PRACTICE EXERCISE 12.1

Q1. Which effect of current can be utilised in detecting a current carrying concealed in a wall?

Q2. What conclusion do you get from the observation that a current-carrying wire deflects a compass needle placed near it?

Q3. Name the scientist who discovered the magnetic effect of current.

Q4. State qualitatively the effect of inserting an iron core into a current-carrying solenoid.

Q5. Name the rule for finding the direction of magnetic field produced by a straight current-carrying conductor.

Q6. Stat the form of magnetic field lines around a straight current-carrying conductor.

Q7. What ist he other name of Maxwell's right-hand thumb rule?

Q8. State whether the following statement is true or false:

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

Q9. What is the shape of a current-carrying conductor whose magnetic field pattern resembles that of a bar magnet?

Q10. State three ways in which the strength of an electromagnet can be increased.

Q11. Fill in the following blanks with suitable words:

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

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

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

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

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

Q12. Describe how you will locate a current-carrying wire concealed in a wall.

Q13. Describe some experiment to show that the magnetic field is associated with an electric current?

Q14. Draw a sketch to show the magnetic lines of force due to a current-carrying straight conductor.

Q15. Name and state the rule to determine the direction of magnetic field around a straight current-carrying conductor.

Q16. State ane explain Maxwell's right-hand thumb rule.

Q17. What is Maxwell's corkscrew rule? For what purpose is it used?

Q18. Draw the magnetic lines of force due to a circular wire carrying current.

Q19. What are the various ways in which the strength of magnetic field produced by a current-carrying circular coil can be increased?

Q20. State and explain the Clock face rule for determining the polarities of a circular wire carrying current.

Q21. 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?

Q22. Draw a circuit diagram to show how a soft iron piece can be transformed into an electromagnet.

Q23. Describe how an electromagnet could be used to separate copper from iron in a scrap yard.

Q24. How does an electromagnet differ from a per manent magnet?

Q25. Name two devices in which electromagnets are used and two devices where permanent magnets are used.

Q26. What is a solenoid? Draw a sketch to show the magnetic field pattern produced by a current-carrying solenoid.

Q27. Name the type of magnet which the magnetic field pattern of a current-carrying solenoid resembles.

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PRACTICE EXERCISE 12.2

Q1. 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?

Q2. List three ways in which the magnetic field strength of a current-carrying solenoid can be increased?

Q3. What type of core should be put inside a current-carrying solenoid to make an electromagnet?

Q4. What is an electromagnet? Describe the construction and working of an electromagnet with the help of a labelled diagram.

Q5. Explain why, an electromagnet is called a temporary magnet.

Q6. Explain why, the core of an electromagnet should be of soft iron and not of steel.

Q7. State the factors on which the strength of an electromagnet depends. How does it depend on these factors?

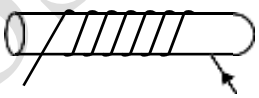
Q8. Write some of the important uses of electromagnets.

Q9. In the straight wire A, current is flowing in the vertically downward direction whereas in wire B the current is flowing in the vertically 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.

Q10. 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?

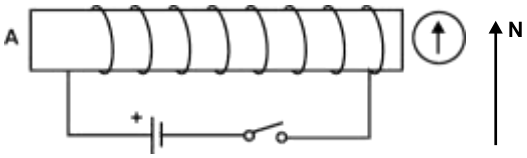


Q11. A current-carrying straight wire is held in exactly vertical position. If the current passes through this wire in the vertically upward direction, what is the direction of magnetic field produced by it? Name the rule used to find out the direction of magnetic field.

Q12. For the coil in the diagram below, when the switch is pressed:

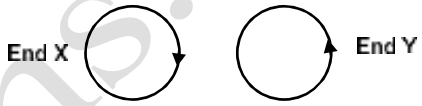
(a) what is the polarity of end A?

(b) which way will the compass point then?



Q13. 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?

Q14. The directions of current flowing 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 the state the rule which you have used to determine the polarities.

Q15. The magnetic field associated with a current-carrying straight conductor is in anticlockwise direction. If 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?

Q16. A thick wire is hanging from a wooden table. An anticlockwise magnetic field is to be produced the wire by passing 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?

Give reason for your choice.

Q17. What produces magnetism in the human body?

Q18. Name one medical technique which is based on magnetism produced in human body. For what purpose is this technique used?

Q19. What is the full form of MRI?

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PRACTICE EXERCISE 12.3

Q1. Name one medical technique which is based on magnetism produced in human body? For what purpose is this technique is used

Q2. Name the technique by which doctors can produce pictures showing inside of the human body?

Q3. Name one technique which can detect cancerous tissue inside the body of a person?

Q4. State any two properties of magnetic field lines.

Q5. What are the two ways in which you can trace the magnetic field pattern of a bar magnet.

Q6. You are given the magnetic field pattern of a bar magnet. How will you find out where the magnetic field is the strongest.

Q7. Draw a diagram to show the magnetic field lines around a bar magnet?

Q8. What is a magnetic field. How can the direction of magnetic field lines at a place be determined.

Q9. Explain why, two magnetic field lines do not intersect each other.

