PHYSICS

BOOKS - VK GLOBAL PUBLICATION PHYSICS (HINGLISH)

MAGNETIC EFFECTS OF ELECTRIC CURRENT

Ncert Intext Questions

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

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2. Draw magnetic field lines around a bar magnet.

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3. List the properties of magnetic field lines.

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4. Why do two magnetic field lines of force never intersect each other?

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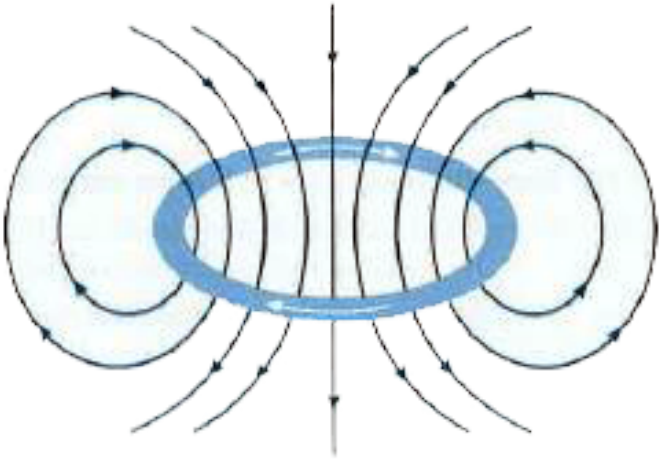
5. Consider a circular loop of wire lying in the plane of the table. Let the current pass through the loop clockwise. Apply the right-hand rule to find out the direction of the

magnetic field inside and outside the loop.



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

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7. Choose the correct option. The magnetic field inside a long straight solenoid carrying current

A. is zero.

B. decreases as we move towards its ends.

C. increases as we move towards its ends.

D. is the same at all points.

Answer:

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8. 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)

(ii)

(iii)

(iv)

A. mass

B. speed

C. velocity

D. momentum

Answer:

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9. A positively charged particle (alpha-particle) projected towards west is deflected towards north be a magnetic field. The direction of magnetic field is:

A. towards south

B. towards east

C. downward

D. upward

Answer:

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10. State Fleming's left hand rule.

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11. State different ways to induce current in a coil.

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12. Name some sources of direct current.

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13. Some of the sources of direct current are dry cell battery, car battery, and dc generator.

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14. Choose the correct option.

A rectangular coil of copper wires is rotated in a magnetic field. The direction of the induced current changes once in each

A. two revolutions

B. one revolution

C. half revolution

D. one-fourth revolution

Answer: C

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15. Name two safety measures commonly used in eletric circuits and appliances.

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16. 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.

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

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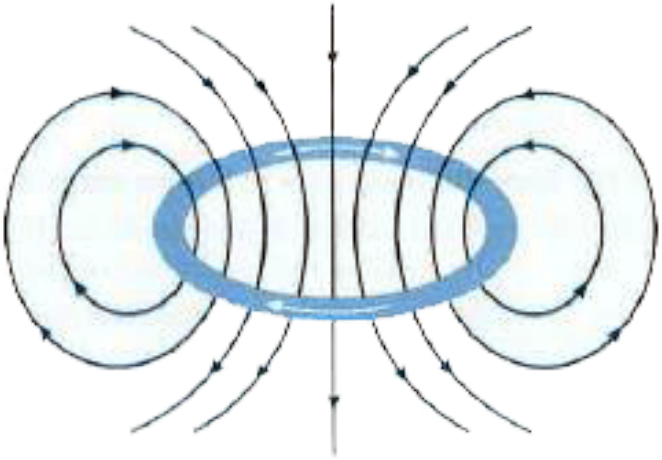

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Answer:

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25. 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).

