CBSE CLASS X

Science (086)

QUESTION PAPER

AI-generated question paper

Code: PXUUEA **Questions: 36** **Maximum Marks: 72** **Generated: 2026-06-25 17:52**

SELECTIONS USED

Subject	Science
Lessons	12 Magnetic Effects of Electric Current
Level of understanding	Exam-ready
Question selection	CBSE board paper, whole lesson (~80 marks across Sections A-E)
Model	claude-sonnet-4-6

Composition — Difficulty: 11 straightforward · 20 medium · 5 deep | Types: 14 MCQ · 6 Assertion–reason · 5 Very short · 5 Short · 3 Long · 3 Case-based | Sections: A 20Q/20m · B 5Q/10m · C 5Q/15m · D 3Q/15m · E 3Q/12m

Q1. straightforward exam-ready **[1]**

The magnetic field lines produced by a long straight current-carrying conductor are:
(A) Straight lines parallel to the conductor
(B) Straight lines perpendicular to the conductor
(C) Concentric circles centred on the conductor
(D) Radial lines emerging from the conductor

A Straight lines parallel to the conductor
B Straight lines perpendicular to the conductor
C Concentric circles centred on the conductor
D Radial lines emerging from the conductor

◆ **Magnetic Effects of Electric Current**

Q2. straightforward exam-ready **[1]**

If the current through a straight conductor is increased, the magnetic field at a fixed point near it will:
(A) Decrease
(B) Remain unchanged
(C) Increase
(D) First increase then decrease

A Decrease
B Remain unchanged
C Increase
D First increase then decrease

◆ **Magnetic Effects of Electric Current**

Q3. straightforward exam-ready **[1]**

Which rule is used to find the direction of the force experienced by a current-carrying conductor placed perpendicular to a magnetic field?

(A) Right-hand thumb rule
(B) Fleming's left-hand rule
(C) Maxwell's right-hand rule
(D) Fleming's right-hand rule

A Right-hand thumb rule
B Fleming's left-hand rule
C Maxwell's right-hand rule
D Fleming's right-hand rule

◆ **Magnetic Effects of Electric Current**

Q4. straightforward exam-ready **[1]**

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

(A) Zero everywhere
(B) Uniform and parallel to the axis
(C) Strongest near the ends
(D) Directed radially outward

A Zero everywhere
B Uniform and parallel to the axis
C Strongest near the ends
D Directed radially outward

◆ **Magnetic Effects of Electric Current**

Q5. straightforward exam-ready **[1]**

In domestic wiring, the wire with green insulation is the:

(A) Live wire
(B) Neutral wire
(C) Earth wire
(D) Phase wire

A Live wire
B Neutral wire
C Earth wire
D Phase wire

◆ **Magnetic Effects of Electric Current**

Q6. medium exam-ready **[1]**

An alpha particle projected towards the east is deflected towards the south by a magnetic field. The direction of the magnetic field is:
(A) Upward
(B) Downward
(C) Towards the north
(D) Towards the west

A Upward
B Downward
C Towards the north
D Towards the west

◆ **Magnetic Effects of Electric Current**

Q7. medium exam-ready **[1]**

Two magnetic field lines can never intersect each other because:
(A) Magnetic field has no physical existence at the point of intersection
(B) At a point of intersection, the compass needle would have to point in two directions simultaneously, which is impossible
(C) Field lines always form closed loops
(D) The magnetic field is zero at the point of intersection

A Magnetic field has no physical existence at the point of intersection
B At a point of intersection, the compass needle would have to point in two directions simultaneously, which is impossible
C Field lines always form closed loops
D The magnetic field is zero at the point of intersection

◆ **Magnetic Effects of Electric Current**

Q8. medium exam-ready **[1]**

A circular coil of wire has 50 turns. Compared to a single-turn coil of the same size carrying the same current, the magnetic field at the centre of the 50-turn coil is:
(A) 50 times smaller
(B) The same
(C) 50 times larger
(D) 2500 times larger

