Affiliated to CBSE, New Delhi (Affiliation No. 1030642)

GNPS

GOMTI NANDAN PUBLIC SCHOOL

Gandhi Ward, Bina (M.P.) 470113. | 9165 609 333. | info@mygnps.com | www.mygnps.com

CLASS X · SCIENCE (086) · PHYSICS · CBSE BOARD EXAMINATION 2027

CHAPTER 12

Magnetic Effects of Electric Current

Chapter Practice Booklet · Questions only · Answers in the separate Answer Booklet

12 note blocks + 7 diagrams | 61 practice questions | 3 case studies | Board question index

INSIDE THIS BOOKLET

1	**Chapter Notes** 12 note blocks, 7 original diagrams, rules table + exam snapshot	2
A	**NCERT Practice** 19 questions	7
B	**Exemplar Practice** 15 questions	9
C	**Board Pattern Practice** 27 questions, with frequency stars	10
D	**Case-Based Questions** 3 case studies	13
E	**Board PYQ Index** Real 2023–2026 questions by type	14
F	**My Mistakes** Your error log	15

STUDENT DETAILS

NAME _____

CLASS & SECTION _____

ROLL NO. _____

BOOKLET STARTED ON _____

CHAPTER TEST SCORE ____ / 20

1

READ THIS FIRST

Chapter Notes

The whole chapter in short-note form: every definition, activity, diagram, formula and reason. Revise from here – you should not need the textbook again.

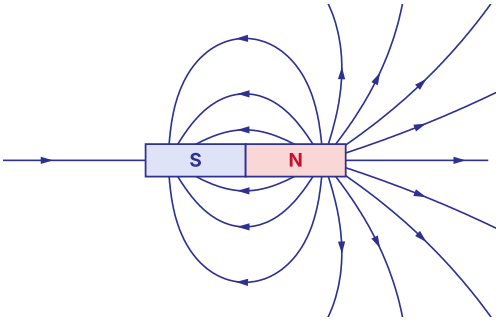
1 Electricity and magnetism are linked

- A **compass needle** is a tiny bar magnet. Its north-seeking end is its **north pole (N)**. Like poles repel; unlike poles attract.
- **Oersted (1820):** a compass needle placed near a wire is **deflected** when current flows in the wire. Reverse the current and the deflection reverses.
- So an electric current produces a **magnetic field** around it. This is the **magnetic effect of current**.

Magnetic field: the region around a magnet (or a current) in which its magnetic force can be detected. It has both **size (strength)** and **direction**, so it is a vector quantity.

2 Magnetic field lines

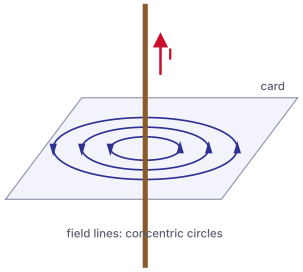
Field line: the path along which a free north pole would tend to move. The **direction of the field** at a point is the direction in which the **N pole of a compass** placed there points.



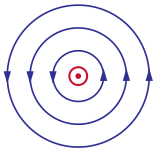
Field lines of a bar magnet

- Outside the magnet they go from **N to S**; inside the magnet from **S to N**. So they are **closed curves**.
- **Crowded lines = strong field** (near the poles); lines far apart = weak field.
- **Two field lines never cross.** If they did, a compass at the crossing would point in two directions at once – impossible.
- The **tangent** to a field line at a point gives the field direction there.
- **Activities:** iron filings sprinkled on paper over a magnet arrange themselves along the field lines; a compass moved step by step from N to S traces one line.

3 Field of a straight current-carrying wire



Current upward: circles anticlockwise seen from above

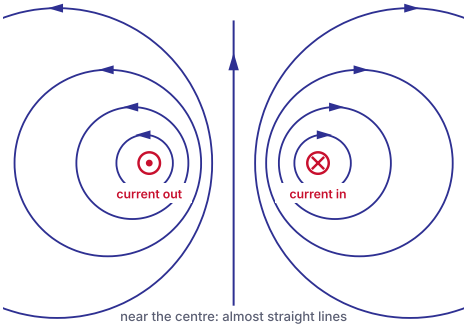


Top view, current out of page

- The field lines are **concentric circles** with the wire at the centre, in a plane **perpendicular** to the wire.
- Reverse the current → the direction of the circles reverses.
- **Strength increases** when the **current increases**; it **decreases** as the **distance** from the wire increases (the circles get farther apart).