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A. mass

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Ncert Exercises

1. Which of the following correctly describes the magnetic field near a long straight wire?

A. The field consists of straight lines perpendicular to the wire.

B. The field consists of straight lines parallel to the wire.

C. The field consists of radial lines originating from the wire.

D. The field consists of concentric circles centred on the wire.

Answer:

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2. The phenomenon of electromagnetic enduction is:

A. The process of charging a body.

B. The process of generating magnetic field due to a current passing through a coil.

C. Producing induced current in a coil due to relative motion between a magnet and the coil.

D. The process of rotating a coil of an electric motor.

Answer:

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3. The device used for producing current is called a:

A. Generator

B. Galvanometer

C. Ammeter

D. Motor

Answer:

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4. The essential difference between an AC generator and a DC generator is that

A. AC generator has an electromagnet while a DC generator has permanent magnet.

B. DC generator will generate a higher voltage.

C. AC generator will generate a higher voltge.

D. AC generator has slip rings while the DC generator has a commutator

Answer:

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5. At the time of short circuit, the current in the circuit

A. reduces substantially

B. does not change

C. increases heavily

D. varies continuously

Answer:

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6. State whether the statements are true or false.

An electric motor converts mechanical energy into electrical energy.

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7. State whether the statements are true or false.

A wire with a green insulation is usually the live wire of an electric supply.

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8. List three sources of magnetic fields.

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9. How does a solenoid behave like a magnet? Can you determine the north and south poles of a current-carrying solenoid with the help of a bar magnet? Explain.

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

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11. 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?

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12. Name some devices in which electric motors are used.

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13. A coil of isulated copper wire is connected to a galvanometer. What will happen if a bar magnet is (i) pushed into the coil (ii) Withdrawn from inside the coil (iii) held stationary inside of coil?

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14. Two circular coils A and B are placed close to each other. If the current in the coil A is

changed, will some current be induced in the coil B? Give reason.

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15. 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 and (iii) current induced in a coil due to its rotation in a magnetic field.

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16. Explain the underlying principle and working of an electric generator by drawing a labelled diagram. What is the function of brushes?

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17. When does an electric short circuit occur?

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

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Answer:

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Answer:

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Very Short Answer Questions

1. What happens if a current carrying conductor is placed in the magnetic field?

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2. On what effect of an electric current does an electromagnet work?

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3. Name the alloy which is mainly used for making permanent magnets.

View Text Solution

4. Why is electromagnetic induction so called?

View Text Solution

5. Name an instrument in which the directive property of a magnet is used.

View Text Solution

6. What is solenoid?

View Text Solution

7. Which effect of electric current is utilised in the working of an electric fuse?

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8. What is the frequency of A.C. (alternating current) in India?

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9. What will you do if you see a person coming in contact with a live wire?

View Text Solution

10. How can it be proved that a magnetic field exists around a current carrying metallic wire?

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11. How is the strength of the magnetic field at a point near a wire related to the strength of the electric current flowing in the wire?

View Text Solution

12. How is the fuse connected in an electric circuit?

View Text Solution

13. Why is a fuse usually made of tin or tin-copper alloy?

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14. What is the capacity of a fuse commonly used in domestic electrical fittings?

View Text Solution

15. Name the device used to protect the electric circuits from overloading and short circuiting.

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16. On which effect of electricity does fuse work?

View Text Solution

17. What kind of magnetic field is produced by a current carrying solenoid?

View Text Solution

18. Show, with the help of a diagram, the nature of field lines of magnetic field around a current carrying straight conductor.

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19. State Faraday's law of electromagnetic induction.

View Text Solution

20. The frequency of alternating current in India is 50 Hz. What does it mean?

View Text Solution

21. Name the scientist who discovered the relationship between electric current and magnetic field.

View Text Solution

22. What does the closeness of field lines in a magnetic field signify?

View Text Solution

23. Name the device which converts mechanical energy into electrical energy.

View Text Solution

24. Which type of generator is used at power stations?

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25. Does the AC generator have any slip ring?