A 50 times smaller
B The same
C 50 times larger
D 2500 times larger

◆ **Magnetic Effects of Electric Current**

Q9. straightforward exam-ready **[1]**

At the time of a short circuit in a domestic wiring system, the current in the circuit:
(A) Reduces substantially
(B) Does not change
(C) Increases heavily
(D) Varies continuously

A Reduces substantially
B Does not change
C Increases heavily
D Varies continuously

◆ **Magnetic Effects of Electric Current**

Q10. straightforward exam-ready **[1]**

The force on a current-carrying conductor placed in a magnetic field is maximum when the angle between the current direction and the magnetic field is:
(A) 0°
(B) 45°
(C) 90°
(D) 180°

A 0°
B 45°
C 90°
D 180°

◆ **Magnetic Effects of Electric Current**

Q11. medium exam-ready **[1]**

The core of an electromagnet is made of soft iron rather than steel because soft iron:
(A) Is cheaper than steel
(B) Has higher electrical resistance
(C) Loses its magnetism easily when current is switched off
(D) Conducts electricity better than steel

A Is cheaper than steel
B Has higher electrical resistance
C Loses its magnetism easily when current is switched off
D Conducts electricity better than steel

◆ **Magnetic Effects of Electric Current**

Q12. medium exam-ready **[1]**

In a domestic circuit, different electrical appliances are connected in parallel rather than in series primarily so that:
(A) Each appliance gets the full supply voltage
(B) The circuit carries less total current
(C) Fuses are not required
(D) The earth wire is not needed

A Each appliance gets the full supply voltage
B The circuit carries less total current
C Fuses are not required
D The earth wire is not needed

◆ **Magnetic Effects of Electric Current**

Q13. straightforward exam-ready **[1]**

The direction of the magnetic field lines inside a bar magnet is:
(A) From north pole to south pole
(B) From south pole to north pole
(C) Perpendicular to the axis of the magnet
(D) In random directions

A From north pole to south pole
B From south pole to north pole
C Perpendicular to the axis of the magnet
D In random directions

◆ **Magnetic Effects of Electric Current**

Q14. deep exam-ready **[1]**

Which of the following properties of a proton moving freely in a magnetic field can change?
(A) Mass
(B) Speed
(C) Velocity
(D) Both speed and velocity

A Mass
B Speed
C Velocity
D Both speed and velocity

◆ **Magnetic Effects of Electric Current**

Q15. medium exam-ready **[1]**

Assertion (A): The magnetic field produced by a current-carrying solenoid resembles the field of a bar magnet.
Reason (R): One end of the current-carrying solenoid acts as a north pole and the other end acts as a south pole.
(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).
(C) Assertion (A) is true, but Reason (R) is false.
(D) Assertion (A) is false, but Reason (R) is true.

A Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
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C Assertion (A) is true, but Reason (R) is false.
D Assertion (A) is false, but Reason (R) is true.

◆ **Magnetic Effects of Electric Current**

Q16. medium exam-ready **[1]**

Assertion (A): When the current through a straight conductor is reversed, the direction of the magnetic field around it also reverses.
Reason (R): The magnetic field around a straight conductor depends on the magnitude but not the direction of the current.
(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).
(C) Assertion (A) is true, but Reason (R) is false.
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C Assertion (A) is true, but Reason (R) is false.
D Assertion (A) is false, but Reason (R) is true.

◆ **Magnetic Effects of Electric Current**

Q17. deep exam-ready **[1]**

Assertion (A): An electric fuse is connected in series with the live wire of a domestic circuit.
Reason (R): If the fuse were connected to the neutral wire, it would still protect appliances from overloading and short-circuiting equally well.
(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).
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C Assertion (A) is true, but Reason (R) is false.
D Assertion (A) is false, but Reason (R) is true.

