Assignments in Science Class X

Topic: - Magnetic Effects of Electric Current

IMPORTANT NOTES

1. **Magnetic field:** The space surrounding a magnet, in which its influence in the form of magnetic force can be detected, is called magnetic field.
2. When an electric current is passed through a conductor, then a magnetic field is produced around the conductor, i.e., the conductor behaves like a magnet, as long as the current flows through it.
3. **Ampere's swimming rule:** Imagine a swimmer, swimming in the direction of flow of current and always looking towards the needle, such that current enters from his feet and leaves from his head. The direction in which the left hand of the swimmer points, gives the direction of motion of the north pole of the magnetic needle.
4. **SNOW Rule:** The direction of motion of the north pole of the magnetic needle can be found out by the remembering the word SNOW, where S stands for south, N for north, O for over and W for west.
5. **Right hand thumb rule:** Imagine you are holding the conductor with the palm of your right hand, such that fingers encircle the conductor and the thumb points in the direction of the current. Then the direction of the fingers encircling the conductor, gives the direction of the magnetic lines of force around it.
6. **Solenoid:** An insulated copper wire wound on some cylindrical cardboard or plastic tube, such that its length is greater than its diameter and it behaves like a magnet when a current is made to flow through it, is called a solenoid.
7. **Electromagnet:** A solenoid which has an iron core within it is called electromagnet. The iron core intensifies the magnetic field of the solenoid, as iron gets magnetized due to magnetic induction.
8. **Fleming's left hand rule:** Stretch the thumb, the fore finger and the middle finger of your left hand mutually at right angles to each other, such that the forefinger points in the direction of the magnetic field and the middle finger in the direction of flow of current. Then thumb gives the direction of motion of conductor.
9. **Electric Motor:** An electric motor is a device which converts electric energy into mechanical energy.
10. **Commutator:** A rotating device which changes the direction of current after every half rotation is called the commutator.
11. **Fleming's right hand rule:** Stretch the palm of your right hand in such a way that the thumb, the fore finger and the middle finger are mutually at right angles to each other. Now point the

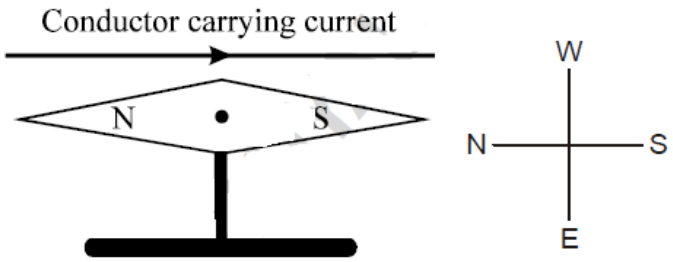
thumb in the direction of motion of the conductor and fore finger in the direction of the magnetic field. Then the direction of the middle finger gives the direction of the induced current.

12. **Electromagnetic Induction:** The phenomenon due to which a changing magnetic field within a conductor or closed coil induces electric current in the conductor or a coil is called electromagnetic induction.
13. **Induced current:** The alternating current produced in a conductor or a closed coil, when the magnetic lines of force rapidly change in it, is called the induced current. Induced current is always alternating in nature.
14. **Lenz's law:** It states "In all cases of electromagnetic induction, the direction of induced current is such that it always opposes the cause (the motion of the conductor) which produces it."
15. **Mutual Induction:** The phenomenon of production of induced e.m.f. in a closed coil, by varying the magnetic flux in another coil is called mutual induction.
16. **Alternating current:** An electric current in which the direction of current changes after equal intervals of time is called alternating current (AC). The electric current supplied for domestic or industrial use is alternating current.
17. **Electric generator:** It is based on the phenomenon of electromagnetic induction. It converts mechanical energy to electric energy.
18. Household wiring is done in parallel. It is provided with safety devices such as fuse and earthing.
19. Electricity for domestic purposes is supplied at 220 V and 50 Hz. Commercial electricity is supplied at 440 V and 50 Hz.