View Text Solution

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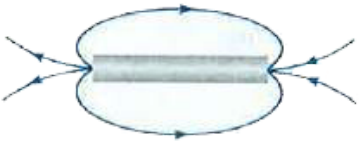
Short Answer Questions I

1. Identify the poles of the magnet in the figure (a) and (b) shown below.



(a)

(b)

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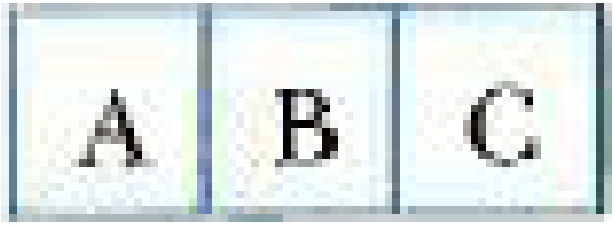
2. The given magnet is divided into three parts A, B and C.



Name the parts where the strength of the magnetic field is:

(i) maximum (ii) minimum

How will density of magnetic field lines differ at these parts.

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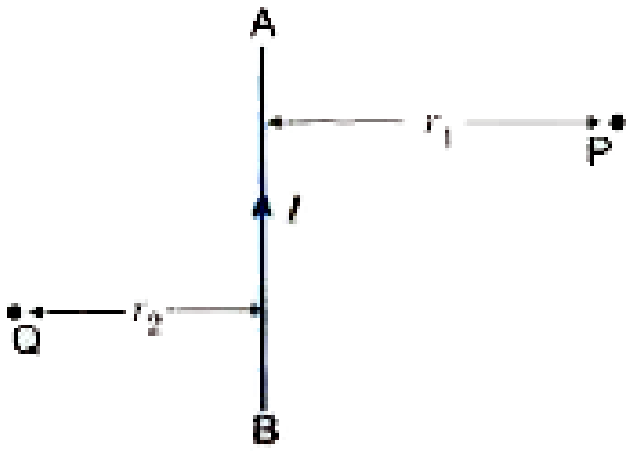
3. AB is a current-carrying conductor in the plane of the paper as shown in figure. What are the directions of magnetic fields produced by it at points P and Q? Given $r_1 > r_2$, where will the strength of the magnetic field be larger?



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4. What is electromagnetic induction?

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5. Write SI unit of magnetic field. Under what condition does a moving charge experience (i) maximum force (ii) minimum force?

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6. What is the electromagnet? Draw a circuit diagram to show low a soft iron piece can be transformed into an electromagnet.

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7. A magnetic compass shows a deflection when placed near a current-carrying wire. How will the deflection of the compass get affected if the current in the wire is increased? Support your answer with a reason.

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8. What does the divergence of magnetic field lines near the ends of a current-carrying straight solenoid indicate?

View Text Solution

9. A student performs an experiment to study the magnetic effect of current around a current carrying straight conductor with the help of a magnetic compass. He reports that

(i) the degree of deflection of the magnetic compass increases when the compass is moved away from the conductor.

(ii) the degree of deflection of the magnetic compass increases when the current through the conductor is increased.

Which of the above observations of the student appears to be wrong and why?

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10. How does the strength of the magnetic field at the centre of a circular coil of a wire depend on: (a) radius of the coil (b) number of turns in the coil.

View Text Solution

11. How is the direction of magnetic field at a point determined?

View Text Solution

12. What is the direction of magnetic field at the centre of a current- carrying circular loop?

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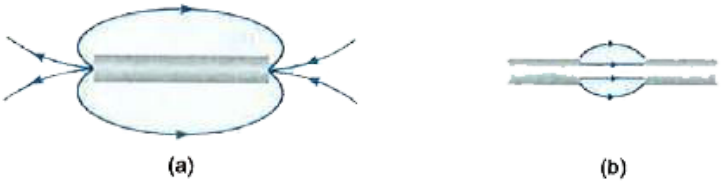

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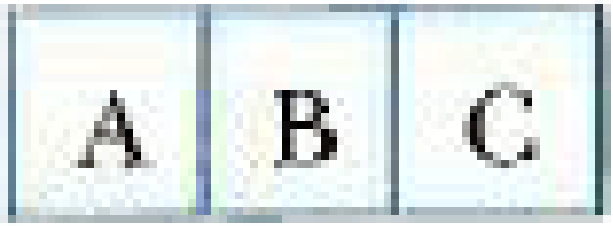

