

UNIT

3

Magnetism and Electromagnetism



TEXT BOOK EXERCISES

I. Choose the correct answer.

1. Which of the following converts electrical energy into mechanical energy.

a) motor b) battery
c) generator d) switch

Ans: a) motor

2. An electric generator converts

a) electrical energy into mechanical energy
b) mechanical energy into heat energy
c) electrical energy into electrical energy
d) mechanical energy into electrical energy.

Ans: d) mechanical energy into electrical energy.

3. The part of the AC generator that passes the current from the armature coil to the external circuit is

a) field magnet b) split rings
c) slip rings d) brushes

Ans: d) brushes

4. Transformer works on

a) AC only
b) DC only
c) both AC and DC
d) AC nor effectively than DC

Ans: a) AC only

5. The unit of magnetic flux density is

a) Weber b) weber/metre
c) weber/meter² d) weber . meter²

Ans: c.weber/meter²

II. Fill in the blanks.

1. The SI Unit of magnetic field induction is _____.

Ans: Testa

2. No force acts in a current carrying conductor when it is _____ to the magnetic field.

Ans: Parallel

3. Devices which is used to convert high alternating current to low alternating current _____.

Ans: set up transformer

4. An electric motor converts _____.

Ans: electrical energy in to mechanical energy.

5. A device for producing electric current is _____.

Ans: Generator

III. Match the following.

- | | |
|------------------------------|---------------|
| 1. Magnetic material | (a) Oersted |
| 2. Non-magnetic material | (b) iron |
| 3. Current and magnetism | (c) induction |
| 4. Electromagnetic induction | (d) wood |
| 5. Electric generator | (e) Faraday |

Ans:

1. Magnetic material (a) iron
2. Non-magnetic material (b) wood
3. Current and magnetism (c) Oersted
4. Electromagnetic induction (e) Faraday
5. Electric generator (e) induction

IV. True or False:

1. A generator converts mechanical energy into electrical energy.

Ans: True

2. Magnetic field lines always repels each other and do not intersect.

Ans: True

3. Fleming's Left hand rule is also known as Dynamo rule.

Ans: False

Fleming's Right hand rule is also known as Dynamo rule.

4. The speed of rotation of an electric motor can be increased by decreasing the area of the coil.

Ans: False,

The speed of rotation of an electric motor can be increased by increasing the area of the coil.

5. A transformer can step up direct current.

Ans: False,

A transformer can step up alternating current.

6. In a step down transformer the number turns in primary coil is greater than that of the number of turns in the secondary coil.

Ans: True

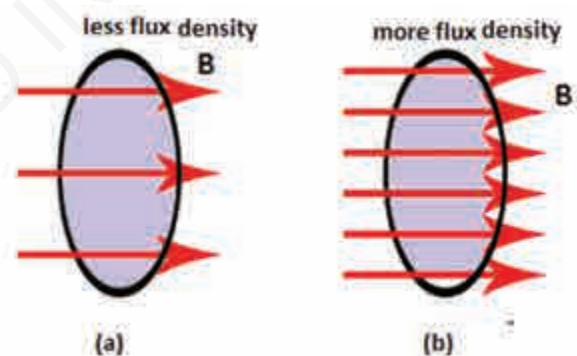
V. Answer in brief.

1. State Fleming's Left Hand Rule.

Fleming's Left hand Rule states that while stretching the three fingers of left hand in perpendicular direction with each other, if the direction of the current is denoted by middle finger of the left hand and the second finger is for direction of the magnetic field then the thumb of the left hand denotes the direction of the force or movement of the conductor.

2. Define magnetic flux density.

The number of magnetic field lines crossing unit area kept normal to the direction of field lines is called magnetic flux density. Its unit is Wb/m^2

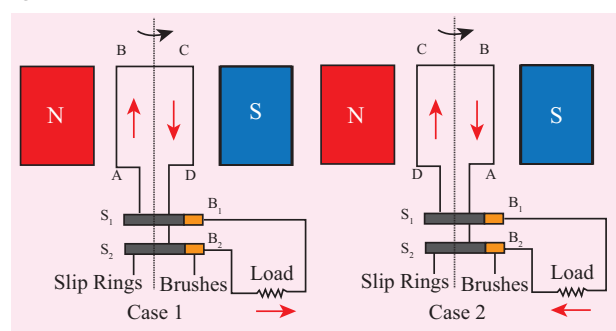


Magnetic flux density

3. List the main parts of an electric motor.

- i) Field Magnet
- ii) A rectangular coil
- iii) Commutator
- iv) Carbon brushes

4. Draw and label the diagram of an AC generator.



AC generator

5. State an important advantage of ac over dc.
 1. The AC can be carried over long distances
 2. Generating AC is easier than DC
 3. The loss of energy while distributing current in the form of AC is negligible.
 4. The AC can be easily converted in to DC
6. Differentiate step up and step down transformer.

Step Up Transformer	Step Down Transformer
1.It is used to change a low alternating voltage to high alternating voltage.	1.It is used to change a high alternating voltage to low alternating voltage.
2.The number of turns in the secondary coil is more than the number of turns in the primary coil.	2.The number of turns in the secondary coil is less than the number of turns in the primary coil.