VERY SHORT ANSWER QUESTIONS

IMPORTANT QUESTIONS

1. In which direction a freely suspended magnetic needle points?
2. Why does a freely suspended magnetic needle point in north-south direction?
3. What is the south pole of a bar magnet?
4. State two properties of the poles of a bar magnet.
5. What do you understand by the term magnetic field of a bar magnet?
6. What is magnetic field line?
7. Name the physicist who discovered the magnetic effect of the electric current.
8. A straight copper conductor is held parallel to the axis of a freely suspended magnetic needle such that the conductor is under the needle and the current is flowing from south to north. In which direction the north of magnetic needle will move?
9.



In the diagram above, in which direction will the north pole of magnetic needle deflect?

10. If a copper conductor carrying a current is held in north-south direction, in which direction will its magnetic field act?

11. Define Ampere's swimming rule to determine the direction of motion of a freely suspended magnetic needle.

12. A circular coil carrying current is held in horizontal plane. In which direction will its magnetic field be?

13. What is solenoid?

14. Imagine you are facing one end of a solenoid, such that the current flowing through it is in the clockwise direction. What kind of magnetic polarity is produced at the end facing you?

15. How is the intensity of magnetic field around a solenoid going to change, if the magnitude of current in it is increased?

16. The number of turns in a solenoid is increased five times, without any increase in current. How is its magnetic intensity affected?

17. What is an electromagnet?

18. Why does the strength of electromagnet increase, when its soft iron core is laminated?

19. State one use of electromagnet in medicine. **20.** State one use of electromagnet in industry.

21. Why does a conductor carrying current experiences force when held in a magnetic field at right angles to it?

22. In the statement of Fleming's left hand rule what do the following represent?

(a) Direction of forefinger (b) direction of middle finger

23. What do you understand by the term induced current?

24. Name the physicist who discovered electromagnetic induction.

25. Is the induced current alternating or direct in nature?

26. What do you understand by the term electric generator?

27. What energy changes take place in an electric generator?

28. What do you understand by the term alternating current?

29. What do you understand by the term direct current?

30. Name a device which produces:

(i) alternating current, (ii) direct current.

31. What do you understand by the term electric fuse?

32. Name two metals used in making an electric fuse wire.

33. What do you understand by the term short circuiting in an electric circuit?

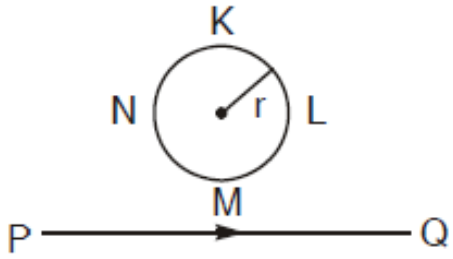
34. What do you understand by the term overloading in an electric circuit?

QUESTIONS FROM CBSE EXAMINATION PAPERS

1. What does the direction of thumb indicate in the right-hand thumb rule?

2. What is the frequency of alternating current in India?

3. What is the magnitude of induced current in the circular loop KLMN, of radius '*r*',



if the straight wire PQ carries a steady current of magnitude '*i*' ampere?

4. How will you use a solenoid to magnetise a steel bar?

5. An alternating electric current has a frequency of 50 Hz. How many times does it change its direction in one second?

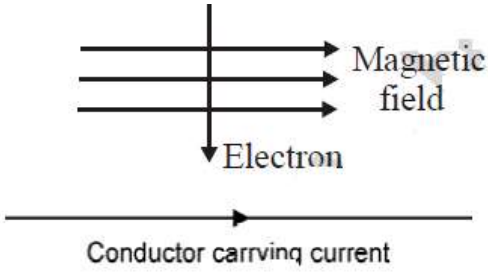
SHORT ANSWER QUESTIONS

IMPORTANT QUESTIONS

1. An electron enters a magnetic field at right angles to it as shown in diagram. The direction of force acting on the electron will be:

(a) to the right (b) to the left (c) out of page (d) into the page

Give a reason for your choice.



2.

The diagram above shows a conductor carrying current.

(i) By drawing diagram show the direction of magnetic field around the conductor.

(ii) Name the rule which helped you to find the direction of magnetic lines of force.