Q10. When an electric current is passed through any wire a magnetic field is produced around it, then when an electric iron connecting cable do not attract near by iron objects when electric current is switched on through it?

Q11. Define magnetic field lines. Describe an activity to draw a magnetic field line outside a bar magnet from one pole to another pole.

Q12. Explain why a freely suspended magnet always points in the north - south direction.

Q13. 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.

Q14. Which of the following is not attracted by a magnet?

(a) steel (b) cobalt

(c) brass (d) nickle

Q15. The magnetic field lines:

(a) intersect at right angles to one another.

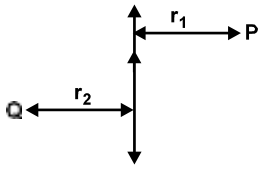
(b) intersect at angle of 45^{O} to each other.

(c) do not cross one another.

(d) cross at an angle of 60^{O} to one another.

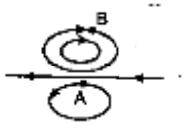
Q16. Consider a circular loop of wire lying in the plane of the table. Let the current pass through the loop clockwise. Apply the right - hand rule to find out the direction of the magnetic field inside and outside the loop.

Q17. AB is a current carrying conductor in the plane of the paper as shown in fig., what are the direction of magnetic fields produced by it at point P and Q? Given $r_1 > r_2$ where will be the strength of the magnetic field be larger?



Q18. A and B are the poles of the core of an electromagnet. B is the north pole and A is the south pole. How the binding has been done.

Q19. In the given figure indicate the point, where the magnetic field is stronger.



Q20. Why does a compass needle get deflected when brought near a bar magnet?

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PRACTICE EXERCISE 12.4

Q1. A current-carrying conductor is held in exactly vertical direction. In order to produce a clock-wise magnetic field around the conductor, the current should be passed in the conductor.

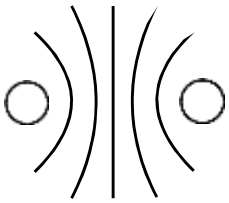
(a) from top towards bottom

(b) from left towards right

(c) from bottom towards top

(d) from right towards left.

Q2. 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

Q3. The magnetic field inside a long straight sole-noid 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

Q4. Which of the following correctly describes the magnetic field near a long straight wire?

(a) The field consists of straight lines perpen-dicular to the wire.

(b) The field consists of straight lines parallel to the wire

(c) The field consists of radial lines originat-ing from the wire

(d) The field consists of concentric circles centred on the wire

Q5. 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

Q6. 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

Q7. 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

Q8. The most suitable material for making the core of an electromagnet is:

(a) soft iron (b) brass

(c) aluminium (d) steel

Q9. The magnetic effect of current was discovered by:

(a) Maxwell (b) Fleming

(c) Oersted (d) Faraday

Q10. A soft iron bar is inserted inside a cur- rent-carrying solenoid. The magnetic field in- side the solenoid:

(a) will decrease (b) will increase

(c) will become zero

(d) will remain the same

Q11. 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

Q12. The front face of a circular wire carrying cur-rent behave like a north pole. The direction of current in this face of the circular wire is

(a) clockwise (b) downwards

(c) anticlockwise (d) upwards

Q13. The back face of a circular loop of wire is 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

Q14. The strength of the magnetic field between the poles of electromagnet would be unchanged if

(a) current in the electromagnet winding were doubled

(c) distance between the poles of electromagnet were doubled

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PRACTICE EXERCISE 12.5

Q1. What happens when a current-carrying conductor is placed in a magnetic field?

Q2. When is the force experienced by a current-carrying conductor placed in a magnetic field largest?

Q3. In a statement of Fleming's left-hand rule, what do the following represent?

(a) direction of current finger
(b) direction of forefinger
(c) direction of thumb

Q4. Name one device which works on the magnetic effect of current.

Q5. Name the device which converts electrical energy into mechanical energy.

Q6. A motor converts one form of energy into another. Name the two forms.

Q7. State whether the following statement is true or false:
An electric motor convert mechanical energy into electrical energy.

Q8. 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.

Q9. Name the device which is used to reverse the direction of current in the coil of a motor.

Q10. What is the other name of the split ring used in an electric motor?

Q11. What is the function of a commutator in an electric motor?

Q12. Of what substance are the brushes of an electric motor made?

Q13. Of what substance is the core of the coil of an electric motor made?

Q14. In an electric motor, which of the following remains fixed and which rotates with the coil?
Commutator; Brush

Q15. What is the role of the split ring in an electric motor?

Q16. 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.

Q17. 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.

Q18. State two was to increase the force on a current-carrying conductor in a magnetic field.

Q19. Name one device whose depends on the force exerted on a current-carrying coil placed in a magnetic field.

Q20. State Fleming's left hand rule. Explain it with the help of labelled diagram.

Q21. What is the principle of an electric motor? Name some of the devices in which electric motors are used.

Q22. In a d.c. motor, why must the current to the coil be reversed twice during each rotation?

Q23. What device reverses the current?

Q21. State what happen to the direction of rotation of a motor if:

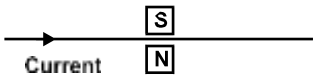
(i) the current field were reversed
(ii) the magnetic field were reversed
(iii) both current and magnetic field were reversed simultaneously.

