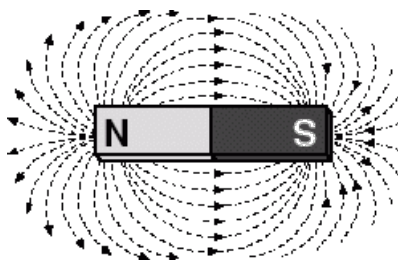


Magnetic Effects of Electric Current

110. Draw the pattern of magnetic field lines due to a bar magnet. The magnetic field lines are closed curves. Why?

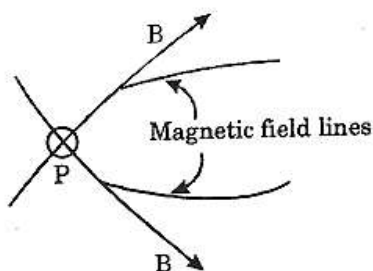
2012/2013 [2 Marks]



Inside the magnet, the direction of field lines is from its south pole to its north pole. So the magnetic field lines are closed curves.

111. Why can't two magnetic field lines cross (intersect) each other?

2011/2012/2013 [2 Marks]



If two field lines intersect each other, at the point of intersection their two tangents with two directions of the magnetic field can be drawn. Which implies that the magnetic field has two directions at the same point. This is not possible.

112. (a) Write four properties (characteristics) of magnetic lines of forces.
(b) Give two uses of magnetic compass.

2010/2011/2012/2013 [5 Marks]

- (a) (i) Field lines emerge from north pole and merge at south pole outside the magnet.
(ii) They are closed curves.
(iii) Magnetic force is greater where the field lines are crowded.
(iv) No two field lines are found to cross (intersect) each other.
(b) **Uses of magnetic compass:**
(i) A magnetic compass can be used to find direction.
(ii) It can be used to test if a substance has magnetic properties or not.

113. Draw a diagram to represent a uniform magnetic field in a given region.

2011/2013/2015/2016 [1 Mark]



114. For same current flowing through a solenoid and a straight conductor, the magnetic field produced by a solenoid is much stronger than the magnetic field produced by a straight current carrying conductor. State one reason to justify that statement.

2013/2014/2015/2016 [1 Mark]

It is because a circular coil of the solenoid multiplies the magnetic field produced.

115. A current carrying freely suspended solenoid rests in north-south direction. Justify this statement with reason.

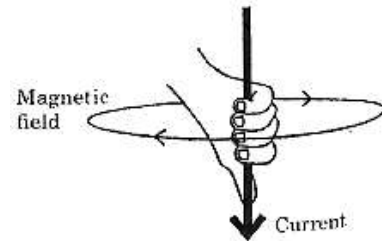
2010/2011/2013 [2 Marks]

Pattern of the magnetic field around a solenoid looks similar to that around a bar magnet. One end of the solenoid behaves as north pole while other as south pole. A current-carrying solenoid, when freely suspended, sets itself in the north-south direction, like a bar magnet.

116. State the rule for finding the direction of the magnetic field produced around a current carrying conductor.

2010/2011/2012/2015 [2 Marks]

Direction of the magnetic field is determined by the right-hand thumb rule. It states that if we hold a current carrying conductor in our right hand such that the thumb points towards the direction of current then the wrapped fingers will give the direction of the magnetic field.



117. (a) Describe an activity to demonstrate the pattern of magnetic field lines around a straight conductor carrying current.
(b) State the rule to find the direction of magnetic field associated with a current carrying conductor.
(c) What is the shape of a current carrying conductor whose magnetic field patterns resembles that of a bar magnet?

2010/2011/2012/2013 [5 Marks]

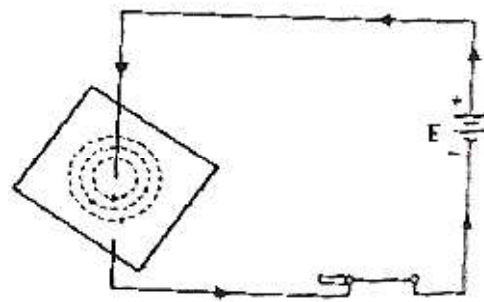
(a) A piece of cardboard is taken. A wire is inserted passing through its centre such that the wire is perpendicular to the plane of the cardboard. Some iron filings are sprinkled on the cardboard.

When current is passed through the wire, the iron filings arrange themselves in concentric circles around the wire as shown in the figure given alongside.

These concentric circles on the cardboard represent the field lines of the magnetic field produced due to the current flowing through the conductor.

(b) Direction of the magnetic field is determined by the right-hand thumb rule. It states that if we hold a current-carrying conductor in our right hand such that the thumb points towards the direction of current then the wrapped fingers will give the direction of the magnetic field.

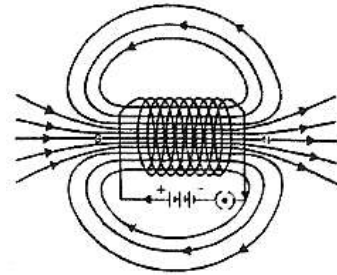
(c) Cylindrical magnetic field pattern of a solenoid resembles that of a bar magnet.



- 118 (a) What is a solenoid? Draw the pattern of magnetic field lines around a current carrying solenoid.
 (b) What is the pattern of field lines inside a solenoid? What do they indicate?
 (c) How is the magnetic field produced in solenoid used?

2010/2011/2012/2013 [5 Marks]

- (a) A coil of many circular turns of insulated copper wire wrapped closely in the shape of the cylinder is known as a solenoid.
 (b) The field lines inside the magnetic field is uniform.
 (c) A solenoid is used to magnetize a soft iron piece to obtain electromagnet.



