2. Magnetic Effects of Electric Current

Very Short Answer Type Questions-Pg-73

1. Question

State any two properties of magnetic field lines.

Answer

The two properties of magnetic field

Lines are:

(a) the field lines start with the north pole of the magnet and ends at the south pole of the very same.

(b) the closer the field lines will be the stronger will be the magnetic field.

2. Question

What are the two ways in which you can trace the magnetic field pattern of a bar magnet?

Answer

The two ways are :

(a) with the help of a compass, as it always indicate the north pole.

(b) it can be traced by sprinkling iron dust.

3. Question

You are given the magnetic field pattern of a magnet. How will you find out from it where the magnetic field is the strongest ?

Answer

As we know, the magnetic field is Stronger where the field line is Closest. So the area with the Closest field line in the given Pattern have the strongest Magnetic field.

4. Question

State whether the following statement is true or false :

The axis of earth's imaginary magnet and the geographical axis coincide with each other.

Answer

False

The two axis do not coincide with each other as they are separated by an angle of about 17 degree.

5. Question

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

Answer

A compass needle is a small bar magnet. when it is brought near to another bar magnet their field lines interact with each other.

Hence, the compass needle shows deflection.

6. Question

Where do the manufacturers use a magnetic strip in the refrigerator? Why is this magnetic strip used?

Answer

To keep the door closed properly manufacturers use a strip of magnets at the doors of refrigerators.

7. Question

Fill in the following blanks with suitable words :

(a) Magnetic field lines leave the.....pole of a bar magnet and enter at its.....pole.

(b) The earth's magnetic field is rather like that of a ..... magnet with its.....pole in the northern hemisphere.

Answer

(a) North, south (magnetic field lines begins with north pole and end at the south pole.)

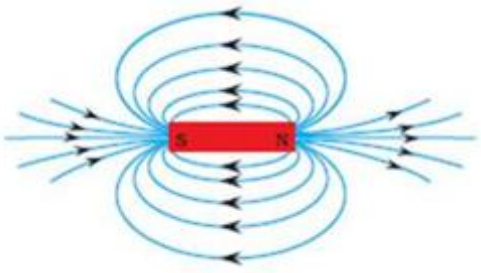
(b) bar, south.

Short Answer Type Questions-Pg-73

8. Question

Draw a diagram to show the magnetic field lines around a bar magnet

Answer



The field lines begins with north pole and ends at south pole.

9. Question

What is a magnetic field? How can the direction of magnetic field lines at a place be determined?

Answer

The area in which the force of magnet is exerted is called magnetic field line to determine the magnetic field line direction you to place a compass on a plane the direction of the needle of a compass shows the north pole, and so will be the direction of the magnetic field line which begins with the north pole and end at south pole.

10. Question

Explain why, two magnetic field lines do not intersect each other.

Answer

As a matter of fact the resultant of forces at north pole can only be in one direction. But if magnetic field lines intersect each other then the north pole will show resultant forces in two direction, which is not possible.

11. Question

When an electric current is passed through any wire, a magnetic field is produced around it. Then why an electric iron connecting cable does not attract nearby iron objects when electric current is switched on through it?

Answer

This is because, the field produced is very weak.

Long Answer Type Questions-Pg-73

12 A. Question

Define magnetic field lines. Describe an activity to draw a magnetic field line outside a bar magnet from one pole to another pole.

Answer

A magnetic field lines are lines which are drawn around the magnet and which always starts with the north pole and ending at the south pole.

Activity:

> to draw a magnetic field line around the bar magnet.

> take a bar magnet and a compass and place them on a plane over a hard sheet.

> the boundary of the marker should be marked.

> Place the compass near the north pole of the magnet. The south pole of the needle points towards the north pole of the magnet. The north pole of the compass is directed away from the north pole of the magnet.

> mark the both end of the needle.

> now move the needle to a new position such that the previously occupied north position should now occupy the south position and vice versa.

> continue this process till you the south pole of the bar magnet.

> now by joining all the points by a curve will represent the magnetic field line.

12 B. Question

Explain why, a freely suspended magnet always points in the north-south direction.

Answer

The earth itself act as a magnet .and its geographical north is in south pole and the geographical south in north pole .so a freely suspended magnet always points in north-south direction.

Multiple Choice Questions (MCQs)-Pg-73

13. Question

A strong bar magnet is placed vertically above a horizontal wooden board. The magnetic lines of force will be:

A. only in horizontal plane around the magnet

B. only in vertical plane around the magnet

C. in horizontal as well as in vertical planes around the magnet

D. in all the planes around the magnet

Answer

This is because magnet exert force in every direction.

14. Question

The magnetic field lines produced by a bar magnet :

A. originate from the south pole and end at its north pole

B. originate from the north pole and end at its east pole

C. originate from the north pole and end at its south pole

D. originate from the south pole and end at its west pole

Answer

the magnetic field line always originates from the north pole and ends at south pole.

15. Question

Which of the following is not attracted by a magnet ?

A. steel

B. cobalt

C. brass

D. nickel

Answer

because brass is an alloy.

16. Question

The magnetic field lines :

A. intersect at right angles to one another

B. intersect at an angle of 45° to each other

C. do not cross one another

D. cross at an angle of 60° to one another

Answer

magnetic field line never intersect each other.

17. Question

The north pole of earth's magnet is in the:

A. geographical south

B. geographical east

C. geographical west

D. geographical north

Answer

geographical south is in the north pole.

18. Question

The axis of earth's magnetic field is inclined with the geographical axis at an angle of about:

A. 5°

B. 15°

C. 25°

D. 35°

Answer

15°

19. Question

The shape of the earth's magnetic field resembles that of an imaginary:

A. U-shaped magnet

B. Straight conductor carrying current

C. Current-carrying circular coil

D. Bar magnet

Answer

bar magnet.

20. Question

A magnet attracts:

A. plastics

B. any metal

C. aluminium

D. iron and steel

Answer

Iron and steel shows magnetic behaviour

21. Question

A plotting compass is placed near the south pole of a bar magnet. The pointer of plotting compass will :

A. point away from the south pole

B. point parallel to the south pole

C. point towards the south pole

D. point at right angles to the south pole

Answer

The plotting compass is placed near the south pole of a bar magnet. The pointer of plotting compass will point at right angles to the south pole.

22. Question

The metallic pointer of a plotting compass gets deflected only when it is placed near a bar magnet because the pointer has :

A. electromagnetism

B. permanent magnetism

C. induced magnetism

D. ferromagnetism

Answer

The metallic pointer of a plotting compass get deflected only when it is placed near a bar magnet because the pointer has permanent magnetism.

23. Question

Which of the following statements is incorrect 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 lines

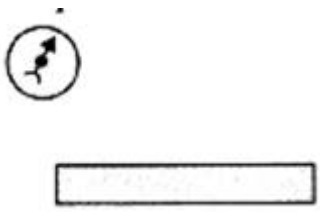
Answer

The strength of field is zero, when the magnetic field lines are equidistance and parallel.

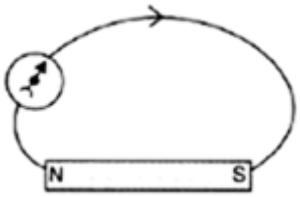
Questions Based on High Order Thinking Skills (HOTS)-Pg-74

24. Question

Copy the figure given below which shows a plotting compass and a magnet. Label the N pole of the magnet and draw the field line on which the compass lies.



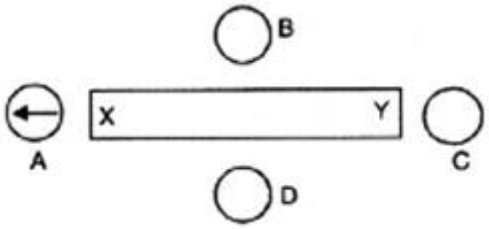
Answer



As the needle of the compass is tending to move toward the other end of the bar magnet, so the nearer end will show the north pole and the other end will show the south pole.

25 A. Question

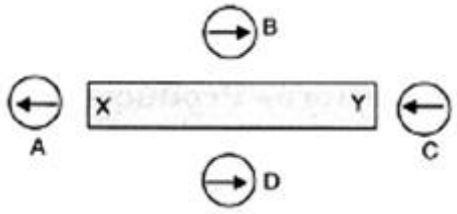
The diagram shows a bar magnet surrounded by four plotting compasses. Copy the diagram and mark in it direction of the compass needle for each of the cases B, C and D.



Answer

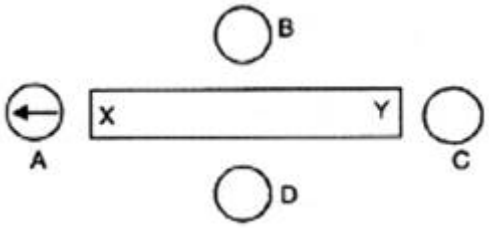
Arrows shows the direction due to the deflection.

As the



25 B. Question

Which is the north pole, X or Y ?

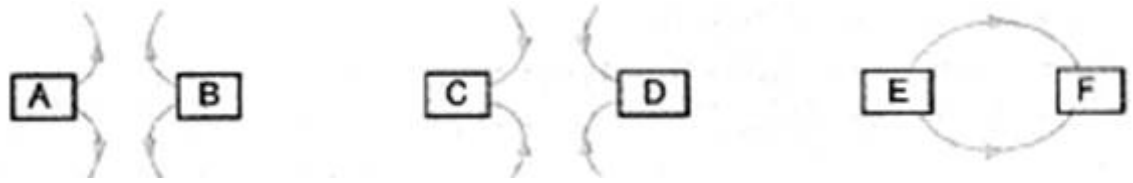


Answer

As we see in the figure, the pointer is pointing away from the magnet. It means X is the NORTH POLE

26. Question

The three diagrams in the following figure shows the lines of force (field lines) between the poles of two magnets. Identify the poles A, B, C, D, E and F.



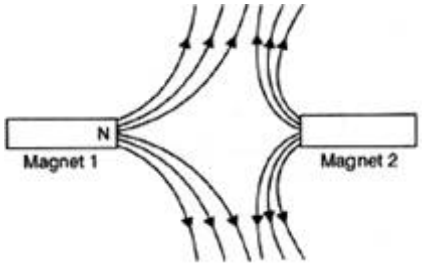
Answer

A=N, B=N, C=S, D=S, E=N, and F=S.

The field lines originate from the north pole and end at the south pole.

27. Question

The figure given below shows the magnetic field between two magnets:

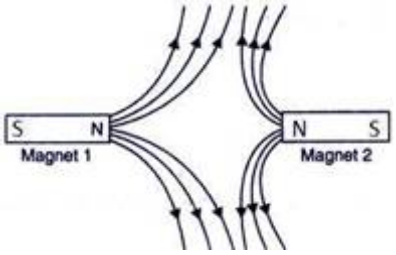


(i) Copy the diagram and label the other poles of the magnets.

(ii) Which is the weaker magnet?

Answer

(i) S-N, N-S



The field line always emits form the north pole and ends at the south pole.

(ii) Magnet 2 is the weaker magnet.

It has small magnetic field.

Very Short Answer Type Questions-Pg-81

1. Question

Which effect of current can be utilised in detecting a current-carrying wire cancelled in a wall?

Answer

magnetic effect of a current can be utilised in detecting a current carrying wire cancelled in a wall.

2. Question

What conclusion do you get from the observation that a current-carrying wire deflects a compass needle placed near it?

Answer

By the deflection of a compass needle, when placed near a current carrying wire gives a conclusion that there is a magnetic field produced around the wire.

3. Question

Name the scientist who discovered the magnetic effect of current.

Answer

Oersted, was the scientist who first discovered the magnetic effect of current.

4. Question

State qualitatively the effect of inserting an iron core into a current-carrying solenoid.

Answer

The magnetic field become very strong when the iron core is inserted into a current carrying conductor.

5. Question

Name the rule for finding the direction of magnetic field produced by a straight current-carrying conductor.

Answer

The rule for finding the direction of magnetic field produced by a straight current carrying conductor was given by Maxwell's right hand thumb rule.

6. Question

State the form of magnetic field lines around a straight current--++carrying conductor.

Answer

A concentric circle is formed around a straight current carrying conductor and its centre lies in the conductor.

7. Question

What is the other name of Maxwell's right-hand thumb rule?

Answer

Maxwell's corkscrew rule is the other name for the Maxwell's right-hand thumb rule.

8. Question

State whether the following statement is true or false:

The magnetic field inside a long circular coil carrying current will be parallel straight lines.

Answer

True, Inside a long circular coil carrying current the magnetic field lines are always parallel with each other.

9. Question

What is the shape of current-carrying conductor whose magnetic field pattern resembles that of a bar magnet?

Answer

A current carrying conductor is of solenoid shape whose magnetic field pattern seems to that of the bar magnet.

10. Question

State three ways in which the strength of an electromagnet can be increased.

Answer

The three ways are :-

(1) By increasing the number of turns in the coil.

(2) Increase the current flow in the coil.

(3) The air gaps between the poles should must be reduced.

11. Question

Fill in the following blanks with suitable words:

(a) The lines of _____ round a straight-carrying conductor are in the shape of _____

(b) For a current-carrying solenoid, the magnetic field is like that of a _____

(d) The magnetic effect of a coil can be increased by increasing the number of _____, increasing the _____ or inserting an _____ core.

(e) If a coil is viewed from one end and the current flows in an anticlockwise direction, then this end is a _____ pole.