Right-hand thumb rule: hold the wire in your **right hand** with the **thumb along the current**. The direction in which your **fingers curl** is the direction of the magnetic field lines. (Also called Maxwell's corkscrew rule.)

4 Field of a circular loop (coil)

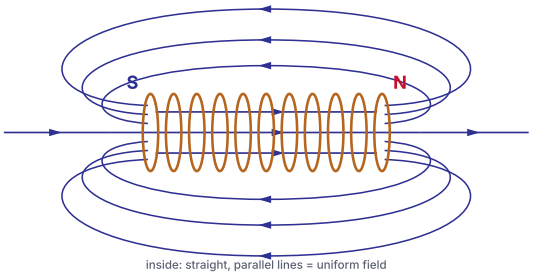


Vertical section of a loop: current comes out at the left, goes in at the right

- Every small part of the loop acts like a short straight wire with circles around it.
- Near the wire the circles are small; towards the **centre** they become so large that the lines look like **straight lines**.
- At the centre, the fields of **all parts of the loop point the same way** and add up.
- For a coil of **n turns**, the field is **n times** that of one turn, because the current in every turn flows the same way.
- **Field at the centre increases** with (i) more current, (ii) more turns; it **decreases** when the radius of the loop is larger.

5 Solenoid

Solenoid: a coil of many circular turns of **insulated copper wire** wound closely in the shape of a cylinder.



A solenoid behaves like a bar magnet

- The field pattern outside is like that of a **bar magnet**: one end acts as N, the other as S.
- **Inside**, the lines are **parallel straight lines** → the field is the **same at all points (uniform)**.
- Reverse the current → the N and S ends exchange places.
- **Which end is N?** Look at an end: if the current there flows **anticlockwise** that end is **N**; clockwise → S.
- Strength depends on: **number of turns**, **current**, and the **core material** (a soft-iron core makes it much stronger).

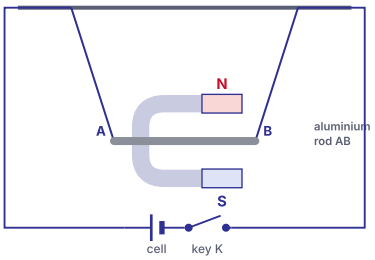
6 Electromagnet

Electromagnet: a piece of **soft iron** placed inside a solenoid becomes a strong magnet while current flows.

Electromagnet	Permanent magnet
Temporary – magnetism lasts only while current flows	Keeps its magnetism
Strength can be changed (current, turns)	Strength is fixed
Polarity can be reversed by reversing the current	Polarity is fixed
Core: soft iron	Made of steel / alloys such as alnico

Uses: cranes that lift scrap iron, electric bells, relays, MRI machines, loudspeakers.

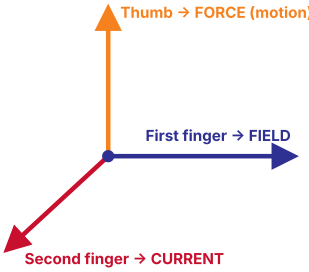
7 Force on a current-carrying conductor



Aluminium rod between the poles of a horseshoe magnet

- A magnet exerts a force on a wire carrying current (Ampère). The wire and the magnet exert **equal and opposite** forces on each other.
- **Activity:** switch on the current → rod AB is **displaced**. Reverse the current *or* turn the magnet round (reverse the field) → the rod moves the **other way**.
- Force is **largest** when the current is **perpendicular** to the field; it is **zero** when the current is **parallel** to the field.
- The force (and the displacement) increases with a larger current, a stronger magnet or a longer part of the rod in the field.

