PHYSICS

BOOKS - U-LIKE PHYSICS (HINGLISH)

MAGNETIC EFFECTS OF ELECTRIC CURRENT

N C E R T 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 lines of force (magnetic field lines).

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4. Why don't two magnetic lines of force 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. In Activity 13.7 (NCERT Textbook), 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 ?

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

A. towards south.

B. towards east.

C. downward.

D. upward

Answer: D

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9. State Fleming's left-hand rule.

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10. What is the principle of an electric motor ?

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11. What is the role of the split ring in an electric motor?

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

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13. State the principle of an electric generator.

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14. Name some sources of direct current.

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15. Which sources produce alternating current ?

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

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18. 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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19. What precaution should be taken to avoid the overloading of domestic electric circuits ?

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N C E R T Questions Choose The Correct Options

1. The magnetic field inside a long straight solenoid-carrying current.

A. is zero

B. decreases as we move towards its end.

C. increases as we move towards its end.

D. is the same at all points.

Answer: D

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2. 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.)

A. Mass

B. Speed

C. Velocity

D. Momentum

Answer: C

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N C E R T 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: D

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2. The phenomenon of electromagnetic induction 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: C

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

A. generator

B. galvanometer

C. ammeter

D. motor

Answer:

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4. The essential difference between an A.C. generator and a D.C. generator is that

A. A.C. generator has an electromagnet while a D.C. generator has permanent magnet.

B. D.C. generator will generate a higher voltage.

C. A.C. generator will generate a higher voltage.

D. A.C. generator has slip rings while the D.C. 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. vary continuously.

Answer:

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6. State whether the following statements are true or false :

A. An electric motor converts mechanical energy into electrical energy.

B. An electric generator works on the principle of electromagnetic induction.

C. The field at the centre of a long circular coil carrying current will be parallel straight lines.

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

Answer:

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7. List three methods of producing magnetic fields.

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

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10. 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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11. Draw a labelled diagram of an electric motor. Explain its principle and working. What is the function of a split ring in an electric motor?

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

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13. A coil of insulated 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, (ii) held stationary inside the 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 metallic appliances ?

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Case Based Source Based Integrated Questions

1. Answer question numbers (a)-(d) on the basis of your understanding of the following paragraph and the related studied concepts :

The phenomenon of electromagnetic

induction is the production of induced current in a coil placed in a region where the magnetic field changes with time. The magnetic field may change due to a relative motion between the coil and a magnet placed near to the coil. If the coil is placed near to a current carrying conductor, the magnetic field may change either due to a change in the current through the conductor or due to the relative motion between the coil and conductor. The direction of the induced current is given by the Fleming's right-hand rule.

What is the cause of current induced in a coil in electromagnetic induction phenomenon ?

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2. Answer question numbers (a)-(d) on the basis of your understanding of the following paragraph and the related studied concepts :

The phenomenon of electromagnetic induction is the production of induced current in a coil placed in a region where the magnetic field changes with time. The magnetic field

may change due to a relative motion between the coil and a magnet placed near to the coil. If the coil is placed near to a current carrying conductor, the magnetic field may change either due to a change in the current through the conductor or due to the relative motion between the coil and conductor. The direction of the induced current is given by the Fleming's right-hand rule.

Name three different methods for causing induced currents.

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3. Answer question numbers (a)-(d) on the basis of your understanding of the following paragraph and the related studied concepts :

The phenomenon of electromagnetic induction is the production of induced current in a coil placed in a region where the magnetic field changes with time. The magnetic field may change due to a relative motion between the coil and a magnet placed near to the coil. If the coil is placed near to a current carrying conductor, the magnetic field may change either due to a change in the current through

the conductor or due to the relative motion between the coil and conductor. The direction of the induced current is given by the Fleming's right-hand rule.

State Fleming's right-hand rule.

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4. Answer question numbers (a)-(d) on the basis of your understanding of the following paragraph and the related studied concepts :

The phenomenon of electromagnetic

induction is the production of induced current in a coil placed in a region where the magnetic field changes with time. The magnetic field may change due to a relative motion between the coil and a magnet placed near to the coil. If the coil is placed near to a current carrying conductor, the magnetic field may change either due to a change in the current through the conductor or due to the relative motion between the coil and conductor. The direction of the induced current is given by the Fleming's right-hand rule.