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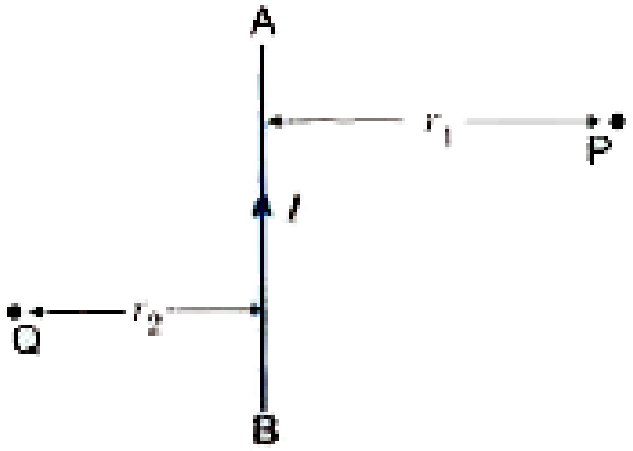

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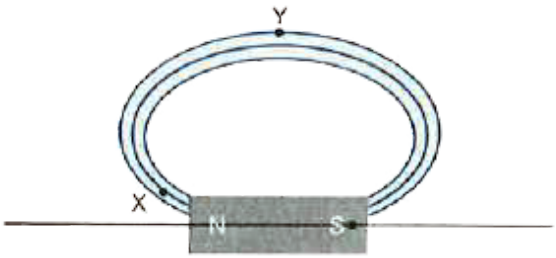
Short Answer Questions Ii

1. Magnetic field lines are shown in the given diagram. A student makes a statement that magnetic field at X is stronger than at Y. Justify this statement. Also redraw the diagram and

mark the direction of magnetic field lines.



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2. What is the difference between a direct current and an alternating current? How many times does AC used in India change direction in one second?

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3. How can the magnitude of the induced current be increased?

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

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5. What is the direction of magnetic field lines outside a bar-magnet?

View Text Solution

6. The magnetic field lines in a given region are getting crowded. What does it indicate?

View Text Solution

7. State one advantage of AC over DC.

View Text Solution

8. What are magnetic field lines? How is the direction of a magnetic field at a point determined? Mention two important properties of magnetic field lines.

View Text Solution

9. A copper coil is connected to a galvanometer. What would happen if a bar magnet is

(i) pushed into the coil with its north pole entering first

(ii) held at rest inside the coil

(iii) pulled out again?

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10. Explain what is short circuiting and overloading in an electric supply.

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11. What change in the deflection of the compass needle placed at a point near current carrying straight conductor shall be observed if the (a) current through the conductor is increased? (b) direction of current in the conductor is reversed? (c) compass is moved away from the conductor?

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12. Name and state the rule used for determination of direction of induced current produced in a conductor due to a changing magnetic field and give one practical application of this phenomenon in everyday life.

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13. A coil made of insulated copper wire is connected to a galvanometer. What will

happen to the deflection of the galvanometer if this coil is moved towards a stationary bar magnet and then moved away from it? Give reason for your answer and name the phenomenon involved.

View Text Solution

14. In what respect does the construction of an AC generator differ from that of a DC generator?

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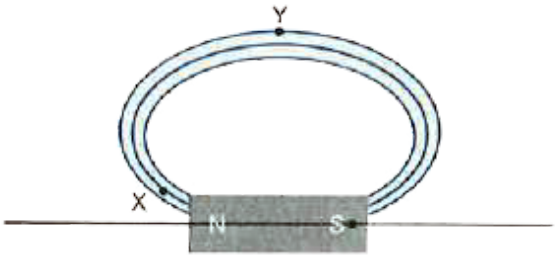

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Long Answer Questions

1. Briefly explain an activity to plot the magnetic field lines around a bar magnet. Sketch the field pattern for the same

specifying field directions.

