

Chapter 14. Electric Current and its Effect

Very Short Q&A:

Q1: Circuit diagram is a simplified conventional pictorial representation of an_____.

Ans: electrical circuit

Q2: A circuit diagram uses standard symbols for electric components. True/ False.

Ans: True.

Q3: Define electric circuit.

Ans: A closed path formed by the interconnection of electrical components through which electric current flows is called an electrical circuit.

Q4: For a bulb to glow, it must be connected to a battery. Why?

Ans: because a bulb will require more power

Q5: What is a cell holder?

Ans: A compartment that holds two or more cells together to form a battery is called a cell holder.

Q6: If current does not flow through a circuit, then it is said to be an

- a. Open circuit
- b. Closed circuit
- c. Incomplete circuit
- d. Both a and c

Ans: Both a and c

Q7: A circuit is said to be open circuit or complete when current flows through it.. True/ False.

Ans: False

Q8: What is a battery?

Ans: A combination of two or more cells connected together is called a battery. It is formed by connecting the positive terminal of one cell to the negative terminal of another.

Q9: The symbol for battery is

a.



b.



c.



d. None of these

Ans:

c.



Q10: Draw the symbol for electric bulb in an electric circuit.

Ans:



Q11: Which one of the two minimise wastage of electricity CFL's or an electric bulb?

Ans: CFL's

Q12: Enlist some appliances that work on the property of the heating effect of electric current.

Ans: the electric room heater, electric roti maker, electric iron, toaster, hair dryer, electric stove, immersion water heater, food warmer, electric coffee maker, electric rice cooker and geyser.

Q13: Electric room heaters have coils of wire that produce heat, which are known as heating elements. True/False.

Ans: True

Q14: State some factors that affect production of heat in a wire through which an electric current is passing.

Ans: Length and thickness of the wire, the duration of flow of current, and the material of the wire.

Q15: Name the principle of working of electric fuse.

Ans: The electric fuse works on the principle of the heating effect of electric current.

Q16: What is an electric fuse?

Ans: An electric fuse is a safety device to prevent damage to an electrical circuit when excessive current flows through it.

Q17: What is the full form of MCB?

Ans: Multiple Circuit Breakers

Q18: What is the full form of CFL's?

Ans: Compact Fluorescent Lamps

Q19: State one advantage of MCB.

Ans: These switches turn off automatically when there is an overload or a short circuit.

Q20: An electromagnet does not attract a piece of iron.

Ans: False

Q21: When current is switched 'on' in a room heater, it_____.

Ans: gives out heat

Q22: Longer line in the symbol for a cell represents its ----- terminal.

- a. Negative
- b. Positive
- c. Neutral
- d. None of these

Ans: Negative.

Q23: Name a safety device in domestic circuit used to prevent electrical fire due to short circuit or overloading.

Ans: Electric fuse.

Q24: Enlist some appliances that work on the property of the magnetic effect of electric current.

Ans: Electric Bell, Motor, Fan etc.

Q25: What is meant by electric current?

Ans: Electric Current: Flow of electrons.

Q26: What is an electric circuit?

Ans: Electric Circuit : The closed path in which electric current flows.

Q27: What happens when current is switched 'on' in a room heater?

Ans: It becomes red hot and gives out heat

Q28: Which of the two absorbs more radiation- a dark coloured object or a light coloured object?

Ans: Heating effect of electric current and magnetic effect of electric current.

Q29: Would any of the bulbs glow when the switch is in the 'OFF' position in a circuit?

Ans: None of the bulb will glow when the switch is in the 'OFF' position as there will be no electric current in the circuit.

Q30: What is a circuit diagram?

Ans: In an electrical Circuit when we replace electrical components with their symbols we call it Circuit diagram.

Q31: When the electric current through the fuse exceeds a certain limit, the fuse wire melts and breaks. True/False

Ans: True

Q32: The combination of two or more cells is called a _____.

Ans: Battery

Q33: A straight wire carrying electric current is moving out of plane of paper and is perpendicular to it. What is the direction and type of induced magnetic field?

Ans: Induced magnetic field will be in the form of concentric circles in the plane of paper.

Q34: A current through a horizontal power line flows in north to south direction. What is the direction of magnetic field (i) at a point directly below it and (ii) at a point directly above it?

Ans: (i) West to East (ii) East to West

Q35: What do you mean by electromagnetic induction?

Ans: The process, due to which a changing magnetic field in a conductor induces a current in another conductor, is called electromagnetic induction.