3. A thick copper wire is passed through a hole in a cardboard held in the horizontal plane, such that the current moves in the copper wire in the upward direction. Plot four magnetic lines of force around the conductor by drawing a neat diagram and show clearly the direction of magnetic lines of force.

4. A straight conductor passes vertically downward through a cardboard on which are sprinkled grains of fine iron powder. What will you observe when?

(i) a weak current is passed through the conductor?

(ii) a strong current is passed through the conductor?

5. How will you find the magnetic polarity at the ends of solenoid, without using a magnetic compass?

6. How will you locate a current carrying wire concealed in a wall?

7. Mention two factors which determine the strength of an electromagnet.

8. If the current in a freely suspended conductor is flowing vertically downward, such that magnetic field is in north-south direction, then in which direction the conductor will move?

Name the rule which helped you to answer this question.

9. Fleming stated two laws involving left hand and right hand. Which law is applicable when?

(i) Electrical energy changes into mechanical energy?

(ii) Mechanical energy changes into electrical energy?

10. (i) What is the nature of electric current produced in the coil of any electric generator?
(ii) Draw a diagram to represent the current named by you.

11. Why does a freely suspended magnet always point in north-south direction?

12. State two desirable properties of a fuse wire.

13. Two fuse wires of same length are rated 15A and 5A. Which of the two fuse wires will be thicker and why?

14. How does the earthing protect user from getting electric shock?

15. Why is the earth terminal in a plug made?
(i) Thicker (ii) longer as compared to live or neutral terminals?

QUESTIONS FROM CBSE EXAMINATION PAPERS

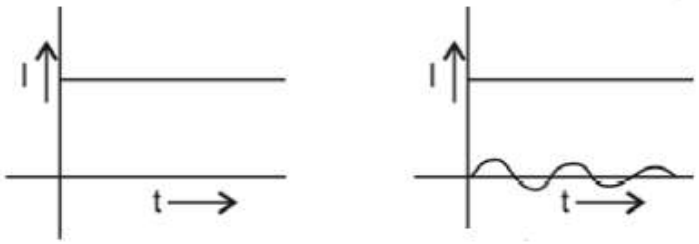
1. In what situation do we use Fleming's right hand rule?

2. What will be the frequency of an alternating current, if its direction changes after every 0.01 s?

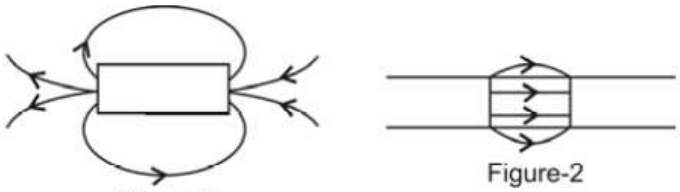
3. What is a solenoid? Draw the pattern of magnetic field lines of a solenoid through which a steady current flows.

4. Draw the pattern of magnetic lines of the field produced by a current carrying circular loop.

5. You are given following current (I)-time (t) graphs from the sources



6. Identify the poles of the magnet in the given figure (1) and (2)



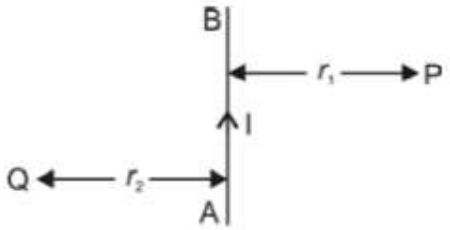
7. What are permanent magnet and electromagnet? Give two uses of each.

8. Describe an activity to draw the magnetic field produced around a current carrying conductor.

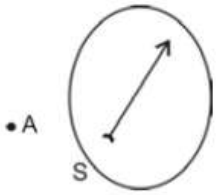
9. Explain briefly different methods of producing induced emf.

10. 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.

11. AB is a current carrying conductor in the plane of the paper as shown in figure. What are the directions of magnetic field produced by it at points P and Q? Given $r1 > r2$, where will the strength of the magnetic field be larger?



12. A magnetic compass needle is placed in the plane of paper near point A as shown in the figure. In which plane should a straight current carrying conductor be placed so that it passes through A and there is no change in the deflection of the compass? Under what condition is the deflection maximum and why?



