Physics | NEET

Class 12 Physics - Current Electricity

NEET track | Short Notes + 5 CBSE-based questions + 5 NEET PYQ-based questions with solutions

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Format: Quick revision + solved practice	Chapter scope: Class 12 Physics

1. Quick Short Notes

- Current I = nqAv_d e, where n is free electron density, A is area, v_d is drift speed and e is electronic charge.
- Ohm's law: V = IR for ohmic conductors at constant temperature.
- Resistance of a wire: R = rho*l/A. Resistivity rho is a material property and its SI unit is ohm-m.
- Current density J = I/A and J = sigma E, where sigma = 1/rho.
- In series, resistances add: Rs = R1 + R2 + ... ; in parallel, 1/Rp = sum(1/Ri).
- Cell current: I = E/(R + r), where E is emf, R is external resistance and r is internal resistance.
- Terminal voltage of a discharging cell: V = E - Ir.
- Kirchhoff's junction law is based on conservation of charge; loop law is based on conservation of energy.
- Potentiometer is a null-deflection device used to compare emf and measure internal resistance accurately.
- Board tip: write the reason while applying Kirchhoff laws and always show unit of resistivity and emf.

2. CBSE-based Board Practice

Q1. A resistor of 5 ohm is connected across 10 V. Find the current through it.

Solution: Using Ohm's law, I = V/R = 10/5 = 2 A.

Q2. A wire has resistance 4 ohm, length 2 m and cross-sectional area 0.5 mm^2. Calculate its resistivity.

Solution: rho = RA/l = 4 x (0.5 x 10^-6)/2 = 1.0 x 10^-6 ohm-m.

Q3. Two resistors 2 ohm and 3 ohm are connected in series across 10 V. Find current in the circuit and voltage across each resistor.

Solution: Rtotal = 2 + 3 = 5 ohm. Current I = 10/5 = 2 A. Voltage drops: V1 = 2 x 2 = 4 V, V2 = 2 x 3 = 6 V.

Q4. A cell of emf 2 V and internal resistance 0.5 ohm is connected to an external resistance of 3.5 ohm. Find the current and terminal voltage.

Solution: I = E/(R + r) = 2/(3.5 + 0.5) = 0.5 A. Terminal voltage V = E - Ir = 2 - 0.5 x 0.5 = 1.75 V.

Q5. State the principle of a potentiometer. Why is it preferred over a voltmeter for measuring emf?

Solution: Principle: the potential drop across a uniform wire is proportional to its length when a steady current flows through it. It is preferred because it works on null method and draws no current from the cell under test.

3. NEET PYQ-based Practice

Q1. State the SI unit of resistivity.

Solution: The SI unit of resistivity is ohm-metre (ohm-m).

Q2. Calculate the equivalent resistance of 2 ohm and 3 ohm connected in parallel.

Solution: Req = (2 x 3)/(2 + 3) = 6/5 = 1.2 ohm.

Q3. What happens to the resistance of a metallic conductor with increase in temperature?

Solution: For metals, resistance increases with increase in temperature because lattice vibrations increase and electron flow faces more opposition.

Q4. Kirchhoff's junction law is a consequence of which conservation principle?

Solution: It follows from conservation of charge.

Q5. A cell has emf 1.5 V and internal resistance 0.5 ohm. Find the short-circuit current.

Solution: For short circuit, external resistance is zero. I = E/r = 1.5/0.5 = 3 A.

Practice tip: First revise the short notes, then attempt CBSE board questions in written format, and finally solve the exam-specific section in timed mode.