(f) If a coil is viewed from one end, and the current flows in a clockwise direction, then this end is a _____ pole.

Answer

(a) Magnetic field, concentric circles

(b) Bar magnet

(d) Turns, current, coil

(e) North pole

(f) South pole

Explanation: (a) a concentric circle is formed by the lines of a straight current carrying conductor.

(b) when current is passes through a solenoid it starts to act as a bar magnet.

(d) by increasing the no. of turns or increasing the flow of current or inserting the coil in a core the magnetic effect can be increased.

(e) north pole is the direction, if a coil is viewed from one end and the flow of current is in anticlockwise direction.

(f) when the current flow direction is clockwise when view from one end of the coil then that end is south pole.

Short Answer Type Questions-Pg-82

12. Question

Describe how you will locate a current-carrying wire concealed in a wall.

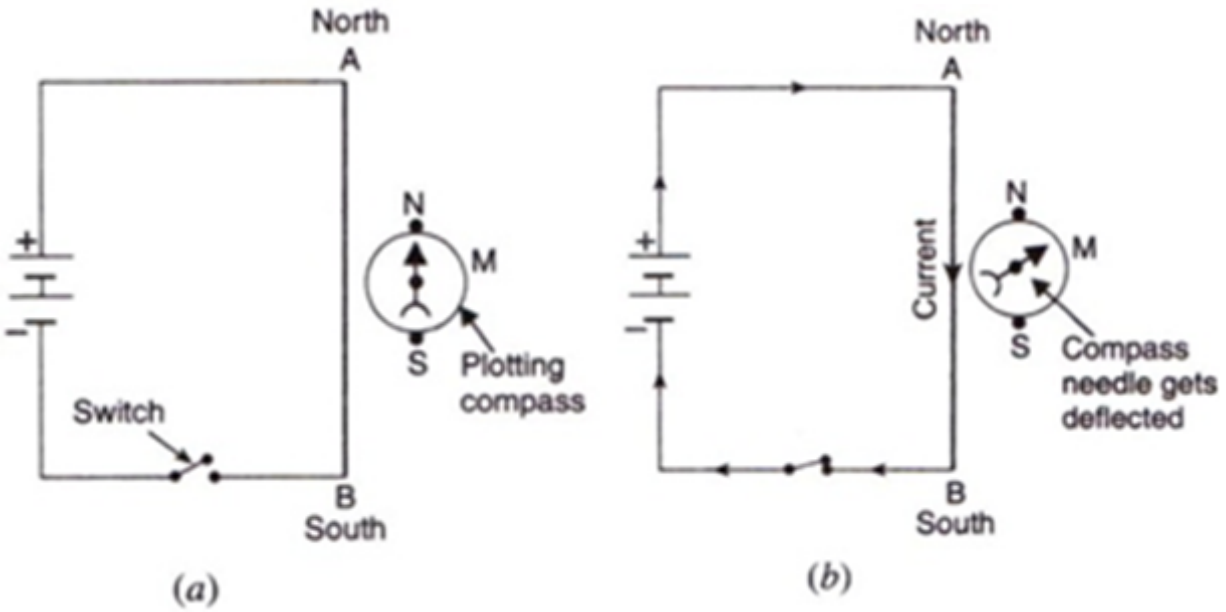
Answer

To locate a current carrying wire concealed in a wall one should use a plotting compass. by moving plotting compass on the wall the deflection in its needle shows the place where wire is concealed in the wall.

13. Question

Describe some experiment to show that the magnetic field is associated with an electric current.

Answer



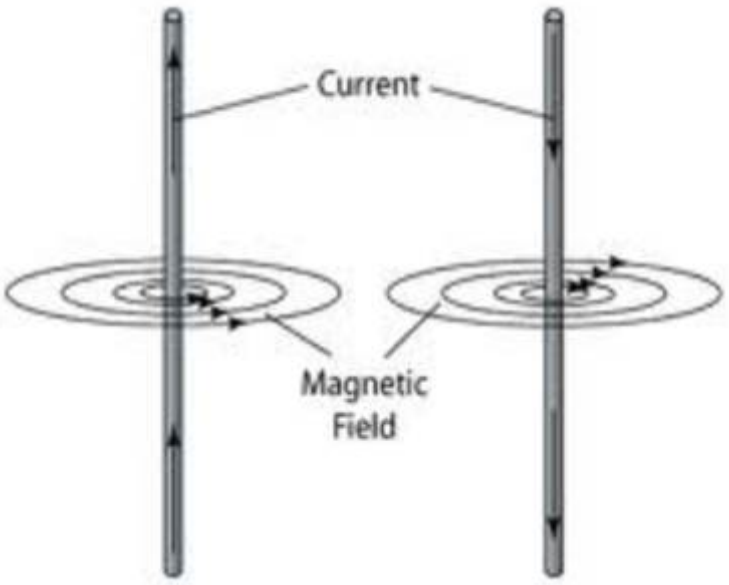
let us take a copper wire AB on a plane such that it faces North-South. Now place a plotting compass under it. connect both end to a battery with a switch to put it on and off.

When the switch is on then the plotting compass needle shows deflection. When its turned off then the compass stop showing any deflection. This shows that the magnetic field is associated with electric field.

14 A. Question

Draw a sketch to show the magnetic lines of force due to a current-carrying straight conductor.

Answer



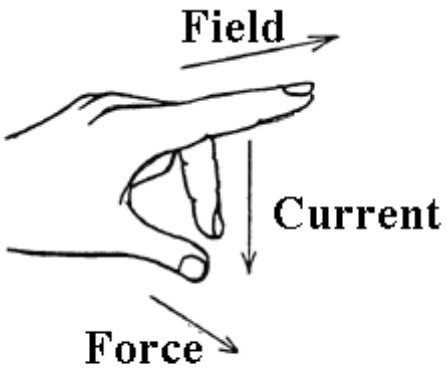
14 B. Question

Name and state the rule to determine the direction of magnetic field around a straight current-carrying conductor.

Answer

The Fleming's left rule is used to determine the direction of magnetic field around a straight current-carrying conductor. According to the rule,

The F(Thumb) represents the direction of Force of the conductorThe B(Forefinger) represents the direction of the Magnetic fieldThe I(Centre finger) represents the direction of the Current.



Fleming's Left hand rule

15. Question

State and explain Maxwell's right-hand thumb rule.

Answer

Maxwell’s right hand thumb rule. According to this law if we hold our thumb of right hand in the direction of magnetic field and close our finger then our enclosed finger shows the magnetic field line around the conductor.

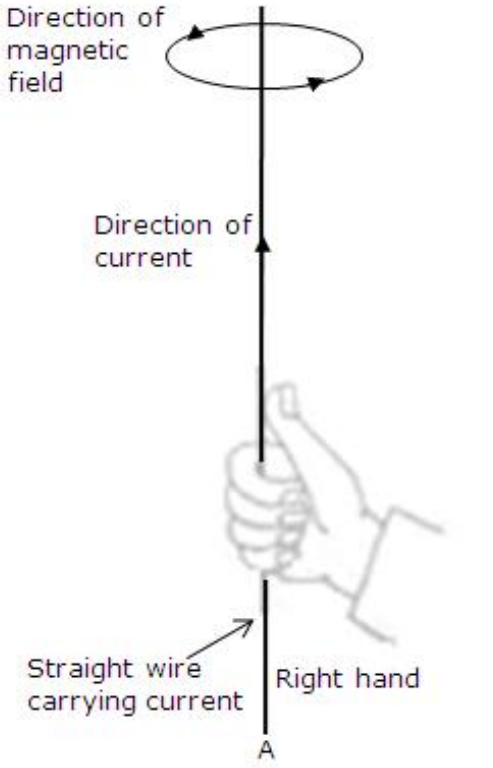


Figure : Right-hand thumb Rule to find the direction of Magnetic field

Let AB be a straight wire. Placed vertically A to B. To find the direction of magnetic field we assume that we are holding the current carrying wire in such a way that our thumb of right hand shows the direction of flow of current. Then the finger enclosing the wire. The direction in which our finger is enclosed shows the direction of magnetic field which is anticlockwise.

16. Question

What is Maxwell's corkscrew rule? For what purpose is it used?

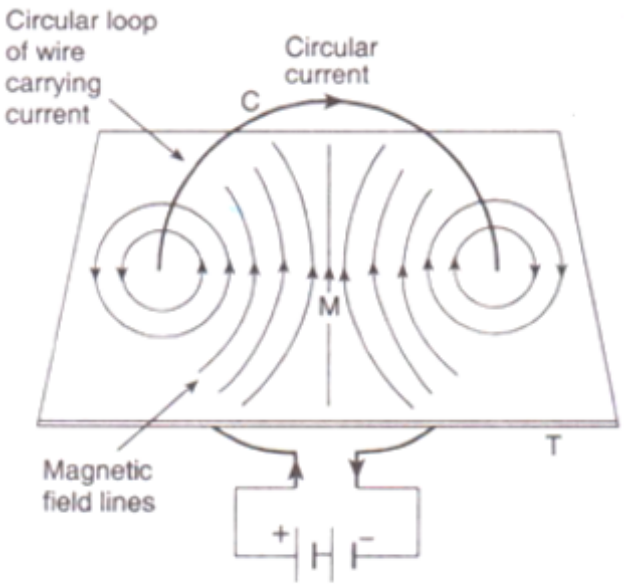
Answer

Maxwell’s right hand thumb rule is also known as Maxwell’s corkscrew rule. It is used to find out the direction of magnetic field along a straight current carrying conductor.

17 A. Question

Draw the magnetic lines of force due to a circular wire carrying current.

Answer



Magnetic lines of force due to a circular wire carrying current

17 B. Question

What are the various ways in which the strength of magnetic field produced by a current-carrying circular coil can be increased?

Answer

There are two ways of doing this :-

(1) must increase the number of turns of the coil.

(2) Must increase the current flow in the coil.

18. Question

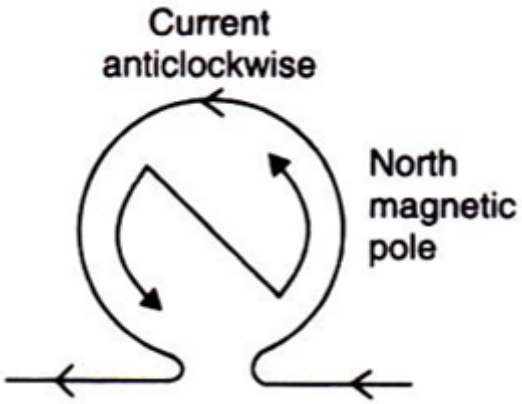
State and explain the Clock face rule for determining the polarities of a circular wire carrying current.

Answer

According to this rule, we first look at one face of the coil and if the current through the coil seems to be flowing in the clockwise direction, then that face is considered as the South pole. And if the current seems to be flowing in the anti-clockwise direction, then the face of the coil is considered as the North pole.

a) For this face of the coil, the current is flowing in the clockwise direction, so it acts as South-Pole.

b) For this face of the coil, he current if flowing in he anti-clockwise direction, so it acts as North-Pole.



19. Question

Name any two factors on which the strength of magnetic field produced by a current-carrying solenoid depends. How does it depend on these factors?

Answer

It depends on following factors:-

i) Current: Larger he current, stronger will be the magnetic field.

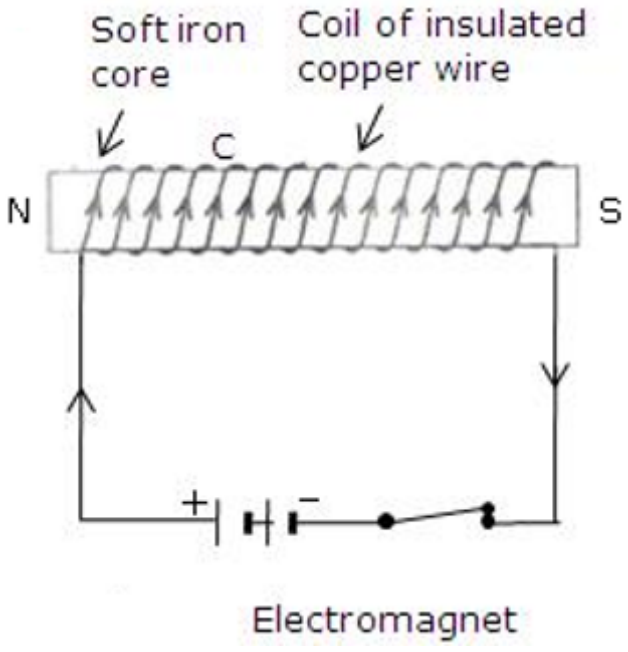
ii) Number of coils in the solenoid: Greater the number of coils in the solenoid, stronger will be the magnetic field produced.

20 A. Question

Draw a circuit diagram to show how a soft iron piece can be transformed into an electromagnet.

Answer

A coil C of insulated wire is wound around the soft iron core and the two ends of the coil are connected to a battery. This is how an electromagnet is made.



20 B. Question

Describe how an electromagnet could be used to separate copper from iron in a scrap yard.

Answer

Electromagnetic cranes are used to separate copper from iron in a scrap yard. Switch in on the curen energises the electromagnet, thus producing magnetic field. This magnetic field attracts the iron pieces, thus separating them from the copper.

21 A. Question

How does an electromagnet differ from a permanent magnet?

Answer

An electromagnet produces a temporary magnetic field which sustains till the current flows through the coils of the electromagnet, while a permanent magnet produces a permanent magnetic field.

