Page Number:196

Question 1:

Why does a compass needle get deflected when brought near a bar magnet?

Answer:

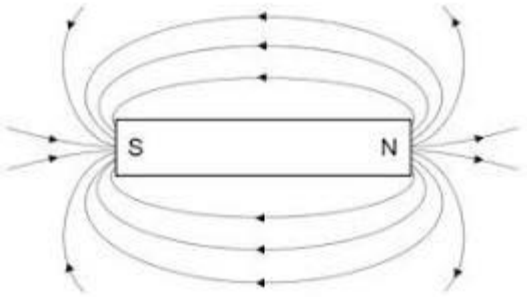
The magnetic field of the magnet exerts force on both the poles of the compass needle. The forces experienced by the two poles are equal and opposite. These two forces form a couple which deflects the compass needle.

Page Number:200

Question 1:

Draw magnetic field lines around a bar magnet.

Answer:



Question 2:

List the properties of magnetic lines of force.

Answer: Properties of magnetic lines of force :

1. The magnetic field lines originate from the north pole of a magnet and end at its south pole.
2. The magnetic field lines become closer to each other near the poles of a magnet but they are widely separated at other places.
3. Two magnetic field lines do not intersect one another.

Question 3:

Why don't two magnetic lines of force intersect each other ?

Answer:

This is due to the fact that the resultant force on a north pole at any point can be only in one direction. But if the two magnetic field lines intersect one another, then the resultant force on north pole placed at the point of intersection will be along two directions, which is not possible.

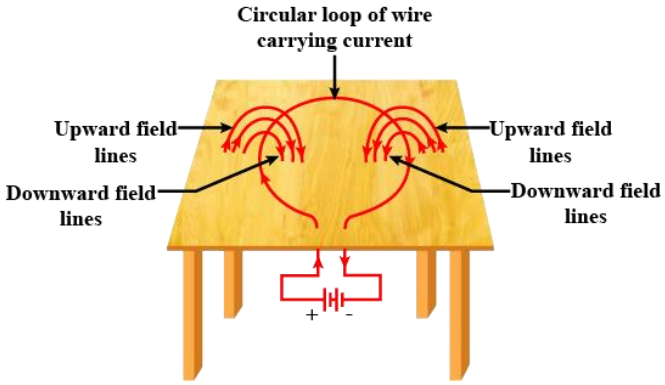
Page Number:201

Question 1:

Consider a circular loop of wire lying on the plane of the table. Let the current pass through the loop clockwise. Apply the right hand rule to find out the direction of the magnetic field inside and outside the loop.

Answer:

In the following diagram the current is flowing clockwise. If we are applying right hand thumb rule to the left side of the loop then the direction of magnetic field lines inside the loop are going into the table while outside the loop they are coming out of the table.

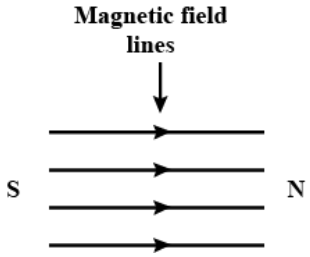


Question 2:

The magnetic field in a given region is uniform. Draw a diagram to represent it.

Answer:

Uniform magnetic field is represented by parallel magnetic field lines in same direction.



Question 3:

Choose the correct option.
The magnetic field inside a long straight solenoid-carrying current
(i) is zero
(ii) decreases as we move towards its end
(iii) increases as we move towards its end
(iv) is the same at all points

Answer: (iv) is the same at all points

Question 1:

Which of the following property of a proton can change while it moves freely in a magnetic field. (There may be more than one correct answer.)
(i) Mass
(ii) Speed
(iii) Velocity
(iv) Momentum

Answer: The correct options are (iii) velocity, (iv) momentum.

Question 2:

In Activity 12.7 how do we think the displacement of rod AB will be affected if (i) current in rod AB is increased (ii) a stronger horse-shoe magnet is used; and (iii) length of the rod AB is increased ?

Answer:

(i) When the current in the rod AB is increased, force exerted on the conductor increases, so the displacement of the rod increases.

(ii) When a stronger horse-shoe magnet is used, the magnitude of the magnetic field increases. This increases the force exerted on the rod and the displacement of the rod.

(iii) When the length of the rod AB is increased, force exerted on the conductor increases, so the displacement of the rod increases.

Question 3:

A positively-charged particle (alpha particle) projected towards west is deflected towards north by a magnetic field.
The direction of magnetic field is :
(i) towards south
(ii) towards east
(iii) downward
(iv) upward

Answer: (iv) upward

Explanation

[Here, the positively charged alpha particles are moving towards west, so the direction of current is towards east. The deflection is towards north, so the force is towards north, so, we are given that
(i) direction of current is towards west
(ii) direction of force is towards north.