Q36: How we can show that magnetic field exists around a wire carrying current?

Ans: By using magnetic compass which, shows deflection.

Q37: How can a solenoid be used to magnetise a steel bar?

Ans: By inserting the steel bar inside the solenoid and switching on electric current.

Q38: Give the factors that affect strength of magnetic field at a point due to a straight conductor carrying current.

Ans: Magnitude of electric current, perpendicular distance between that point and conductor.

Q39: A fuse is connected with a live wire or with neutral wire?

Ans: Fuse is always connected with live wire.

Short Q&A:

Q1: Differentiate between electric current and electric circuit.

Ans: Electric Current is the flow of electrons. But an electric Circuit is the closed path in which electric current flows.

Q2: Explain the formation and uses of battery.

Ans: A combination of two or more cells connected together is called a battery. It supplies electric current. It is formed by connecting the positive terminal of one cell to the negative terminal of another. To identify the positive and negative terminals, they are denoted as + and -, respectively. These batteries are used in many devices, such as torch lights, mobile phones, calculators and even automobiles.

Q3: Explain the function of cell in a circuit.

Ans: A cell supplies electric current. The positive terminal (+) of a cell is represented by a vertical long line, while the negative terminal (-) is shown as a parallel, shorter line.

Q4: An electrician is carrying out some repairs in a building. He wants to replace a fuse by a piece of wire. Would you agree with the electrician? Give reasons for your response.

Ans: There is a maximum limit on the current which can safely flow through a circuit. If by accident the current exceeds this safe limit, the wires may become overheated and may cause fire. In order to prevent this, in all buildings fuses are inserted in all electrical circuits. If a proper fuse is there in the circuit, it will blow off and break the circuit. A fuse is thus a safety device which prevents damages to electrical circuits and possible fires. So we will not agree with an electrician, who is using a wire in place of fuse of proper rating as if by accident the current exceeds safe limit, the wires may become overheated and may cause fire.

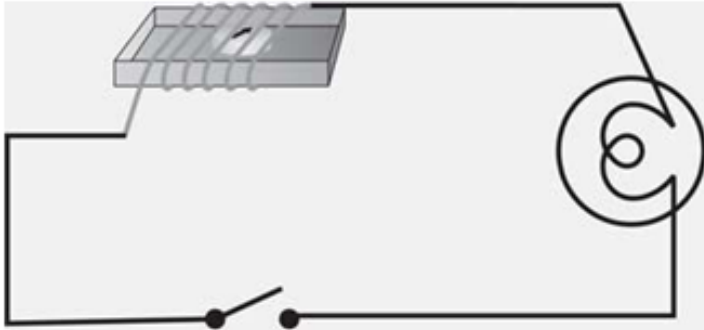
Q5: How fuses are useful?

Ans: A fuse is thus a safety device which prevents damages to electrical circuits and possible fires.

Q6: Can we use an electromagnet separating plastic bags from a garbage heap? Explain.

Ans: An electromagnet cannot be used for separating plastic bags from a garbage heap as it attracts only iron pieces and will not attract plastic bags.

Q7: Look at the figure given below and answer whether the compass needle will show deflection or not when the switch in the circuit shown is closed?



Ans: The compass needle will not show any deflection when the switch in the circuit shown by above figure is closed, because there is no power source like cells in the circuit hence there will be no electric current flow in the circuit. In the absence of electric current there will be no magnetic effect to cause the deflection of compass needle.

Q8: When the current is switched on through a wire, a compass needle kept nearby gets deflected from its north-south position. Explain.

Ans: As we know that the needle of a compass is a tiny magnet, which points in north-south direction. When we bring a magnet close to it, the needle gets deflected. Also, when an electric current flows through a wire, it produces magnetic effect around it. Therefore, when the current is switched on through a wire, a compass needle kept nearby gets deflected from its north-south position due to magnetic effect of electric current around the wire.

Q9: Write short notes on heating effects of electric current.

Ans: When an electric current flows through a wire, the wire gets heated. It is the heating effect of current or When current flows through a metal wire it gets heated up, this is called heating effect of current. E.g. a glowing electric bulb becomes warm. This effect has many applications like Electric Heater, Light Bulb etc.

Q10: Distinguish between an electric motor and generator?

Ans: Following are the points of difference between an electric motor and a generator:
ElectricMotor

It converts electrical energy into mechanical energy.
It needs electrical energy for its working.
They are used as water pumps, marble grinders etc.
Generator

- It converts mechanical energy into electrical energy
- It needs mechanical energy for its working.
- They are used as water pumps, marble grinders etc.
- Diesel generator, hydro-electric generator are the examples of it.