◆ **Magnetic Effects of Electric Current**

Q18. straightforward exam-ready **[1]**

Assertion (A): The magnetic field near the poles of a bar magnet is stronger than the field at the midpoint along its equator.
Reason (R): The density of magnetic field lines at a point represents the relative magnitude of the magnetic field at that point.
(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).
(C) Assertion (A) is true, but Reason (R) is false.
(D) Assertion (A) is false, but Reason (R) is true.

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C Assertion (A) is true, but Reason (R) is false.
D Assertion (A) is false, but Reason (R) is true.

◆ **Magnetic Effects of Electric Current**

Q19. medium exam-ready **[1]**

Assertion (A): Metallic bodies of electrical appliances such as electric irons and refrigerators are connected to the earth wire.
Reason (R): The earth wire provides a low-resistance path so that any leakage current flows to the earth, keeping the metallic body at earth potential and protecting the user from severe electric shock.
(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).
(C) Assertion (A) is true, but Reason (R) is false.
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C Assertion (A) is true, but Reason (R) is false.
D Assertion (A) is false, but Reason (R) is true.

◆ **Magnetic Effects of Electric Current**

Q20. medium exam-ready **[1]**

Assertion (A): The magnetic field lines of a bar magnet are closed curves.
Reason (R): Outside the magnet, field lines go from north to south pole, and inside the magnet they continue from south to north pole, forming a complete closed loop.
(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).
(C) Assertion (A) is true, but Reason (R) is false.
(D) Assertion (A) is false, but Reason (R) is true.

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B Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).
C Assertion (A) is true, but Reason (R) is false.
D Assertion (A) is false, but Reason (R) is true.

◆ **Magnetic Effects of Electric Current**

Q21. medium exam-ready **[2]**

State the right-hand thumb rule. A vertical wire carries current in the downward direction. Using the right-hand thumb rule, state the direction of the magnetic field at a point to the east of this wire.

◆ **Magnetic Effects of Electric Current**

Q22. straightforward exam-ready **[2]**

What is a solenoid? State two ways in which the magnetic field pattern produced by a current-carrying solenoid is similar to that of a bar magnet.

◆ **Magnetic Effects of Electric Current**

Q23. medium exam-ready **[2]**

A current-carrying horizontal aluminium rod is placed between the poles of a horseshoe magnet with the magnetic field directed vertically upward. State the direction of the force on the rod if the current flows from west to east. Name the rule you used.

◆ **Magnetic Effects of Electric Current**

Q24. medium exam-ready **[2]**

What causes short-circuiting in a domestic electric circuit? State one consequence and one measure to prevent it.

◆ **Magnetic Effects of Electric Current**

Q25. medium exam-ready **[2]**

Why does the deflection of a compass needle placed near a current-carrying wire decrease when the compass is moved farther away from the wire?

◆ **Magnetic Effects of Electric Current**

Q26. medium exam-ready **[3]**

Draw labelled diagrams showing the magnetic field lines (a) around a bar magnet and (b) around a current-carrying circular loop. State one similarity between the two field patterns.

◆ **Magnetic Effects of Electric Current**

Q27. medium exam-ready **[3]**

Explain how an electromagnet is made. Mention two ways in which the strength of an electromagnet can be increased.

◆ **Magnetic Effects of Electric Current**

Q28. medium exam-ready **[3]**

A student connects a 3 kW electric geyser to a domestic circuit of 220 V that has a 5 A fuse. What will happen? Show your calculation and explain the reason for the outcome.

◆ **Magnetic Effects of Electric Current**

Q29. straightforward exam-ready **[3]**

State Fleming's left-hand rule. Name any two devices that work on the principle of force experienced by a current-carrying conductor in a magnetic field.

◆ **Magnetic Effects of Electric Current**

Q30. deep exam-ready **[3]**

Explain why the magnetic field at the centre of a current-carrying circular loop appears to consist of parallel straight lines. How does increasing the number of turns in the circular coil affect this field?

