Important DC Circuits Formulas PDF

Formulas
Examples
with Units

List of 17
Important DC Circuits Formulas

1) Conductance given Current Formula

Evaluate Formula

Formula

$$G = \frac{I}{V}$$

Example with Units

$$0.0333\,\text{S} = \frac{0.75\,\text{A}}{22.5\,\text{V}}$$

2) Conductance given Resistivity Formula

Evaluate Formula

Formula

$$G = \frac{A}{l \cdot \rho}$$

Example with Units

$$0.0334\,\text{S} = \frac{91\,\text{mm}^2}{15.55\,\text{m} \cdot 0.000175\,\Omega\text{*m}}$$

3) Conductance in DC Circuit Formula

Evaluate Formula

Formula

$$G = \frac{1}{R}$$

Example with Units

$$0.0333\,\text{S} = \frac{1}{30\,\Omega}$$

4) Current Divider for Two Resistors Formula

Evaluate Formula

Formula

$$I_{R1} = I_s \cdot \left(\frac{R_2}{R_1 + R_2} \right)$$

Example with Units

$$2.3335\,\text{A} = 4.87\,\text{A} \cdot \left(\frac{11.5\,\Omega}{12.5\,\Omega + 11.5\,\Omega} \right)$$

5) Current Division in Two Capacitors Formula

Evaluate Formula

Formula

$$I_C = I_s \cdot \left(\frac{C_1}{C_2} \right)$$

Example with Units

$$2.922\,\text{A} = 4.87\,\text{A} \cdot \left(\frac{1.5\,\text{F}}{2.5\,\text{F}} \right)$$

6) Current Division in Two Inductors Formula

Evaluate Formula

Formula

$$I_{L1} = I_s \cdot \left(\frac{L_2}{L_1 + L_2} \right)$$

Example with Units

$$1.6233\,\text{A} = 4.87\,\text{A} \cdot \left(\frac{0.15\,\text{H}}{0.3\,\text{H} + 0.15\,\text{H}} \right)$$

7) Current in DC Circuits Formula

Evaluate Formula

Formula

$$I = \frac{V}{R}$$

Example with Units

$$0.75\,\text{A} = \frac{22.5\,\text{V}}{30\,\Omega}$$

8) Delta to Star Transformation Formula

Evaluate Formula

Formula

$$Z_A = \frac{Z_1 \cdot Z_3}{Z_1 + Z_2 + Z_3}$$

Example with Units

$$10.5114\,\Omega = \frac{37\,\Omega \cdot 25\,\Omega}{37\,\Omega + 26\,\Omega + 25\,\Omega}$$

9) Energy in DC Circuit Formula

Evaluate Formula

Formula

$$E = P \cdot T$$

Example with Units

$$0.0278\,\text{kW*h} = 16.875\,\text{W} \cdot 1.65\,\text{h}$$

10) Maximum Power Transfer Formula

Evaluate Formula

Formula

$$P_m = \frac{V_{th}^{\,2} \cdot R_L}{\left(R_L + R_{th}\right)^2}$$

Example with Units

$$21.0868\,\text{W} = \frac{27.6\,\text{V}^{\,2} \cdot 18\,\Omega}{\left(18\,\Omega + 7.5\,\Omega\right)^2}$$

11) Power in DC Circuit Formula

Evaluate Formula

Formula

$$P = V \cdot I$$

Example with Units

$$16.875\,\text{W} = 22.5\,\text{V} \cdot 0.75\,\text{A}$$

12) Resistance in DC Circuit Formula

Evaluate Formula

Formula

$$R = \frac{V}{I}$$

Example with Units

$$30\,\Omega = \frac{22.5\,\text{V}}{0.75\,\text{A}}$$

13) Star to Delta Transformation Formula

Evaluate Formula

Formula

$$Z_1 = Z_A + Z_B + \left(\frac{Z_A \cdot Z_B}{Z_C}\right)$$

Example with Units

$$37.1667\,\Omega = 10.5\,\Omega + 8\,\Omega + \left(\frac{10.5\,\Omega \cdot 8\,\Omega}{4.5\,\Omega}\right)$$