21 B. Question

Name two devices in which electromagnets are used and two devices where permanent magnets are used.

Answer

Electromagnets are used in Electric bell and Electric motors.

Permanent magnets are used in Refrigerators doors and Toys.

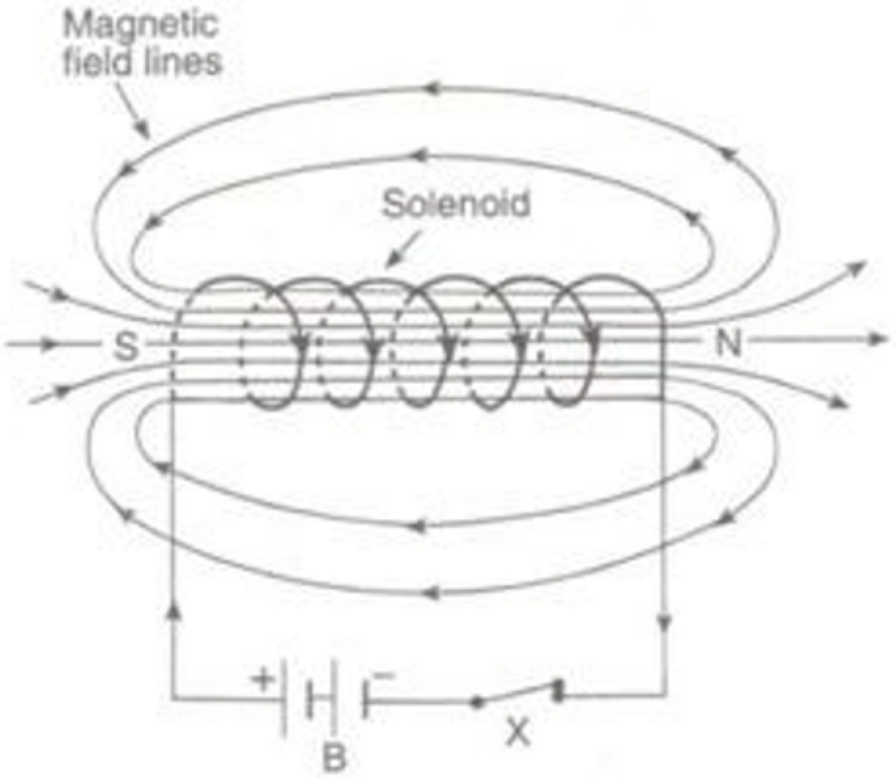
Long Answer Type Questions-Pg-82

22 A. Question

What is a solenoid? Draw a sketch to show the magnetic field pattern produced by a current-carrying solenoid.

Answer

A solenoid is a long coil containing a large number of close turns of insulated copper wire.



22 B. Question

Name the type of magnet with which the magnetic field pattern of a current-carrying solenoid resembles.

Answer

The magnetic field produced by a current carrying solenoid is similar to that produced by a bar magnet.

22 C. Question

What is the shape of field lines inside a current-carrying solenoid? What does the pattern of field lines inside a current-carrying solenoid indicate?

Answer

Magnetic field lines inside a current carrying conductors are in the form of parallel straight lines.

22 D. Question

List three ways in which the magnetic field strength of a current-carrying solenoid can be increased?

Answer

Following are the three ways of increasing the strength of the magnetic field of current carrying solenoid:

i) Increasing the current flowing through the coil of solenoid.

ii) Increasing the number of turns in he solenoid.

iii) Using soft iron core in he solenoid.

22 E. Question

What type of core should be put inside a current-carrying solenoid to make an electromagnet ?

Answer

Soft iron core should be used.

23 A. Question

What is an electromagnet? Describe the construction and working of an electromagnet with the help of a labelled diagram.

Answer

An electromagnet is called a temporary magnet because it produces magnetic field lines only when the current flows through the coil of the electromagnet. When we stop the current through the coil, the magnetic field lines diminishes.

23 B. Question

Explain why, an electromagnet is called a temporary magnet.

Answer

Soft iron core is used in the electromagnets because it loses all its magnetism when the current through the coil stops flowing. While in case of steel, there is still some magnetism even after the current stops flowing through the coil of electromagnet.

23 C. Question

Explain why, the core of an electromagnet should be of soft iron and not of steel.

Answer

The strength of electromagnet depends on the following factors:

i) Number of turns in the coil: Increasing the number of turns in the coil increase the strength of magnetic field produced by the electromagnet.

ii) Current flowing through the coil: Increasing the current flowing through the coil increases the strength of magnetic field produced.

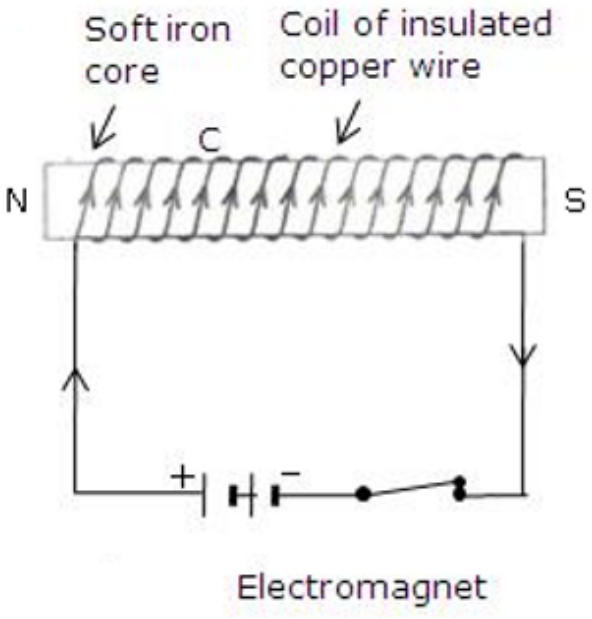
iii) Length of air gap between its poles: Decreasing he length of air gap between the poles of electromagnet increases the strength of electromagnet.

23 D. Question

State the factors on which the strength of an electromagnet depends. How does it depend on these factors ?

Answer

An electromagnet is a temporary magnet which works on the magnetic effect of the current. It consists of long coil of insulated copper wire wound around a soft iron core and he two ends of he coil are connected to a battery. As the current flows through the coil, the magnetic field lines ae produced. These field lines sustains till the current continues to flow through the coil of electromagnet.



23 E. Question

Write some of the important uses of electromagnets

Answer

Electromagnets are used in several devices such as Electric bell, Electric motors, Loudspeakers, etc. They are also used by doctors to remove iron or steel particles from patient's eyes and to remove iron pieces from wounds.

Multiple Choice Questions (MCQs)-Pg-83

24. Question

The strength of the magnetic field between the poles of an electromagnet would be unchanged if :

A. current in the electromagnet winding were doubled

B. direction of current in electromagnet winding were reversed

C. Distance between the poles of electromagnet were doubled

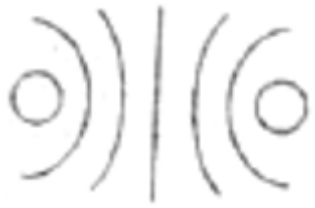
D. material of the core of electromagnet were changed

Answer

the strength of the magnetic field between the poles of an electromagnet would be unchanged if the direction of current in electromagnet winding were reversed.

25. Question

The diagram given below represents magnetic field caused by a current-carrying conductor which is:



A. a long straight wire

B. a circular coil

C. a solenoid

D. a short straight wire

Answer

the diagram represents the magnetic field caused by a circular current carrying conductor.

26. Question

The magnetic 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

the magnetism inside a long straight solenoid remains same at every point.

27. Question

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

the magnetic field near a long straight wire consists of concentric circles centred on the wire.

28. Question

The north-south polarities of an electromagnet can be found easily by using:

A. Fleming’s right-hand rule

B. Fleming’s left-hand rule

C. Clock face rule

D. Left-hand thumb rule

Answer

the north-south polarities of an electromagnet can be found easily by using clock face rule.

29. Question

The direction of current in the coil at one end of an electromagnet is clockwise. This end of the electromagnet will be:

A. north pole

B. east pole

C. south pole

D. west pole

Answer

the direction of current in the coil at one end of an electromagnet is clockwise then that end is south pole.

30. Question

If the direction of electric current in a solenoid when viewed from a particular end is anticlockwise, then this end of solenoid will be:

A. west pole

B. south pole

C. north pole

D. east pole

Answer

the direction of electric current is anticlockwise when viewed form the north pole.

31. Question

The most suitable material for making the core of an electromagnet is:

A. soft iron

B. brass

C. aluminium

D. steel

Answer

soft iron is mostly used for making the core of the electromagnet.

32. Question

The magnetic effect of current was discovered by:

A. Maxwell

B. Fleming

C. Oersted

D. Faraday

Answer

the magnetic effect of the current was discovered by Oersted.

33. Question

A soft iron bar is inserted inside a current-carrying solenoid. The magnetic field inside the solenoid:

A. will decrease

B. will increase

C. will become zero

D. will remain the same

Answer

when soft iron bar is inserted inside a current carrying solenoid then it increases the magnetic field inside the solenoid.

34. Question

The magnetic field lines in the middle of the current-carrying solenoid are :

A. circles

B. spirals

C. parallel to the axis of the tube

D. perpendicular to the axis of the tube

Answer

the magnetic field lines in the middle of the current carrying solenoid are parallel to the axis of the tube.

35. Question

The front face of a circular wire carrying current behaves like a north pole. The direction of current in this face of the circular wire is:

A. clockwise

B. downwards

C. anticlockwise

D. upwards

Answer

When the front face of a circular wire carrying current behaves like north pole ,then the direction of current in this field is anticlockwise.

36. Question

The back face of a circular loop of wire found to be south magnetic pole. The direction of current in this face of the circular loop of wire will be:

A. towards south

B. clockwise

C. anticlockwise

D. towards north

Answer

The back face of a circular loop of wire found to be south magnetic pole .the direction of the current in this face is clockwise.

Questions Based on High Order Thinking Skills (HOTS)-Pg-84

37. Question

In the straight wire A, current is flowing in the vertically downward direction whereas in wire B the current is flowing in the vertically upward direction. What is the direction of magnetic field:

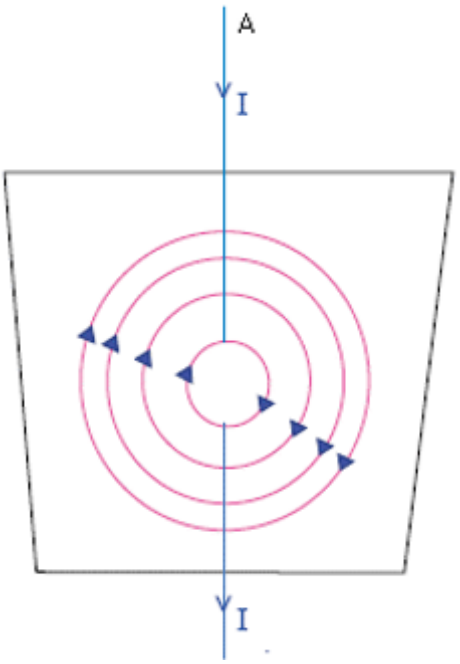
(a) in wire A?

(b) in wire B?

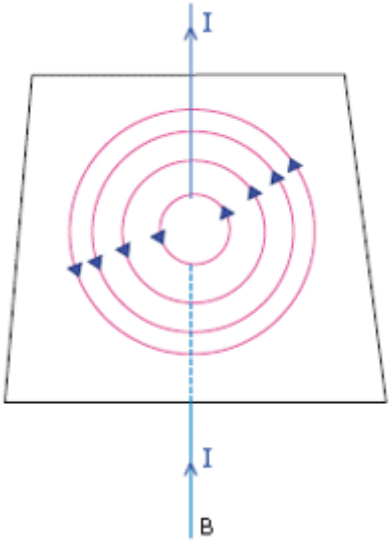
Name the rule which you have used to get the answer.

Answer

(a) Clockwise would be the direction of magnetic field in wire A.



(b) the direction of the magnetic field in the wire B is anticlockwise.



Maxwell's right hand thumb rule.

38. Question

The figure shows a solenoid wound on a core of soft iron. Will the end A be a N pole or S pole when the current flows in the direction shown?

Answer

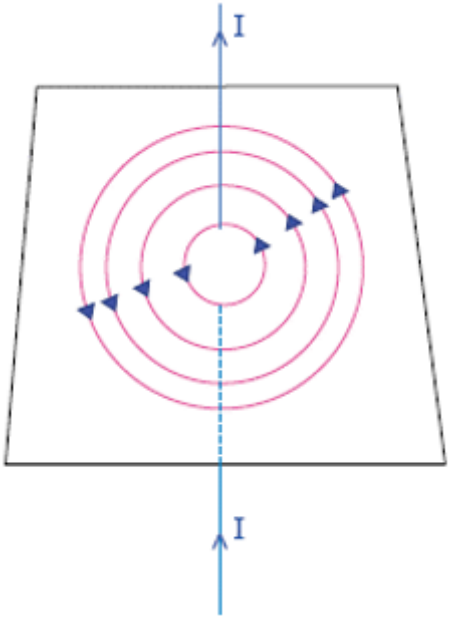
According to the fig. end a is the south pole as the direction of the current flow is clockwise from this end.

39. Question

A current-carrying straight wire is held in exactly vertical position. H the current passes through this wire in the vertically upward direction, what is the direction of magnetic field produced by it? Name the rule used to find out the direction of magnetic field.