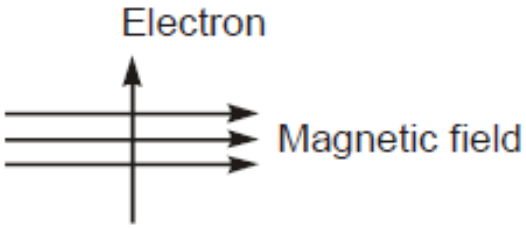
13. No two magnetic field lines can intersect each other. Explain.

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 reasons.

15. What is meant by the term magnetic field lines? List any two properties of magnetic field lines.

16. Explain different ways to induce current in a coil.

17. An electron enters a uniform magnetic field at right angles to it as shown in the figure below. In which direction will this electron move? State the rule applied by you in finding the direction of motion of the electron.



18. Write four properties of magnetic lines of force.

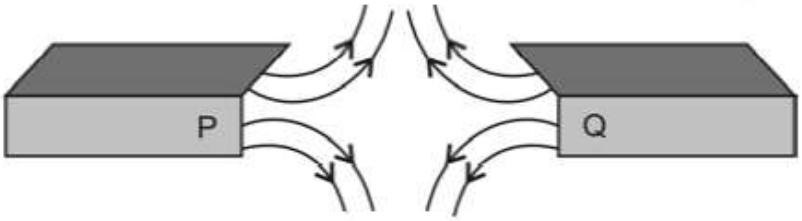
19. A student performs an experiment to study the magnetic effects of current around a current carrying straight conductor with the help of a magnetic compass. He reports that:

(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?

20. In the figure below, identify the poles marked P and Q as North Pole or South Pole. Give reason for your answer.



21. A student, while studying the force experienced by a current carrying conductor in a magnetic field records the following observations:

(i) The force experienced by the conductor increases as the current is increased.

(ii) The force experienced by the conductor decreases as the strength of the magnetic field is increased.

Which of the two observations is correct and why?

22. A coil of insulated wire is connected to a galvanometer. What would be seen if a bar magnet with its south pole towards one face of the coil is:

(a) Moved quickly towards it?

(b) Moved quickly away from it?

(c) Placed near its one face?

(d) Name the phenomena involved.

23. 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 of wire in the coil

24. State Fleming's left hand rule. A positively charged particle projected towards West is deflected towards North by a magnetic field. Find the direction of magnetic field.

25. How can it be shown that a magnetic field exists around a wire through which a direct electric current is passing?

26. Under what conditions does a moving charge experience: (i) maximum force; (ii) minimum force?

SHORT ANSWER QUESTIONS

IMPORTANT QUESTIONS

1. How does the magnetic field set up by a solenoid change when:

(i) The number of turns of the coil is increased?

(ii) The strength of current is increased?

(iii) Soft iron core is inserted within the coil?

2. State four practical uses of electromagnets.

3. Draw a rough sketch of pattern of field lines due to:

(i) Current flowing into a circular coil.

(ii) Solenoid carrying current.

4. (a) Why is fuse wire always placed in live wire?

(b) How does a fuse wire protect an electric circuit?

5. (a) How is household circuit earthed?

(b) Explain how the fuse melts when a short circuited appliance gets earthed?

6. (i) What is the function of an electric switch in an electric circuit?

(ii) Why is the switch placed in the live wire, which is connected to an appliance?

(iii) What consequences will follow, if the switch is placed in the neutral wire?

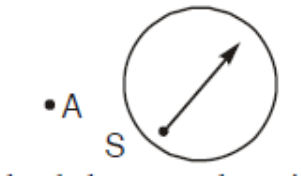
7. A straight copper conductor, whose ends are connected to a sensitive galvanometer, is moved up and down in a strong magnetic field.

(i) State your observations.

(ii) What is the nature of induced current generated in the conductor?

(iii) What kind of energy transformations takes place in the above experiment?

8. A magnetic compass needle is placed in the plane of paper near point A as shown in figure. In which plane should a straight current carrying conductor be placed so that it passes through A and there is no change in the direction of the compass? Under what condition is the deflection maximum and why. **[HOTS]**



9. It is established that an electric current through a metallic conductor produces a magnetic field around it. Is there a similar magnetic field produced around a thin beam of moving (i) alpha particles, (ii) neutrons? Justify your answer.