Q22. In what ways can a motor be made more powerful.

Q23. What is an electric motor? With the help of a labelled diagram, describe the working of a simple electric motor.

Q24. What are the special features of commercial electric motors?

Q25. Which way does the wire in the diagram below tend to move?



Q26. If 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?

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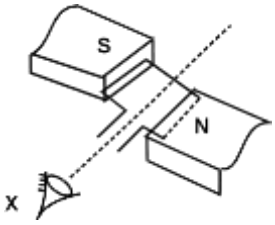
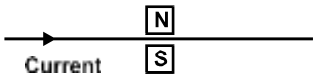
PRACTICE EXERCISE 12.6

Q1. 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.



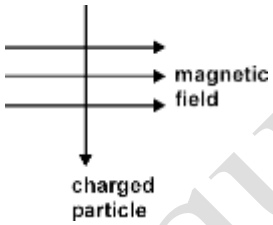
Is the current flowing clockwise or anticlockwise around the coil when viewed from above?

Q2. Which way does the wire in the diagram below tend to move?



Q3. What is the force on a current-carrying wire that is parallel to a magnetic field? Give reason for your answer.

Q4. A charged particles 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 intersection with the magnetic field?

Q5. Name the device which converts mechanical energy into electric energy.

Q6. 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?

Q7. Name the phenomenon which is made use of in an electric generator.

Q8. Name the rule which gives the direction of included current.

Q9. What condition is necessary for the production of current by electromagnetic inductiron?

Q10. What type of generator is used at Power Station?

Q11. What change should be made in an a.c. generator so that it may become a d.c. generator?

Q12. 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

Q13. What is the function of brushes in an electric generator?

Q14. 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?

Q15. 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?

Q16. What is the major difference between the simple alternator and most practical alternators?

Q17. Why are Thermal Power Stations usually located near a river?

Q18. List three sources of magnetic fields.

Q19. Complete the following sentence:
A generator with commutator produces _____ current.

Q20. 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.

Q21. Explain the principle of an electric generator.

Q22. State two ways in which the current induced in the coil of a generator could be increased.

Q23. What is the difference between alternating current and direct current?

Q24. Sate two type of current is given by (i) a dry cell and (ii) a Power House generator?

Q25. State and explain Fleming's right hand rule.

Q26. Name the state the rule to find the direction of current induced in a coil due to its rotation in a magnetic field.

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PRACTICE EXERCISE 12.7

Q1. Name the state the rule to find the direction of force experienced by a current-carrying straight conductor placed in a magnetic field which is perpendicular to it.

Q2. In what respect does the construction of an A.C. generator differ from the that of a D.C. generator.

Q3. What normally drives the alternators in a Thermal Power Station? What fuel can be sued to heat water in the boiler?

Q4. 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.

Q5. What do you understand by the term "electromagnetic induction"? Explain with the help of a diagram.

Q6. Name one device which works on the phenomenon of electromagnetic induction.

Q7. Describe different ways to induce current in a coil of wire.

Q8. What do you understand by the terms 'direct current' and 'alternating current'?

Q9. Name some sources of direct current and some of alternating current.

Q10. State an important advantage of alternating current over direct current.

Q11. What is the frequency of A.C. supply in India?

Q12. 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 S-pole is inserted?
(d) the magnet is at rest in the coil?

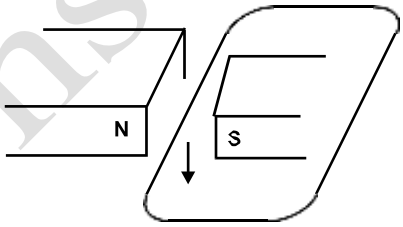
State three ways of increasing the deflection on the galvanometer.

Q13. 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 efffect being produced by the moving magnet?
(ii) State what happens to the reading shown ion the galvanometer when the magnet is moved wards the coil at a great speed.
(iii) The original experiment is repeated. This time the magnet is moved towards the coil at a great speed. State two changes you would notice in the reading on the galvanometer.

Q14. 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?

Q15. 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?

Q16. 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?

Explain your answer mentioning the name of the phenomenon involved.

Q17. 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?

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PRACTICE EXERCISE 12.8

Q1. What name is given to the device which automatically cuts off the electricity supply during short-circuiting in household wiring?

Q2. 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?

Q3. Give the symbol of an electric fuse used in circuit diagrams.

Q4. 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.

Q5. Along with live wire and neutral wire, a third wire is also used in domestic electric wiring. What is along to this third wire?

Q6. List the colours of the three wires in the cable connected to the plug of the neutral wire in a mains supply cable?

Q7. What is the electric potential of the neutral wire in a mains supply cable?

Q8. If fuses of 250 mA, 500mA, 1A, 5A and 10A were available, which one would be the most suitable for protecting an amplifier rated at 240V, 180W?

Q9. When does an electric short circuit occur?

Q10. In which wire in an A.C. housing circuit is the switch introduced to operate the lights?

Q11. In household circuits, is a fuse wire connected in series or in parallel?

