EXAM-DAY · 90-MIN REVISION CARD

Electrostatic Potential and Capacitance

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

FORMULAS & KEY RESULTS

- V due to point charge q at distance r: $V = kq/r$ ($k = 1/4\pi\varepsilon_0 = 9\times10^9$ Nm²/C²)
- V due to multiple charges: $V_{total} = \Sigma\, kq_i/r_i$ (algebraic sum — scalars)
- Relationship: $E = -dV/dr$ (E points in direction of decreasing V)
- Work done in moving charge q from A to B: $W = q(V_A - V_B)$
- PE of system of two charges: $U = kq_1q_2/r$
- Capacitance: $C = Q/V$ (units: farad F = C/V)
- Parallel-plate capacitor (vacuum): $C_0 = \varepsilon_0 A/d$
- Parallel-plate capacitor with dielectric K: $C = K\varepsilon_0 A/d$
- Series: $1/C_{eq} = \Sigma\, 1/C_i$ (Cap OPPOSITE to resistors!)
- Parallel: $C_{eq} = \Sigma\, C_i$
- Energy stored: $U = \frac{1}{2} CV^2 = \frac{1}{2} Q^2/C = \frac{1}{2} QV$
- Energy density (between plates): $u = \frac{1}{2} \varepsilon_0 E^2$

TOP 5 PYQ PATTERNS

1 Series + Parallel equivalent capacitance derivation
5 marks · 95% of years
Step-by-step derivation; always state the SAME-CHARGE (series) and SAME-VOLTAGE (parallel) constraints upfront.

2 Parallel-plate capacitor with dielectric
5 marks · 80% of years
Derive $C = K\varepsilon_0 A/d$. Explain polarisation reduces field → lower V → higher C.

3 Energy stored + redistribution
4 marks · 75% of years
$U = \frac{1}{2}CV^2$. Sharing: Q conserved, energy NOT conserved (heat + radiation loss).

4 Numerical: V due to multiple charges
3 marks · 80% of years
$V_{total} = \Sigma\, kq_i/r_i$. Algebraic sum (sign of V matches sign of charge).

5 Equipotential surfaces — properties + types
3 marks · 60% of years
Perpendicular to E. Work on surface = 0. Closer = stronger field. Never intersect.

90-MIN REVISION FLOW

0-15 min
Memorise the 12 core formulas + units

15-35 min
Drill 2 capacitor-network problems (series + parallel + mixed)

35-50 min
Write the parallel-plate dielectric derivation from memory in 8 min

50-65 min
Practise 2 energy-redistribution numericals

65-80 min
Solve 3 V-from-multiple-charges numericals

80-90 min
Take 20-MCQ Chapter CBT at readyforboards.com

Confidence, not anxiety. You've practised this all year. Trust your steps. Don't change strategy on exam morning. Helpline: **+91 70330 05444** · **readyforboards.com**