A region A has magnetic field lines relatively closer than another region B. Which region has stronger magnetic field. Give reason to support your answer.

View Text Solution

2. Briefly explain an activity to plot the magnetic field lines around a straight current carrying conductor. Sketch the field pattern for the same, specifying current and field

directions. What happens to the field,

(a) if the strength of the current is decreased?

(b) if the direction of the current is reversed?

View Text Solution

3. (a) With the help of a labelled diagram, explain the distribution of mgnetic field due to a current through a circular loop. Why is it that if a current carrying coil has n turns the field produced at any point is n times as large as that produced by a single turn?

(b) Draw a pattern of magnetic field formed around a current carrying solenoid. What happens to the magnetic field when the current through the solenoid is reversed?

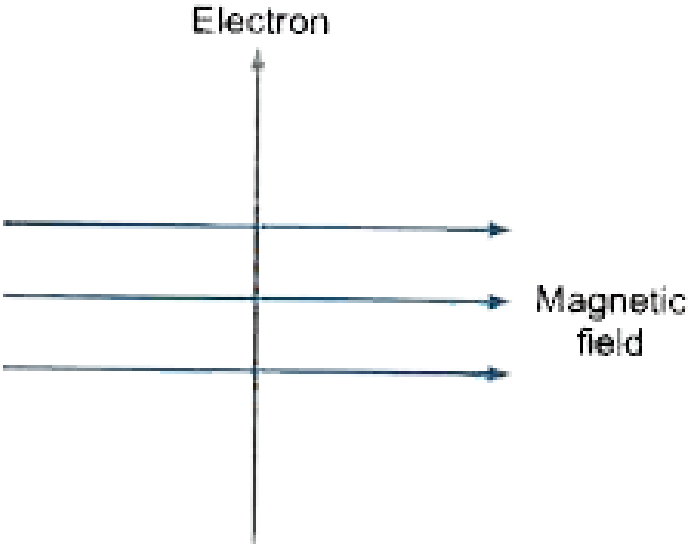
View Text Solution

4. (a) Explain an activity to show that a current-carrying conductor experiences a force when placed in a magnetic field.

(b) State the rule which gives the direction of force acting on the conductor.

(c) An electron moves perpendicular to a magnetic field as shown in the figure.

What would be the direction of force experienced on the electron?



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5. With the help of a diagram, describe an experiment to show that a change in current flowing through a coil induces an electric current in a neighbouring coil.

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6. Draw an appropriate schematic diagram showing common domestic circuits and discuss the importance of fuse. Why is it that a

burnt out fuse should be replaced by another fuse of identical rating?

View Text Solution

7. (i) Two circular coils P and Q are kept close to each other, of which coil P carries a current. If coil P is moved towards Q, will some current be induced in coil Q? Give reason for your answer and name the phenomenon involved.

(ii) What happens if coil P is moved away from Q?

(iii) State any two methods of inducing current in a coil.

View Text Solution

8. (i) With the help of an activity, explain the method of inducing electric current in a coil with a moving magnet. State the rule used to find the direction of electric current thus generated in the coil.

(ii) Two circular coils P and Q are kept close to each other, of which coil P carries a current.

What will you observe in Q?

(a) If current in the coil P is changed?

(b) If both the coils are moved in the same direction with the same speed? Give reason.

View Text Solution

9. Explain the underlying principle and working of direct current generator (or DC dynamo) by drawing a labelled diagram.

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10. Briefly explain an activity to plot the magnetic field lines around a bar magnet. Sketch the field pattern for the same specifying field directions.

A region A has magnetic field lines relatively closer than another region B. Which region has stronger magnetic field. Give reason to support your answer.

View Text Solution

11. Briefly explain an activity to plot the magnetic field lines around a straight current carrying conductor. Sketch the field pattern for the same, specifying current and field directions. What happens to the field,

(a) if the strength of the current is decreased?