QUESTIONS FROM CBSE EXAMINATION PAPERS

1. (a) Describe an activity to draw a magnetic field line outside a bar magnet from one pole to another.
(b) List any two properties of magnetic field lines.
2. Explain two ways to induce current in a coil. When is the induced current produced highest? State the rule used to find direction of induced current.
3. (a) What are the factors on which the magnetic field produced by the current carrying circular coil depends?
(b) What happens if the current through the coil is reversed?
4. Describe an activity to draw the magnetic field line around a coil of wire.
5. Describe an activity to show how to magnetise an iron nail.
6. Why does a current carrying conductor kept in a magnetic field experience force? On what factors does the direction of this force depend? Name and state the rule used for determination of direction of this force.
7. (a) Swati 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?
(b) Write two properties of magnetic field lines.
8. What does the direction of thumb indicate in the right-hand thumb rule? In what way this rule is different from Fleming's left-hand rule?
9. What is meant by the 'magnetic field lines'? List any two properties of magnetic field lines?
10. What is a solenoid? Draw a diagram to show the magnetic field lines around a solenoid. What is its main use?
11. Give an activity to show magnetic field produced by a current carrying circular coil.
12. Explain the magnetic effects of current for Oersted's experiment with the help of labeled diagram.
13. State the rule to determine the direction of force experienced by a current carrying conductor in a magnetic field. How will this force get affected on?
(i) Doubling the magnitude of current?
(ii) Reversing the direction of current flow?

14. Under what condition does a current carrying conductor kept in a magnetic field experience maximum force? On what other factors does the magnitude of this force depend? Name and state the rule used for determination of direction of this force.

15. A coil made of insulated copper wire is connected to a galvanometer. What will happen to the deflection of the galvanometer if a bar magnet is pushed into the coil and then pulled out of it? Give reason for your answer and name the phenomenon involved.

16. How will the magnetic field produced in a current carrying a circular coil change if we
(i) Increase the value of current,
(ii) increase the distance from the coil,
(iii) increase the number of turns of the coil?

17. What happens to the deflection of the compass needle placed at a point near current carrying straight conductor?
(a) if the current is increased,
(b) if the direction of current in the conductor is changed,
(c) if compass is moved away from the conductor?

18. State Fleming's Right hand rule. Give one application of this rule. What is SI unit of induced current?

19. Draw a figure of current carrying solenoid and show magnetic field lines inside and outside it. Compare the pattern of the field with the magnetic field around a bar magnet.

20. When is an electric circuit said to be over loaded? State two measures to avoid it. What name is given to a situation in which the live and the neutral wires accidently come in contact? State the role of a safety device in this situation.

21. With the help of a neat diagram describe how you can generate induced current in a circuit.

22. 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.

23. What is an electric fuse? What result do you expect if someone operates an electric heater of power rating 2 kW, 220 V in a domestic electric circuit? What has a fuse of current rating of 5A? Justify your answer.

24. Describe an activity to show how you can make an electromagnet in your school laboratory.

25. Draw a diagram to show how a magnetic needle deflects when it is placed above or below a straight conductor carrying current depending on the direction of the current in the conductor.

LONG ANSWER QUESTIONS

IMPORTANT QUESTIONS

1. (i) A straight conductor carries a current as shown in diagram. What is the direction of magnetic field lines around the conductor?

(ii) State the law which helped you to find the direction of magnetic field lines.
(iii) On what a factor does the force experienced by a current carrying conductor placed in a uniform magnetic field depends?

2. A powerful bar magnet is moved within the closed coil, which is connected to a sensitive galvanometer. The magnet is initially moved slowly and then rapidly in and out of the coil. It is observed that galvanometer needle moves from one side to the other and the deflection increases with the increase in the movement of magnet. Furthermore, if the motion of magnet is stopped the galvanometer shows no deflection. State five conclusions which you can draw from the above experiment.

3. 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? Describe some salient features of magnetic lines of field concept.

