

Objective Type Questions

1. Name the following:

- | | |
|------------------------------|-------------------|
| (a) Hans Christian Oersted | (b) Electric bell |
| (c) Nichrome | (d) Tungsten |
| (e) Compact Fluorescent Lamp | (f) Dry cell |

2. Fill in the following blanks with suitable words:

- | | |
|-------------------|-----------------|
| (a) electromagnet | (b) magnet |
| (c) magnetic | (d) red hot |
| (e) electric fuse | (f) electrolyte |

3. State whether the following statements are true or false:

- | | | | |
|-----------|-----------|-----------|-----------|
| (a) True | (b) False | (c) False | (d) False |
| (e) False | (f) False | (g) False | |

4. Match the items in Column A with those in Column B:

- | | | | |
|----------|-----------|---------|----------|
| (a) (iv) | (b) (iii) | (c) (i) | (d) (ii) |
|----------|-----------|---------|----------|

Subjective Type Questions

Short Answer Type Questions

1. No, an electromagnet cannot be used to separate plastic bags because **plastic is non-magnetic**. Electromagnets attract **only magnetic materials** like iron, steel, nickel, or cobalt.
2. Iron is used because it **becomes strongly magnetised** when current flows and **loses its magnetism** when the current is switched off. Steel, however, retains magnetism and cannot be easily demagnetised, making it unsuitable for an electromagnet.
3. (i) Electric iron – to press clothes, (ii) Room heater – to heat a room.
4. A fuse wire must melt quickly when current exceeds the safe limit. Metals like copper or aluminium have high melting points and will not melt easily, so they cannot protect the circuit. Fuse wire is made of low melting point alloy (like tin-lead) to ensure safety.

5. The type of fuse used in individual electrical appliances is called a cartridge fuse.



Explanation:

- A cartridge fuse consists of a thin fuse wire sealed inside a glass tube.
 - The glass tube has metal caps at both ends, which are connected to the circuit.
 - If excess current flows through the appliance, the fuse wire melts and breaks, cutting off the electricity supply.
 - This protects the appliance from damage due to overcurrent.
6. If a fuse is not used:
- excess current may overheat wires, causing fire hazards.
 - electrical appliances may get damaged due to high current.
 - household wiring becomes.
7. Filament bulbs are not efficient because rather than light.
- Fluorescent lamps (CFLs)
 - LED bulbs
8. In the figure, we have two setups:
- Left setup: Iron nail + copper strip in lemon juice
 - Right setup: Iron nail + copper strip in pure water

Lemon juice is an electrolyte (contains ions), so it can conduct electricity. Pure water is a very poor conductor of electricity because it lacks free ions.

Result:

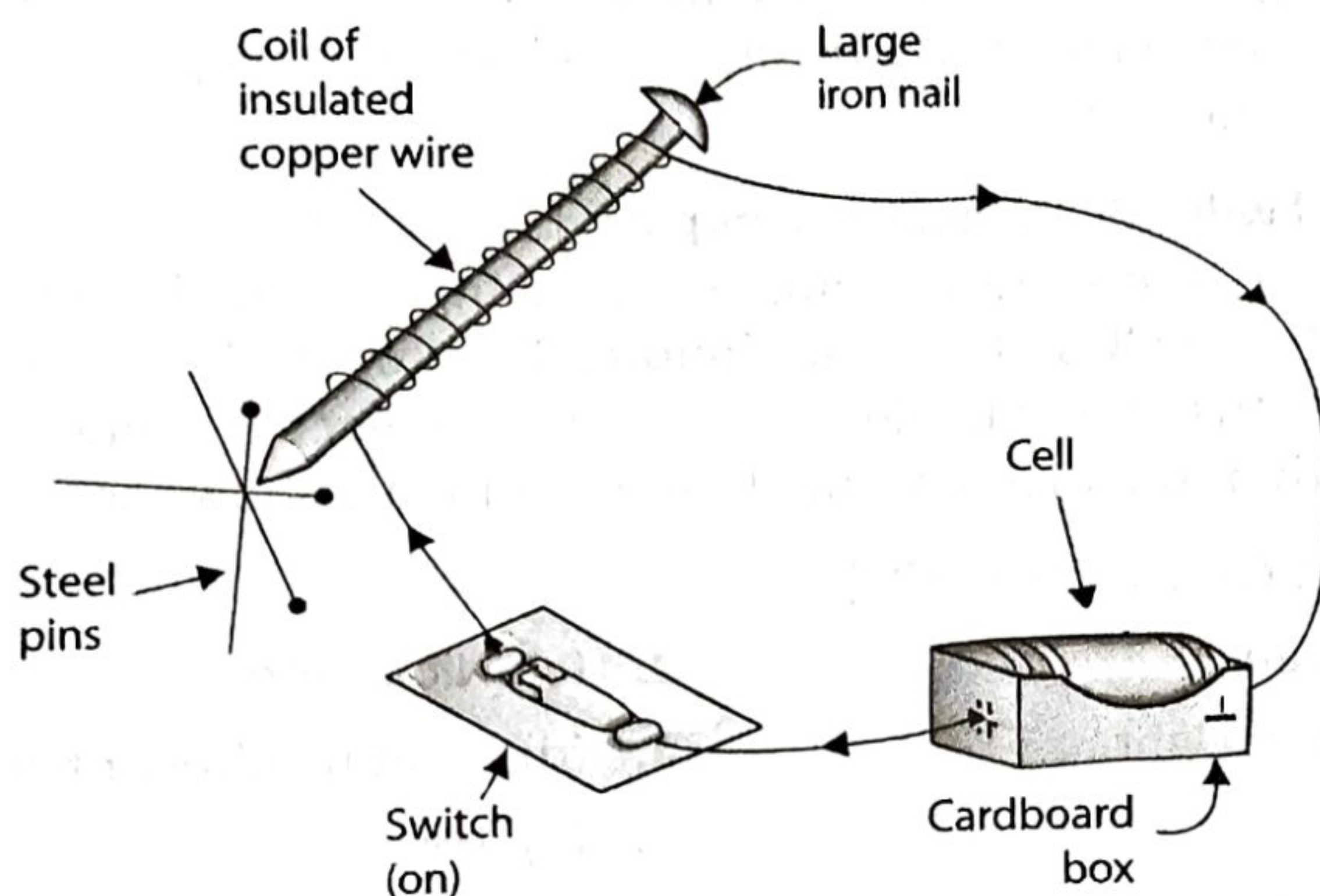
- When the switch is closed, current will flow only through the lemon juice setup, causing the LED to glow.
- In the pure water setup, the LED will not glow due to insufficient conduction.