8 Fleming's left-hand rule



Stretch the **thumb, first finger and second finger** of the **left hand** so that they are mutually perpendicular. If the **first finger** points along the **field** and the **second finger** along the **current**, the **thumb** points along the **force (motion)** on the conductor.

MEMORY AID
F-B-I: thumb **F**orce · first finger **B** (field) · second finger **I** (current).
For a beam of **electrons**, the current is **opposite** to the direction in which the electrons move.

Devices that use this force: electric motors, loudspeakers, measuring meters. (The working of the motor, electromagnetic induction and the generator are not in the 2026–27 board syllabus.)

9 Direct and alternating current

- **Direct current (DC):** flows in **one direction** only, e.g. from a cell or battery.
- **Alternating current (AC): reverses its direction** again and again at regular intervals, e.g. the mains supply at home.
- **Frequency of AC in India = 50 Hz:** 50 complete cycles each second, so the current changes direction **after every 1/100 second** (100 times a second).
- **Advantage of AC over DC:** AC can be sent over **long distances without much loss of energy**.

10 Domestic electric circuits

- Mains supply comes by two wires: **live** (red insulation, at 220 V) and **neutral** (black, at 0 V). The potential difference between them is **220 V**.
- The third wire, **earth** (green), is joined to a **metal plate buried deep in the ground** near the house.
- Path: pole → **main fuse** → **electricity meter** → **distribution box** → separate circuits.
- Two kinds of circuit: **15 A** for high-power appliances (geyser, air cooler, heater) and **5 A** for bulbs and fans.
- All appliances are joined in **parallel**: each gets the full 220 V and can be switched on or off on its own.
- **Switches and fuses** are always placed in the **live wire**.

11 Safety devices: earthing and fuse

- **Earthing:** the metal body of an iron, toaster, refrigerator etc. is joined to the earth wire. If live wire touches the body, the current flows to the earth through this **low-resistance path**; the body stays at earth potential, so the user does not get a severe shock.
- **Fuse:** a short wire of **low melting point** joined in **series** with the live wire. When too much current flows, it gets hot (heating effect of current) and **melts**, breaking the circuit and protecting appliances and wiring.
- Many homes now use an **MCB** (miniature circuit breaker), which switches off automatically and can be reset.

12 Short circuit and overloading

- **Short circuit:** the live and neutral wires come in **direct contact** (damaged insulation or a fault in an appliance). Resistance becomes almost zero, so a very large current flows.
- **Overloading:** too much current is drawn – too many appliances on one socket, a high-power appliance on a 5 A line, or a sudden rise in supply voltage.
- Both can heat the wires and cause a **fire**. The **fuse / MCB** cuts off the supply.

WORKED EXAMPLE

A 2.2 kW heater on a 220 V line draws $I = \frac{P}{V} = \frac{2200}{220} = 10$ A. On a 5 A circuit the fuse will melt; it must be used on a 15 A circuit.

Rules and patterns to remember

Learn the shape, the rule and what makes the field stronger

Source of field	Shape of field lines	Direction from	Field is stronger when
Bar magnet	Closed curves, N → S outside, S → N inside	Compass needle	Near the poles (lines crowded)
Straight wire	Concentric circles around the wire	Right-hand thumb rule	Current ↑, distance from wire ↓
Circular loop	Circles near the wire, nearly straight at the centre	Right-hand thumb rule	Current ↑, turns ↑, radius ↓
Solenoid	Like a bar magnet; parallel straight lines inside (uniform)	Anticlockwise end = N	Current ↑, turns ↑, soft-iron core
Force on a wire	Force ⊥ to both current and field	Fleming's left-hand rule	Current ⊥ field, current ↑, field ↑

Domestic wiring	Fact to remember
Live	Red (new: brown) · 220 V · fuse and switch go here
Neutral	Black (new: blue) · 0 V
Earth	Green · joined to a metal plate deep in the ground and to metal bodies of appliances
Ratings	15 A line: geyser, heater, AC · 5 A line: bulbs, fans · AC in India: 220 V, 50 Hz

Explain why – quick answers

Common 1- and 2-mark reasons

Two field lines never cross – at the crossing a compass would have to point in two directions, which is impossible.

