnetic flux around the coil." Comment to this statement.
b. Suggest a method to glow the bulb continuously.
c. Which is the phenomenon related to this action?
d. Name a device where this phenomenon is made in use.
e. What is the use of this device?

20.It is given the figure of a step down transformer.



a. What is the principle of transformer?
b. Identify primary and secondary coil of the transformer given. Justify your answer.
c. If induced voltage in <u>one turn</u> of the secondary is 2V, the voltage in one turn of the primary will be .....
(2 V, more than 2 V , less than 2 V)

21.What are the two major structural differences between step up and step down transformer?

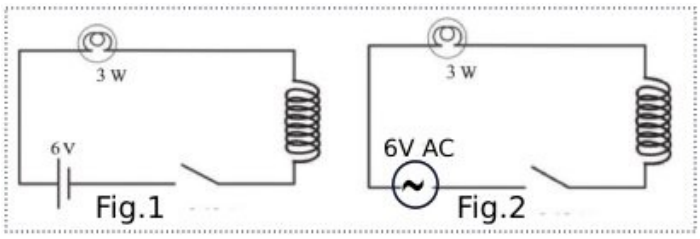
22. The number of turns in primary and secondary coils of an ideal transformer are 5000 & 250 respectively. If primary voltage is 120 V and current in the primary is 0.1 A, find voltage, current and power in the secondary.

23. In a transformer, the voltage & current are in ..... proportion and number of turns & voltage is in ..... proportion.

24. Write down the relation between number of turns, voltage and current in primary and secondary coils of a transformer.

25.If 10 V from a battery is applied to the primary of a step up transformer, the output voltage will be .....
a. 10 V b. Greater than 10 V c. Less than 10V. d. Zero.

26.See the circuits given.



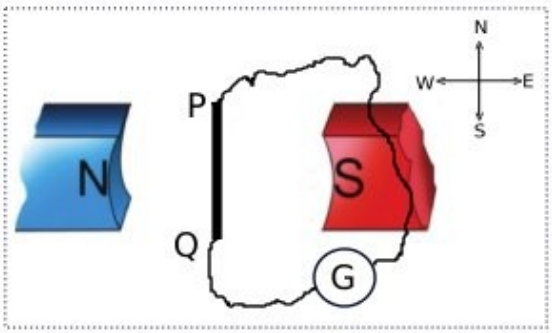
a. What difference do you see in current used in each circuit?
b. Of the two bulbs, which will glow more brightly? Justify you answer.
c. If a soft iron core is inserted into the coils, ...
(There will not be any change in the brightness in circuits.1&2/ There will be change in brightness in both circuits/ Brightness will be changed in circuit.2 only)

27. What is inductor? What is its use?
28. Inductors are not used in DC circuits. Why?
29. Current can be regulated with resistor and inductor. Compare its features.

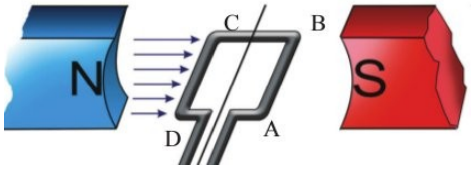
Ebrahim.V .A
GHSS S. Ezhippuram.
Phone:9495676772

3: ELECTROMAGNETIC INDUCTION: SELF ASSESSMENT TOOL WITH KEYS

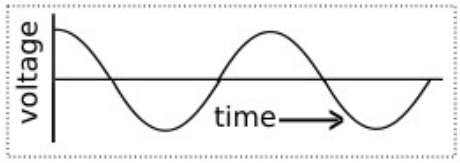
1. It was Michael Faraday who generated electric current from magnetic field.
a. Name the phenomenon related to this?
b. List out the materials required for the experimentation of this?
c. Suggest three methods to get better result of this experiment.
Ans.a. Electromagnetic induction. b. Bar magnet, coil and galvanometer.
c. Use powerful magnet, increase number of turns of the coil, Increase speed of the movement of magnet/coil.
2. Name the law used to find direction of induced current. **Ans**. Fleming's right hand rule.
3. According to Fleming's right hand rule, which are the directions to which forefinger and thumb are to be stretched?
Ans. Forefinger – towards direction of magnetic field.
Thumb – direction of movement of the conductor.
4. See the figure. Two magnetic poles areplaced along East – West direction and a conductor PQ is in between the poles along north – south direction.



a. Identify the direction of magnetic field here?
(From east to west/ from west to east)
b. If the conductor is vertically lifted up, what will be the direction of current through the conductor PQ?
(From Q to P/ From P to Q)
c. Name the law that helped you to predict the direction of current?
d. In this arrangement, identify the device marked G.
Ans. a. From west to east (Because it is from magnetic north pole to magnetic south pole)
b. From Q to P. (From south to north direction) c. Fleming's right hand rule. d. Galvanometer.
5.a. Name the device that can produce continuous current using electromagnetic induction.
b. What are its major parts? c. Identify energy conversion taking place in this device.
Ans. a. Electric generator b. Armature, field magnet, slip rings and brushes.
c. Mechanical Energy into electrical energy.
6. It is pictured the location of a rotating armature at a particular instant.