Q12. Usually three insulated wires of different colours are used in an electrical appliance. Name the three colours.

Q13. What is the usual colour of the insulation of: (a) live wire (b) neutral wire and (c) earth wire?

Q14. What is the main purpose of earthing an electrical appliance?

Q15. Give two reasons why different electrical appliances in a domestic circuit are connected in parallel.

Q16. 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?

Q17. Fill in the 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.

Q18. Of what substance is the fuse wire made? Why?

Q19. Explain why, a copper wire cannot be used as a fuse wire.

Q20. What type of electric fuse is used in electrical appliances like car stereos? Explain with the help of a labelled diagram.

Q21. Distinguish between the terms 'overloading' and 'short-circuiting' as used in domestic circuits.

Q21. When does a fuse cut off current? How does it do it?

Q22. What is the maximum number of 60W bulbs that can be run from the main supply of 220Volts if you do not want to overload a 5A fuse?

Q23. Explain the importance of using in a household electric circuit (i) fuse and (ii) earthing wire.

Q24. An electric iron is rated at 230V, 750W. Calculate (i) the maximum current, and (ii) the number of units of electricity it would use in 30 minutes.

Q25. Which of the following fuse ratings would be suitable for this electric iron?
1A, 3A, 5A, 13A

Q26. What is the function of an earth wire? Why is it necessary to earth the metallic bodies of electrical appliances?

Q27. What current is taken by a 3kW electric geyser working on 240 V mains?

Q28. What size fuse should be used in the geyser circuit?

Q29. Why are fuses fitted in the fuse box of a domestic electric supply?

Q30. What device could be used in place of the fuses?

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PRACTICE EXERCISE 12.9

Q1. Draw a labelled diagram to show the domestic electric pole to a room. Give the wiring for a bulb and a three-pin socket only.

Q2. State two hazards associated with the use of electricity.

Q3. State the important precautions which should be observed in the use of electricity.

Q4. What will you do if you see a person coming in contact with a live wire?

Q5. Explain why, electric switches should not be operated with wet hands.

Q6. An air-conditioner of 3.2kW power rating is connected to a domestic electric circuit having a current rating of 10A. The voltage of power supply is 220V. What will happen when the air-conditioner is switched on? Explain your answer.

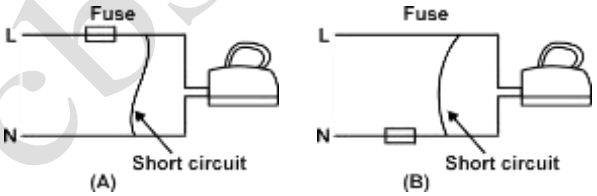
Q7. Three appliances are connected in parallel to the same source which provides a voltage of 220V. Afuse connected to the source will blow if the current from the source exceeds 10A. If the three appliances are rated at 60W, 500W and 1200W at 220V, will the fuse blow?

Q8. A vacuum cleaner draws a current of 2A from the main supply.

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

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

Q9. Which of the following circuits will still be dangerous even if the fuse blows off and electric iron stops working during a short circuit?



Q10. An electric kettle rated as 1200W at 220V and a toaster rated at 1000W at 220V are both connected in parallel to a source of 220V. 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.

Q11. 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?

Q12. (a) Explain why, it is more dangerous to touch the live wire of a mains supply rather than the neutral wire.

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

Q13. A domestic lighting circuit has a fuse of 5A. If the mains supply is at 230V, calculate the maximum number of 36W tube-lights that can be safety used in this circuit.

Q14. Write the differences between magnetic effect of electric current and electro magnetic induction.

Q15. Why earth behaves like a magnet.

Q16. What is the difference between DC generator and AC generator.

Q17. Write the advantages of AC over DC

Q18. Write the disadvantages of AC over DC.

Q19. Write the name of main parts of generator.

Q20. Write the other name of split ring.

Q21. Write the other name of commutator.

Q22. Write the other name of fleming's left hand rule.

Q23. Write the other name of fleming's right hand rule.

Q24. Write the other name of current carrying conductor seeking.

Q25. Write the sources of DC current.

Q26. Write the sources of AC current.

Q27. Draw neat and clean diagram of AC generator.

Q28. Draw neat and clean diagram of DC generator.

Q29. Draw neat and clean diagram of domestic circuit.

Q30. Draw neat and clean diagram of electric fuse.

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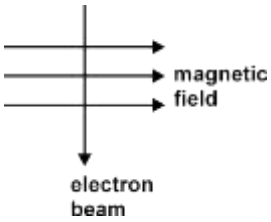
PRACTICE EXERCISE 12.10

Q1. 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

Q2. An electric beam enters a magnetic field at right angles to as shown in the figure.