A compass needle deflects near a current-carrying wire – the current produces a magnetic field around the wire.

Field lines near a straight wire get farther apart outwards – the field becomes weaker as the distance from the wire increases.

The field inside a solenoid is uniform – the field lines inside are parallel and equally spaced.

Soft iron is used as the core of an electromagnet – it becomes strongly magnetised while current flows and loses its magnetism when current stops.

A coil of many turns gives a stronger field – the current in each turn flows the same way, so the fields of all turns add up.

No force acts on a wire placed along the field – the force is zero when the current is parallel to the field.

Appliances are connected in parallel at home – each gets 220 V and can be switched on or off independently.

The fuse is put in the live wire – when it melts, the appliance is cut off from the 220 V wire and is safe to touch.

Metal-bodied appliances are earthed – leaking current goes to the earth, so the user does not get a severe shock.

AC is used for supplying power to towns – it can be transmitted over long distances with little loss of energy.

A heater should not be used on a 5 A socket – it draws more than 5 A, which overloads the circuit and melts the fuse.

Exam snapshot

What the board asks, and how to prepare

SYLLABUS 2026–27

- Magnetic field and field lines; field due to a current-carrying straight conductor, a circular loop and a solenoid.
- Force on a current-carrying conductor; Fleming's left-hand rule.
- Direct current; alternating current and its frequency; advantage of AC over DC.
- Domestic electric circuits.

Not assessed in the board exam: electric motor, electromagnetic induction, electric generator (formative only).

BOARD WEIGHTAGE

25 / 80

Physics = 25 marks (Section C). Unit IV **Effects of Current** (Electricity + this chapter) = **13**. This chapter gave **3–6 marks** in recent papers: often a 3-mark question or a 5-mark question, plus a 1-mark MCQ or A–R.

MOST ASKED IN BOARD AND SAMPLE PAPERS, 2025–2027 (5 PAPERS CHECKED)

How often	Question type	Marks	Papers
★★★	Straight wire: right-hand thumb rule, field vs distance and current	1–5	4 of 5
★★★	Circular loop, solenoid, electromagnet: patterns and factors	2–5	3 of 5
★★☆	Field lines: meaning, direction, properties, never cross	1–3	2 of 5
★★☆	Force on a conductor, Fleming's left-hand rule, electron beams	1–5	2 of 5
★★☆	Domestic circuits: wires, earthing, fuse, short circuit, overloading	1–3	2 of 5
☆☆☆	AC and DC, frequency 50 Hz, advantage of AC	1–3	0 of 5

MISTAKES THAT COST MARKS

- Using the **right** hand for the force on a conductor – Fleming's rule for force uses the **left** hand.
- Forgetting that the current is **opposite** to the motion of electrons.
- Drawing field lines that **cross**, or without **arrows**, or open at the ends of a bar magnet.
- Writing "field inside a solenoid is zero" – it is **strong and uniform**.
- Saying the fuse is joined in parallel – it is in **series** with the **live** wire.
- Mixing up **short circuit** (live touches neutral) with **overloading** (too much current drawn).

HOW TO USE THIS BOOKLET

1. **Day 1:** Read the notes and the key tables; then Part A (NCERT).
2. **Day 2:** Part B (Exemplar) and Part C (board pattern). Do every MUST DO question first.
3. **Day 3:** Part D (case studies) and the real board questions listed in Part E.
4. **Tue 1 Dec (zero period): Physics chapter test – 20 marks, 40 minutes.**
5. Check every answer in the **Answer Booklet**. Write each mistake on the My Mistakes page (Part F).

PART A · NCERT PRACTICE

A NCERT Practice

The ideas of every NCERT activity, in-text question and exercise, asked in new words. Finish every question.