Answer

The direction of the current flow is anticlockwise. This can be determined by using Maxwell's right hand thumb rule.

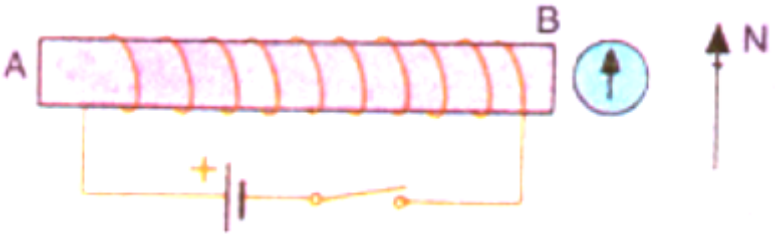


40. Question

For the coil in the diagram below, when the switch is pressed:

(a) What is the polarity of end A?

(b) Which way will the compass point then?



Answer

(a) End A becomes south pole. This is because from the end at the current flows in clockwise direction.

(b) The movement of the compass needle is away form the end B. As end B is the north pole.

41. Question

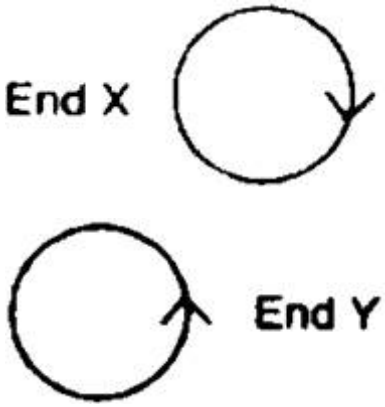
A current flows downwards in a wire that passes vertically through a table top. Will the magnetic field lines around it go clockwise or anticlockwise when viewed from above the table?

Answer

According to the Maxwell's right hand thumb rule the direction of the magnetic field will be in clockwise direction.

42. Question

The directions of current flowing in the coil of an electromagnet at its two ends X and Y are as shown below:



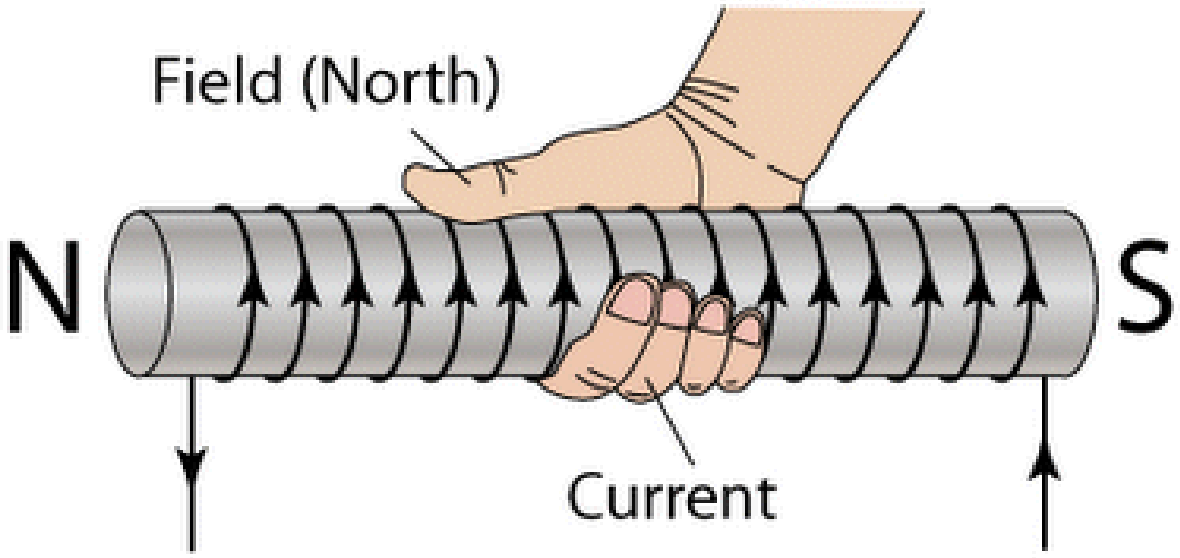
(a) What is the polarity of end X?

(b) What is the polarity of end Y?

(c) Name and state the rule which you have used to determine the polarities.

Answer

The easy way to find the polarity is right-hand rule: " If the current flows in the direction of your fingers, the thumb points towards the north pole".



If we assume an electromagnet which has two ends i.e. X and Y, then,(a) South is the polarity of end X as direction of current flow from that end is clockwise.

(b) The end Y will be the north pole as the current flow from this end shows the anticlockwise direction.

(c) The rule used here to find the polarity of the ends is clock face rule. According to this rule if the face from where it is being observed is showing the flow of current in anticlockwise direction

then that end is N-pole but if the same face shows the flow of current in a clockwise direction then that end becomes S-pole.

43. Question

The magnetic field associated with a current-carrying straight conductor is in anticlockwise direction. H the conductor was held along the east-west direction, what will be the direction of current through it? Name and state the rule applied to determine the direction of current?

Answer

East to west will be the direction of the current.

According to the Maxwell's right hand thumb rule if the enclosed fingers shows the direction of the magnetic field then the thumb will always point in the direction of current flow.

44. Question

A current-carrying conductor is held in exactly vertical direction. In order to produce a clockwise magnetic field around the conductor, the current should be passed in the conductor:

(a) from top towards bottom

(b) from left towards right

(c) from bottom towards top

(d) from right towards left

Answer

(a) the current should be passed from top to bottom to produce a clockwise magnetic field around the conductor.

45. Question

A thick wire is hanging from a wooden table. An anticlockwise magnetic field is to be produced around the wire by passing current through this wire by using a battery. Which terminal of the battery should be connected to the:

(a) top end of wire?

(b) bottom end of wire?

Answer

the direction desired to pass the current is upward.

Very Short Answer Type Questions-Pg-91

1. Question

What happens when a current-carrying conductor is placed in a magnetic field?

Answer

When a conductor is placed in a magnetic field then a mechanical force is exerted on the conductor, which eventually make the conductor move.

2. Question

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

Answer

The force experienced by a current carrying conductor is largest when it is placed at right angle in a magnetic field.

3. Question

In a statement of Fleming's left-hand rule, what do the following represent?

(a) direction of centre finger.

(b) direction of forefinger.

(c) direction of thumb.

Answer

(a) By Fleming’s left hand rule direction of centre finger represent the current.

(b) Direction of the forefinger in the Fleming’s left hand rule represents the magnetic field.

(c) Force acting on the conductor is represented by the direction of thumb in Fleming’s left hand rule.

4. Question

Name one device which works on the magnetic effect of current.

Answer

The device which work on the magnetic effect of current is electric bell. Electric bell works when electromagnetism is produced.

5. Question

Name the device which converts electrical energy into mechanical energy.

Answer

Electrical motor is used to convert electrical energy in to mechanical energy.

6. Question

A motor converts one form of energy into another. Name the two forms.

Answer

A motor converts electrical energy into mechanical energy. So the two forms are electrical and mechanical.

7. Question

State whether the following statement is true or false:

An electric motor converts mechanical energy into electrical energy.

Answer

False, because electric motor is used to convert electrical energy in to mechanical energy.

8. Question

For Fleming's left-hand rule, write down the three things that are 90° to each other, and next to each one write down the finger or thumb that represents it.

Answer

The three things that are 90° to each other, and next to each, and next to each one are:-

Current- it is denoted by the direction of the centre finger.

Magnetic field- ii is denoted by the direction of the fore finger.

Force or motion- it is denoted by the thumb.

9. Question

Name the device which is used to reverse the direction of current in the coil of a motor.

Answer

Commutator is used to reverse the direction of current in the coil of a motor.

10. Question

What is the other name of the split ring used in an electric motor?

Answer

Commutator is the other name for the split ring which is used in the coil of a motor.

11. Question

What is the function of a commutator in an electric motor?

Answer

Its function is to reverse the current every time it reaches the vertical position in the coil.

12. Question

Of what substance are the brushes of an electric motor made ?

Answer

The brushes of an electrical motor are made of carbon.

13. Question

Of what substance is the core of the coil of an electric motor made?

Answer

The core of the coil of an electric motor is made of soft iron.

14. Question

In an electric motor, which of the following remains fixed and which rotates with the coil?

Commutator; Brush

Answer

The part of the electric motor which remain fixed is brush and the part which rotate with the coil is commutator.

15. Question

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

Answer

Every time in a revolution when the coil passes the vertical position the split ring is there to reverse the current.

16. Question

Fill in the following blanks with suitable words:

(a) Fleming's Rule for the motor effect uses the ..... hand.

(b) A motor contains a kind of switch called a ..... which reverses the current every half ..... .

Answer

(a) Left

Fleming’s rule for the motor effect uses the left hand.

(b) Commutator; rotation

a motor contains a kind of switch called a commutator which reverse the current every half rotation.

Short Answer Type Questions-Pg-91

17 A. Question

A current-carrying conductor is placed perpendicularly in a magnetic field. Name the rule which can be used to find the direction of force acting on the conductor.

Answer

Fleming’s left hand rule can be used to find the direction of force acting on the conductor.

17 B. Question

State two ways to increase the force on a current-carrying conductor in a magnetic field.

Answer

The two ways are:-

(1) by increasing the flow of current.

(2) by increasing the strength of the magnetic field.

17 C. Question

Name one device whose working depends on the force exerted on a current-carrying coil placed in a magnetic field.

Answer

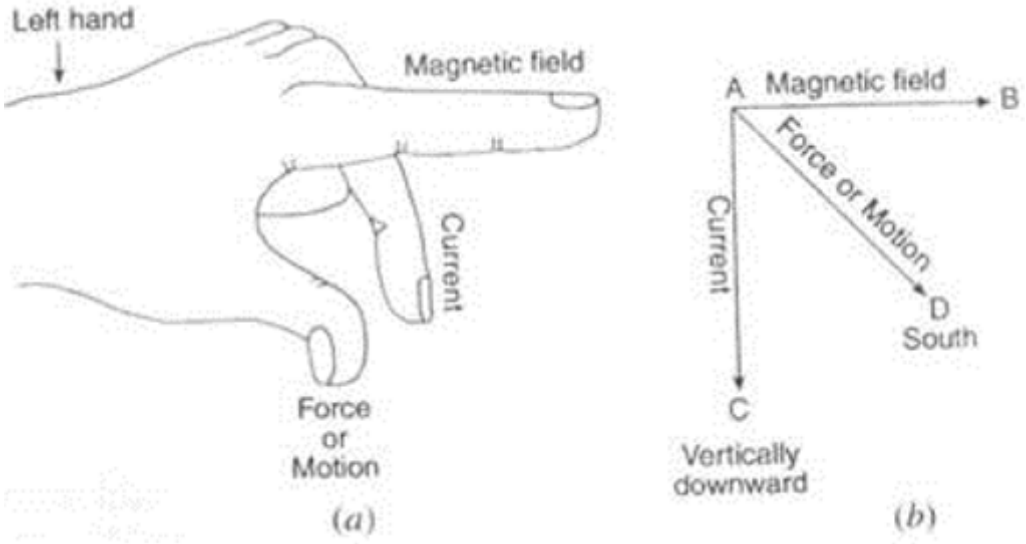
Electric motor is the device whose working depends on the force exerted by a current carrying conductor.

18. Question

State Fleming's left-hand rule. Explain it with the help of labelled diagrams.

Answer

Fleming’s left hand rule says that the centre finger shows the direction of the current, the fore finger represents the direction of the magnetic field and the thumb shows the direction of force or motion.



19. Question

What is the principle of an electric motor? Name some of the devices in which electric motors are used.

Answer

The principle on which the electric motor work says that if a rectangular current carrying coil is placed in a magnetic field, a force act on it which make it to rotate continuously.

Some of the devices using electric motors are:- electric fans, washing machine, mixer, grinder, etc.

20 A. Question

In a d.c. motor, why must the current to the coil be reversed twice during each rotation ?

Answer

To make the coil rotate continuously in the same direction, the current to coil in most of the d.c motor reversed twice during each rotation.

20 B. Question

What device reverses the current?

Answer

The device which reverse the current is known as commutator.

21 A. Question

State what would happen to the direction of rotation of a motor if :

(i) the current were reversed

(ii) the magnetic field were reversed

(iii) both current and magnetic field were reversed simultaneously.

Answer

(i) When the current were reversed then in that case the rotation of the motor would be reversed.

(ii) When the magnetic field were reversed then in that case the rotation of the motor would reverse.

(iii) When both the current and magnetic field were reversed simultaneously then in that case the rotation of the motor remains same or unchanged.

21 B. Question

In what ways can a motor be made more powerful?

Answer

To make a motor more powerful it is necessary to increase the number of turns on the coil in the motor.