Name a practical device based on the phenomenon of electromagnetic induction.

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5. Answer question numbers (a)-(d) on the basis of your understanding of the following paragraph and the related studied concepts :

Oersted demonstrated that an electric current flowing through a conductor produces a magnetic field. The field so produced exerts a force on a magnet placed in the vicinity of the

conductor. Ampere suggested that the magnet must also exert an equal and opposite force on the current carrying conductor. The direction of the force on the conductor depends upon the direction of current as well as the direction of magnetic field. Force acting on the conductor is found maximum when the direction of current is at right angles to the direction of the the magnetic field. In such a condition we can use a simple rule to find the direction of the force on the conductor Electric motor, electric generator, microphone, loudspeaker and measuring instruments etc.

make use of current carrying conductors and magnetic fields.

How can you demonstrate that an electric current flowing through a conductor produces a magnetic field around it?

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6. Answer question numbers (a)-(d) on the basis of your understanding of the following paragraph and the related studied concepts :

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direction of the force on the conductor

Electric motor, electric generator, microphone, loudspeaker and measuring instruments etc. make use of current carrying conductors and magnetic fields.

What happens to the direction of force experienced by a current carrying conductor placed in a magnetic field if direction of current flow is reversed ?

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7. Answer question numbers (a)-(d) on the basis of your understanding of the following paragraph and the related studied concepts :

Oersted demonstrated that an electric current flowing through a conductor produces a magnetic field. The field so produced exerts a force on a magnet placed in the vicinity of the conductor. Ampere suggested that the magnet must also exert an equal and opposite force on the current carrying conductor. The direction of the force on the conductor depends upon the direction of current as well

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Name the rule to find the direction of the force acting on a current carrying conductor placed at light angles to a magnetic field.

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Oersted demonstrated that an electric current flowing through a conductor produces a magnetic field. The field so produced exerts a force on a magnet placed in the vicinity of the conductor. Ampere suggested that the magnet must also exert an equal and opposite force on the current carrying conductor. The

direction of the force on the conductor depends upon the direction of current as well as the direction of magnetic field. Force acting on the conductor is found maximum when the direction of current is at right angles to the direction of the the magnetic field. In such a condition we can use a simple rule to find the direction of the force on the conductor Electric motor, electric generator, microphone, loudspeaker and measuring instruments etc. make use of current carrying conductors and magnetic fields.

An electric motor and a generator both make

use of current carrying conductors and magnetic fields, then what is the difference between the two. Give any one point.

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Multiple Choice Questions

1. The area around a magnet, in which its influence (force of attraction or repulsion) can be felt, is called its

A. magnetic field.

B. magnetic strength

C. magnetic power.

D. magnetic intensity.

Answer: A

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2. A constant current I flows through a horizontal metal wire in the plane of the paper from east to west as shown in the figure. The

direction of magnetic field will be from north to south at a point:

A. directly above the wire.

B. directly below the wire.

C. on the north side of the wire in the plane of the paper.

D. on the south side of the wire in the plane of the paper.

Answer: B

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3. The direction of magnetic field developed around a current-carrying conductor can be easily found by the use of

A. Right-hand thumb rule.

B. Left-hand thumb rule.

C. Fleming's left-hand rule.

D. Fleming's right-hand rule.

Answer: A

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4. The strength of the magnetic field around a current-carrying straight conductor

A. is same every where around the conductor.

B. is directly proportional to the square of distance of a point from the conductor.

C. is directly proportional to the current flowing in the conductor.

D. is inversely proportional to the current

Answer: C

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5. Choose the incorrect statement from the following regarding magnetic field lines:

A. The direction of magnetic field at a point is taken to be the direction in which the

north pole of a magnetic compass needle points.

B. Magnetic field lines are closed curves

C. If magnetic field lines are parallel and equidistant, they represent zero field strength

D. Relative strength of magnetic field is shown by the degree of closeness of the field line.

Answer: C

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6. The strength of a magnetic field inside a long current-carrying straight solenoid coil is

A. more at the ends than at the centre.

B. minimum in the middle

C. same at all points.

D. found to increase from one end to the other.

Answer: C

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7. In a long straight solenoid N - and S- poles are created at the two ends of the solenoid . Which of the following statements is incorrect?

