DC Circuits - Important Topics

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Concept of Potential Difference, Current, Resistance, Inductance and Capacitance

Potential difference is the work done to move a unit charge between two points.
Current is the flow of electric charge.
Resistance opposes current flow, measured in ohms (Ω).
Inductance opposes changes in current and stores energy in a magnetic field.
Capacitance stores energy in an electric field and opposes voltage changes.

Current and Voltage Sources

Ideal sources provide constant voltage or current, while practical sources have internal resistance.
Dependent sources depend on circuit variables, whereas independent sources are fixed.

Ohm’s Law

V = IR, where V is voltage, I is current, and R is resistance.

Kirchhoff’s Laws

KVL: The sum of voltages around a closed loop is zero.
KCL: The sum of currents entering a junction equals the sum of currents leaving it.

Series-Parallel Circuits

Resistors in series: Req = R1 + R2 + ... + Rn.
Resistors in parallel: 1/Req = 1/R1 + 1/R2 + ... + 1/Rn.

Network Theorems

Superposition, Thevenin, Norton, and Maximum Power Transfer Theorems help simplify complex circuits for analysis.