7. A portable radio has a built in transformer so that it can work from the mains instead of batteries. Is this a step up or step down transformer?

Ans: Step down transformer.

8. Two coils A and B of insulated wire are kept close to each other. Coil A is connected to a galvanometer. While coil B is connected to a battery through a key. What would happen if
 - (i) a current is passed through coil B by plugging the key?
 - (ii) the current is stopped by removing the plug from the key?
 - i) As the key is plugged, at that instant, there is a deflection in the galvanometer due to induced emf (generation of current)
 - ii) As the key is removed there is a deflection but in the opposite direction.

9. State Faraday's laws of electromagnetic induction.

First Law:

whenever there is a change in the magnetic flux linked with a closed circuit an emf is produced.

Second Law:

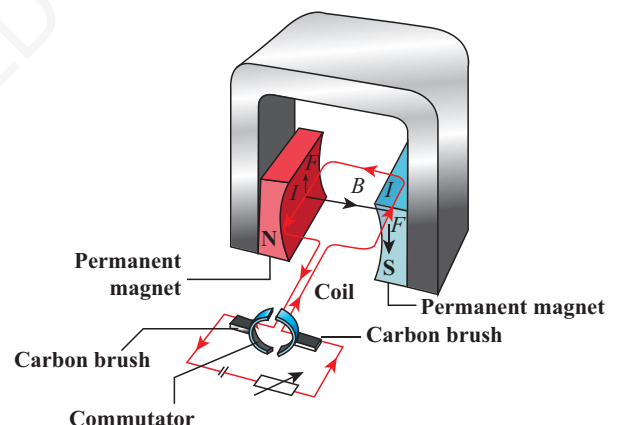
The amount of emf induced varies directly as the rate at which the flux changes.

VI. Answer in detail.

1. Explain the principle, construction and working of a dc motor.

Principle:

Whenever a current carrying conductor is placed in a magnetic field, it experiences a mechanical force.



Construction:

An electric motor, consists of a rectangular coil ABCD of insulated copper wire. The coil is placed between two poles of a field magnet such that the arm AB and CD are perpendicular to the direction of magnetic field. The ends of the coil are connected to the two halves S1 and S2 of a split ring. The inner side of these halves are insulated and attached to an axle. The external conducting edges of S1 and S2 touch two conducting stationary brushes B1 and B2, respectively.

Working:

1. DC power supply
is switched on

2. Current flows into
and out of the coil
through the carbon
brushes

3. Current in the coil
produces a magnetic
field

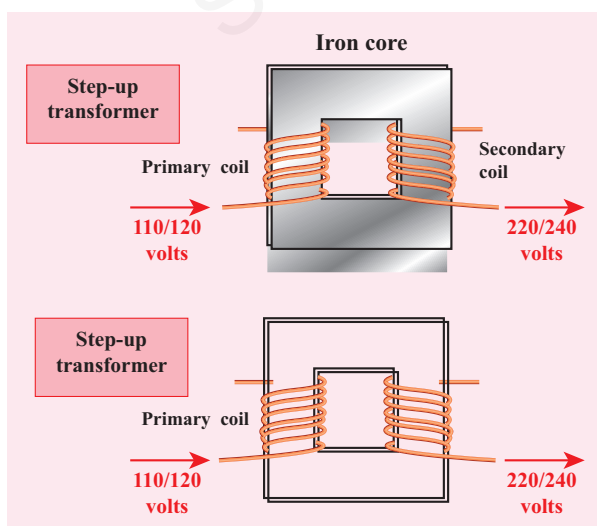
4. Magnetic fields due to
current and permanent
magnets combine to
form catapult fields

5. Magnetic forces
act on the sides of
the coil beside the
poles of the magnets

6. Magnetic forces
produce turning
effect to rotate
the coil

2. Explain two types of transformer.

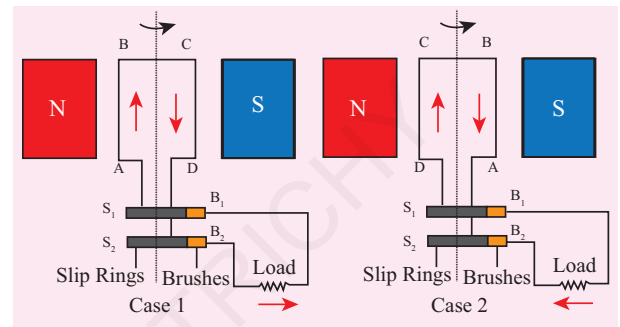
Step up transformer: The transformer used to change a low alternative voltage to a high alternating voltage is called a step up transformer. ie ($V_s > V_p$). In a step up transformer, the number of turns in the secondary coil is more than the number of turns in the primary coil ($N_s > N_p$).



Step up and Step down transformers

Step down transformer: The transformer used to change a high alternating voltage to a low alternating voltage is called a step down transformer ($V_s < V_p$). In a step down transformer, the number of turns in the secondary coils are less than the number of turns in the primary coil ($N_s < N_p$).

3. Draw a neat diagram of an AC generator.



Prepared by

Z.YASMIN,M.Sc.,B.Ed.,

B.T ASST SCIENCE

CHENNAI HIGH SCHOOL

SHARMA NAGAR, CHENNAI-39.