A. The field lines the solenoid are in the form straight lines indicating the

magnetic field is same at all points inside the solenoid .

B. The pattern of the magnetic field associated with the solenoid is different from the patter of the magnetic field around a bar magnet.

C. N-and S- poles exchange positions when the direction of the current through the solenoid is reversed.

D. Magnetic field produced inside the soleind can be used to magnetise a bar of magnetic material like soft iron when placed inside the solenoid.

Answer: B

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8. An electron movies with a speed v along positive direction of x - axis . If a magnetic field

B acts along the positive y - direction , then the force on the electron will act along .

A. x-axis

B. y-axis

C. $-ve$ z - direction

D. $+ve$ z - direction .

Answer: C

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9. The strenght of magnetic field along the axis of a solenoid coil:

A. increase on increasing current flowing through the solenoid coil

B. increase on increasing the number of turns in the solenoid coil

C. increases on introducing a soft iron core inside the solenoid coil .

D. all to the above

Answer: D

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10. A unifrom magnetic field exists in the plane of paper pointing from left to right as shown in the figure . In the field an electron and a proton move as shown. The electron and proton experience.

A. force both pointing into the plane of paper

B. forces both pointing out the plane of paper

C. forces pointing into the plane of paper and out of the plane of paper respectively .

D. force pointing opposite and along the direction of the uniform magnetic field respectively.

Answer: A

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11. A current - carrying conductor is placed peprendicular to the direction of a unifrom magnetic field . The electron and proton experiene.

A. Maxwell's cork screw rule

B. Ampere's rule

C. Fleming's left - hand rule

D. Fleming's right - hand rule .

Answer: C

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12. A charged particle moving in a unifrom magnetic experiences a force of maximum magnitude when direction of motion of charged particle is .

A. parallel to the direction of magnetic field

B. at right angle to the direction of magnetic field

C. antiparallel to the direction of magnetic field

D. inclined at 45° to the direction of magnetic field .

Answer: B

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13. Select the correct statement about the magnetic field lines :

A. Magnetic field lines start from N - and S-poles of a magnet and go upto infinity

B. In air magnetic field lines start from S-pole and and at N -pole.

C. Magnetic field lines can freely intersect with each other

D. No,two magnetic field lines can ever intersect one another .

Answer: D

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14. Choose the wrong statement out of the following :

A. Magnetic poles always exsits in pairs

B. Magnetic poles must have same magnetic strenght

C. Like magnetic poles attract each other .

D. Unlike magnetic poles attract each other .

Answer: C

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15. An electric motor converts

A. mechanical energy into electrical energy.

B. electrical energy into sound energy

C. electrical energy into mechanical energy

D. mechanical energy into sound energy.

Answer: C

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16. In Fleming's left-hand rule the thumb indicates the direction of

A. magnetic field applied.

B. current flown in the conductor.

C. induced current

D. mechanical force on the conductor.

Answer: D

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17. The phenomenon of electromagnetic induction is

A. the process of charging a body.

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

C. the process of producing induced current in a coil on changing magnetic field around it.

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

Answer: C

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18. Fleming's right hand rule gives

A. magnitude of the induced current.

B. magnitude of the magnetic field

C. direction of the induced current.

D. both direction and magnitude of the induced current.

Answer: C

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19. While applying Fleming's right-hand rule the central (middle) finger of right-hand indicates

A. the direction of magnetic field.

B. the direction of rotation of conductor.

C. the direction of current being flown

D. the direction of induced current.

Answer: D

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True Or False

1. Both outside and inside a bar magnet, the magnetic field lines start from north pole and end at the south pole.

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2. Magnetic field lines cannot intersect at any point except the magnetic poles of a magnet.

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3. Magnetic field lines around a current carrying straight conductor are concentric circles.

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4. The strength of a magnetic field developed around a current-carrying straight thin wire is directly proportional to the amount of current flowing through the wire and inversely

proportional to the distance from the current wire.

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5. A current-carrying conductor placed in a uniform magnetic field experiences maximum force when the conductor is placed parallel to the magnetic field.

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6. An electric motor is a device employed to transforms electrical energy into mechanical energy.

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7. Fleming's left-hand rule is called as the motor rule and Fleming's right-hand rule is known as the generator rule.