The direction of force acting on electron beam will be

(a) to the left (b) to the right

(c) into the page (d) out of the page

Q3. 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°

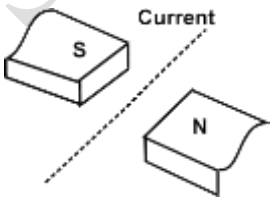
(c) 90° (d) 180°

Q4. The force exerted on 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°

Q5. 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 the magnet is directed:

(a) from N to S (b) from S to N

(c) vertically downwards

(d) vertically upwards

Q6. 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

Q7. A magnetic field exerts no force on:

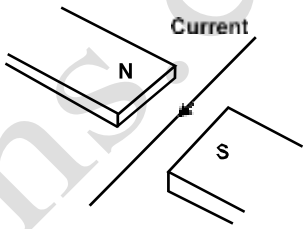
(a) an electric charge moving perpendicular to its direction

(b) an unmagnetised iron bar

(c) a stationery electric charge

(d) a magnet

Q8. A horizontal wire carries a current as shown in figure below magnetic poles N and S:



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

(a) in the direction of the current

(b) vertically downwards

(c) opposite to the current direction

(d) vertically upwards

Q9. 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) one revolution

(c) half revolution

(d) one-fourth revolution

Q10. 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.

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PRACTICE EXERCISE 12.11

Q1. The device used for producing electric current is called a

(a) generator (b) galvanometer

(c) ammeter (d) motor

Q2. The essential difference between an AC generator and a DC generator that:

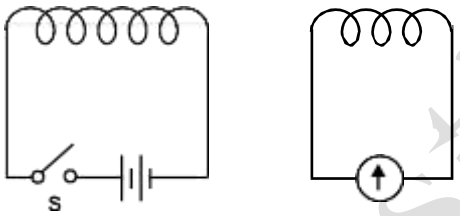
(a) AC generator has an electromagnet while a DC generator has permanent magnet

(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.

Q3. When the switch S is closed in the figure below, the pointer of the galvanometer moves t 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

Q4. Each one of the following changes will increase emf (or voltage) in a simple generator except:

(a) increasing the number of turns in the armature coil

(b) winding the coil on a soft iron armature.

(c) increasing the size of the gap in which the armature turns

(d) increasing the speed of rotation.

Q5. The north pole of long bar magnet was pushed slowly into a short solenoid connected to a galvanometer. The magnet was half stationery 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 o the solenoid

Q6. An electric generator converts:

(a) electric energy into mechanical energy

(b) mechanical energy into heat energy

(c) electrical energy into chemical energy

(d) mechanical energy into electrical energy

Q7. 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

Q8. 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 o the coil

(c) the resistivity of the wire of the coil

(d) the strength of the magnet

Q9. The frequency of direct current (d.c.) is

(a) 0 Hz (b) 50 Hz

(c) 60 Hz (d) 100 Hz

Q10. The frequency of alternating current (a.c.) supply in India is:

(a) 0 Hz (b) 50 Hz

(c) 60 Hz (d) 100 Hz

Q11. At the time of short circuit, the current in the circuit:

(a) reduces substantially

(b) does not change

(c) increases heavily

(d) varies continuously

Q12. A 1.25 kW heater works on a 220V mains supply. What current rating would a suitable fuse have?

(a) 2A (b) 5A

(c) 10A (d) 13A

Q13. The maximum number of 40W tube-lights connected in parallel which can safely be run from a 240V supply with a 5A fuse is

(a) 5 (b) 15

(c) 20 (d) 30

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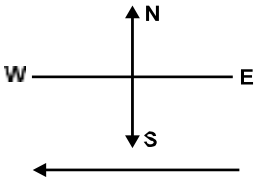
SOLVED HOT QUESTIONS

Q1. What is the basic cause of induced emf.

Ans. The basic cause of induced emf is Change in magnetic flux.

Q.2 A constant current flows in a horizontal wire in the plane of the paper from east to west as shown in fig., The direction of magnetic field at a point will be north to south.



(a) directly above the wire.

(b) directly below the wire.

(c) at a point located in the plane of the paper, on the north side of the wire.

(d) at a point located in the plane of the paper, on south side of the wire.

Ans. (b) directly below the wire.

Q3. Which effect of electric current is utilized in the working of an electro magnet.

Ans. An electromagnet works on the magnetic effect of electric current.

Q4. Which effect of electric current is utilized in the working of an electric motor.

Ans. Magnetic effect of electric current is utilised in the working of an electric motor.

Q5. How do you convert an A.C. generator into D.C generator.

Ans. Replacing slip ring arrangement by split ring arrangement or (commutator).

Q.6 Under what conditions permanent electromagnet is obtained if a current carrying solenoid is used.

Ans. (i) The current through the solenoid should be direct current.

(ii) The rod inside is made of a magnetic material such as steel.

Q7. What type of magnetic lines of force are there in a uniform magnetic field.

Ans. Parallel magnetic lines of forces in a uniform magnetic field.

Q8. If the current in a wire is flowing in the vertically downward direction and a magnetic field applied from west to east. What is the direction of force on the wire.

Ans. The force applied on the wire in the south direction.

Q9. What is meant by magnetic field.

Ans. The region around a magnet, in which force of attraction or repulsion can be detected, is called a magnetic field.

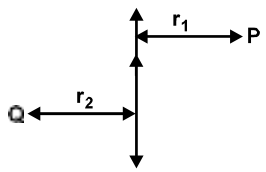
Q10. In household circuits, is a fuse wire connected in series or parallel.

Ans. Fuse wire connected in series in household circuit.

Q11. Name the colour of earth, live and neutral wire.