◆ **Magnetic Effects of Electric Current**

Q31. medium exam-ready **[5]**

(i) State the rule used to find the direction of the magnetic field produced by a current-carrying straight conductor.
(ii) A horizontal power line carries current from west to east. Using the appropriate rule, determine the direction of the magnetic field at a point (a) directly above the wire and (b) directly below the wire.
(iii) How would the magnetic field change at those points if the current in the power line were doubled?

◆ **Magnetic Effects of Electric Current**

Q32. medium exam-ready **[5]**

(i) With a neat labelled diagram, describe the pattern of the magnetic field produced by a current-carrying solenoid. How does the field inside the solenoid differ from the field outside it?
(ii) What is an electromagnet? Name the material used for its core and give one reason why that material is preferred.
(iii) List any two applications of electromagnets in everyday life.

◆ **Magnetic Effects of Electric Current**

Q33. deep exam-ready **[5]**

(i) Describe, with a diagram, the domestic electric circuit used in homes, identifying the live wire, neutral wire, and earth wire by their insulation colours and stating the potential difference between live and neutral wires.
(ii) Why are appliances with metallic bodies connected via a three-pin plug, but an ordinary electric bulb uses only a two-pin plug?
(iii) State two causes of overloading in a domestic circuit and explain how a fuse protects the circuit in such a situation.

◆ **Magnetic Effects of Electric Current**

Q34. medium exam-ready **[4]**

Read the following and answer the questions below.

Oersted's accidental discovery in 1820 revealed that a compass needle placed near a current-carrying wire gets deflected. This showed that a moving electric charge creates a magnetic field in the surrounding space. It was later established that a current-carrying conductor, when placed in an external magnetic field, experiences a mechanical force. This discovery led to the development of several devices that convert electrical energy into mechanical energy.

(a) What conclusion did Oersted draw from the deflection of the compass needle placed near the current-carrying wire? [1]
(b) In what direction does a compass needle placed below a horizontal wire (with current flowing from south to north) deflect — towards the east or towards the west? [1]
(c) State the rule that gives the direction of the force on a current-carrying conductor placed perpendicular to a magnetic field. [1]
(d) Name one device that converts electrical energy into mechanical energy using the force on a current-carrying conductor in a magnetic field. [1]

◆ **Magnetic Effects of Electric Current**

Q35. medium exam-ready **[4]**

Read the following and answer the questions below.

In a hospital, engineers are setting up the domestic-type wiring for wards, where each ward has multiple electrical appliances connected in parallel. Each ward has two separate circuits — a 15 A circuit for high-power appliances such as geysers and air conditioners, and a 5 A circuit for lights and fans. The hospital also has machines that generate strong magnetic fields by passing large currents through coils.

(a) Why are the appliances in each ward connected in parallel rather than in series? [1]
(b) Why is a 15 A fuse used for the high-power appliance circuit instead of a 5 A fuse? [1]
(c) Give one reason why two separate circuits of different current ratings are used in the same ward. [1]
(d) What is the colour of insulation used for the earth wire in domestic wiring, and what is its purpose? [1]

◆ **Magnetic Effects of Electric Current**

Q36. deep exam-ready **[4]**

Read the following and answer the questions below.

A science teacher sets up a demonstration: a straight copper wire is connected to a battery and a switch, and a compass needle is placed close to the wire. When the switch is closed, the needle deflects. The teacher then bends the wire into a circular loop and passes current through it. Iron filings on a cardboard placed through the loop reveal a field pattern. When the teacher winds the wire into a tight cylindrical coil of many turns and passes current through it, the field pattern changes dramatically and resembles that of a well-known permanent magnet.

(a) When the switch is closed in the straight-wire setup, what does the deflection of the compass needle indicate? [1]
(b) At the centre of the current-carrying circular loop, the magnetic field lines appear as parallel straight lines. Give a reason for this. [1]
(c) What shape of permanent magnet does the field of the tightly wound cylindrical coil resemble, and what are the corresponding 'poles' of this coil? [1]
(d) If the number of turns in the cylindrical coil is doubled while the current remains the same, how does the magnetic field inside the coil change? [1]

◆ **Magnetic Effects of Electric Current**

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