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8. When ever magnetic field of a coil changes, a voltage is induced across the ends of the coil.

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Fill In The Blanks

1. The magnetic effect of electric current was discovered by_____ .

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2. _____is a smooth curve, tangent to which at any point gives the direction of magnetic field at that point.

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3. A current carrying _____ can be used to magnetise an electromagnet.

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4. The device that reverses the direction of current flow through the coil of an electric motor after every half rotation is called _____.

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5. In Fleming's right-hand rule the fore finger points in the direction of_____ and the direction of induced current is indicated by_____.

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Assertion Reason Questions

1. Assertion (A) : The poles of a magnet cannot be separated by breaking into two parts.

Reason (R) : In nature magnetic monopoles do not exist.

A. Both (A) and (R) are true and (R) is correct explanation of the assertion

B. Both (A) and (R) are true but (R) is not the correct explanation of the assertion.

C. (A) is true but (R) is false.

D. (A) is false but (R) is true.

Answer: A

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2. Assertion (A) : The phenomenon of electromagnetic induction is the production of induced current in a coil placed in a region where the magnetic field changes with time.

Reason (R) : Electric motor utilises the phenomenon of electromagnetic induction.

A. Both (A) and (R) are true and (R) is correct explanation of the assertion

B. Both (A) and (R) are true but (R) is not the correct explanation of the assertion.

C. (A) is true but (R) is false.

D. (A) is false but (R) is true.

Answer: C

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3. Assertion (A) : The end of a solenoid where current apperars to flow clockwise behaves as a magnetic south pole .

Reason (R) : Direction of magnetic field associated with a current carrying conductor /coil is found by applying is found by applying right hand thumb rule.

A. Both (A) and (R) are true and (R) is correct explanation of the assertion

B. Both (A) and (R) are true but (R) is not the correct explanation of the assertion.

C. (A) is true but (R) is false.

D. (A) is false but (R) is true.

Answer: A

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4. Assertion (A) : Electromagnets are made of soft iron.

Reason (R) : The strenght of an electromagnet

is increased by increasing the current flowing through the solenoid coil.

A. Both (A) and (R) are true and (R) is correct explanation of the assertion

B. Both (A) and (R) are true but (R) is not the correct explanation of the assertion.

C. (A) is true but (R) is false.

D. (A) is false but (R) is true.

Answer: B

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5. Assertion (A) : A straight wire carries current in the vertically upwards .Magnetic field lines around it are concentric circles in horizontal plane in an anticlockwise direction.

Reason (R) : Direction of magnetic field is given by right hand thumb rule .

A. Both (A) and (R) are true and (R) is correct explanation of the assertion

B. Both (A) and (R) are true but (R) is not the correct explanation of the assertion.

C. (A) is true but (R) is false.

D. (A) is false but (R) is true.

Answer: A

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6. Assertion (A) : Electric motor is a machine which is used to produced electrical energy .

Reson (R) : The law of conservation of energy

is obyed in the phenomenon of electromagnetic induction.

A. Both (A) and (R) are true and (R) is correct explanation of the assertion

B. Both (A) and (R) are true but (R) is not the correct explanation of the assertion.

C. (A) is true but (R) is false.

D. (A) is false but (R) is true.

Answer: D

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7. Assertion (A) : A commercial motor uses a soft iron core on which the coil carrying current in wound.

Reason (R) : Presence of soft iron core enhances the power of the motor as it increase the magnetic field .

A. Both (A) and (R) are true and (R) is correct explanation of the assertion

B. Both (A) and (R) are true but (R) is not the correct explanation of the assertion.

C. (A) is true but (R) is false.

D. (A) is false but (R) is true.

Answer: A

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Very Short Answer Questions

1. Define magnetic field of a bar magnet.

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2. What is the direction of magnetic field at a given point ?

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3. Name the two factors that completely define a magnetic field at a point .

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4. What are magnetic field lines ?

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5. At what place of the magnet are the magnetic field lines closer ?

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6. In the Fig. 13.10 , identify the poles marked P and Q as north or south pole . Give reason .

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7. What is the direction of magnetic field lines of a magnet ?

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8. Identify the poles of the magnet is the given

See Fig.13.11 (i) and (ii).

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9. State the obervation made by Oerseted on the basis of his experiment with current - carrying conductors ?