Ans. The colour of earth, live and neutral wire are Green, red and black respectively.

Q12. AB is a current carrying conductor in the plane of the paper as shown in fig., what are the direction of magnetic fields produced by it at point P and Q? Given $r_1 > r_2$ where will be the strength of the magnetic field be larger?



Ans. In the plane of paper at point P and out of it at Q. The strength of the magnetic field is larger at the point located closer i.e., at Q.

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Q13. Name the device which converts mechanical energy into electrical energy.

Ans. Generator converts mechanical energy into electric energy.

Q14. What is the material of which the permanent magnets are usually made.

Ans. Alloy of steel (carbon steel, tungsten steel) alnico and nipermag etc.

Q15. What happens if a current carrying conductor is placed in magnetic field.

Ans. It experiences force.

Q16. Which effect of current can be utilized to detect a current carrying wire concealed in a wall.

Ans. Magnetic effect of electric current is utlised to detect a current carrying wire concealed in a ball.

Q17. What is the composition of the alloy called nipermag.

Ans. Alloy of iron, nickel, aluminum and titanium.

Q18. Give one important use of alnico.

Ans. Used for making permanent magnets.

Q19. Name one medical technique, which is based on magnetism based on human body.

Ans. Magnetic resonance imaging (MRI).

Q20. What is a Van Allan radiation belt.

Ans. Region around earth where charged particles get trapped under influence of earth's magnetic field.

Q21. Name some devices, which works on magnetic effect of current.

Ans. Microphone, ammeter and voltmeter etc.

Q22. Of what substance is the core of an electric motor made.

Ans. Soft iron is used to make core of electric motor.

Q23. Name the phenomenon on which is made use of in an electric generator.

Ans. Electromagnetic Induction.

Q24. What is the main purpose of earthing an electric supply.

Ans. To avoid risk of electrical shocks.

Q25. Does a stationary charge produce magnetic field.

Ans. No, stationery charge cannot produce a magnetic field.

Q26. Can copper wire be used as a fuse wire.

Ans. No, due to its high melting point.

Q27. An electron is moving along the x - axis and the magnetic field is along the y - axis in the plane of the paper, what is the direction of force.

Ans. The force is perpendicular to both X and Y axis i.e., in the negative Z direction (Hint: Use Fleming's Left Hand Rule).

Q28. There is a magnetic field where lines of forces are along south to north. A positive charge moves vertically downwards in which direction the force will act.

Ans. The force applied on positive charge towards east.

Q29. A current is seen to flow clock wise on one of a solenoid. What is the polarity of this face.

Ans. S Pole (Hint S N)

Q30. A solenoid carrying current is suspended freely in which direction will it settle.

Ans. The polarity is south pole.

Q31. If the direction of the current in the freely suspended magnet is reversed, what will happen.

Ans. The solenoid will rotate by 180^{o}.

Q32. A and B are the poles of the core of an electromagnet. B is the north pole and A is the south pole. How the binding has been done.

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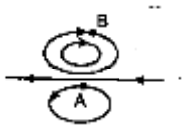
Ans.

Q33. In the given figure indicate the point, where the magnetic field is stronger.



Ans. The magnetic field is stronger at point A.

Q34. Define one tesla.

Ans. If a conductor carrying a current of 1 ampere and placed perpendicular to the magnetic field, experience a force of 1 newton per unit length then the magnetic field strength is called tesla.

Q35. A copper ring is suspended by thread in a vertical plane. One end of the magnet is brought horizontally towards the ring. How will the position of ring affected.

Ans. The ring will move away from the magnet. This is because as per lenz's law, an emf is induced in the ring with an pole at the face of the ring towards the magnet. Force of repulsion is responsible for motion of the ring from the magnet.

Q36. Give two ways to increase the magnitude of induced current.

a. By increasing the strength of magnetic field used.

b. By increasing the speed of movement of the conductor in the magnetic field.

Q37. A coil is removed from magnetic field (a) rapidly (b) slowly. In which case, more work will be done.

Ans. Work done will be more when the coil is removed rapidly. This is because in that case opposing emf, induced in the coil will be more.

Q38. A circuit has a fuse of 5A. What is the maximum number of 100W (220V) bulbs that can be safely used in the circuit.

Ans. Suppose X bulbs can be used safely.

Power of X bulbs, P = 100X watt.

Potential difference, V = 200 volt

P = VI => 100 X = 220 × 5 => X = 11

Q39. What factors increases the speed of a D.C. motor.

a. No. of turns of the coil

b. magnetic field. c. current

Q40. Will there be any force on a charged particle moving parallel to the lines of force of a magnetic field?

Ans. No, maximum force is when the charged particle is moving perpendicular to the line of lines of force.

Q41. What are the factors on which magnetic field due to a current carrying solenoid depends.

Ans. a. Current in conductor.

b. Number of turns.

Q42. What is solenoid. Draw a sketch to show the magnetic lines of force produced by current carrying solenoid.

Ans. Insulted copper coil of large number of turns.

Q43. How will magnetic field of a straight current carrying conductor change when

a. Current is doubled

b. Magnetic compass is moved away from conductor

Ans. a. Magnetic field will be doubled.

b. Magnetic field decreases

Q44. What are magnetic field lines. How is the directions of magnetic field lines determined.