Long Answer Type Questions-Pg-92

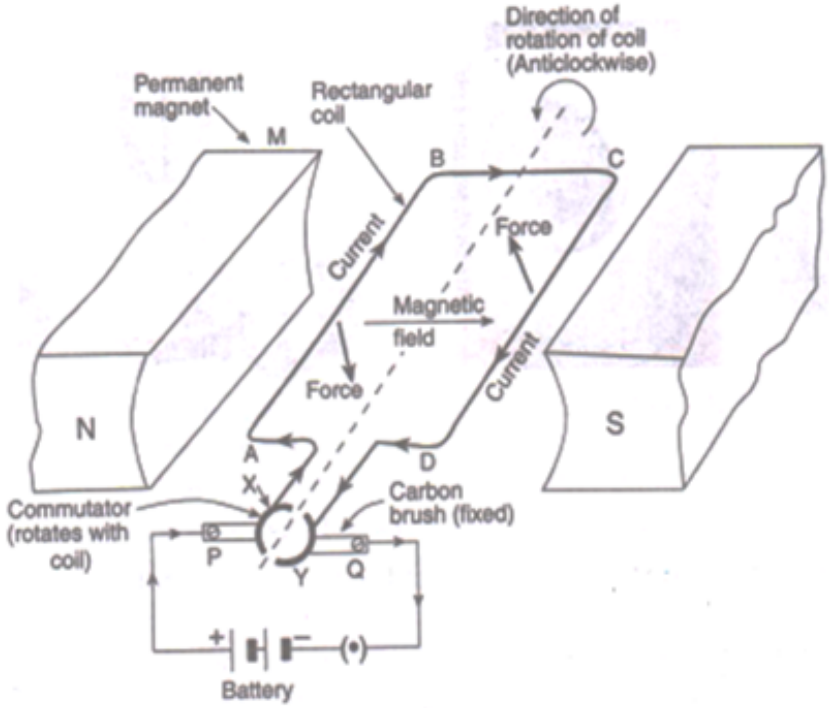
22 A. Question

What is an electric motor? With the help of a labelled diagram, describe the working of a simple electric motor.

Answer

It is device used for the conversion of electrical energy in to mechanical energy.

The working of a simple electric motor



Initially, the coil ABCD is in the horizontal position. On pressing the switch, current enters the coil through carbon brush P and commutator half ring X. The current flows in the direction ABCD and leaves via ring Y and brush Q. The direction of magnetic field is from N pole to S pole of the magnet. According to Fleming's left-hand rule, the force on sides AB and CD is in the downward and upward directions respectively. This makes the coil ABCD move in the anticlockwise direction.

When the coil reaches vertical position, then the brushes P and Q will touch the gap between the two commutator rings and current is cut off. But the coil does not stop rotating as it has already gained momentum. When the coil goes beyond the vertical position, the side CD comes on the left side and side AB comes to the right side, and the two commutator rings change contact from one brush to the other. This reverses the direction of current in the coil, which in turn reverses the direction of forces acting on the sides AB and CD of the coil. The side CD is pushed down and side AB is pushed up. Thus, the coil rotates anticlockwise by another half rotation.

The reversing of current in the coil is repeated after every half rotation due to which the coil (and its shaft) continues to rotate as long as current from the battery is passed through it. The rotating shaft of electric motor can drive a large number of machines which are connected to it.

22 B. Question

What are the special features of commercial electric motors?

Answer

the special features of commercial electric motors are:-

i. the coil is wound on a soft iron core. This increases the strength of magnetic field, which makes the motor more powerful.

ii. the coil contains a large number of turns of insulated copper wire.

iii. a powerful electromagnet is used in place of permanent magnet.

Multiple Choice Questions (MCQs)-Pg-92

23. Question

In an electric motor, the direction of current in the coil changes once in each:

A. two rotations

B. one rotation

C. half rotation

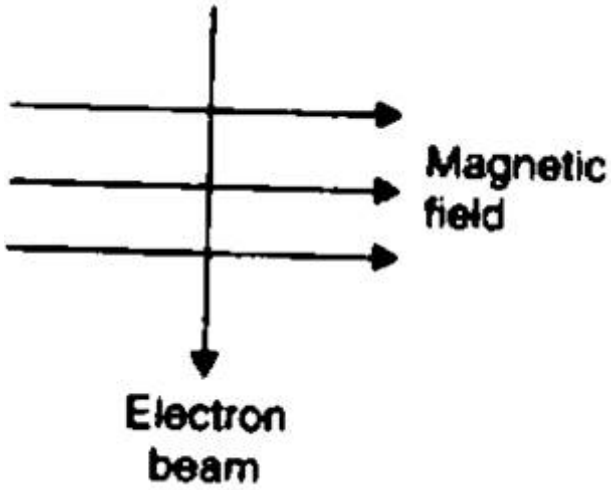
D. one-fourth rotation

Answer

In an electric motor, the direction of current in the coil changes once in half rotation.

24. Question

An electron beam enters a magnetic field at right angles to it as shown in the Figure.



The direction of force acting on the electron beam will be:

A. to the left

B. to the right

C. into the page

D. out of the page

Answer

The direction of force acting on the electron beam will be into the page.

25. Question

The force experienced by a current-carrying conductor placed in a magnetic field is the largest when the angle between the conductor and the magnetic field is:

A. 45°

B. 60°

C. 90°

D. 180°

Answer

The force experienced by a current carrying conductor placed in a magnetic field is the largest when the angle between the conductor and the magnetic field is 90°

26. Question

The force exerted on a current-carrying wire placed in a magnetic field is zero when the angle between the wire and the direction of magnetic field is:

A. 45°

B. 60°

C. 90°

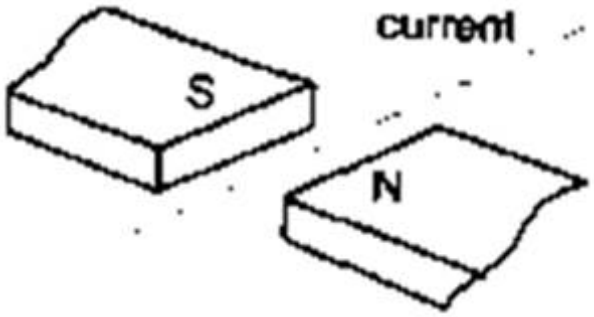
D. 180°

Answer

The force exerted on a current carrying wire placed in a magnetic field is zero when the angle between the wire and the direction of magnetic field is 180°.

27. Question

A current flows in a wire running between the S and N poles of a magnet lying horizontally as shown in Figure below:



The force on the wire due to the magnet is directed:

A. from N to S

B. from S to N

C. vertically downwards

D. vertically upwards

Answer

A current flows in a wire running between the S and N poles of a magnet lying horizontally then the force on the wire due to the magnet is directed vertically downward.

28. Question

An electric motor is a device which transforms:

A. mechanical energy to electrical energy

B. heat energy to electrical energy

C. electrical energy to heat energy only

D. electrical energy to mechanical energy

Answer

An electric motor is a device which transform electrical energy into mechanical energy.

29. Question

A magnetic field exerts no force on:

A. an electric charge moving perpendicular to its direction

B. an unmagnetized iron bar

C. a stationary electric charge

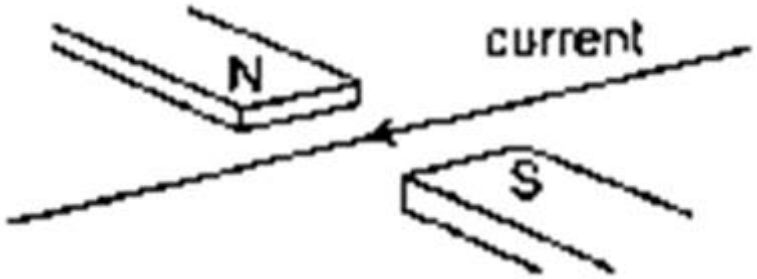
D. a magnet

Answer

A magnetic field exert force on a stationary electric charge.

30. Question

A horizontal wire carries a current as shown in Figure below between magnetic poles N and S:



Is the direction of the force on the wire due to the magnet:

A. in the direction of the current

B. vertically downwards

C. opposite to the current direction

D. vertically upwards

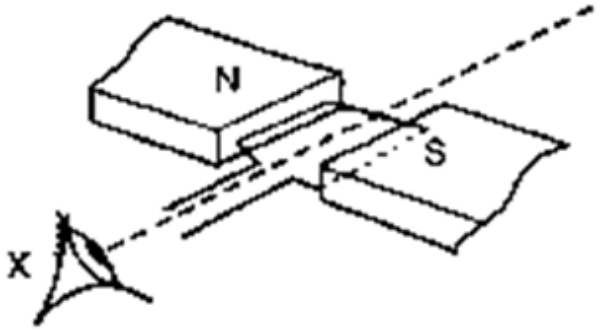
Answer

The direction of the force on the wire due to the magnet is vertically upwards.

Questions Based on High Order Thinking Skills (HOTS)-Pg-93

31. Question

In the simple electric motor of figure given below, the coil rotates anticlockwise as seen by the eye from the position X when current flows in the coil.



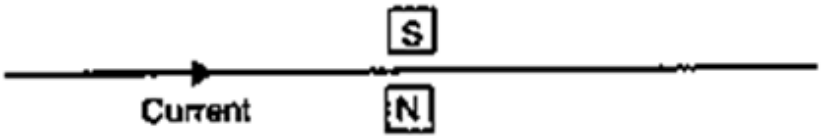
Is the current flowing clockwise or anticlockwise around the coil when viewed from above?

Answer

Clockwise direction is observed when seen form above. this can be observed by the Fleming's left hand rule.

32. Question

Which way does the wire in the diagram below tend to move?



Answer

The direction of the wire is to move in the upward direction by the virtue of Fleming's left hand rule.

33. Question

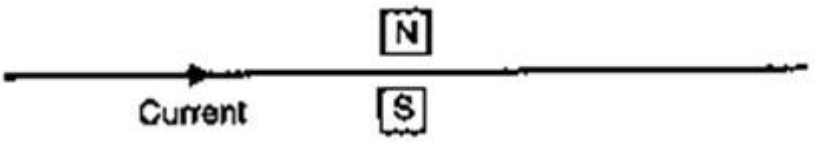
H the current in a wire is flowing in the vertically downward direction and a magnetic field is applied from west to east, what is the direction of force on the wire?

Answer

H the current in a wire is flowing in the vertically downward direction and a magnetic field is applied from west to east, the direction of force on the wire is due south.

34. Question

Which way does the wire in the diagram below tend to move?



Answer

The movement of the wire is in the downward direction, by the virtue of Fleming's left hand rule.

35. Question

What is the force on a current-carrying wire that is parallel to a magnetic field? Give reason for your answer.

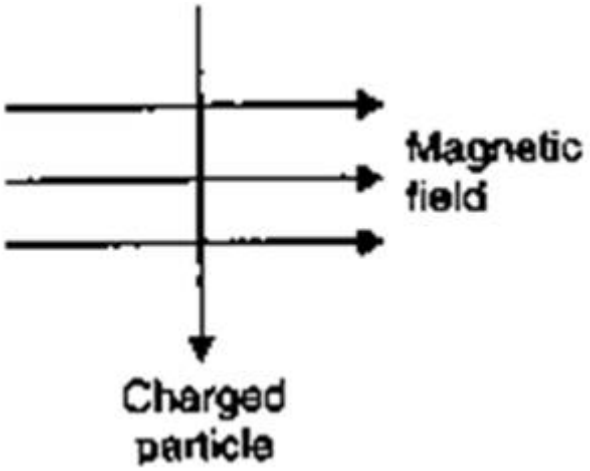
Answer

The force on a current carrying wire that is parallel to a magnetic field will be zero.

This is because the magnitude of force depends on the sin of the angle between the direction of current and the direction of magnetic field, so if the current carrying wire is held parallel to the magnetic field, the force will be zero.

36. Question

A charged particle enters at right angles into a uniform magnetic field as shown:



What should be the nature of charge on the particle if it begins to move in a direction pointing vertically out of the page due to its interaction with the magnetic field?

Answer

The nature of charge on the particle if it begins to move in a direction pointing vertically out of the page due to its interaction with the magnetic field, will be positively charged.

Very Short Answer Type Questions-Pg-102

1. Question

Name the device which converts mechanical energy into electric energy.

Answer

The device which converts mechanical energy into electric energy is electric generator.

2. Question

Out of an A.C. generator and a D.C. generator:

(a) which one uses a commutator (split rings)?

(b) which one uses slip rings?

Answer

(a) D.C generator uses split rings.

(b) A.C generator uses slip rings.

3. Question

Name the phenomenon which is made use of in an electric generator.

Answer

The phenomenon which is made use of in an electric generator is electromagnetic induction.

4. Question

Name the rule which gives the direction of induced current.

Answer

the rule which gives the direction of induced current is Fleming's left hand rule.

5. Question

What condition is necessary for the production of current by electromagnetic induction?

Answer

A relative motion between the wire and the magnet is necessary for the production of current by electromagnetic induction.

6. Question

What type of generator is used at Power Stations?

Answer

A.C. generator (or Alternator) is used at Power Stations.

7. Question

What change should be made in an a.c. generator so that it may become a d.c. generator?

Answer

change should be made in an a.c. generator so that it may become a d.c. generator is :-

1) replace the slip rings of an AC generator by a commutator.

8. Question

State whether the following statements are true or false:

(a) A generator works on the principle of electromagnetic induction.

(b) A motor works on the principle of electromagnetic induction.

Answer

(a) True, Electromagnetic induction is necessary for the working of a generator.

(b) False, Electromagnetic induction principle is for electric generator but not for motor.

9. Question

What is the function of brushes in an electric generator?

Answer

To transfer the current from coil to load is the function of brushes in the electric generator.

10. Question

When a wire is moved up and down in a magnetic field, a current is induced in the wire. What is this phenomenon known as?

Answer

When a wire is moved up and down in a magnetic field, a current is induced in the wire. this phenomenon known as Electro-magnetic induction.