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10. State the conclusion that can be draw from the observation that a current - carrying wire deflects a magnetic needle placed near it .

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11. What is the shape of magnetic field lines due to a straight current - carrying conductor ?

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12. State the rule of determine the direction of magnetic field around a current - carrying wire .

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

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14. How will the magentic field lines due to a current - carrying conductor be affected on inreasing the current in the conductor ?

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15. What happens to the magnetic field lines due to a current - carrying conductor when the current is reversed ?

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16. Where will be the value of magnetic field maximum due to current -carrying circular conductor ?

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17. Mention the region of a current - carrying solenoid where field lines are parallel straight lines .

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18. What is the shape of a current - carrying condcutor whose magnetic field patter resembles that of a bar magnet ?

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19. A current - carrying solenoid coil is suspended freely. In which direction will it settle ? Why ?

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20. What is magnetic force ?

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21. On what factors does the magnitude of force experienced by a current-carrying conductor placed normally in a magnetic field depend?

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22. When is the force experienced by a current-carrying conductor placed in a magnetic field (i) maximum, (ii) minimum ?

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23. Under what condition is the force by a current-carrying conductor placed in a magnetic field maximum ?

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24. A stationary charge is placed in a magnetic field. Will it experience a force ? Give reason to justify your answer.

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25. State the direction of magnetic field in the following diagram (refer to Fig. 13.13).

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26. Why does a current-carrying conductor experience a force when it is placed in a magnetic field ?

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27. What is the function of a galvanometer in a circuit ?

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28. What is electromagnetic induction ?

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29. Define the term 'induced current'.

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30. Write any one method to induce current in a coil.

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31. Which law gives the direction of induced current produced due to electromagnetic induction phenomenon ?

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32. Name the physical quantities which are indicated by the direction of thumb and forefinger in the Fleming's right-hand rule.

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33. Give one application of electromagnetic induction.

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34. How is the induced current in a secondary coil related to current in a primary coil ?

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35. The change in magnetic field lines in a coil is the cause of induced electric current in it. Name the underlying phenomenon.

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Short Answer Questions

1. 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.

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2. (a) Describe an activity to draw a magnetic field line outside a bar magnet from one pole to another pole.

(b) What does the degree of closenes of field lines represent ?

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3. (a) Describe an activity to show that an electric current-carrying wire behaves like a magnet.

(b) Write the rule which determines the direction of magnetic field developed around a current carrying straight conductor.

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4. Describe an activity to know the direction of magnetic field produced by a current-carrying

straight conductor. Also show that direction of magnetic field is reversed on reversing the direction of current.

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5. Describe an activity with a neat diagram to demonstrate the presence of magnetic field around a current-carrying straight conductor.

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6. Draw the pattern of magnetic field lines around a current-carrying straight conductor. How does the strength of the magnetic field produced change :

(i) with the distance from the conductor ?

(ii) with an increase in current in a conductor ?

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7. (a) Draw magnetic field lines around a current-carrying straight conductor.

(b) A compass needle is placed near a current-carrying straight conductor. State your observation for the following cases and give reasons for the same in each case :

(i) Magnitude of electric current is increased.

(ii) The compass needle is displaced away from the conductor.

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8. (a) Describe an activity to show the magnetic field lines formed by a current-

carrying circular coil.

(b) Draw the magnetic field lines due to current-carrying circular coil.

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9. 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.

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10. How will the magnetic field produced in a current-carrying circular coil change if we increase the

(i) value of current, (ii) distance from the coil

(it) number of turns of the coil ?

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11. How would the strength of magnetic field due to a current-carrying loop be affected, if:

(a) the radius of the loop is reduced to half of

its original value, and

(b) the strength of the current through the loop is doubled ? Give reason for your answer.

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12. What is a solenoid ? Draw magnetic field lines due to a current-carrying solenoid. Write three important features of the magnetic field obtained.

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

(b) Mention two ways to increase the strength of the magnetic field of a solenoid.

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14. What are permanent magnet and electromagnent ? Give two uses of each .

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15. (a) What is an electromagent ? Draw a circuit diagram to show how a soft iron piece can be transformed into an electromagnet ?

(b) State two ways by which the strenght of an electromagnet can be increased.

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16. State important characteristics of magnetic force experienced by charge moving in a

magnetic field (or a current-carrying conductor placed in a magnetic field).