(b) if the direction of the current is reversed?

View Text Solution

12. (a) With the help of a labelled diagram, explain the distribution of mgnetic field due to a current through a circular loop. Why is it that if a current carrying coil has n turns the field produced at any point is n times as large as that produced by a single turn?

(b) Draw a pattern of magnetic field formed around a current carrying solenoid. What happens to the magnetic field when the current through the solenoid is reversed?

View Text Solution

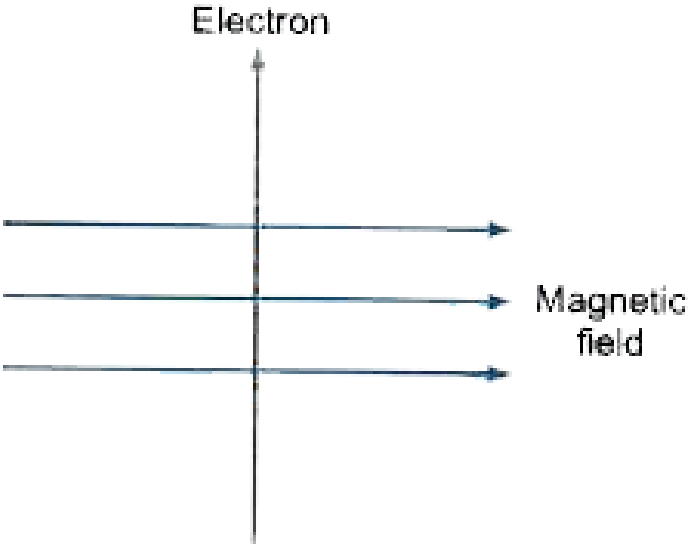
13. (a) Explain an activity to show that a current-carrying conductor experiences a force when placed in a magnetic field.

(b) State the rule which gives the direction of force acting on the conductor.

(c) An electron moves perpendicular to a magnetic field as shown in the figure.

What would be the direction of force

experienced on the electron?



View Text Solution

14. With the help of a diagram, describe an experiment to show that a change in current

flowing through a coil induces an electric current in a neighbouring coil.

View Text Solution

15. Draw an appropriate schematic diagram showing common domestic circuits and discuss the importance of fuse. Why is it that a burnt out fuse should be replaced by another fuse of identical rating?

View Text Solution

16. (i) Two circular coils P and Q are kept close to each other, of which coil P carries a current. If coil P is moved towards Q, will some current be induced in coil Q? Give reason for your answer and name the phenomenon involved.

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View Text Solution

17. (i) With the help of an activity, explain the method of inducing electric current in a coil with a moving magnet. State the rule used to find the direction of electric current thus generated in the coil.

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(a) If current in the coil P is changed?

(b) If both the coils are moved in the same direction with the same speed? Give reason.

View Text Solution

18. Explain the underlying principle and working of direct current generator (or DC dynamo) by drawing a labelled diagram.

View Text Solution

Hots Higher Order Thinking Skills

1. Meena draws magnetic field lines of field close to the axis of a current-carrying circular

loop. As she moves away from the centre of the circular loop she observes that the lines keep on diverging. How will you explain her observation?