Magnetic field and field lines

A1. Why is a compass needle deflected when it is brought near a bar magnet? What does this tell us about the space around the magnet? [2]

A2. Draw the magnetic field lines around a bar magnet and list three properties of magnetic field lines. MUST DO [3]

A3. Why do two magnetic field lines never intersect? [1]

A4. How can you find the direction of the magnetic field at a point near a magnet? How is the relative strength of the field shown by field lines? [2]

Field due to a current

A5. A long straight wire carrying current passes vertically through a horizontal sheet of cardboard. Iron filings are sprinkled on the card and it is tapped gently. MUST DO [3]

(i) Describe the pattern formed.

(ii) What happens to the direction of the field if the current is reversed?

(iii) What happens to the strength of the field if the current is increased?

A6. State the right-hand thumb rule. Use it to find the direction of the magnetic field around a vertical wire in which current flows downwards, as seen from above. MUST DO [2]

A7. Current in a horizontal wire flows from south to north. Find the direction of the magnetic field at a point directly **below** the wire and at a point directly **above** it. [2]

A8. Draw the pattern of field lines due to a current-carrying circular loop. Why do the lines near the centre of the loop appear almost straight? [3]

A9. List three factors on which the magnetic field at the centre of a current-carrying circular coil depends. [3]

A10. A circular loop of wire lies flat on a table. Current flows through it **anticlockwise** as seen from above. Find the direction of the magnetic field (i) inside the loop (ii) outside the loop. [2]

Solenoid and electromagnet

A11. What is a solenoid? Draw the field lines in and around a current-carrying solenoid. What does the pattern inside tell you? MUST DO [3]

A12. How is an electromagnet made? Give two ways in which it differs from a permanent magnet. [3]

Force on a current-carrying conductor

A13. Describe an activity to show that a current-carrying conductor placed in a magnetic field experiences a force. How can the direction of the force be reversed? MUST DO [3]

A14. State Fleming's left-hand rule. MUST DO [2]

A15. An alpha particle (positively charged) moves vertically downwards. It is deflected towards the east by a magnetic field. What is the direction of the field? [2]

Domestic circuits

A16. Name the three wires used in a domestic circuit and give the colour of the insulation on each. What is the potential difference between the live and the neutral wire in India? [2]

A17. What is the function of an earth wire? Why is it necessary to earth metallic appliances? MUST DO [2]

A18. An electric oven of 2.2 kW is used in a domestic circuit (220 V) that has a current rating of 5 A. What result do you expect? Show your calculation. [2]

A19. What precautions should be taken to avoid overloading of domestic circuits? Give two. [2]

PART B · EXEMPLAR PRACTICE

B Exemplar Practice

Exemplar-style questions, one step harder. Give a reason with every short answer.

Multiple choice

1 mark each

B1. Which of the following correctly describes the magnetic field near a long straight current-carrying wire? [1]

(a) The field lines are parallel to the wire

(b) The field lines are radial, starting from the wire

(c) The field lines are concentric circles centred on the wire

(d) There is no field outside the wire

B2. The magnetic field inside a long straight solenoid carrying current: [1]

(a) is zero (b) decreases towards its ends

(c) increases towards its ends (d) is the same at all points

B3. Which statement about magnetic field lines is **incorrect**? [1]

(a) They are closed curves

(b) They cross each other where the field is strongest

(c) They are crowded near the poles

(d) A tangent to a line gives the direction of the field

B4. The magnetic field at the centre of a current-carrying circular coil can be increased by: [1]

(a) increasing the radius of the coil (b) decreasing the number of turns

(c) increasing the number of turns (d) decreasing the current

B5. A current-carrying straight conductor is placed in a uniform magnetic field. The force on it is maximum when the angle between the conductor and the field is: [1]

(a) 0° (b) 45° (c) 90° (d) 180°

B6. A beam of electrons moves from west to east in a magnetic field pointing vertically downwards. The force on the beam is towards the: [1]

(a) north (b) south (c) east (d) west

B7. In Indian homes, the alternating current changes its direction once every: [1]

(a) 1/50 s (b) 1/100 s (c) 1/25 s (d) 1 s

B8. A fuse wire is made of a material that has: [1]

(a) high resistance and high melting point

(b) low resistance and high melting point

(c) high resistance and low melting point

(d) low melting point and is joined in the neutral wire

B9. Which of these is **not** a reason for overloading of a domestic circuit? [1]

