CBSE Important Questions for Class 10 Science Chapter 13: CBSE Important Questions for Class 10 Science Chapter 13 Magnetic Effects of Electric Current focuses on how electric current generates magnetic fields and how this effect can be applied. Key topics include magnetic field lines, magnetic force on a current-carrying conductor, Fleming's Left-Hand Rule, electromagnetic induction, and the working of electric motors and generators.

Important questions revolve around drawing field line diagrams, understanding Oersted's experiment, solving problems on force calculation using the right-hand thumb rule, and explaining the principles of devices like transformers. Mastery of these concepts is essential for understanding electricity and magnetism's role in practical applications.

CBSE Important Questions for Class 10 Science Chapter 13 Overview

CBSE Important Questions for Class 10 Science Chapter 13 Magnetic Effects of Electric Current, as it introduces students to the fundamental relationship between electricity and magnetism. The chapter covers essential concepts like magnetic field lines, the effect of electric current on magnetic fields, Fleming's Left-Hand Rule, and electromagnetic induction. These principles form the foundation for understanding the working of key devices like electric motors, generators, and transformers, which are integral to modern technology.

The chapter also includes important experiments like Oersted's experiment, which demonstrates how electric current generates a magnetic field. Given its significance in both board exams and real-world applications, mastering this chapter is vital for students. The important questions help in breaking down complex ideas, ensuring students are well-prepared for exam scenarios and future studies in physics.

CBSE Important Questions for Class 10 Science Chapter 13 Magnetic Effects of Electric Current

Below is the CBSE Important Questions for Class 10 Science Chapter 13 Magnetic Effects of Electric Current -

Question 1: Choose the wrong statement from the following regarding magnetic lines of the field

(a) Magnetic field lines are closed curves.

(b) The north pole of a magnetic compass is used to determine the direction of the magnetic field at a particular location.

(c) If magnetic field lines are parallel and equidistant, they represent zero-field strength.

(d) The degree of closeness of the field lines indicates the relative strength of the magnetic field.

Answer 1: (c)

Explanation: (c) is incorrect since a homogenous magnetic field is represented by parallel lines of magnetic field.

Question 2: The phenomenon of electromagnetic induction is

- **the process of generating a magnetic field due to current passing through a coil.**
- **the process of charging a body.**
- **producing induced current in a coil due to relative motion between a magnet and the coil.**
- **the process of rotating a coil of an electric motor.**

Answer 2: (c)

Explanation: Electromagnetic induction is the process by which a coil emits current due to the relative motion of the coil and magnet.

Question 3: For a current in a long straight solenoid, North and South poles are created at the two ends. Among the given statements, the incorrect statement is:

(a) The N- and S-poles exchange position when the direction of current through the solenoid is reversed.

(b) Since the field lines inside the solenoid are all straight lines, the magnetic field must be uniform over the whole solenoid.

(c) The pattern of the magnetic field associated with the solenoid is different from the pattern of the magnetic field around a bar magnet.

(d) When a piece of a magnetic substance, such as soft iron, is placed inside the coil, the powerful magnetic field created inside the solenoid can be used to magnetise the piece.

Answer 3: (c)

Explanation:

Because the solenoid operates like a bar magnet, its magnetic field is patterned after the magnetic bar that surrounds a bar magnet.

Question 4: If the key in the arrangement given below is taken out (i.e. the circuit is made open) and magnetic field lines are drawn over the horizontal plane ABCD, the lines are

(a) concentric circles.

(b) straight lines parallel to each other.

(c) elliptical in shape.

(d) As we go away from point O, the circles become elliptical as opposed to concentric.

Answer 4: (b)

Explanation:

There won't be any magnetic field in the circuit after the key is removed, making the circuit an open circuit with no current flowing through it.
The only magnetic field in that area will be that of the earth, and it will take the form of straight lines parallel to one another across the horizontal plane ABCD.
Additionally, equidistant and parallel magnetic field lines result from a little portion of the magnetic field lines being uniform and constant. As a result, the lines will be parallel and straight.

Hence the correct option is option C.

Question 5: A circular loop, when placed in a plane perpendicular to the plane of the paper, may carry a current when the key is ON. The current, as seen from points A and B (in the plane of the paper and on the axis of the coil), is anticlockwise and clockwise, respectively. The magnetic field lines point from B to A. The North pole of the resultant magnet is on the face close to

(a) A.

(b) B.

(c) B when the current is small and A if the current is large.

(d) A if the current is small, and B if the current is large.