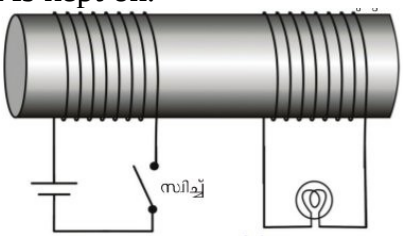


a. In this position, magnetic flux passing through the plane of the armature is ..... (minimum/ maximum)
b. "This is the position at which maximum current is induced in the armature." Comment to this statement.
c. If the rotation of the armature is supposed to start from the location seen in the picture, draw the graph of induced current.
d. If speed of armature is increased keeping strength of the magnet remains constant, which of the following in respect of induced current is correct?
(Only frequency increases /Increase both frequency and intensity./ no any change in frequency and intensity)
Ans. a. Minimum.
b. The statement is correct. Because it is the situation of rate of change of magnetic flux is maximum.
d. Increase both frequency and intensity.
c.

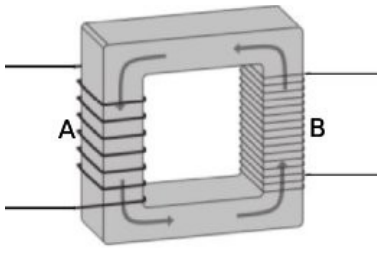


7. What is the frequency of AC distributed in our country?
Ans. a. 50 Hz
8. Explain rotor and stator in respect of an electric generator?
Ans. For generating current in a generator either armature or field magnet is to be rotated. The rotating part of generator is *rotor* and static (stationary) part is *stator*.
9.In a power generator, which are used as *rotor* and *stator*?
Ans. In a power generator field magnet is used as *rotor* and armature as *stator*.

10. What is the benefit of using armature as stator?
Ans. By doing so, slip rings and brushes can be avoided thereby avoiding electric spark.
11. Usually armature is not used as *rotor* in power generators. Why?
Ans. The armature of power generator is heavy and hence it is difficult to rotate.
12.Electromagnets are used in power generator as field magnet. What are the benefits of this?
Ans. i.The strength of electromagnet doesn't decrease with use.
ii. Can make powerful electromagnet as our need. iii. Strength of electromagnet can be adjusted.
13. Permanent magnets are not used in power generators. Why?
Ans. * Permanent magnets having sufficient strength are not available.
* The strength of permanent magnet decreases gradually with use.
* Strength of permanent magnet cannot be regulated.
14. Name the device used for providing DC for field magnet in power generators?
Ans. Auxiliary DC generator called exciter. Big batteries are also used for this purpose.
15. What is the structural difference between single phase generator and three phase generator?
Ans. In single phase generator, one armature is arranged in between the poles of the field magnet.
But in three phase generator, three armatures are arranged around the field magnet at an angular separation of 120°.
16. In a three phase generator, the maximum current from each coil is equal and phase difference of current between each coil is same. How is it made possible?
Ans. i. Since the three armatures are identical, maximum and minimum current obtained from each coil is same.
ii. The angular separation between each coil is same and is 120°. So the phase difference between the induced currents are also same.
17. Some hints related to a device is given.
* Sound is converted into electrical energy. * Voice coil is one of its major parts.
a. Identify the device. b. What is its working principle? c. Briefly explain its working.
Ans.a. Moving coil microphone. b. Electromagnetic induction.
c. A field magnet, voice coil and a diaphragm are the major parts of a moving coil microphone. The voice coil is arranged in between the poles of field magnet so as to vibrate freely. It is also connected to the diaphragm.
When sound is produced in front of the diaphragm, the diaphragm and voice coil are vibrated. This leads to the generation of electric signal (audio signal) in the voice coil in accordance with the sound as the coil is vibrated in magnetic field.
18. The electric signal (audio signal) obtained from a microphone is sent to the loud speaker only after the amplification. Why?
Ans. Because the audio signal obtained from a microphone is too weak.
19. See the picture. The bulb in the arrangement doesn't glow if the switch is kept on.