(a) Many appliances on one socket (b) A sudden rise in supply voltage

(c) Using an earth wire (d) Live and neutral wires touching

B10. The N and S poles of a current-carrying solenoid can be interchanged by: [1]

(a) increasing the current
(b) putting a soft-iron core in it
(c) reversing the direction of the current
(d) increasing the number of turns

Short answer

2–3 marks

B11. Two compasses are placed at points P and Q near a straight wire carrying current. P is 2 cm from the wire and Q is 6 cm from it. At which point will the deflection be larger? What happens to both deflections if the current is doubled? [2]

B12. Look at an end of a current-carrying solenoid. The current there appears to flow clockwise. Is that end a north pole or a south pole? Give two ways to make the solenoid a stronger magnet. [3]

B13. A wire carrying current from east to west lies in a magnetic field pointing vertically upwards. In which direction will it move? What will happen if both the current and the field are reversed? [2]

B14. Distinguish between a short circuit and overloading. Name the device that protects a circuit from both. MUST DO [3]

B15. Why are all the appliances in a house connected in parallel and not in series? Give two reasons. [2]

C

PART C · BOARD PATTERN

Board Pattern Practice

Question types from the 2025 and 2026 board papers and the CBSE sample papers. ★★★ = asked in 3 or more of the 5 papers checked · ★★ = 2 papers · ★ = 1 paper.

ASSERTION–REASON: HOW TO ANSWER

(a) Both A and R are true, and R is the correct explanation of A.
(b) Both A and R are true, but R is not the correct explanation of A.
(c) A is true, but R is false.
(d) A is false, but R is true.

Field lines and their properties

★★☆ 2 of 5 papers · 1–3 marks

C1. Magnetic field lines outside a bar magnet start from the: [1]

(a) S pole and end at the N pole
(b) N pole and end at the S pole
(c) middle of the magnet
(d) N pole and never end

C2. ASSERTION–REASON [1]

Assertion (A): Magnetic field lines never intersect each other.

Reason (R): The field at a point has only one direction.

C3. ASSERTION–REASON [1]

Assertion (A): The magnetic field is strongest near the poles of a bar magnet.

Reason (R): Magnetic field lines are closer together near the poles.

C4. What is meant by a magnetic field line? Give two reasons why we say field lines are closed curves. [3]

Straight conductor and right-hand thumb rule

★★★ 4 of 5 papers · 1–5 marks

C5. A vertical wire carries current upwards. When seen from above, the magnetic field lines around it are: [1]

(a) clockwise circles (b) anticlockwise circles
(c) straight lines towards the east (d) straight lines towards the west

C6. Three points X, Y and Z are 1 cm, 3 cm and 5 cm from a long straight wire AB carrying a steady current. At which point is the magnetic field strongest and at which is it weakest? Justify your answer. MUST DO [2]

C7. Why does the pattern of the magnetic field around a current-carrying wire depend on the shape of the wire? [2]

C8. Two long straight parallel wires P and Q carry equal currents in **opposite** directions. What is the direction of the field due to each at the midpoint O between them? Is the total field at O larger or smaller than that due to one wire? What would happen if the currents were in the same direction? [3]

C9. A compass is placed near a straight wire carrying current. List three observations you make when (i) the current is reversed (ii) the current is increased (iii) the compass is moved away from the wire. MUST DO [3]

Circular loop, solenoid and electromagnet

★★★ 3 of 5 papers · 2–5 marks

C10. The field lines at the centre of a current-carrying circular loop are: [1]

(a) concentric circles (b) nearly straight and parallel
(c) radial lines (d) absent

C11. Which change will **not** increase the strength of an electromagnet? [1]

(a) More turns of wire (b) A larger current
(c) A soft-iron core (d) A copper core instead of soft iron

C12. ASSERTION–REASON [1]

Assertion (A): A soft-iron bar placed inside a current-carrying solenoid becomes a magnet.
Reason (R): The magnetic field inside a solenoid is strong and uniform.