14) Voltage Divider for Two Resistors Formula

Evaluate Formula

Formula

$$V_{R1} = V_s \cdot \left(\frac{R_1}{R_1 + R_2}\right)$$

Example with Units

$$62.5\,\text{V} = 120\,\text{V} \cdot \left(\frac{12.5\,\Omega}{12.5\,\Omega + 11.5\,\Omega}\right)$$

15) Voltage Division for Two Capacitors Formula

Evaluate Formula

Formula

$$V_C = V_s \cdot \left(\frac{C_2}{C_1 + C_2} \right)$$

Example with Units

$$75\,\text{V} = 120\,\text{V} \cdot \left(\frac{2.5\,\text{F}}{1.5\,\text{F} + 2.5\,\text{F}} \right)$$

16) Voltage Division in Two Inductors Formula

Evaluate Formula

Formula

$$V_{L1} = V_s \cdot \left(\frac{L_1}{L_1 + L_2} \right)$$

Example with Units

$$80\,\text{V} = 120\,\text{V} \cdot \left(\frac{0.3\,\text{H}}{0.3\,\text{H} + 0.15\,\text{H}} \right)$$

17) Voltage in DC Circuit Formula

Evaluate Formula

Formula

$$V = I \cdot R$$

Example with Units

$$22.5\,\text{V} = 0.75\,\text{A} \cdot 30\,\Omega$$

Variables used in list of DC Circuits Formulas above

- **A** Area of Conductor *(Square Millimeter)*
- C_1 Circuit Capacitance 1 *(Farad)*
- C_2 Circuit Capacitance 2 *(Farad)*
- **E** Energy *(Kilowatt-Hour)*
- **G** Conductance *(Siemens)*
- **I** Current *(Ampere)*
- I_C Capacitor 1 Current *(Ampere)*
- I_{L1} Inductor 1 Current *(Ampere)*
- I_{R1} Resistor 1 Current *(Ampere)*
- I_s Source Current *(Ampere)*
- **l** Length of Conductor *(Meter)*
- L_1 Circuit Inductance 1 *(Henry)*
- L_2 Circuit Inductance 2 *(Henry)*
- **P** Power *(Watt)*
- P_m Maximum Power *(Watt)*
- **R** Resistance *(Ohm)*
- R_1 Resistance 1 *(Ohm)*
- R_2 Resistance 2 *(Ohm)*
- R_L Load Resistance *(Ohm)*
- R_{th} Thevenin Resistance *(Ohm)*
- **T** Time *(Hour)*
- **V** Voltage *(Volt)*
- V_C Capacitor 1 Voltage *(Volt)*
- V_{L1} Inductor 1 Voltage *(Volt)*
- V_{R1} Resistor 1 Voltage *(Volt)*
- V_s Source Voltage *(Volt)*
- V_{th} Thevenin Voltage *(Volt)*
- Z_1 Delta Impedance 1 *(Ohm)*
- Z_2 Delta Impedance 2 *(Ohm)*
- Z_3 Delta Impedance 3 *(Ohm)*
- Z_A Star Impedance A *(Ohm)*
- Z_B Star Impedance B *(Ohm)*

Constants, Functions, Measurements used in list of DC Circuits Formulas above

- Measurement: **Length** in Meter (m)
  Length Unit Conversion
- Measurement: **Time** in Hour (h)
  Time Unit Conversion
- Measurement: **Electric Current** in Ampere (A)
  Electric Current Unit Conversion
- Measurement: **Area** in Square Millimeter (mm²)
  Area Unit Conversion
- Measurement: **Energy** in Kilowatt-Hour (kW*h)
  Energy Unit Conversion
- Measurement: **Power** in Watt (W)
  Power Unit Conversion
- Measurement: **Capacitance** in Farad (F)
  Capacitance Unit Conversion
- Measurement: **Electric Resistance** in Ohm (Ω)
  Electric Resistance Unit Conversion
- Measurement: **Electric Conductance** in Siemens (S)
  Electric Conductance Unit Conversion
- Measurement: **Inductance** in Henry (H)
  Inductance Unit Conversion
- Measurement: **Electric Potential** in Volt (V)
  Electric Potential Unit Conversion
- Measurement: **Electric Resistivity** in Ohm Meter (Ω*m)
  Electric Resistivity Unit Conversion

- Z_C Star Impedance C *(Ohm)*
- ρ Resistivity *(Ohm Meter)*

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