Ans. Represents force experienced by magnetic pole. Direction can be determined by magnetic compass.

Q45. On what factors does the force experienced by a current carrying conductors depends.

Ans. Strength of magnetic field, Length of conductor and Magnitude of current

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Q46. A coil of wire is connected to a galvanometer. What would happen if a bar magnet is:

a. pulled away from the coil

b. Held stationary against the coil

Ans. a. Deflection b. No deflection

Q47. What is the function of earth wire. Why is it necessary to earth the metallic appliances.

Ans. Earthing wire is used to connect the non current metallic part of Earth. It is used to avoids risk of shocks.

Q48. What do you understand by electromagnetic induction explain with the help of a diagram.

Ans. Production of electric current by moving a straight conductor in magnetic field.

Q49. Give two reasons why different electrical appliances in domestic circuit are connected in parallel.

Ans. a. If fault occurs in once circuit, its fuse will melt leaving the other circuit in operation.

b. Same voltage is available for all electrical appliances.

Q50. Explain the importance of using following in a household electric circuit.

a. Fuse b. Earthing wire.

Ans. Fuse disconnects the electrical supply when a short circuit occurs to save the electrical appliances from further damage.

Q51. What is the usual capacity of electric fuse used.

a. In the lightening circuit.

b. In the power circuit.

Ans. a. 5 A b. 15 A

Q52. Give three properties of magnetic lines of force.

Ans. a. No two field lines are found to intersect each other.

b. The relative strength of the magnetic field is shown by the closeness of the field lines.

c. Field lines contract lengthwire.

Q53. Why does a compass needle get deflected when brought near a bar magnet?

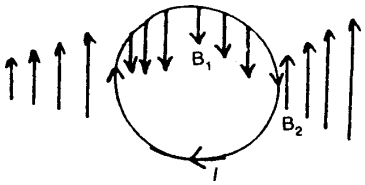
Ans. Compass needle is a small bar magnet and when it is brought near a bar magnet than compass needle is either attracted or repleted from the bar magnet. This makes the compass needle deflect.

Q54. Why don't two magnetic lines of force intersect each other?

Ans. Two lines of force never intersect each other because if they intersect, it means that at the point of intersection, the needle should point towards two directions, which is not possible.

Q55. Consider a circular loop of wire lying in the plane of the table. Let the current pass through the loop clockwise. Apply the right - hand rule to find out the direction of the magnetic field inside and outside the loop.

Ans. The magnetic field inside the loop is inside the plane of the table and perpendicular to it. The magnetic field outside the loop is above the plane of the table and perpendicular to it.



B_1 - Magnetic field inside the loop.

B_2 - Magnetic field outside the loop.

I - Current

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MULTIPLE CHOICE QUESTION'S

Q1. An electric motor converts

(a) mechanical energy into electrical energy

(b) electrical energy into sound energy

(c) electrical energy into mechanical energy

(d) mechanical energy into sound energy

Q2. In Fleming's left-hand rule the thumb indicates the direction of

(a) magnetic field applied

(b) current flown in the conductor

(c) induced current

(d) mechanical force on the conductor

Q3. The phenomenon of electromagnetic induction is

(a) the process of charging a body

(b) the process of generating magnetic field due to current passing through a coil

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

(d) the process of rotating a coil of an electric motor

Q4. The device used to produce an electric current in a circuit is called

(a) galvanometer

(b) electric generator

(c) electric motor

(d) inverter

Q5. The direction of induced current produced in a rectangular coil, when it is rotated in a uniform magnetic field, is given by

(a) Fleming's right-hand rule

(b) Fleming's left-hand rule

(c) Ampere's rule

(d) Right-hand thumb rule

Q6. The frequency of A.C supply in India is

(a) 100 Hz

(b) 50 Hz

(c) 50 s

(d) 100 s

Q7. In India the direction of alternating current changes its direction after a time interval of

(a) $\frac{1}{50}$ s (b) $\frac{1}{25}$ s

(c) $\frac{1}{100}$ s (d) $\frac{1}{200}$ s

Q8. While applying Fleming's right-hand rule the central (middle) finger of right-hand indicates

(a) the direction of magnetic field

(b) the direction of rotation of conductor

(c) the direction of current being flown

(d) the direction of induced current

Q9. At the time of short circuiting of an electrical circuit the current in the circuit

(a) is substantially reduced

(b) abruptly increases

(c) changes continuously

(d) does not change at all

Q10. In domestic electric circuits the colour of insulation covers of wires in the supply is generally

(a) red for live wire and green for neutral wire

(b) red for live wire and black for neutral wire

(c) green for live wire and red for neutral wire

(d) green for live wire and black for neutral wire

Q11. The most important safety method used in domestic electrical circuit so as to protect home appliances from short circuiting or overloading is

(a) earthing

(b) use of fuse of appropriate rating

(c) use of voltage stabilisers

(d) use of an electric meter

Q12. Fuse wire should be prepared from a material having:

(a) high resistivity and high melting point

(b) high resistivity and low melting point

(c) low resistivity and high melting point

(d) low resistivity and low melting point.

