

EXAM-DAY · 90-MIN REVISION CARD

Current Electricity

Print this · Fold it · Carry to the exam-hall gate · Revise once · Then walk in.

FORMULAS & KEY RESULTS

Ohm's law: $V = IR$

Resistance: $R = \rho L / A$

Resistivity (temp): $\rho(T) = \rho_0 [1 + \alpha (T - T_0)]$

Drift velocity: $v_d = (eE/m) \tau = eV \tau / (mL)$

Current from drift: $I = n e A v_d$

Mobility: $\mu = v_d / E$;
conductivity $\sigma = n e \mu$

Series R: $R_{eq} = R_1 + R_2 + \dots$

Parallel R: $1/R_{eq} = 1/R_1 + 1/R_2 + \dots$

Power: $P = VI = I^2 R = V^2 / R$

Heat: $H = I^2 R t$ (Joule's law)

Terminal voltage: $V = \epsilon - I r$

Cells in series: $\epsilon_{eq} = \epsilon_1 + \epsilon_2$; $r_{eq} = r_1 + r_2$

Cells in parallel: $1/r_{eq} = 1/r_1 + 1/r_2$; $\epsilon_{eq}/r_{eq} = \sum (\epsilon_i/r_i)$

Wheatstone balance: $P/Q = R/S$

KCL (junction): $\sum I_{in} = \sum I_{out}$

KVL (loop): $\sum (EMF) = \sum (IR \text{ drops})$

Potentiometer: $\epsilon = k \cdot I$,
where $k = V/L$

TOP 5 PYQ PATTERNS

1 Drift velocity derivation + $I = neAv_d$

3 marks · 90% of years
 $F = eE$, $a = eE/m$, $v_d = a \tau$

2 Wheatstone bridge balance condition

3 marks · 85% of years
 $I_g = 0$ then KVL gives $P/Q = R/S$

3 Equivalent EMF and r — series/parallel cells

3 marks · 80% of years
Series adds; parallel reciprocal-add of r and weighted-add of ϵ/r

4 Terminal voltage / internal resistance numerical

2 marks · 75% of years
 $V = \epsilon - Ir$; two data points solve r and ϵ

5 Potentiometer vs voltmeter for EMF

3 marks · 70% of years
Null method $\Rightarrow I = 0 \Rightarrow V_{terminal} = \epsilon$ (true EMF)

90-MIN REVISION FLOW

0-15 min

Drift velocity derivation + Ohm's law microscopic form. Memorise $v_d = eE \tau / m$ and $I = neAv_d$.

15-30 min

Resistance + resistivity. $R = \rho L / A$; $\rho(T)$. Practise 3 numericals on changing L , A .

30-50 min

Kirchhoff's laws + Wheatstone bridge. Derive balance condition. 2 KCL/KVL numericals.

50-70 min

Cells — single, series, parallel. Terminal voltage. 2 numericals on r and equivalent EMF.

70-85 min

Potentiometer + metre bridge — principle, null point, why preferred over voltmeter.

85-90 min

Speed-revise cheat sheet formula grid; flag any formula you hesitated on for tomorrow.

Confidence, not anxiety. You've practised this all year. Trust your steps. Don't change strategy on exam morning.
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