11. Question

When current is 'switched on' and 'switched off' in a coil, a current is induced in another coil kept near it.

What is this phenomenon known as?

Answer

When current is 'switched on' and 'switched off' in a coil, a current is induced in another coil kept near it. this phenomenon known as Electromagnetic induction.

12. Question

What is the major difference between the simple alternator and most practical alternators?

Answer

The major difference between the simple alternator and most practical alternators is,

Simple alternator: Magnet fixed and coil rotates; Practical alternator: Coil fixed and magnet rotates .

13. Question

Why are Thermal Power Stations usually located near a river?

Answer

To obtain water for making steam for turning turbines and for cooling spent steam to condense it back into hot water for making fresh steam Thermal Power Stations usually located near a river.

14. Question

List three sources of magnetic fields.

Answer

Three sources of magnetic fields are, Permanent magnets; Electromagnets ; Conductors carrying current (such as straight wire, circular coil and solenoid carrying current) .

15. Question

Complete the following sentence :

A generator with commutator produces.....current.

Answer

A generator with commutator produces **direct** current.

Short Answer Type Questions-Pg-103

16. Question

Two circular coils A and B are placed close to each other. If the current in coil A is changed, will some current be induced in the coil B? Give reason for your answer.

Answer

If the current in coil A is changed then Yes, some current will be induced in the coil B because of change in magnetic field through the coil B due to change in current in coil A. This is called electromagnetic induction.

17 A. Question

Explain the principle of an electric generator.

Answer

when a straight conductor is moved in a magnetic field, then current is induced in the conductor is the principle on which electric generator works.

17 B. Question

State two ways in which the current induced in the coil of a generator could be increased.

Answer

two ways in which the current induced in the coil of a generator could be increased are:-

(i) by rotating the coil faster

(ii) by using a coil with a larger area

18 A. Question

What is the difference between alternating current and direct current?

Answer

DC flows in one direction only while AC reverses direction after equal intervals of time is the difference between alternating current and direct current and also,

(i) DC current remains same with time in its value and direction.

(ii) AC current changes with time and changes its direction every time after a certain interval of time.

18 B. Question

What type of current is given by

(i) a dry cell, and

(ii) a Power House generator?

Answer

(i) A dry cell gives dc current.

(ii) A Power House generator gives ac current.

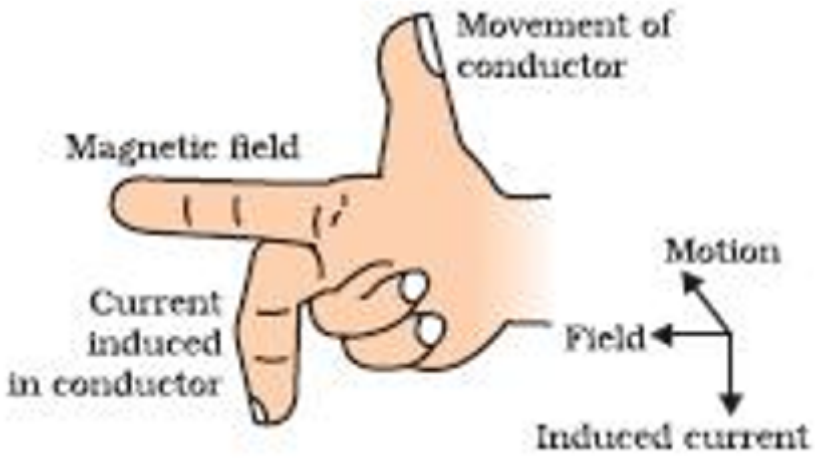
19. Question

State and explain Fleming's right hand rule.

Answer

Fleming’s right hand rule gives the direction of induced current produced in a straight conductor moving in a magnetic field.

According to Fleming's right hand rule: Hold the thumb, the fore finger and the centre finger of your right-hand at right angles to one another. Adjust your hand in such a way that forefinger points in the direction of magnetic field, and thumb points in the direction of motion of conductor, then the direction in which centre finger points, gives the direction of induced current in the conductor.



20. Question

Name and state the rule to find the direction of:

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

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

Answer

(a) current induced in a coil due to its rotation in a magnetic field is stated by Fleming's right hand thumb rule.

(b) Force experienced by a current-carrying straight conductor placed in a magnetic field which is perpendicular to it is stated by Fleming's left hand rule.

21 A. Question

In what respect does the construction of an A.C. generator differ from that of a D.C. generator?

Answer

The construction of an A.C. generator differs from a D.C. generator in the following ways:-

S.no	Property	DC Generator	AC Generat
1.	Definition	A DC generator converts mechanical energy into electrical energy in the form of DC current	An AC generator conv mechanical energy in energy in the form of
2.	Construction	In a DC generator, the coil through which the current flows rotates under the influence of the uniform magnetic field produced by a pair of fixed permanent magnets.	In an AC generator, tl through which the cu remains stationary wl permanent magnet ro
3.	Direction of Current	In a DC generator, the current is produced only one direction.	In an AC generator, tl polarity is reversed p
4.	Parts	A DC generator consists of a stationary permanent magnet and a rotating coil. It also has a commutator and brushes for the transmission of generated current	On the contrary, the A generator has no com has a rotor and stator on the principle of electromagnetic indu
5.	Maintainence	DC generators demands frequent maintenance and are less reliable.	AC generators requir very less maintenanc extremely reliable.
6.	Cost	DC generator is relatively cheaper	The initial cost of an A generator is high.
7.	Efficiency	Dc generator is usually less efficient due to frequent sparking during transmission and several other losses like eddy-current, hysteresis etc.	AC generator is quite and incur less loses c DC generator.

21 B. Question

What normally drives the alternators in a Thermal Power Station? What fuels can be used to heat water in the boiler?

Answer

High pressure steam normally drives the alternators in a Thermal Power Station.

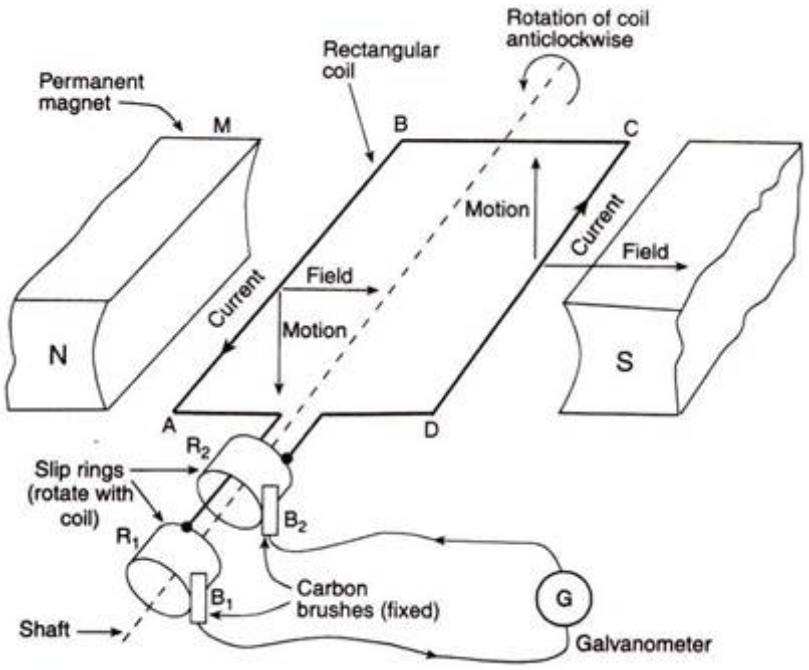
Fuels can be used to heat water in the boiler are Coal; Natural gas; Oil.

Long Answer Type Questions-Pg-103

22. Question

Draw the labelled diagram of an A.C. generator. With the help of this diagram, explain the construction and working of an A.C. generator.

Answer



Construction:

AC generator consists of a rectangular coil ABCD which can be rotated fastly between the poles N and S of a strong horseshoe-type permanent magnet M. The coil is made of a large number of turns of insulated copper wire. The two ends A and D of the coil are connected to two circular pieces of copper metal called slip rings R1 and R2. As the slip rings rotate with the coil, the two fixed pieces of carbon called brushes, B1 and B2, keep contact with them. So, the current produced in the rotating coil can be tapped out through slip rings into the carbon brushes. The outer ends of carbon brushes are connected to a galvanometer to show the flow of current in the external circuit.

Working:

Let us assume the coil ABCD, which is at the start in the horizontal position, is rotated in the anticlockwise direction. The side AB of the coil moves down and side CD moves up. By virtue of this, induced current is produced in both the sides, which flows in the direction BADC (according to Fleming's right hand rule). Thus, in the first half rotation, the current in the external circuit flows from brush B1 to B2. After half revolution, sides AB and CD will

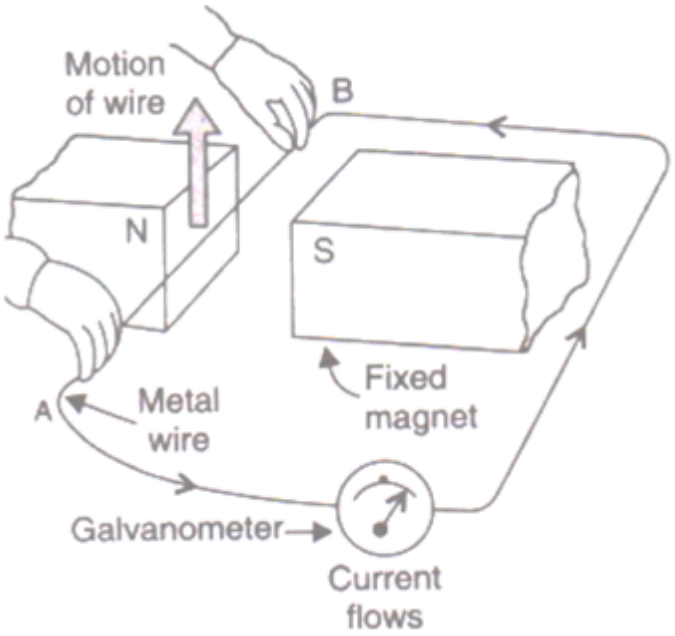
interchange their positions. So, side AB starts moving up and side CD starts moving down. As a result, direction of induced current in the coil is reversed and flows in the direction CDAB. The current in the external circuit flows from brush B_2 to B_1.

23 A. Question

What do you understand by the term "electromagnetic induction"? Explain with the help of a diagram.

Answer

The term "electromagnetic induction refers to the production of electricity from magnetism is known as electromagnetic induction.



23 B. Question

Name one device which works on the phenomenon of electromagnetic induction.

Answer

a device which works on the phenomenon of electromagnetic induction is Electric generator.

23 C. Question

Describe different ways to induce current in a coil of wire.

Answer

current can be induced in a coil of wire through these ways:-

(i) by moving the coil relative to a fixed magnet

(ii) by keeping the coil fixed and moving a magnet relative to it.

24 A. Question

What do you understand by the terms 'direct current' and 'alternating current'?

Answer

In direct current (DC), the electric charge (current) only flows in one direction. Electric charge in alternating current (AC), on the other hand, changes direction periodically. The voltage in AC circuits also periodically reverses because the current changes direction.

24 B. Question

Name some sources of direct current and some of alternating current.

Answer

some sources of direct current and some of alternating current are:-

Dynamo, solar cell, batteries. Etc. (direct current).

Hydroelectric power plant, electric generator, etc. (ac current)

24 C. Question

State an important advantage of alternating current over direct current.

Answer

changes direction periodically in ac occurs but this is not possible with dc.

24 D. Question

What is the frequency of A.C. supply in India?

Answer

The frequency of A.C. supply in India is 60HZ.

Multiple Choice Questions (MCQs)-Pg-103

25. Question

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

A. two revolutions

B. half revolution

C. one revolution

D. one-fourth revolution

Answer

A rectangular coil of copper wire is rotated in a magnetic field the direction of induced current changes once in each half revolution.

26. Question

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

The phenomenon of electromagnetic induction is producing induced current in a coil due to relative motion between a magnet and the coil.

27. Question

The device used for producing electric current is called a:

A. generator

B. galvanometer

C. ammeter

D. motor

Answer

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

28. Question

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 voltage.

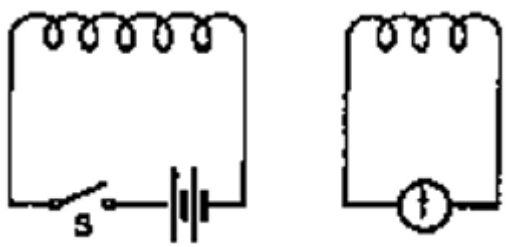
D. AC generator has slip rings while the DC generator has a commutator.

Answer

The essential difference between an AC generator and a DC generator is that AC generator has slip rings while the DC generator has a commutator.

29. Question

When the switch Sis closed in the figure given below, the pointer of the galvanometer moves to the right.



If S is kept closed, will the pointer:

A. return to zero?

B. stay over on the right?

C. move to the left and stay there

D. move to and fro until S is opened

Answer

When the switch Sis closed in the figure given below, the pointer of the galvanometer moves to the right. If S is kept closed, will the pointer return to zero.