Q11: Write short notes on magnetic effects of electric current

Ans: When an electric current flows through a wire, it produces magnetic effect around it. A current carrying coil of an insulated wire wrapped around a piece of iron is called an electromagnet. Magnetic Effect of electric current has many applications like Electric Bell, Motor, Fan etc

Q12: What are filaments of a bulb and a heater made up of?

Ans: In a bulb there is a thin wire called the filament made up of tungsten. When current passes through it, it glows and gets heated up. In a heater there is a coil of wire called element which is made up of nichrome. When current passes through element it becomes red hot and give out heat.

Q13: State the factors on which amount of heat produced depends?

Ans: The amount of heat produced in a wire depends on

(A) Its material – better conductors produce less heat; e.g. Elements of electric appliances are made of nichrome whereas connecting wires are made up of copper which is a better conductor so they do not get heated up as the element.

(B) Its length – as length increases heat produced increases; e.g. elements are coiled in heaters to increase length.

(C) Thickness – as thickness increases heat produced decreases; e.g. lead wires of iron, heater etc. are thicker than normal connecting wire so that they don't get heated up easily.

Q14: Why does electric current show magnetic effect?

Ans: When electric current flows through a conductor, electrons move by spinning and orbiting nucleus. This motion of electrons produces magnetic effect. As Ampere suggested, a magnetic field is produced whenever an electrical charge is in motion.

Q15: Why are fuse wire not used in circuit containing electric cell?

Ans: Fuse wire is used to prevent sudden excess flow of current. Cell provide current of fix magnitude So fuse wire are not used in circuit containing electric cell.

Q16: Why does electric current show heating effect?

Ans: When electric current flows through a conductor, a part of electrical energy get converted into heat energy due resistance offered to electron.

Q17: What is magnetic field?

Ans: The region around the magnet, where force of attraction or repulsion can be felt by magnetic materials, is called as magnetic field.

Q18: What are the patterns of magnetic field lines inside and outside of a solenoid?

Ans: Following are the patterns of magnetic field lines inside and outside of a solenoid

- a. The field lines inside the solenoid are parallel straight lines
- b. The field lines outside the solenoid are curved lines

Q19: State the principle of working of electric generator. What are its important parts?

Ans: The working of electric generator is based on the principle of electromagnetic induction. The Important parts of electric generator are armature, slip rings, brushes and field magnets.

Q20: Two magnetic lines of force don't intersect each other. Explain why?

Ans: If two magnetic lines of force will intersect each other then, at the point of intersection there will be two different directions of magnetic field which is not possible.

Q21: Give two methods by which we can increase the strength of magnetic field produced by a circular coil carrying current?

Ans: The two methods by which we can increase the strength of magnetic field are as follow

- a. By increasing the number of turns of wire in the coil.
- b. By increasing the current flowing through the coil.

Q22: The patterns of magnetic field lines inside a solenoid are parallel straight lines. What does this indicate?

Ans: The field lines inside the solenoid are parallel straight lines. This indicates that the magnetic field is uniform and is therefore, same at all points inside it.

Q23: The patterns of magnetic field lines outside a solenoid are parallel curved lines. What does this indicate?

Ans: The field lines outside the solenoid are curved lines. This indicates that the magnetic field is non-uniform.

Q24: State the factors on which the force experienced by a current carrying conductor placed in a uniform magnetic field depends upon?

Ans: The factors which govern the force experienced by conductor which is placed in a uniform magnetic field are:-

1. Strength of the magnetic field in which conductor is placed.
2. Strength of current flowing through the conductor.
3. Length of conductor

Q25: Why mostly all electrical home appliances like refrigerator, toaster etc. are provided with a wire having green insulation?

Ans: Earth wire is the insulated green coloured copper wire which is connected to a metal plate deep inside the earth near the house. It is used as a safety measure. It is kept at zero potential by connecting it to the ground, thus, providing a low-resistance conducting path for the current.

When by electric fault, if current flows through the metallic body of electric appliance and we touch it, then current finds the lower resistance path of earth wire than our body. So, current flows through earth wire only and we remain safe.

Q26: Write short notes on Short Circuiting.