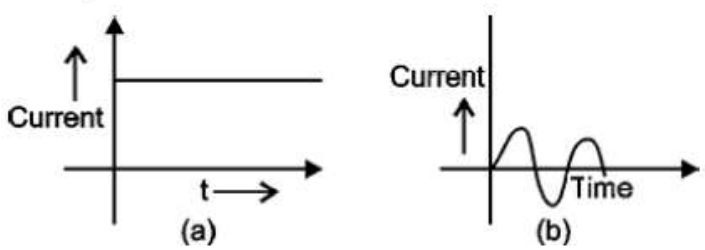
4. Explain with the help of a labelled diagram the distribution of magnetic field due to a current through a circular loop. Why is it that if a current carrying coil has *n* turns the field produced at any point is *n* times as large as that produced by a single turn?

5. 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?

QUESTIONS FROM CBSE EXAMINATION PAPERS

1. Describe in short, an activity to (i) demonstrate the pattern of magnetic field lines around a straight current carrying conductor, and (ii) find the direction of magnetic field produced for a given direction of current in the conductor. Name and state the rule to find the direction of magnetic field associated with a current carrying conductor. Apply this rule to determine the direction of the magnetic field inside and outside a current carrying circular loop lying horizontally on a table. Assume that the current through the loop in anticlockwise.

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



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

3. (a) What is a solenoid?
(b) Draw the field lines of the magnetic field through and around a current carrying solenoid.
(c) Compare the field pattern with magnetic field around a bar magnet.

4. (a) Which rule helps to find the force on a current carrying conductor in a magnetic field?
(b) State the rule.
(c) Name the three factors on which the force on the current carrying conductor depends.

5. (a) Describe an experiment with a diagram to show that force is exerted on a current carrying conductor when placed perpendicular in a magnetic field.

(b) How will this force change if current in the conductor is increased? (c) Name a device that uses the above principle.

6. (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 a solenoid used?

7. (a) What is electromagnetic induction?

(b) Explain the various methods of producing induced current.

(c) State the rule which gives the direction of induced current.

(d) Name two devices which work on the principle of electromagnetic induction.

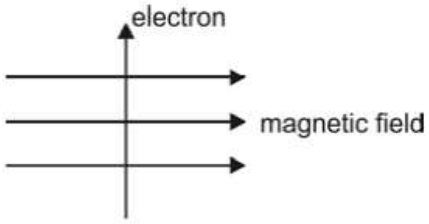
8. (a) What are factors on which the magnetic field produced by a current carrying conductor depends?

(b) What happens to the magnetic field lines due to a current carrying conductor, when the current is reversed? State the rule which gives this direction and current.

9. (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 by the electron?



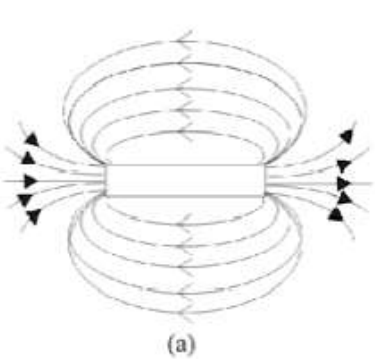
10. (a) What is a solenoid?

(b) Draw the pattern of magnetic field formed around a current carrying solenoid. Compare this field to that of a bar magnet.

(c) Explain what is short circuiting and over loading in electric supply?

11. Describe the activity that shows that a current carrying conductor experiences a force perpendicular to its length and the external magnetic field. How does Fleming's left-hand rule help us to find the direction of the force acting on the current carrying conductor?

