EXERCISE 10(B)

Solution:
The factors on which the magnitude of force on a current carrying conductor placed in a magnetic field depends directly are as follows:
(i) On strength of magnetic field B
(ii) On current I in the conductor
(iii) On length l of conductor

Solution:
(a) Force will be zero, when current in the conductor is in the direction of magnetic field
(b) When current in conductor is normal to the magnetic field

Solution:
If the current is reversed in the conductor placed in a magnetic field, the direction of force is also reversed.

Solution:
Fleming's left hand rule: Stretch the forefinger, central finger and the thumb of your left hand mutually perpendicular to each other. If the forefinger indicates the direction of magnetic field and the central finger indicates the direction of current, then the thumb will indicate the direction of motion of conductor.

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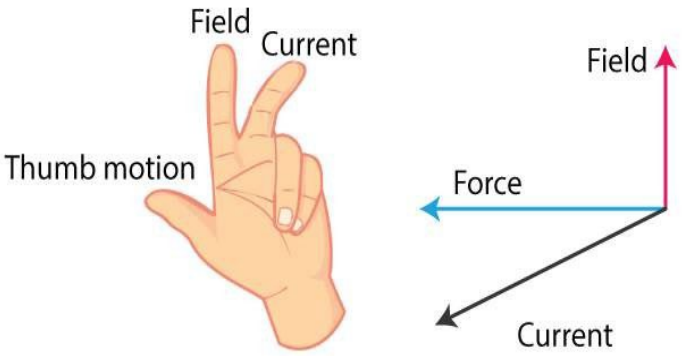
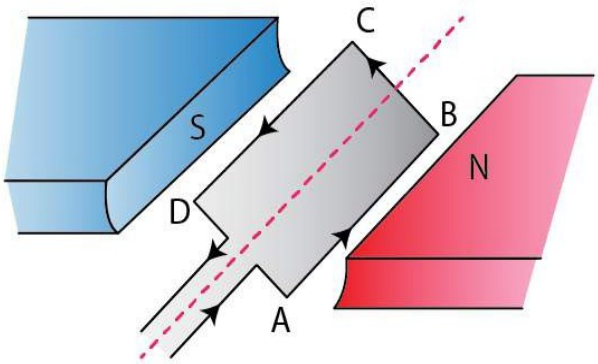


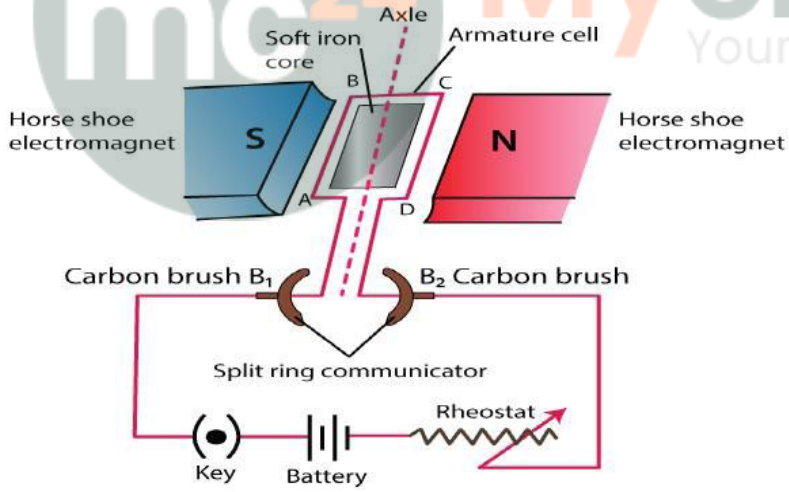
Question: 6
State the unit of magnetic field in terms of the force experienced by a current carrying conductor placed in a magnetic field.
Solution:
The unit of magnetic field in terms of the force experienced by a current carrying conductor placed in a magnetic field is Newton / ampere × meter (or $NA^{-1}m^{-1}$)

Question: 7
A flat coil ABCD is freely suspended between the pole pieces of a U-shaped permanent magnet with the plane of coil parallel to the magnetic field.
(a)What happens when a current is passed in the coil?
(b) When will coil come to rest?
(c) When will the couple acting on the coil be (i) maximum, (ii) minimum?
(d) Name an instrument which makes use of the principle stated above.
Solution:
(a) The coil experiences a torque due to which it rotates
(b) The coil will come to rest when its plane becomes normal to the magnetic field
(c) (i) When the plane of coil is parallel to the magnetic field
(ii) When the plane of coil is normal to the magnetic field
(d) The instrument which makes use of the principle is d.c. motor

Question: 8
A coil ABCD mounted on an axle is placed between the poles N and S of a permanent magnet as shown in figure



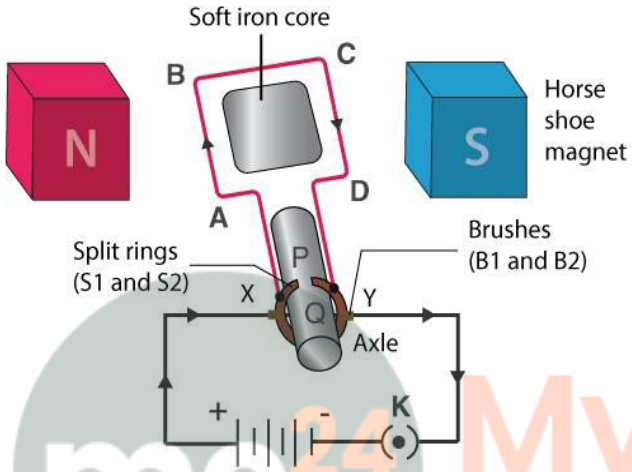
(a) In which direction will the coil begin to rotate when current is passed through the coil in direction ABCD by connecting a battery at the ends A and D of the coil?
(b)Why is a commutator necessary for the continuous rotation of coil?
(c) Complete the diagram with commutator, etc. for the flow of current in the coil.
Solution:
(a) The coil begins to rotate in anticlockwise direction
(b) The arms AB and CD get interchanged after half rotation, so the direction of torque on coil reverses. To keep the coil rotating in the same direction, a commutator is needed to reverse the direction of current in the coil after each half rotation of coil. Hence, commutator is necessary for the continuous rotation of coil.



Question: 9
What is an electric motor? State its principle.
Solution:
An electric motor is a device which converts the electrical energy into the mechanical energy.

Principle: An electric motor (dc motor) works on the principle that when an electric current is passed through a conductor placed normally in a magnetic field, a force acts on the conductor as a result of which the conductor begins to move and thus mechanical energy is obtained.

Question: 10
Draw a labelled diagram of a d.c motor showing its main parts.
Solution:



Question: 11
What energy conversion does take place during the working of a d.c motor?
Solution:
During the working of a d.c. motor electrical energy converts into mechanical energy.

Question: 12
State two ways by which the speed of rotation of an electric motor can be increased.
Solution:
The speed of rotation of an electric motor can be increased by following ways
(i) By increasing the strength of current in the coil
(ii) By increasing the number of turns in the coil

Question: 13
Name two appliances in which an electric motor is used.
Solution:
Electric motors are used in electrical gadgets like fan, washing machines, refrigerators,

computers etc.

MULTIPLE CHOICE TYPE
Question: 1
In an electric motor, the energy transformation is:
(a) From electrical to chemical
(b) From chemical to light
(c) From mechanical to electrical
(d) From electrical to mechanical
Solution:
In an electric motor, the energy transformation is from electrical to mechanical.