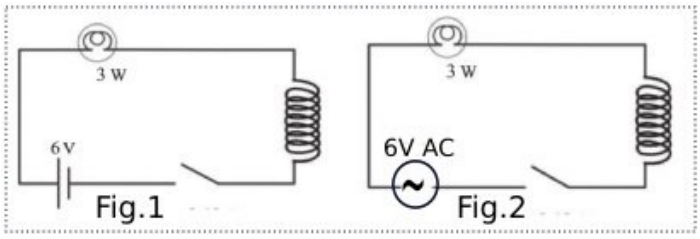


a. "The bulb doesn't glow because of the absence magnetic flux around the coil." Comment to this statement.
b. Suggest a method to glow the bulb continuously.
c. Which is the phenomenon related to this action?
d. Name a device where this phenomenon is made in use.
e. What is the use of this device?
Ans.a.The statement is wrong. The bulb doesn't glow continuously as there is no <u>change</u> in magnetic flux. b.Pass AC through primary coil. c. Mutual induction. d. Transformer.
e. For raising and lowering voltage of AC .
20.It is given the figure of a step down transformer.



a. What is the principle of transformer?
b. Identify primary and secondary coil of the transformer given. Justify your answer.
c. If induced voltage in <u>one turn</u> of the secondary is 2V, the voltage in one turn of the primary will be ..... (2 V, more than 2 V , less than 2 V)

Ans.a. Mutual induction.
b. i.B is the primary coil.
ii. Reasons: More turns are there in B. Thin wire is used there.
c. 2 V (Because voltage in each turn of primary and secondary coil will be same whether it is step up or step down transformer)
21.What are the two major structural differences between step up and step down transformer?
Ans.a. In step down transformer, the number of turns in the primary is greater than that in the secondary. In addition to this, comparatively thick winding wire is used in the secondary.
But in step up transformer, the number of turns in the primary is less than that in the secondary. And comparatively thin winding wire is used in the secondary.
22. The number of turns in primary and secondary coils of an ideal transformer are 5000 & 250 respectively. If primary voltage is 120 V and current in the primary is 0.1 A, find voltage, current and power in the secondary.
Ans. Np = 5000 Ns = 250 Vp = 120 V Ip = 0.1 A
Vs/Vp = Ns/Np Then Vs/120 = 250/5000 Or Vs x 5000 = 120x250 **Vs = 6 V**
Ip/Is = Vs/Vp $0.1/I_s = 6/120$ $6 \times I_s = 0.1 \times 120$ $I_s = 0.1 \times 120/6 =$ **2 A**
Power, Ps = VsxIs = 6x2 = 12 W
23. In a transformer, the voltage & current are in ..... proportion and number of turns & voltage is in ..... proportion. **Ans**. a. Inverse. b. Direct.
24. Write down the relation between number of turns, voltage and current in primary and secondary coils of a transformer. **Ans**. Vs/Vp = Ns/Np = Ip/Is
25.If 10 V from a battery is applied to the primary of a step up transformer, the output voltage will be ..... a. 10 V b. Greater than 10 V c. Less than 10V. d. Zero.
Ans. Zero.
26.See the circuits given.
a. What difference do you see in current used in each circuit?
b. Of the two bulbs, which will glow more brightly? Justify you answer.
c. If a soft iron core is inserted into the coils, ... (There will not be any change in the brightness in circuits.1&2/ There will be change in brightness in both circuits/ Brightness will be changed in circuit.2 only)



Ans.a. In the first circuit, DC is used. But in the second one, AC is used.
b. In circuit.1. As the current is DC, there is no self induction in this circuit.
c. Brightness will be changed in circuit.2 only)
27. What is inductor? What is its use?
Ans. Inductors are coils used to oppose change in electric current in a circuit. It can be used to regulate AC without energy loss.
28. Inductors are not used in DC circuits. Why?
Ans. Only variable current can make self induction. Since DC is invariable current, it cannot make self induction and hence can't regulate intensity of current.
29. Current can be regulated with resistor and inductor. Compare its features.
Ans. Resistor: Can be used in AC circuit and DC circuit. There is loss of energy in the form heat when resistor is used.
Inductor: It can be used only in AC circuit. It doesn't make energy loss in the form of heat.

Ebrahim.V .A
GHSS S. Ezhippuram.
Phone:9495676772