C13. Draw the field lines of a current-carrying solenoid and mark its N and S ends. State two ways in which the field of a solenoid is similar to, and one way it differs from, that of a bar magnet. [3]

C14. Why is the field produced by a coil of 50 turns 50 times that produced by a single turn, for the same current? [2]

Force on a conductor and Fleming's left-hand rule

★★☆ 2 of 5 papers · 1–5 marks

C15. In Fleming's left-hand rule, the second (middle) finger shows the direction of: [1]

(a) magnetic field (b) force
(c) current (d) motion of electrons

C16. A straight wire carrying current is placed along the direction of a uniform magnetic field. The force on the wire is: [1]

(a) maximum (b) zero
(c) along the field (d) opposite to the current

C17. ASSERTION–REASON [1]

Assertion (A): The rod in the conductor-in-a-magnetic-field activity moves the other way when the poles of the magnet are interchanged.

Reason (R): The direction of the force depends on the direction of the magnetic field.

C18. A beam of electrons enters a magnetic field directed **into the page**, moving from left to right. In which direction will the beam be deflected? Explain. MUST DO [2]

C19. Rod AB lies east–west between the poles of a horseshoe magnet, with the N pole above it and the S pole below it. Current flows from A (west) to B (east). [3]

(i) What is the direction of the magnetic field on the rod?

(ii) In which direction does the rod move?

(iii) Give one way to make the rod move farther.

AC, DC and domestic circuits

★★☆ 2 of 5 papers · 1–3 marks

C20. The frequency of the AC supplied to Indian homes is: [1]

(a) 50 Hz (b) 60 Hz (c) 100 Hz (d) 220 Hz

C21. In a domestic circuit, the switch for a fan is joined: [1]

(a) in the neutral wire (b) in the earth wire

(c) in the live wire (d) between the earth and neutral wires

C22. ASSERTION–REASON [1]

Assertion (A): The metal body of an electric iron is connected to the earth wire.

Reason (R): The earth wire has a high resistance.

C23. Give two differences between direct current and alternating current, and one advantage of AC over DC. [3]

C24. A house has a 15 A line and a 5 A line. Which line should be used for (i) a 2 kW geyser (ii) four 60 W bulbs? Justify with a calculation (supply 220 V). [2]

C25. Draw a labelled schematic diagram of a common domestic circuit showing the main fuse, meter, distribution box, earth wire and two separate circuits. [3]

Long answer

Section D style · 5 marks

C26. (a) Draw the pattern of field lines due to a current-carrying circular loop. (b) Write two factors on which the field at its centre depends. (c) A coil carries current anticlockwise as seen from the front. Which pole does the front face act as? (d) Why is the field produced by a solenoid used to make an electromagnet? [5]

C27. (a) State Fleming's left-hand rule. (b) Describe an activity to show that a force acts on a current-carrying conductor in a magnetic field. (c) When is this force (i) largest (ii) zero? (d) Name one device that uses this force. MUST DO [5]

D

PART D · SECTION E STYLE

Case-Based Questions

Each case carries 4 marks (1 + 1 + 2), as in the case-based questions of the board paper.

D1. Case Study · The Science-Fair Electromagnet [4]

Aarav winds 100 turns of insulated copper wire on a cardboard tube and connects it to a battery through a switch. With the switch closed, the tube attracts a few pins. He slips a soft-iron nail into the tube and now it lifts a whole bunch of pins. When he opens the switch, the pins fall off.

(i) What name is given to the coil Aarav made? [1]

(ii) Why did the pins fall off when the switch was opened? [1]

(iii) Give two ways in which Aarav could lift even more pins. [2]

OR

(iii) How can Aarav find out which end of the coil is the N pole? What change would interchange the poles? [2]

D2. Case Study · The Jumping Rod [4]

In the lab, a light copper rod rests on two horizontal metal rails that are joined to a battery and a switch. The rails pass between the poles of a strong magnet so that the field acts **vertically upwards** on the rod. When the switch is closed, current flows through the rod from the left rail to the right rail (towards the east) and the rod rolls along the rails.