12. Shown in the diagrams (a), (b), (c) and (d) are the magnetic fields around different systems. Identify them. Compare the patterns of the fields in all the four examples. Are they similar? Why?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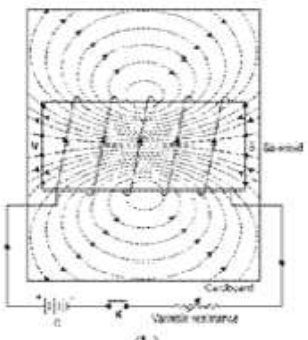
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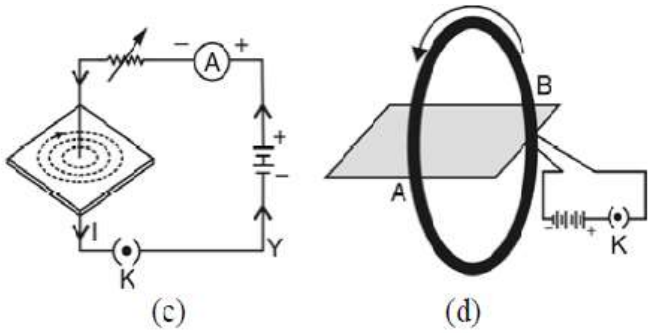

(c) (d)

13. Explain with the help of a labelled diagram the distribution of magnetic 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?

14. Describe the activity that shows that a current carrying conductor experiences a force perpendicular to its length and the external magnetic field. How does Fleming's left-hand rule help us to find the direction of the force acting on the current carrying conductor?

15. (a) A positively charged particle projected towards west is deflected towards north by a magnetic field. What is the direction of the magnetic field?

(b) Draw the magnetic field lines of the field produced due to a current carrying circular loop.

(c) State the law used to find the direction of magnetic field around a straight current carrying conductor.

16. (a) State Fleming's left hand rule with a labeled diagram.

(b) A coil of insulated copper wire is connected to a galvanometer. What happens if a bar magnet is

(i) Pushed into the coil,

(ii) withdrawn from inside the coil,

(iii) held stationary inside the coil?

17. (a) Two circular coils A and B are placed closed to each other. If the current in the coil A is changed, will some current be induced in coil B? Give reason.

(b) 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 coil due to its rotation in a magnetic field.

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

19. What are magnetic field lines? How is the direction of a magnetic field at a point determined? Draw the magnetic field lines (including field directions) of the magnetic field due to a circular coil of current. Name any two factors on which the magnitude of the magnetic field due to this coil depends.

20. Give any two properties of magnetic field lines.

Draw the magnetic field lines (including field directions) of the magnetic field due to a long straight solenoid. Name any two factors on which the magnitude of the magnetic field due to this solenoid depends.

21. (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) Briefly explain any two methods of inducing current in a coil.

22. (i) With the help of an activity, explain the method of inducing electric current in a coil with moving magnets. State the rule 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.

23. 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 this field,

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

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

24. 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.

25. (a) State the rule to determine the direction of

(i) Magnetic field produced around a straight conductor carrying current.

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

(iii) Current induced in a coil due to its rotation in a magnetic field.

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

26. Answer the following questions:

(i) What is the direction of magnetic field lines outside a bar-magnet?

(ii) What is SI unit of magnetic field?

(ii) What does crowding of magnetic field lines indicate?

(iv) What is the frequency of A.C. in India?

(v) Name two organs in the human body where magnetic field is quite significant.

27. What is electromagnetic induction? Draw a schematic diagram showing electromagnetic induction by using two coils and explain the observations.

28. (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) Two room heaters are marked 220 V, 500 W and 200 V, 800 W respectively. If the heaters are connected in parallel to 220 V mains supply, calculate

(i) The current drawn by each heater.

(ii) The resistance of each heater.

(iii) total electric energy consumed in commercial units if they operate simultaneously for 2 hours.

29. (a) State Fleming's Right Hand Rule.

(b) (i) Name the electric device that converts mechanical energy into electrical energy.

(ii) Write the principle involved in this device.

(c) An electric geyser of 2 kW rating is operated in a domestic circuit operating on 220V main supply that has a fuse of current rating of 5A. What will be the outcome? Explain.

30. (i) In which situation Fleming's left hand rule is applied? What does this rule determine?

(ii) How many times will the direction of current change in one second if its frequency is 50 Hz?

(iii) Under what conditions does a moving charge experience:

(1) maximum force, (ii) minimum force?

(iv) How would the strength of magnetic field produced at the centre of circular loop be affected, if :

(1) The strength of current passing through the loop is doubled?

(2) The radius of this loop is reduced to one half of the original radius?