Answer 5: (a) A

Explanation:

Based on the right-hand thumb rule:

It is evident from the right-hand thumb rule that magnetic lines of force enter the face near B and exit the face near A.
The magnet's north pole is where the magnetic fields exit and enter the south pole.

Hence the correct answer is option A.

Question 6: Commercial electric motors do not use

(a) an effectively large number of turns of conducting wire in the current-carrying coil.

(b) a soft iron core on which the coil is wound.

(c) a permanent magnet to rotate the armature.

(d) an electromagnet to rotate the armature.

Answer 6: (c)

Explanation:

Electromagnets are utilised in electric motors in place of permanent magnets**.**

Question 7: Suppose that a uniform magnetic field exists in the plane of paper pointing from left to right. In the field, an electron and a proton move, as shown. The electron and the proton experience

(a) forces both pointings into the plane of the paper.

(b) forces pointing into the plane of the paper and out of the plane of the paper, respectively.

(c)force pointing opposite and along the direction of the uniform magnetic field, respectively.

(d) forces both pointing out of the plane of the paper.

Answer 7: (a)

Explanation:

The direction of electric current flow is opposite to that of an electron. A increasing trend will come from this. If the index finger displays the direction of the magnetic field, the thumb is pressed into the paper, and the ring finger shows the direction of the current.

Question 8: The device used for producing electric current is called a

1. **generator**
2. **galvanometer**
3. **ammeter**
4. **motor**

Answer 8: (1)

Explanation: The device that produces an electric current is referred to as a "generator." A generator uses mechanical energy to create electric energy.

Question 9: The essential difference between an AC generator and a DC generator is that:

1. **An AC generator will generate a higher voltage.**
2. **An AC generator has an electromagnet, while a DC generator has a permanent magnet.**
3. **A DC generator will generate a higher voltage.**
4. **An AC generator has slip rings, while the DC generator has a commutator.**

Answer 9: (4)

Explanation: AC generators feature two rings known as the slip rings, but DC generators have two half rings known as the commutator. This is the main difference between a DC generator and an AC generator.

Question 10: At the time of the short circuit, the current in circuit

1. **varies continuously.**
2. **Reduces substantially.**
3. **Increases heavily.**
4. **Does not change.**

Answer 10: (c)

Explanation: When two bare wires in the circuit come into contact with one another, a short circuit occurs, which causes the amount of current flowing in the circuit to increase suddenly.

Question 11: Which of the following correctly describes the magnetic field near a long straight wire?

- **The field consists of radial lines originating from the wire.**
- **The field consists of straight lines perpendicular to the wire.**
- **The field consists of straight lines parallel to the wire.**
- **The field consists of concentric circles centred on the wire.**

Answer 11: (d)

Explanation: Concentric circles can be seen in the magnetic field around a long, straight wire. The cable supports their centres.

Question 12: Choose the correct option.

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

1. **one revolution**
2. **one-fourth revolution**
3. **half revolution**
4. **two revolutions**

Answer 12: (c)

Explanation: When a rectangular coil is rotated in a magnetic field, the direction of the generated current changes once per half revolution. As a result, the coil's current flow continues in the same direction.

Question 13: Choose the INCORRECT statement

(a) There is a difference between direct and alternating currents in that the former always flows in one direction while the latter occasionally does the opposite.

(b) To determine the direction of magnetic fields caused by current-carrying conductors, apply the right-hand thumb rule.

(c) Fleming's right-hand rule is a simple rule to know the direction of induced current

(d) the AC changes direction after every 1/50 second in India

Answer 13: (d)

Explanation:

In India, the AC frequency is 50 Hz. Every cycle, the direction switches twice, so a change in direction occurs every 1/100 second.

Question 14: Choose the correct option.

The magnetic field inside a long straight solenoid-carrying current:

1. **Increases as we move towards its end.**
2. **Decreases as we move towards its end.**
3. **Is zero.**
4. **Is the same at all points.**

Answer 14: (4)

Since the magnetic field inside a long solenoid carrying a straight current is consistent, it remains constant throughout.

Question 15: A positively-charged particle (alpha-particle) projected towards the west is deflected towards the north by a magnetic field. The direction of the magnetic field is

1. **downward**
2. **towards east**
3. **towards south**
4. **upward**

Answer 15: (d)

Fleming's Left Hand Rule can be used to determine the direction of the magnetic field. The thumb should point in the direction of the magnetic force, the middle finger should point in the direction of the current, and the forefinger should point in the direction of the magnetic field if we position our left thumb, forefinger, and middle finger right perpendicular to each other.

Positively charged particles move westward, and the direction of the current will match their trajectory. The magnetic field will be upward since the magnetic force is directed northward, according to Fleming's Left Hand Rule.