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17. A metallic conductor is suspended perpendicular to the magnetic field of a horse shoe magnet. The conductor gets displaced towards left when a current is passed through it. What will happen to the displacement of the conductor if the:

(i) current through it is increased ?

(ii) horse-shoe magnet is replaced by another stronger horse-shoe magnet?

(iii) direction of current through it is reversed?

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18. (a) List four factors on which the magnitude of magnetic force acting on a moving charge in a magnetic field depend.

(b)How will a fine beam of electrons streaming in west to east direction be affected by a magnetic field directed vertically upwards ?

Explain with the help of a diagram mentioning the rule applied.

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19. Describe an activity to explain how a moving magnet can be used to generate electric current in a coil.

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20. 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.

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21. A coil of insulated copper wire is connected to a galvanometer. What would happen if a

strong bar magnet is:

(a) pushed into the coil?

(b) withdrawn from inside the coil ?

(c) held stationary inside the coil ? Give justification for each observations.

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22. 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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23. Draw a schematic diagram showing electromagnetic induction by using two coils and explain the observations.

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24. Two circular coils P and Q are kept close to each other, of which coil P carries a current. What will you observe in the galvanometer connected across the coil 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 to justify your answer in each case.

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Long Answer Questions

1. A student fixes a sheet of white paper on a drawing board. He places a bar magnet in the

centre of it. He sprinkles some iron filings uniformly around the bar magnet. Then he taps the board gently and observes that the iron filings arrange themselves in a particular pattern.

(a) Why do iron filings arrange in a pattern?

(b) What does the crowding of iron filings at the end of the magnet indicate ?

(c) What does the lines, along which the iron filings align, represent?

(d) Draw a neat diagram to show the magnetic field lines around a bar magnet.

(e) Write any two properties of magnetic field lines.

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2. A student fixes a sheet of white paper on a drawing board. He places a bar magnet in the centre of it. He sprinkles some iron filings uniformly around the bar magnet. Then he taps the board gently.

Now answer the following questions:

(i) What does the student observe ? Draw a

diagram to illustrate your answer.

(ii) Why do the iron filings arrange in such a pattern ?

(iii) What does the crowding of the iron filings at the ends of the magnet indicate ?

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3. Draw the pattern of magnetic field lines produced around a current- carrying straight conductor passing perpendicularly through a horizontal card-board.

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4. State and apply right-hand thumb rule to mark the direction of the field lines.

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5. How will the strength of the magnetic field change when the point where magnetic field is to be determined is moved away from the straight conductor ? Give reason to justify your answer.

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6. What is a solenoid ? Draw the magnetic field pattern through and around a current carrying solenoid.

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7. What does the pattern of field lines inside the solenoid indicate ? How can this field be utilised to magnetise a piece of soft iron ?

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8. What is a solenoid ? Draw the pattern of magnetic field lines of (i) a current-carrying solenoid, and (ii) a bar magnet. List two distinguishing features between the two fields.

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9. Explain an activity to show that a current-carrying conductor experiences a force when

placed in a magnetic field.

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10. (a) State the rule you would use to find the acting on a current - carrying conductor placced is a magnteic field.

(b) Name two devices based on interaction between magnetic field and current - carrying conductor.

(c) Give below are three diagram showing entry of an electron in a magnetic field.

Identify the case in which the force on electron will be maximun and minimun respectively. Give reason for you answer. Find the direction of maximum force acting on electron .

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11. A current - carrying conductor is placed in a magnetic field. Now answer the following :

(i) List the factors on which the magntiude of

force experienced by conductor depends .

(ii) When is the magnitude of this force maximum ?

(iv) State the rule whihc helps in finding the direction of motion of conductor.

(iv) If initially this force was acting from right to left, how will the direction of force change , if :

(a) direction of magnetic field is reversed ?

(b) direction of current is reversed ?

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12. State Fleming's left -hand rule .

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13. Write the princple of working of an electric motor.

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14. Explain the function fo the following parts of an electric motor :

(i) Armatur .

(ii) Brushes .

(iii) Split ring .

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15. what is electromagnetic induction?

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16. Explain the various methods of producing induced current.

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17. State the rule which gives the direction on indcued current .

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18. Name two devices which work on the principle of elctromagnetic induction.

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