31. Question

The north pole of a long bar magnet was pushed slowly into a short solenoid connected to a galvanometer. The magnet was held stationary for a few seconds with the north pole in the middle of the solenoid and then withdrawn rapidly. The maximum deflection of the galvanometer was observed when the magnet was:

A. moving towards the solenoid

B. moving into solenoid

C. at rest inside the solenoid

D. moving out of the solenoid

Answer

The north pole of a long bar magnet was pushed slowly into a short solenoid connected to a galvanometer. The magnet was held stationary for a few seconds with the north pole in the middle of the solenoid and then withdrawn rapidly. The maximum deflection of the galvanometer was observed when the magnet was moving out of the solenoid.

32. Question

An electric generator converts:

A. electrical energy into mechanical energy

B. mechanical energy into heat energy

C. electrical energy into chemical energy

D. mechanical energy into electrical energy.

Answer

An electric generator converts mechanical energy into electrical energy.

33. Question

A d.c. generator is based on the principle of:

A. electrochemical induction

B. electromagnetic induction

C. magnetic effect of current

D. heating effect of current

Answer

A d.c. generator is based on the principle of electromagnetic induction.

34. Question

An induced current is produced when a magnet is moved into a coil. The magnitude of induced current does not depend on :

A. the speed with which the magnet is moved

B. the number of turns of the coil

C. the resistivity of the wire of the coil

D. the strength of the magnet

Answer

The magnitude of induced current does not depend on the resistivity of the wire of the coil.

35. Question

The frequency of direct current (d.c.) is:

A. 0 Hz

B. 50 Hz

C. 60 Hz

D. 100 Hz

Answer

The frequency of direct current (d.c.) is 0 Hz.

36. Question

The frequency of alternating current (a.c.) supply in India is:

A. 0 Hz

B. 50 Hz

C. 60 Hz

D. 100 Hz

Answer

The frequency of alternating current (a.c.) supply in India is 50 Hz.

Questions Based on High Order Thinking Skills (HOTS)-Pg-105

37. Question

A coil is connected to a galvanometer. When the N-pole of a magnet is pushed into the coil, the galvanometer deflected to the right. What deflection, if any, is observed when:

(a) the N-pole is removed?

(b) the s-pole is inserted?

(c) the magnet is at rest in the coil?

State three ways of increasing the deflection on the galvanometer.

Answer

(a) when the N-pole is removed the galvanometer is deflected to the left.

(b) the S-pole is inserted the galvanometer is deflected to the left.

(c) when the magnet is at rest in the coil No deflection in galvanometer is absorved.

three ways of increasing the deflection on the galvanometer are:-

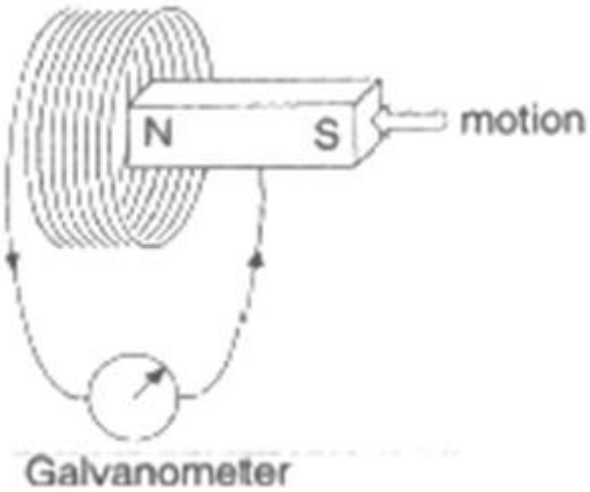
1) Increase the number of turns in the coil.

2) Use a stronger magnet.

3) Increase the speed with which magnet is pushed into the coil (or removed).

38. Question

When the magnet shown in the diagram below is moving towards the coil, the galvanometer gives a reading to the right.



(i) What is the name of the effect being produced by the moving magnet?

(ii) State what happens to the reading shown on the galvanometer when the magnet is moving away from the coil.

(iii) The original experiment is repeated. This time the magnet is moved towards the coil at a great speed.

Answer

(i) The name of the effect being produced by the moving magnet is electromagnetic induction.

(ii) When the magnet is moving away from the coil the needle of the galvanometer get deflected to left.

(iii) Large deflection to right occurs more quickly when the magnet is moved towards the coil at a great speed.

State two changes you would notice in the reading on the galvanometer.

two changes you would notice in the reading on the galvanometer are:-

1) it deflects toward left.

2) And it gets deflected towards right when the magnet is moved toward the coil at a great speed.

39. Question

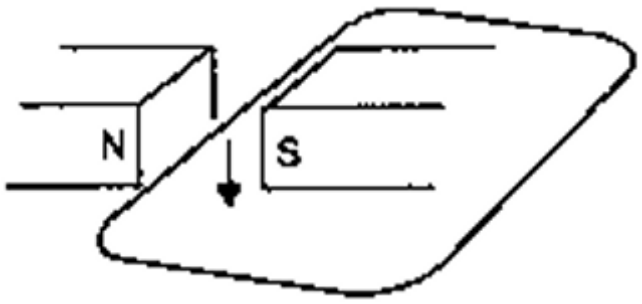
If you hold a coil of wire next to a magnet, no current will flow in the coil. What else is needed to induce a current?

Answer

If you hold a coil of wire next to a magnet, no current will flow in the coil. Motion of the magnet into the coil is needed to induce a current.

40. Question

The wire in Figure below is being moved downwards through the magnetic field so as to produce induced current.



What would be the effect of:

(a) moving the wire at a higher speed?

(b) moving the wire upwards rather than downwards?

(c) using a stronger magnet?

(d) holding the wire still in the magnetic field?

(e) moving the wire parallel to the magnetic field lines?

Answer

(a) when the current increased

(b) moving the wire upwards rather then downward will reverse the Current.

(c) the current will be increased by using a strong magnet.

(d) by holding the wire still in the magnetic field will increase the current.

(e) when the wire is moved parallel to the magnetic field then the current is zero.

41. Question

Two coils A and B of insulated wire are kept close to each other. Coil A is connected to a galvanometer while coil B is connected to a battery through a key. What would happen if:

(i) a current is passed through coil B by plugging the key?

(ii) the current is stopped by removing the plug from the key?

Answer

(i) When a current is passed through coil B by plugging the key then the Galvanometer pointer moves to one side showing that a current is induced in the coil.

(ii) When the current is stopped by removing the plug from the key, Galvanometer pointer moves to the other side showing that the direction of induced current has been reversed. The phenomenon involved is known as electromagnetic induction.

Explain your answer mentioning the name of the phenomenon involved.

42. Question

A portable radio has a built-in transformer so that it can work from the mains instead of batteries. Is this a step-up or step down transformer?

Answer

When a portable radio has a built-in transformer so that it can work from the mains instead of batteries then it will cause the step down to the transformer which may cause reduction in voltage.

Very Short Answer Type Questions-Pg-113

1. Question

What name is given to the device which automatically cuts off the electricity supply during short-circuiting in household wiring?

Answer

Electric fuse is the name given to the device which automatically cuts off the electricity supply during short-circuiting in household wiring.

2. Question

What is the usual capacity of an electric fuse used (i) in the lighting circuit, and (ii) in the power circuit, of a small house?

Answer

i) the usual capacity of an electric fuse used in the lighting circuit is 5A.

ii) in the power circuit of a small house the usual capacity of an electric fuse used is 15A.

3. Question

Give the symbol of an electric fuse used in circuit diagrams.

Answer

Symbol of an electric fuse used in circuit diagram

4. Question

State whether the following statements are true or false:

(a) A wire with a green insulation is usually the live wire.

(b) A miniature circuit breaker (MCB) works on the heating effect of current.

Answer

(a) False

The green wire indicates the wire is grounded.

(b) False

A miniature circuit breaker (MCB) works on the electromechanical effect of current.

5. Question

Along with live wire and neutral wire, a third wire is also used in domestic electric wiring. What name is given to this third wire?

Answer

Earth wire is used along with live wire and neutral wire, a third wire is also used in domestic electric wiring.

6. Question

List the colours of the three wires in the cable connected to the plug of an electric iron.

Answer

Red wire - Live wire

Black wire - Neutral wire

Green wire - Earth wire

7. Question

What is the electric potential of the neutral wire in a mains supply cable ?

Answer

0 volt is the electric potential of the neutral wire in a mains supply cable.

8. Question

If fuses of 250 m A, 500 mA, 1 A, 5 A and 10 A were available, which one would be the most suitable for protecting an amplifier rated at 240 V, 180 W?

Answer

we know that,

I=p/v

So, by putting the values in the formula, we get

I= 180/240= 0.75A.

Fuse wire should must with stand only little more amount of current then 0.75A. so the required fuse is of 1A.

9. Question

When does an electric short circuit occur?

Answer

when live wire and neutral wire come in contact with each other then in that case electric short circuit occur.

10. Question

In which wire in an A.C. housing circuit is the switch introduced to operate the lights?

Answer

To operate the lights in an A.C housing circuit the switch is introduced with the live wire.

11. Question

In household circuits, is a fuse wire connected in series or in parallel?

Answer

In housing circuit the fuse wire is connected in series.

12. Question

Usually three insulated wires of different colours are used in an electrical appliance. Name the three colours.

Answer

Red, Black and Green are the three different colours of wire generally used in an electrical appliances.

13. Question

What is the usual colour of the insulation of:

(a) live wire,

(b) neutral wire, and

(c) earth wire?

Answer

(a) The usual colour of the insulation of the live wire is red.

(b) The neutral wire is generally insulated with black colour.

(c) Green is the colour generally used for insolation of earth wire.

14. Question

What is the main purpose of earthing an electrical appliance?

Answer

The main purpose of providing earthing in an electrical appliances is to avoid the risk of electric sock.

15. Question

Give two reasons why different electrical appliances in a domestic circuit are connected in parallel.

Answer

The two reasons why different electrical appliances in a domestic circuit are connected in parallel are:-

1) Because of the parallel connection it is possible to use one application while the other is switched off.

2) Voltage remains same throughout in case of parallel connection.

16. Question

How should the electric lamps in a building be connected so that the switching on or off in a room has no effect on other lamps in the same building?

Answer

the electric lamps in a building should be connected in parallel so that that switching off or on in a room has no effect on the other lamps in the same building.

17. Question

Fill in the following blanks with suitable words:

(a) A fuse should always be placed in the .....wire of a mains circuit.

(b) The earth wire should be connected to the.....of an appliance.

Answer

(a) In the main circuit a fuse should always be connected with the live wire.

(b) The body of an appliances should always be connected with the earth wire.

Short Answer Type Questions-Pg-114

18 A. Question

Of what substance is the fuse wire made? Why?

Answer

Tin-platted copper wire is used to manufacture the fuse. Because it has low melting point.

18 B. Question

Explain why, a copper wire cannot be used as a fuse wire.

Answer

The melting point of the copper wire is very high so it is not used as a fuse wire. That is because it will not allow the breakdown of the fuse wire which is not advisery.

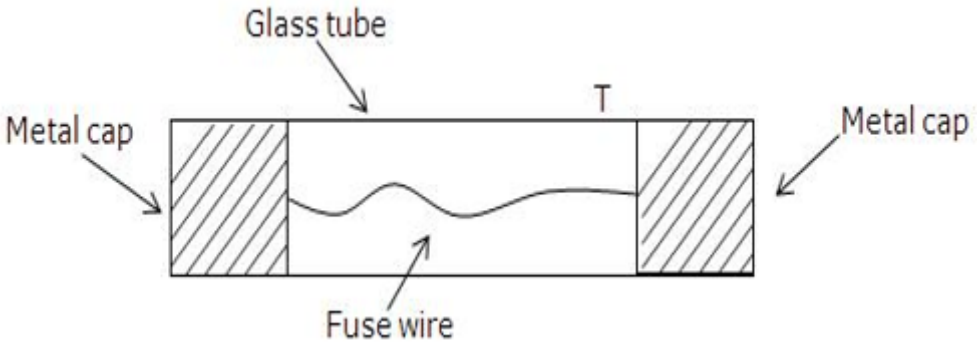
19. Question

What type of electric fuse is used in electrical appliances like car stereos? Explain with the help of a labelled diagram.

Answer

Cartridge fuses are used in electrical appliances like car stereos.

This type of fuse consist of consists of a glass tube T having a thin fuse wire sealed inside it. The glass tube has two metal caps at its two ends. The two ends of the fuse wire are connected to these metal caps. These are there for connecting the fuse in the circuit in a suitably made bracket.



20. Question

Distinguish between the terms 'overloading' and 'short-circuiting ' as used in domestic circuits.

Answer

when live wire and the neutral wire came in contact with each other then short circuit happens.

On the other hand when too many electrical appliances of high power rating are switched on at the same time or are connected to a single socket, they draw extremely large amount of current.

This is known as overloading.

21 A. Question

When does a fuse cut off current? How does it do it?

Answer

A fuse cuts off current when the current exceeds a safe value (due to short circuiting or overloading). When the current becomes large, it heats the fuse wire too much. Since the melting point of fuse wire is low, it melts and breaks the circuit. Thus, current in the circuits is cut off.

21 B. Question

What is the maximum number of 60 W bulbs that can be run from the mains supply of 220 volts if you do not want to overload a 5 A fuse?

Answer

Let us assume the number of bulbs be y.

Power of y bulbs, P=60y

V=220V, I=5A

We know that

P = VI

60y = 220 x 5

60y = 1100

y=18.33

So, number of bulbs required are 18.

22. Question

Explain the importance of using in a household electric circuit

(i) fuse, and

(ii) earthing wire.

Answer

(i) fuse is used for the purpose of protection, and mainly used for avoiding the short circuit.