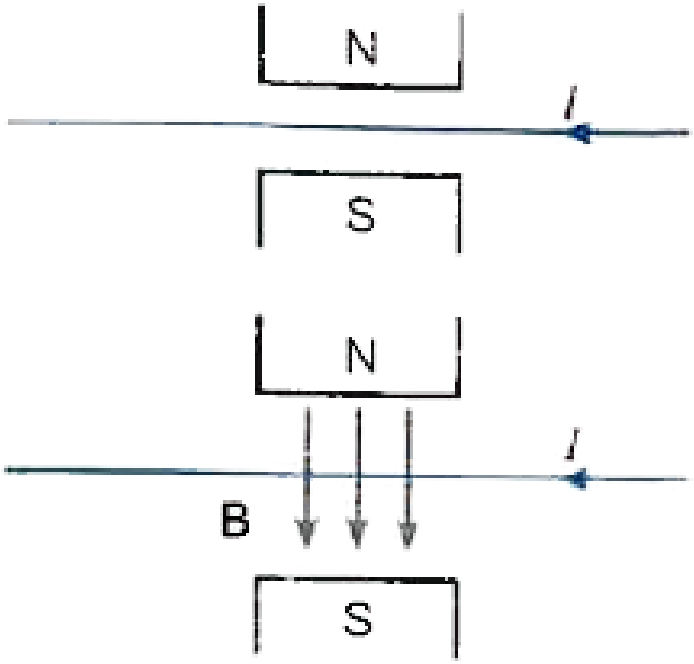
View Text Solution

2. Why does a magnetic compass needle pointing North and South in the absence of a nearby magnet get deflected when a bar magnet or a current carrying loop is brought near it?

View Text Solution

3. A wire is placed between N and S poles of a magnet as shown in figure. If current flows in the wire as shown, in which direction does the

wire tend to move?



View Text Solution

4. A fixed wire AB carries current I. An electron is moving parallel to the wire, in which

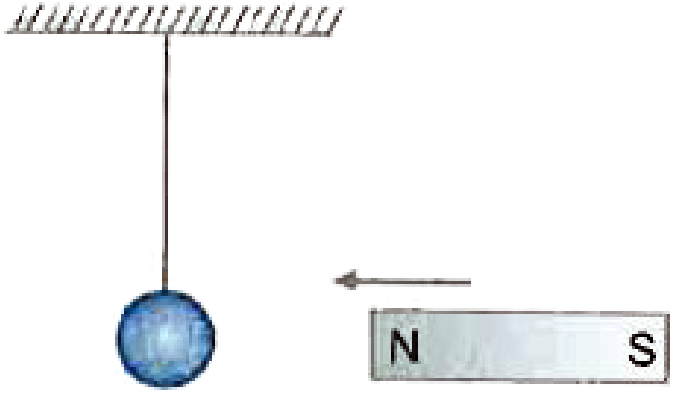
direction does the electron tend to move?

View Text Solution

5. A metallic wire loop is suspended freely and a bar magnet is brought near it as shown in the diagarm.

What will be the direction of induced current in the wire loop when the magnet is moved

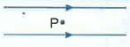
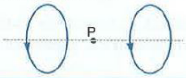
towards it.



View Text Solution

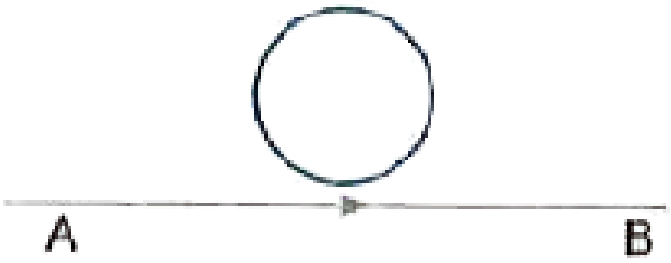
6. Two wires each carrying a steady current i are shown in two different configurations in column I. The magnetic field produced due to current in the wires is described in column II.

Match the situations A and B in column I with all the correct statements in column II.

Column I	Column II
 A. Point P is situated midway between the wires above.	(*i*) The magnetic fields B at P due to the current in the wires are in the same direction.
B. Point P is situated at the mid point of the line joining the centres of the circular wires, which have same radii. 	(*ii*) The magnetic fields B at P due to the current in the wires are in the opposite directions. (*iii*) Magnetic field at P is zero.

View Text Solution

7. A circular metallic loop is kept above the wire AB as shown here.



What is the direction of induced current produced in the loop, if any, when the current flowing in the straight wire

(i) is steady, i.e., does not vary.

(ii) is increasing in magnitude.

Justify your answer in each case.

View Text Solution

8. An electron and a proton, using parallel to each other, enter a uniform magnetic field with same velcoity. The direction of magnetic

field and their motion coincides (is same). How will the direction of their paths be affected when they are travelling in

(a) same direction (b) opposite direction.