Question 16: As shown in Figure 13.4, there are two coils wound on a non-conducting cylindrical rod. The key is not inserted initially. Then the key is inserted and removed later. Then

(a) The galvanometer's deflection is constant throughout.

(b)There are brief, transitory galvanometer deflections that all point in the same direction

(c) The galvanometer briefly deflects, but it quickly disappears, and the key being removed has no impact.

(d) there are momentary galvanometer deflections that die out shortly; the deflections are in opposite directions

Answer 16: (d)

Explanation:

The galvanometer shows a deflection when the key is plugged in, and if we unplug the galvanometer, the deflection direction changes.

Question 17. With the help of activity demonstrates that a bar magnet has a magnetic field around it.

Answer 17:

One easy approach to demonstrate that a bar magnet has field lines surrounding it is to use compass needles. After positioning the magnet on a white sheet, mark the perimeter using pencil. Place the compass needle in close proximity to the magnet's north pole to mark its position. Now, adjust the compass such that its south pole is at the location of the north pole. Several repetitions of this procedure will yield the pattern shown in the figure.

Draw as many lines as you can, following the same procedure as before. These lines represent the magnetic field.

Question 18. What are the magnetic field lines? Justify the following statements to show that:

(a) Two magnetic field lines never intersect each other.

(b) Magnetic fields are closed curves.

Answer 18:

False continuous closed curves known as "magnetic field lines" are used to represent the magnetic field in a given space. North pole to south pole inside the magnet and south pole to north pole outside the magnet are the two directions in which it is pointed.

(a) By drawing a tangent to the field line, one can ascertain the direction of the magnetic field (B) at any given place. The magnetic field at point P will have two directions when two magnetic field lines meet there, as depicted in the image. One arrow is drawn to each of the two magnetic field lines at point P. This is just not possible.

(b) Field lines must begin at the north pole and combine there per convention. The magnet's internal field lines extend from its south pole to its north pole. The magnetic field lines are these closed curves.

Question 19. Explain the following:

(a) If field lines of a magnetic field are crossed at a point, what does it indicate?

(b) Mention two parameters that are necessary to describe a magnetic field completely.

Answer 19:

(a) It is impossible for there to be two magnetic field directions at one location if field lines of a magnetic field intersect at that location.

(b) Necessary parameters are:

- The magnitude of a magnetic field.
- The direction of field lines.

Question 20.

A straight conductor that is carrying current is put close to a compass needle. Give your opinion in each of the following situations, along with your justifications.

(a) The magnitude of electric current is increased.

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

Answer 20:

(a) As the magnetic field intensity increases, which is precisely proportional to the current, the compass needle's deflection grows.

(b) Because the strength of the magnetic field at a site is inversely linked to the separation from the wire. The compass's deflection therefore decreases as it moves away from the conductor.

Question 21.

State how the magnetic field produced by a straight current-carrying conductor at a point depends on

(a) current through the conductor

(b) distance of the point from the conductor.

Answer 21:

The magnetic field at a point produced by a straight current-carrying conductor depends on

(a)as directly proportional to the current passing through it.

(b) as inversely proportional to the distance of that point from the wire.

Question 22.

Give a reason for the following.

(i) There is either a convergence or a divergence of magnetic field lines near the ends of a current carrying a straight solenoid.

(ii) The current-carrying solenoid, when suspended, freely rests along a particular direction.

Answer 22:

(i) Magnetic field lines near the ends of a current-carrying straight solenoid either diverge or converge because the device functions similarly to a bar magnet and has a magnetic field line pattern resembling that of a bar magnet. The converging end of the straight solenoid becomes the north pole as a result, and the ends behave like the north and south poles of a magnet.

(ii) The current-carrying solenoid aligns itself in a north-south orientation and functions like a bar magnet when it is suspended freely.

Benefits of CBSE Important Questions for Class 10 Science Chapter 13

The benefits of CBSE Important Questions for Class 10 Science Chapter 13, "Magnetic Effects of Electric Current," include:

Focused Revision: Helps students concentrate on key concepts like magnetic field lines, electromagnetic induction, and working of motors and generators.

Exam Readiness: Prepares students for board exams by covering frequently asked and high-weightage questions.

Conceptual Clarity: Enhances understanding of core principles like Fleming’s Left-Hand Rule and Oersted’s experiment, making complex topics easier to grasp.

Problem-Solving Skills: Improves students' ability to solve numerical and diagram-based questions efficiently.

Time Management: Offers practice in answering questions within time constraints, improving speed and accuracy.