Let us now hold the forefinger, middle finger and thumb of our left-hand at right angles to one another. Adjust the hand in such a way that our mid finger points towards west (in the direction of current) and thumb points towards north (in the direction of force). Now, if we

look at our forefinger, it will be pointing upward. Because the direction of forefinger gives the direction of magnetic field, therefore, the magnetic field is in the upward direction.]

Page Number:205

Question 1:

Name two safety measures commonly used in electric circuits and appliances.

Answer:

(i) Earthing and
(ii) Electric fuse.

Question 2:

An electric oven of 2 kW power rating is operated in a domestic electric circuit (220 V) that has a current rating of 5 A. What result do you expect ? Explain.

Answer:

The electric oven draws a current given by

$$I = \frac{P}{V} = \frac{2\text{ kW}}{220\text{ V}} = \frac{2000\text{ W}}{220\text{ V}} = \mathbf{9.09\ A}$$

Thus the electric oven draws current much more than the current rating 5 A. That is the circuit is overloaded. Due to excessive current, the fuse wire will blow and the circuit will break.

Question 3:

What precautions should be taken to avoid the overloading of domestic electric circuits ?

Answer:

To avoid the overloading of domestic electric circuits, the following precautions should be taken :
(i) The wires used in the circuit must be coated with good insulating materials like PVC, etc.
(ii) The circuit must be divided into different sections and a safety fuse must be used in each section.
(iii) High power appliances like air-conditioner, refrigerator, a water heater, etc. should not be used simultaneously.

Chapter End Questions

Question 1:

Which of the following correctly describes the magnetic field near a long straight wire ?
(i) the field consists of straight lines perpendicular to the wire
(ii) the field consists of straight lines parallel to the wire
(iii) the field consists of radial lines originating from the wire
(iv) the field consists of concentric circles centred on the wire

Answer: (iv) The field consists of concentric circles centred on the wire

Question 2:

At the time of short circuit, the current in the circuit
(i) reduces substantially
(ii) does not change
(iii) increases heavily
(iv) varies continuously

Answer: (iii) increases heavily

Question 3:

State whether the following statements are True or False.
(i) An electric motor converts mechanical energy into electrical energy.
(ii) An electric generator works on the principle of electromagnetic induction.
(iii) The field at the centre a long circular coil carrying current will be parallel straight lines.
(iv) A wire with a green insulation is usually the live wire of an electric supply.
Answer:

(i) False
(ii) True
(iii) True
(iv) False.

Question 4:

list two methods of producing magnetic fields

Answer: Magnetic field can be produced by

i. A permanent magnet

ii. A current carrying solenoid

Question 5:

When is the force experienced by a current-carrying conductor placed in a magnetic field largest?

Answer:

The force experienced by a current carrying conductor is largest when the directions of magnetic field and electric current are perpendicular to each other.

Question 6:

Imagine that you are sitting in a chamber with your back to one wall. An electron beam, moving horizontally from back wall towards the front wall, is deflected by a strong magnetic field to your right side. What is the direction of magnetic field?

Answer:

The direction of the magnetic field is vertically downwards. The direction of current is from the front wall to the back wall because negatively charged electrons are moving from back wall to the front wall. The direction of magnetic force is rightward. Hence, using Fleming's left hand rule, it can be concluded that the direction of magnetic field inside the chamber is downward.

Question 7:

State the rule to determine the direction of a
(i) magnetic field produced around a straight conductor carrying current.

(ii) force experienced by a current-carrying straight conductor placed in a magnetic field which is perpendicular to it.

(iii) current induced in a straight conductor moving in a magnetic field.

Answer:

(i) The direction of magnetic field produced around a straight current-carrying conductor is determined by using Maxwell's right hand thumb rule.

(ii) The direction of force experienced by a current-carrying straight conductor placed in a magnetic field is determined by Fleming's left-hand rule.

(iii) The direction of current induced in a straight conductor moving in a magnetic field is determined by Fleming's right-hand rule.

Question 8:

When does an electric short circuit occur?

Answer:

Electric short circuit occurs if the insulation of the wires used in circuit is damaged, due to which live wire and neutral wire comes in direct contact. This results in increase of current in the circuit.

Question 9:

What is the function of an earth wire? Why is it necessary to earth metallic appliances?

Answer:

The metallic body of electric appliances is connected to the earth by means of earth wire so that any leakage of electric current is transferred to the ground. This prevents any electric shock to the user. That is why earthing of the electrical appliances is necessary.