Justify your answer.

View Text Solution

9. You are given a galvanometer, an electroplating equipment, a key and two sources of electricity. Give two different

experimental set ups to find whether any of the given sources is AC or DC source.

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10. A circuit has a fuse of 5A. What is the maximum number of 100 watt (220 V) bulbs which can be safely used in the circuit?

View Text Solution

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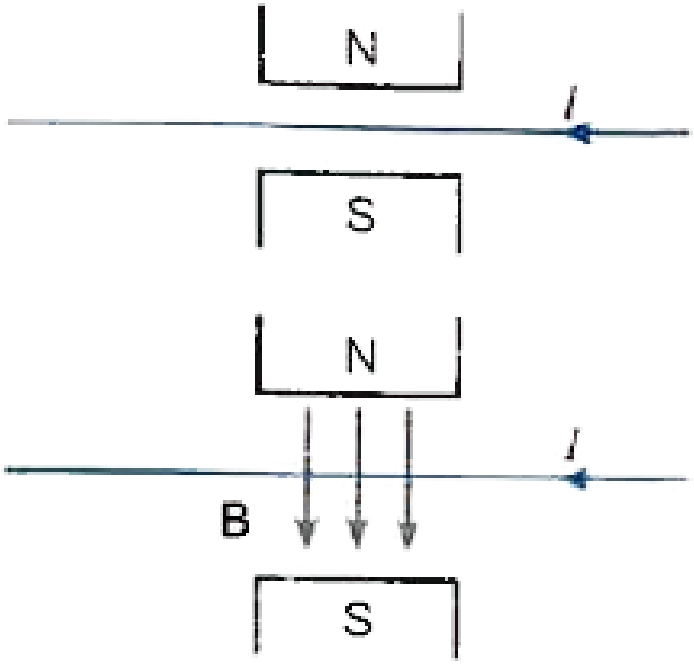

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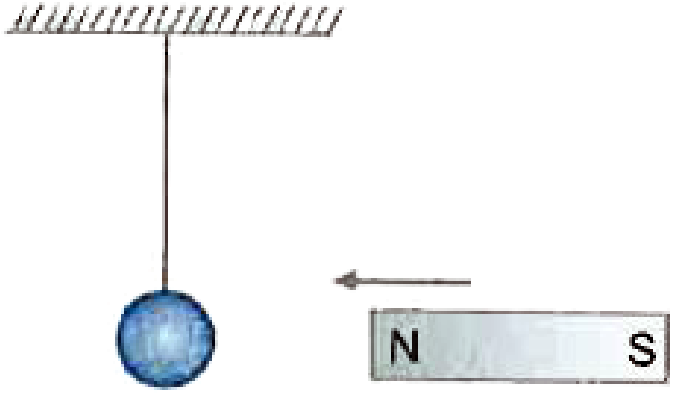

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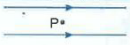
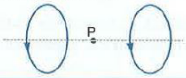
 A. Point P is situated midway between the wires above.	(*i*) The magnetic fields B at P due to the current in the wires are in the same direction.
B. Point P is situated at the mid point of the line joining the centres of the circular wires, which have same radii. 	(*ii*) The magnetic fields B at P due to the current in the wires are in the opposite directions. (*iii*) Magnetic field at P is zero.

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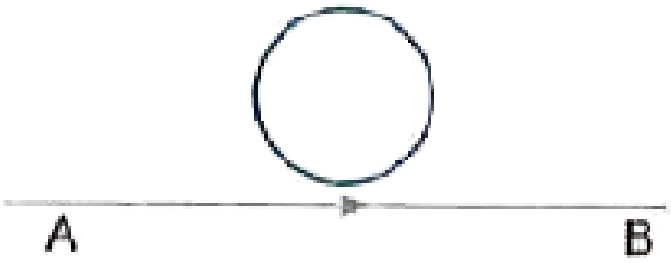

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