Ans: Short-circuiting occurs in a circuit when the live wire comes in direct contact with the neutral wire. This causes much damage to the electric appliances connected with them. Reason of short-circuiting: When the live wire touches the neutral wire, the contact portion of the two wires behave like load and due to very low resistance of copper wire, it draws very large amount of current. In the presence of this high current, the copper wire catches fire, due to joules heating effect.

Q27: Write short notes on Overloading.

Ans: Overloading occurs in a circuit when the current in the circuit increases abruptly. It causes overheating of the wire and might lead to the fire. It can also occur due to accidental increase in the supply voltage or on connecting too many appliances to a single socket.

Q28: Mention the differences between an electromagnet and a permanent magnet.

Ans:

Electromagnet	Permanent magnet
1. It is temporary magnet and can be demagnetized. 2. Magnetic strength can be changed. 3. Its polarity can also be changed. 4. It is prepared from soft iron.	1. It is a permanent magnet and cannot be demagnetized easily. 2. Its strength is fixed. 3. Its polarity is fixed. 4. It is prepared from hard steel.

Q29: What are the properties of magnetic field due to a current through a straight wire?

Ans:

The properties of magnetic field due to a current flowing through a straight wire are:

1. The magnitude of the magnetic field produced at a given point increases as the current through the wire increases.
2. The magnetic field produced by a given current in the conductor decreases as the distance from it increases.
3. The concentric circles representing the magnetic field around a current-carrying straight wire become larger and larger as we move away from it.
4. If the direction of the current is reversed in the wire, the lines will still be circular, but the directions of the lines will be reversed, which can be verified using the compass needle.

Q30: State few characteristics of magnetic field lines.

Ans:

Following are the characteristics of magnetic field line:

- They represent the magnetic field.
- They are directed from north to South Pole outside a magnet and from south to North Pole inside a magnet.
- The field lines are closed curves.

- The strength of magnetic field in a region is determined by closeness of the field lines in that region.
- The closer the field lines are, greater will be the field strength and vice-versa.
- No two field lines ever cross each other as it would mean two different directions of field at point of intersection, which is not possible.
- The parallel lines represent the uniform magnetic field whereas converging lines or diverging lines represents the non-uniform magnetic field.

Q31: An electron enters a magnetic field at right angles to it as shown in fig. The direction of the force acting on the electron will be:

(a) to the right (b) to the left (c) out of the page (d) into the page

Ans: When a conductor carrying current is placed perpendicular to the direction of magnetic field, the force acting on it is given by Fleming's left hand rule. Since the direction of current is the same as that of the motion of a positive charge, the direction of force acting on it when moving perpendicular to the direction of magnetic field is the same as that acting on a current-carrying conductor placed perpendicular to the direction of magnetic field. Obviously, the force acting on an electron is opposite to that. Therefore in this case it is into the page.

Q32: It is established that an electric current through a metallic conductor produces a magnetic field around it. Is there a similar magnetic field produced around a thin beam of moving (i) alpha particles, (ii) neutrons? Justify your answer.

Ans:

(i) Yes, Alpha particles being positively charged constitute a current in the direction of motion.

(ii) No. The neutrons being electrically neutral constitute no current.

Long Q&A:

Q1: Describe domestic household circuit.

Ans: From an electric pole or underground cables, we receive electric supply in our homes. Domestic electric circuit consists of three main wires. The wire with red insulation is called live wire. The wire with black insulation is called neutral wire. Potential difference between the neutral and the live wire is 220 V. The wire with green insulation is called earth wire. It is connected to a metallic body deep inside the earth. According to new International Convention, insulation of live wire should be of brown colour whereas neutral and earth wires should be of light blue and green (or yellow) insulation cover. In our homes, we

receive AC electric power of 220 V with a frequency of 50 Hz. Live wire and neutral wire maintains the p.d. of 220 V. These wires pass through the fuse board. Fuse is specially connected with the live wire. Current rating of this fuse depends on house load. From the fuse board, these wires pass through the electric metre. From the metre, the earth wire is locally inserted inside the ground of the house. After the electric metre, these wires pass through the main switches and fuses in different rooms. Depending on the power of electrical appliances, two types of fuse (5A or 15 A) are used. From the switch and fuse board, the power lines are distributed to different electrical appliances.

Q2: Explain the two effects of electric current along with their principles and uses.

Ans: When an electric current flows through a wire, the wire gets heated. It is the heating effect of current or When current flows through a metal wire it gets heated up, this is called heating effect of current. E.g. a glowing electric bulb becomes warm. This effect has many applications like Electric Heater, Light Bulb etc.

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