Q13. A strong bar magnet is placed vertically above a horizontal wooden board. The magnetic lines of force will be:

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(a) only in horizontal plane around the magnet
(b) only in vertically plane around the magnet
(c) in horizontal as well as in vertical planes around the magnet
(d) in all the planes around the magnet

Q14. 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

Q15. Which of the following is not attracted by a magnet?
(a) steel
(b) cobalt
(c) brass
(d) nickel

Q16. 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

Q17. The north pole of earth's magnet is in the:
(a) geographical south
(b) geographical east
(c) geographical west
(d) geographical north

Q18. 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°

Q19. 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

Q20. A magnet attracts:
(a) plastics
(b) any metal
(c) aluminium
(d) iron and steel

Q21. 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

Q22. 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

Q23. 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
(d) Relative strength of magnetic field is shown by the degree of closeness of the field lines.

Q24. 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) one revolution
(c) half revolution
(d) one-forth revolution

Q25. 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

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relative motion between a magnet and the coil

(d) the process of rotating a coil of an electric motor

Q26. The device used for producing electric current is called a:

(a) generator

(b) galvanometer

(c) ammeter

(d) motor

Q27. The essential difference between an AC generator and a DC generator is that:

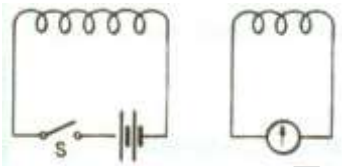
(a) AC generator has an electromagnet while a DC generator has permanent magnet

(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

Q28. When the switch S is 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

Q29. Each one of the following change will increase emf (or voltage) in a simple generator except:

(a) increasing the number of turns in the armature coil

(b) winding the coil on a soft iron armature

(c) increasing the size of the gap in which the armature turns

(d) increasing the speed of rotation

Q30. 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

Q31. An electric generator converts:

(a) electrical energy into mechanical energy

(b) mechanical energy into the energy

(c) electrical energy into chemical energy

(d) mechanical energy into electrical energy

Q32. 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

Q33. An induced current is produced when a magnetic 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

Q34. The frequency of direct current (d.c.) is:

(a) 0 Hz

(b) 50 Hz

(c) 60 Hz

(d) 100 Hz

Q35. The frequency of alternating current (a.c.) supply in India is:

(a) 0 Hz

(b) 50 Hz

(c) 60 Hz

(d) 100 Hz

Q36. At the time of short circuit, the current in the circuit:

(a) reduces substantially

(b) does not change

(c) increases heavily

(d) varies continuously

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Q37. A 1.25 kW heater works on a 220V mains supply. What current rating would a suitable fuse have?

(a) 2A (b) 5A

(c) 10A (d) 13A

Q38. The maximum number of 40W tube-lights connected in parallel which can safely be run from a 240V supply with a 5A fuse is:

(a) 5

(b) 15

(c) 20

(d) 30

Q39. In normal use, a current of 3.5A flows through a hair dryer. Choose a suitable fuse from the following:

(a) 3A (b) 5A

(c) 10A (d) 30A

Q40. 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 13A three-pin plug, the red wire goes to the live pin.

Q41. A car headlamp of 48W works on the car battery of 12V. The correct fuse for the circuit of this car handlamp will be:

(a) 5A

(b) 10A

(c) 3A

(d) 13A

Q42. A 3-pin mains plug is fitted to the cable for a 1kW electric kettle to be used on a 250V a.c. supply. Which of the following statement is not correct?

(a) The fuse should be fitted in the live wire

(b) A 13A 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

Q43. 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) 5A (b) 3A

(c) 1A (d) 2A

Q44. 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

Q45. 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

Q46. The strength of the magnetic field between the poles of an electromagnet would be unchanged if:

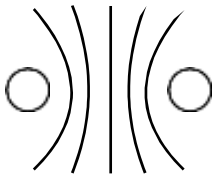
(a) current in the electromagnet winding were doubled

(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

Q47. 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

Q48. The magnetic field inside a long straight solenoid carrying current:

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(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

Q49. 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 straight lines originating from the wire.

(d) The field consists of concentric circles centred on the wire.

Q50. 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

ANSWERS

1. (c)	**2.** (d)	**3.** (c)	**4.** (b)	**5.** (a)
6. (b)	**7.** (c)	**8.** (d)	**9.** (b)	**10.** (b)
11. (b)	**12.** (b)	**13.** (d)	**14.** (c)	**15.** (c)
16. (c)	**17.** (a)	**18.** (b)	**19.** (d)	**20.** (d)
21. (c)	**22.** (b)	**23.** (c)	**24.** (c)	**25.** (c)
26. (a)	**27.** (d)	**28.** (a)	**29.** (c)	**30.** (d)
31. (d)	**32.** (b)	**33.** (c)	**34.** (a)	**35.** (b)
36. (c)	**37.** (c)	**38.** (d)	**39.** (b)	**40.** (b)
41. (a)	**42.** (b)	**43.** (d)	**44.** (d)	**45.** (c)
46. (b)	**47.** (b)	**48.** (d)	**49.** (d)	**50.** (c)

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