(ii) it is very important as it reduces the risk of electric sock, when live wire accidently touches the metal.

23 A. Question

An electric iron is rated at 230 V, 750 W. Calculate

(i) the maximum current, and

(ii) the number of units of electricity it would use in 30 minutes.

Answer

(a) (i) the max. current, I= PV

So, 3.260A is the max current.

(ii) the number of units of electricity it would use in 30 minute is E= P*t

So, 0.75KW*0.5h= o.375KWh.

23 B. Question

Which of the following fuse ratings would be suitable for this electric iron ?

1 A, 3 A, 5 A, 13 A

Answer

the fuse rating suitable for this electric iron should be 5A.

24. Question

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

Answer

the function of an earth wire is, When the live wire of a faulty appliance comes in direct contact with its metallic case, which has been earthed, the large current passes directly to the earth without passing through the user's body. Thus, it is necessary to earth the metallic bodies of electrical appliances so as to avoid fatal electric shocks.

25 A. Question

What current is taken by a 3 kW electric geyser working on 240 V mains?

Answer

given, P = 3kW = 3000W

V = 240V

P = V x I

I = P/V

= 3000/240 = 12.5 A

12.5A would be the required current.

25 B. Question

What size fuse should be used in the geyser circuit?

Answer

The size of the fuse in a geyser circuit is 13A.

26 A. Question

Why are fuses fitted in the fuse box of a domestic electricity supply?

Answer

It is there to protect the whole wiring in case of short circuit.

26 B. Question

What device could be used in place of the fuses?

Answer

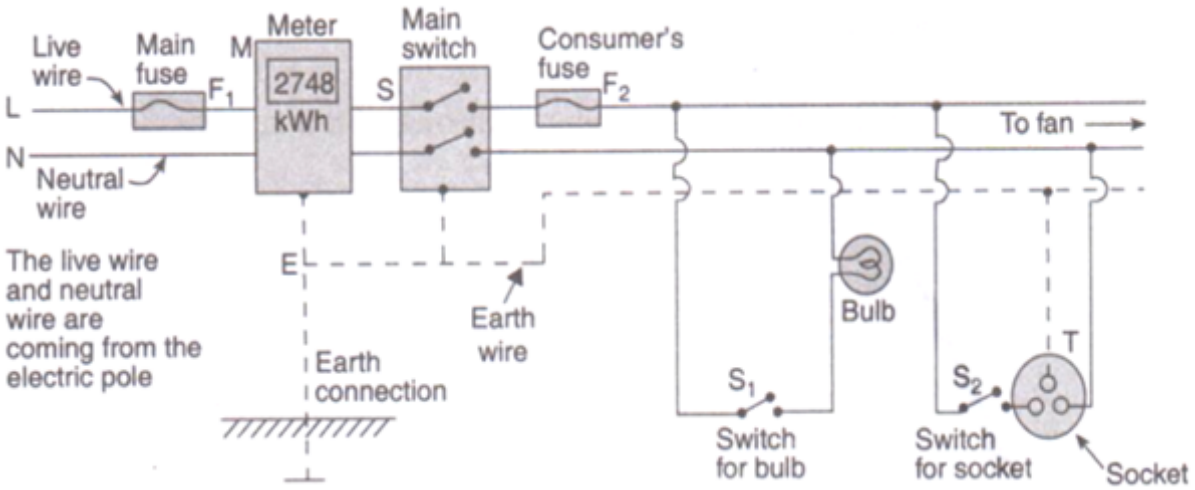
The device used in place of the fuse is MCB.

Long Answer Type Questions-Pg-114

27 A. Question

Draw a labelled diagram to show the domestic electric wiring from an electric pole to a room. Give the wiring for a bulb and a three-pin socket only.

Answer



27 B. Question

State two hazards associated with the use of electricity.

Answer

the two hazards associated with the use of electricity are:-

1) one may get electric sock if he touches the live wire.

2) Electrical fire can occur due to the short circuiting because of overloading.

27 C. Question

State the important precautions which should be observed in the use of electricity.

Answer

the important precautions which should be observed in the use of electricity are:-

1) Wires used should be good.

2) Proper earthing and fuse should must be used.

3) Electric appliances should be used only if they are dry.

27 D. Question

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

Answer

We will switch off the main switch immediately so as to cut off the electricity supply if we see a person coming in contact with a live wire.

27 E. Question

Explain why, electric switches should not be operated with wet hands.

Answer

Electric switches should not be operated with wet hands because it may risk to electric sock.

Multiple Choice Questions (MCQs)-Pg-114

28. Question

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

At the time of short circuit, the current in the circuit increases heavily.

29. Question

A 1.25 kW heater works on a 220 V mains supply. What current rating would a suitable fuse have ?

A. 2 A

B. 5 A

C. 10 A

D. 13 A

Answer

A 1.25 kW heater works on a 220 V mains supply. current rating suitable for the fuse would be 10A.

30. Question

The maximum number of 40 W tube-lights connected in parallel which can safely be run from a 240 V supply with a 5 A fuse is :

A. 5

B. 15

C. 20

D. 30

Answer

The maximum number of 40 W tube-lights connected in parallel which can safely be run from a 240 V supply with a 5 A fuse is 30.

31. Question

In normal use, a current of 3.5 A flows through a hair dryer. Choose a suitable fuse from the following:

A. 3 A

B. 5 A

C. 10 A

D. 30 A

Answer

In normal use, a current of 3.5 A flows through a hair dryer. The fuse required should be of 5A.

32. Question

Which one of the following statements is not true?

A. In a house circuit, lamps are used in parallel.

B. Switches, fuses and circuit breakers should be placed in the neutral wire

C. An electric iron has its earth wire connected to the metal case to prevent the user receiving a shock

D. When connecting a three-core cable to a 13 A three-pin plug, the red wire goes to the live pin.

Answer

Switches, fuses and circuit breakers should be placed in the neutral wire is not true.

33. Question

A car headlamp of 48 W works on the car battery of 12 V. The correct fuse for the circuit of this car headlamp will be:

A. 5 A

B. 10 A

C. 3 A

D. 13 A

Answer

A car headlamp of 48 W works on the car battery of 12 V. The correct fuse for the circuit of this car headlamp will be 5A.

34. Question

A 3-pin mains plug is fitted to the cable for a 1 kW electric kettle to be used on a 250 V a.c. supply. Which of the following statement is not correct?

A. The fuse should be fitted in the live wire

B. A 13 A fuse is the most appropriate value to use

C. The neutral wire is coloured black

D. The green wire should be connected to the earth pin.

Answer

A 13 A fuse is the most appropriate value to use when A 3-pin mains plug is fitted to the cable for a 1 kW electric kettle to be used on a 250 V a.c. supply.

35. Question

A TV set consumes an electric power of 230 watts and runs on 230 volts mains supply. The correct fuse for this TV set is :

A. 5 A

B. 3 A

C. 1 A

D. 2 A

Answer

The correct fuse for the TV set is of 2A when consumes an electric power of 230 watts and runs on 230 volts mains supply.

36. Question

Circuit Breaker Device which can be used in place of fuse in domestic electric wiring is called:

A. CBD

B. DCB

C. MCD

D. MCB

Answer

Circuit Breaker Device which can be used in place of fuse in domestic electric wiring is called MCB.

37. Question

An MCB which cuts off the electricity supply in case of short-circuiting or overloading works on the:

A. chemical effect of current

B. heating effect of current

C. magnetic effect of current

D. electroplating effect of current

Answer

An MCB which cuts off the electricity supply in case of short-circuiting or overloading works on the magnetic effect of current.

Questions Based on High Order Thinking Skills (HOTS)-Pg-115

38. Question

An air-conditioner of 3.2 kW power rating is connected to a domestic electric circuit having a current rating of 10 A. The voltage of power supply is 220 V. What will happen when this air-conditioner is switched on? Explain your answer.

Answer

Given: P=3.2kW=3200W, Fuse current rating=10 A, V=220 V

We have

P=VI

3200 = 220 x I

I=14.54 A

The required current is 14.54A and the rated current is 10A for the fuse, so the breakdown will take place.

39. Question

Three appliances are connected in parallel to the same source which provides a voltage of 220 V. A fuse connected to the source will blow if the current from the source exceeds 10 A. If the three appliances are rated at 60 W, 500 W and 1200 W at 220 V, will the fuse blow?

Answer

Given, P_1=60 W, P_2=1200W, P_3=500W

Fuse rating = 10A

V=220V

We have, P=VI

Total power=60+1200+500=1760W

Therefore, 1760=220xI

I=8A

No, the fuse is of desired specification so it it will work properly.

40. Question

A vacuum cleaner draws a current of 2 A from the mains supply.

(a) What is the appropriate value of the fuse to be fitted in its circuit?

(b) What will happen if a 13 A fuse is fitted in its circuit?

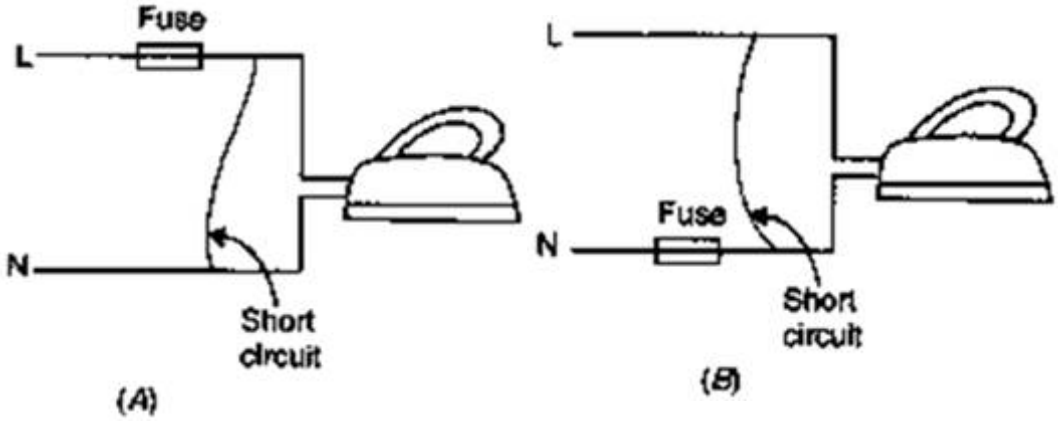
Answer

(a) the appropriate value of the fuse to be fitted in the circuit is 3A.

(b) if a 13 A fuse is fitted in its circuit, short-circuiting or overloading occur which can damage the vacuum cleaner.

41. Question

Which of the following circuits will still be dangerous even if the fuse blows off and electric iron stops working during a short circuit?



Answer

Circuit A is not dangerous after fuse blows because fuse is in live wire so it will cut the connection; Circuit B is dangerous even if fuse blows because the fuse is in neutral wire .

42. Question

An electric kettle rated as 1200 W at 220 V and a toaster rated at 1000 W at 220 V are both connected in parallel to a source of 220 V. If the fuse connected to the source blows when the current exceeds 9.0 A, can both appliances be used at the same time? illustrate your answer with calculations.

Answer

Given, P_1=1200W, P_2=1000W

V=220V

Fuse rating=9A

We know, P=VI

Total current required,

I = P/V

= $(P_1+P_2)/V$

= (1200+1000)/220

= 10A

The fuse will get burnt if both the appliances are switched on together. So one should not use both the appliances at the same time.

43. Question

What is the main difference in the wiring of an electric bulb and a socket for using an electric iron in a domestic electric circuit? What is the reason for this difference?

Answer

There is No earth connection for electric bulb but for the electric iron;

The reason for this difference is, earth connection given to socket for electric iron

44 A. Question

Explain why, it is more dangerous to touch the live wire of a mains supply rather than the neutral wire.

Answer

it is more dangerous to touch the live wire of a mains supply rather than the neutral wire because Live wire at high potential of 220 V on the other hand Neutral wire is at ground potential of 0 V.

44 B. Question

Why is it safe for birds to sit on naked power lines fixed atop tall electric poles?

Answer

It is safe for birds to sit on naked power lines fixed atop tall electric poles because bird's body is not connected to the earth, so no current flows through bird's body into the earth.

45. Question

A domestic lighting circuit has a fuse of 5 A. If the mains supply is at 230 V, calculate the maximum number of 36 W tube-lights that can be safely used in this circuit.

Answer

Let the maximum number of tube-lights be y.

Power of y tube-lights, P=36y

V=230V, I=5A

We know that

P = VI

36y = 230 x 5

36y = 1500

y=31.94

So, number of tube-lights required are 31.

Very Short Answer Type Questions-Pg-85

1. Question

What produces magnetism in the human body?

Answer

The magnetism produces in the human body is because of ionic current flowing in the human body.

2. Question

Name one medical technique which is based on magnetism produced in human body. For what purpose is this technique used?

Answer

(MRI) Magnetic Resonance Imaging is the technique based on magnetism procedure in human body. This is used to get image of the internal parts of the body.

3. Question

Name two human body organs where magnetism produced is significant.

Answer

Brain and Heart are two parts where magnetism is being used for the treatment .

4. Question

What is the full form of MRI?

Answer

The full form of (MRI) is Magnetic Resonance Imaging.

5. Question

Name of the technique by which doctors can produce pictures showing insides of the human body.

Answer

The technique used by doctors to produce inside pictures of human body is called MRI.

6. Question

Name one technique which can detect cancerous tissue inside the body of a person.

Answer

MRI can detect the cancerous tissues inside the human body.