(i) State the rule used to find the direction of the force on the rod. [1]

(ii) In which direction does the rod roll? [1]

(iii) What would happen if (a) the current is reversed (b) the magnet is turned so that the field is along the rod? [2]

OR

(iii) Why does the rod move faster when a battery of higher voltage is used? Name one device that works on this principle. [2]

D3. Case Study · Wiring a New House [4]

An electrician wiring a new house in Bina uses red, black and green wires. He makes a separate 15 A line for the kitchen and bathroom and a 5 A line for the rooms, with an MCB for each line. The owner wants to run a 2.2 kW room heater from a 5 A socket in the bedroom. The supply is 220 V.

(i) Which wire is joined to the metal body of the heater, and what is its colour? [1]

(ii) Why is each line given its own MCB? [1]

(iii) Find the current drawn by the heater and say whether the owner's plan is safe. [2]

OR

(iii) What is a short circuit? How does the MCB protect the house when it happens? [2]

PART E · REAL BOARD QUESTIONS

E Board PYQ Index

Real questions from recent Science board papers and CBSE sample papers, by type. Open the official paper and solve the listed questions.

Frequency	Question type	Marks	Where asked (year: paper code, question number)	Practise here
★★★	**Straight wire: right-hand thumb rule, field vs distance and current**	1–5	**2026:** 31/1/1 Q37(b) · **2025:** Delhi Set 1 Q36(A)(i) two antiparallel wires · **SQP 2024–25:** Q33 · **SQP 2026–27:** Q36	A5–A7, B1, B11, C5–C9
★★★	**Circular loop, solenoid, electromagnet: patterns and factors**	2–5	**2026:** 31/1/1 Q37(a) · **2025:** OD Set 1 Q36(a)(iii)–(iv), Q36 OR (b)(ii) · **SQP 2026–27:** Q38 (case)	A8–A12, B2, B4, B10, B12, C10–C14, C26, D1
★★☆	**Field lines: meaning, direction, properties, never cross**	1–3	**2025:** OD Set 1 Q36(a)(i)–(ii), Q36 OR (b)(i) · **2025:** Delhi Set 1 Q26	A1–A4, B3, C1–C4
★★☆	**Force on a conductor, Fleming's left-hand rule, electron beams**	1–5	**2026:** 31/1/1 Q36 · **2025:** Delhi Set 1 Q36 OR (B)	A13–A15, B5–B6, B13, C15–C19, C27, D2
★★☆	**Domestic circuits: wires, earthing, fuse, short circuit, overloading**	1–3	**2025:** OD Set 1 Q19 (A–R, earth wire) · **2025:** Delhi Set 1 Q36(A)(ii)	A16–A19, B8–B9, B14–B15, C21–C22, C24–C25, D3
☆☆☆	**AC and DC, frequency 50 Hz, advantage of AC**	1–3	Not asked in the 5 papers checked, but it is in the 2026–27 syllabus – learn it for MCQs and A–R.	B7, C20, C23

PAPERS CHECKED (5)

- 2026 board paper 31/1/1 (Set 1) – first paper with separate Biology, Chemistry and Physics sections
- 2025 board paper, Outside Delhi Set 1
- 2025 board paper, Delhi Set 1
- CBSE Sample Question Paper 2024–25
- CBSE Sample Question Paper 2026–27 (the pattern for your exam)

★★★ = asked in 3 or more of the 5 papers checked · ★★ = 2 papers · ★ = 1 paper. Codes: OD = Outside Delhi. Each paper was read question by question; questions from the 2026–27 Sample Paper after Q20 were checked from a summary of the paper. Download the official papers from cbse.gov.in → Previous Year Question Papers and cbseacademic.nic.in → Sample Question Papers, and solve the exact questions listed.

F

PART F · YOUR RECORD

My Mistakes

Write down each mistake from this chapter, including the chapter test.

Every wrong answer is a free lesson. Write it here, find the rule you missed, and redo the question after three days. Bring this page to class before the chapter test.

Date	Part & Q No.	What went wrong	Correct rule or method	Redone ✓