Long Answer Type Questions

1. An electromagnet is a type of magnet in which magnetism is produced only when electric current flows through it. Unlike a permanent magnet, an electromagnet can be turned on and off by controlling the current.

How to make an electromagnet:

- Take a soft iron nail.
- Wrap a copper wire around the nail to form a coil.
- Connect the ends of the wire to a battery.
- When the battery is connected, current flows through the coil, and the iron nail becomes magnetised.
- The nail can now attract small pieces of iron or steel.
- When the battery is disconnected, the nail loses its magnetism.



2. (a) The **heating effect of electric current** means that **whenever electric current flows through a conductor, it produces heat**. This effect is used in many electrical appliances to generate heat.

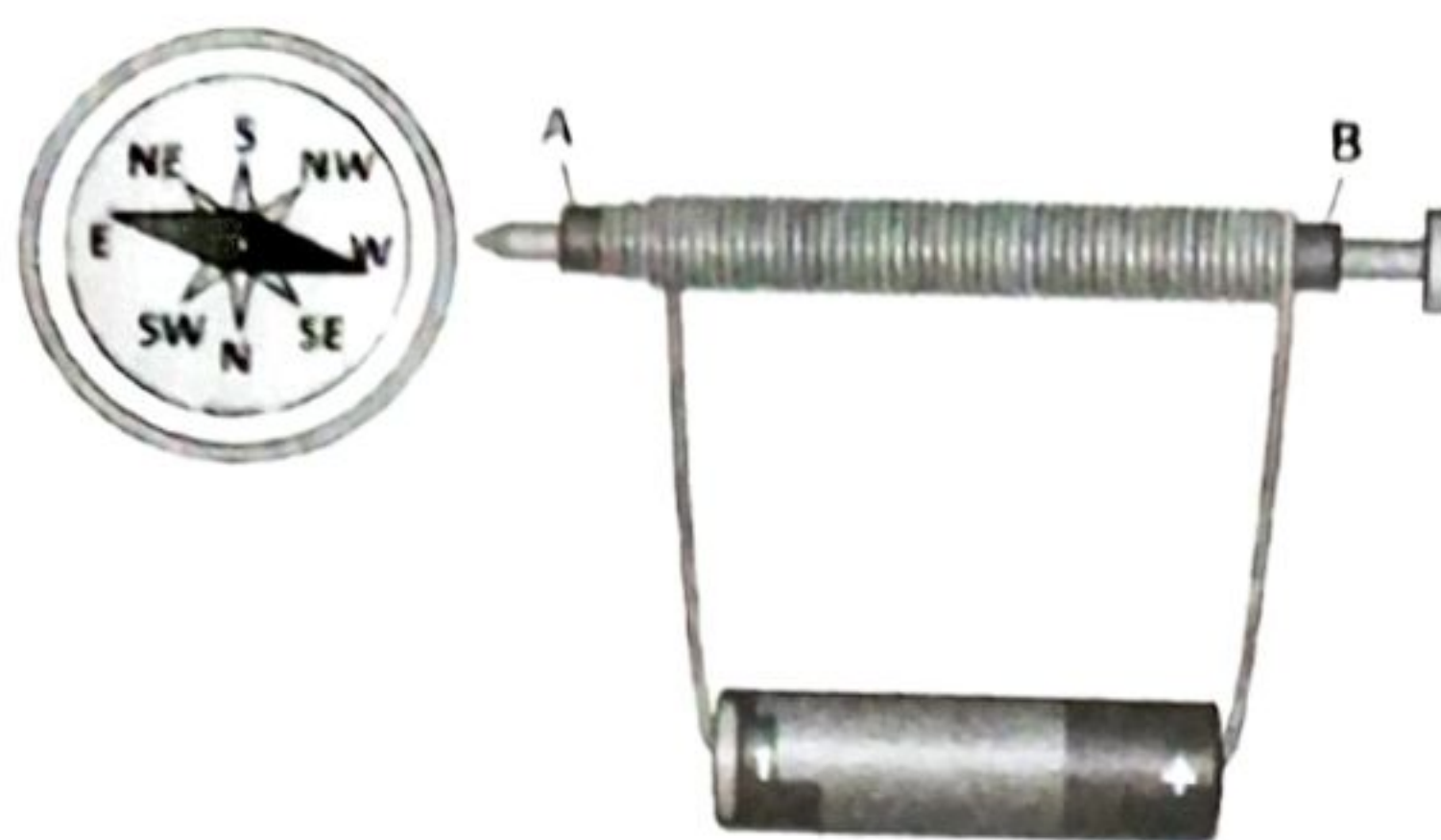
Two appliances that work on the heating effect of current:

- Electric iron – to press clothes.
- Room heater – to heat a room.

- (b) The heating effect of current depends on the **resistance of the conductor**.

- The **heater element** is made of a material like **nichrome**, which has **high resistance**. When current flows through it, **a lot of heat are produced**, making it red hot.
- The **connecting wires** have **low resistance**, so the same current **produces very little heat**, and the wires **remain only slightly warm**.

3. (a) (i) The electric current moves from the cell's positive terminal to the coil's end labeled A, flows through the coil to the end labeled B, and finally returns to the negative terminal of the cell, as indicated by the red arrows in the figure.



- (ii) When current flows through the coil, it produces a magnetic field around it. The compass needle aligns itself with the resultant magnetic field, not just the Earth's field, causing it to deflect. This demonstrates that electric current produces a magnetic effect.
- (iii) Reversing the battery changes the direction of current in the coil. The direction of the magnetic field also reverses. Therefore, the compass needle will deflect in the opposite direction.
- (b) **Yes, the coil will still deflect the compass.** Even without the iron nail, a **current-carrying coil produces a magnetic field**, so the compass needle will still move. **However, the deflection will be less than before.** The **iron nail acts as a magnetic core** and strengthens the magnetic field (it becomes an **electromagnet**). Removing it reduces the strength of the magnetic field, so the compass shows **smaller deflection**.

Multiple Choice Questions (MCQ)

1. (d) Tungsten
2. (c) Nichrome
3. (c) Heat and Light
4. (d) Heating effect of current
5. (a) Iron
6. (d) Heat
7. (c) Oersted
8. (d) No filament
9. (c) Both A and B are correct
10. (d) in all four circuits
11. (b) B and C

21st Century Skills

1. Student B's electromagnet will be stronger. The strength of an electromagnet depends on the amount of current flowing through the coil. A 6 V battery provides a higher potential difference than a 3 V battery, so more current flows through the coil (when the number of turns is the same). Greater current produces a stronger magnetic field, making Student B's electromagnet stronger.
2. (a) When electric current flows through the conductor, it produces a magnetic field around the wire. The compass needle is a tiny magnet, so it gets affected by this magnetic field and deflects from its North-South direction.
(b) Reversing the battery connections reverses the direction of current in the wire. As a result, the direction of the magnetic field also reverses, and the compass needle will deflect in the opposite direction.

- (c) If the current is doubled, the strength of the magnetic field increases. Therefore, the compass needle will show a greater deflection.
3. (a) Nichrome has high electrical resistance. When electric current flows through it, electrical energy is converted into heat energy due to the heating effect of electric current, so the wire becomes hot.
- (b) A thicker wire has less resistance, so less heat will be produced. Therefore, the heating effect will decrease.
- (c) The copper wire will produce much less heat. This is because copper has very low resistance compared to nichrome, so less electrical energy is converted into heat.
4. (a) **Identification:**
- **Anode:** Zinc strip
 - **Cathode:** Copper strip
 - **Electrolyte:** Dilute sulphuric acid
- (b) **Effect of replacing sulphuric acid with vinegar:** The bulb will **glow very dimly or may not glow at all** because vinegar is a **weak acid** and produces fewer ions. Hence, it conducts electricity poorly compared to dilute sulphuric acid.