119. A current carrying conductor in a magnetic field experiences a force. Write the condition for this force to be maximum. Also, give two examples which are based on this effect.

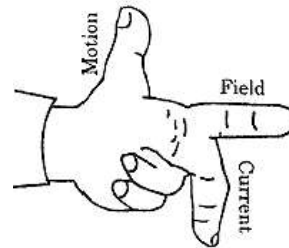
2010/2011/2012/2013 [2 Marks]

- When direction of current is at right angles to the direction of magnetic field, then the force experienced by the conductor is maximum
- Electric motors and generators are based on this effect.

120. Write Fleming's left-hand rule.

2010/2011/2014/2016 [2 Marks]

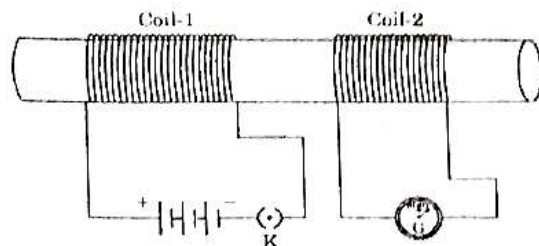
Fleming's left hand rule: When we stretch our thumb, forefinger and middle finger so that they are mutually perpendicular to one another, the forefinger points in the direction of the magnetic field and the middle finger points in the direction of the current; the thumb gives the direction of the force acting on the conductor.



121. Describe an activity with a diagram to show that a current is induced in a coil when current in its neighboring coil wound around the same core is changed. Explain with reason the observations made.

2011/2012/2013 [5 Marks]

Two different coils of insulated copper wire having large number of turns (50 or even more) are taken. The coils are inserted over a non-conducting cylindrical thick paper roll as shown in figure. A battery of 6V, a plug key K are connected in series of coil-1. With coil-2, a sensitive galvanometer is connected. Then, the plug in key K is switched on. Galvanometer joined with coil-2 also gives a momentary deflection and then pointer quickly returns to its mean position.

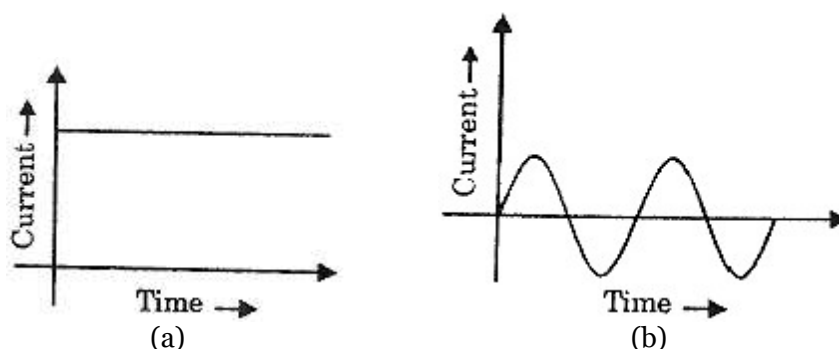


On removing plug from key K in coil-1, the galvanometer reading becomes zero i.e., no deflection takes place after a momentary deflection.

So, we conclude that current is produced in coil-2 on account of electromagnetic induction, whenever current in coil-1 is changing.

122. In our daily life we use two types of electric currents whose current-time graphs are given below:





- Name the type of current in each case.
- Identify any one source for each of current.
- What is the frequency of current in case (b) in our country?
- On the basis of these graphs, list two differences between the two currents.
- Out of the two which one is used in transmitting electric power over long distances and why?

2010/2015/2016 [5 Marks]

- Direct current and alternating current respectively.
- Battery and AC generator respectively
- Frequency of AC in our country is 50 Hz.
- (a) Magnitude of current in DC remains fixed, while in AC, it changes continuously.
(b) Direction of current in DC remains fixed, while in AC, it changes after every $\frac{1}{2n}$ second, where n is the frequency of AC.
- For transmitting electric power over long distances, AC is used instead of DC, because loss of energy during transmission is comparatively very small.

123. Explain why electrical appliances are connected in parallel in household circuits.

2010/2011/2012/2013 [2 Marks]

- In a domestic wiring, each appliance has equal potential difference.
 - In a domestic wiring, each appliance has a separate switch to on/off the flow of current through it. So, they are connected parallel to each other.
 - Each appliance gets maximum current due to lesser resultant resistance.
- (any two)

124. List two characteristics of the material to be used in a fuse wire. Name the material it is made up of. A fuse is always connected in series in an electric circuit. Justify this statement giving reason.

/2014/2015/2016 [3 Marks]

Characteristics:

- It should have low melting point
 - It should have high resistance.
- It should be made of aluminium or copper.
Fuse is always connected in series.

For protecting appliances due to short circuits or overloading, the fuse is related for certain maximum current and blows off when a current is more than the rated value flows through it.

- What is the role of fuse used in series with any electrical appliance?
- Why should a fuse with defined rating not be replaced by one with a larger

rating?

2010/2012/2013 [3 Marks]

(a) Fuse is used for protecting appliances due to short circuiting or overloading. The fuse is rated for a certain maximum current and blows off when a current more than the rated value flows through it.

(b) If a fuse is replaced by one with large ratings, the appliances may get damaged while the protecting fuse does not burn off. This practice of using fuse of improper rating should always be avoided.

126. Draw a schematic diagram of common domestic circuit showing live, neutral and earth wires.

2010/2012/2013 [5 Marks]

