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ENGINEERING PHYSICS 30.9.2021

LECTURE 4: CIRCUITS AND DC INSTRUMENTS

Subtitle

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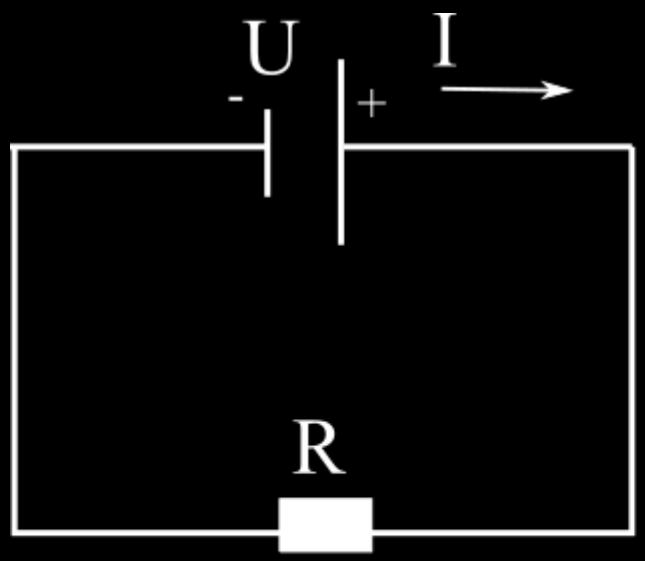
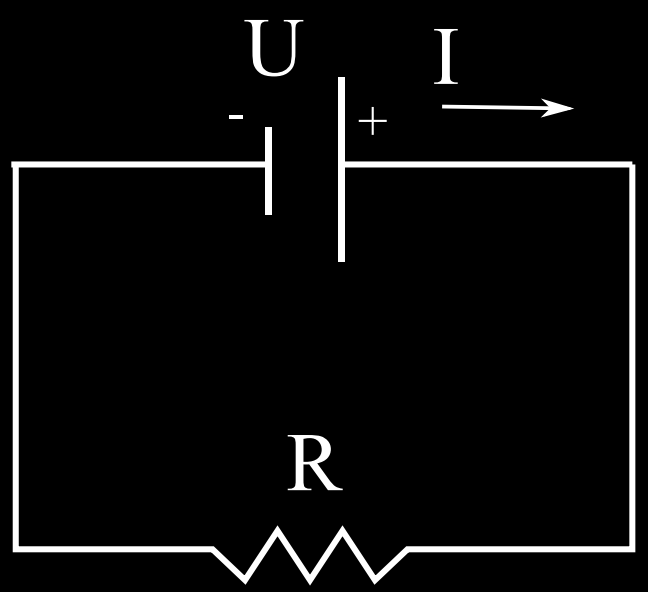
DC CIRCUIT



U	Voltage
[U] = V	Volt
R	Resistance
[R] = Ω	Ohm
I	Electrical current
[I] =	Ampere

ALTERNATIVE NOTATION FOR RESISTANCE



U Voltage

[U] = V Volt

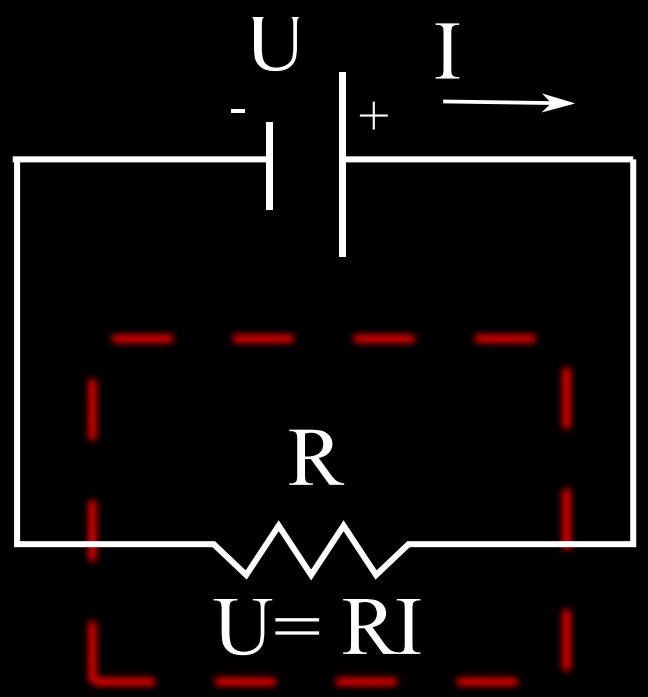
R Resistanc

[R] = Ω Ohm

I Electrical curre

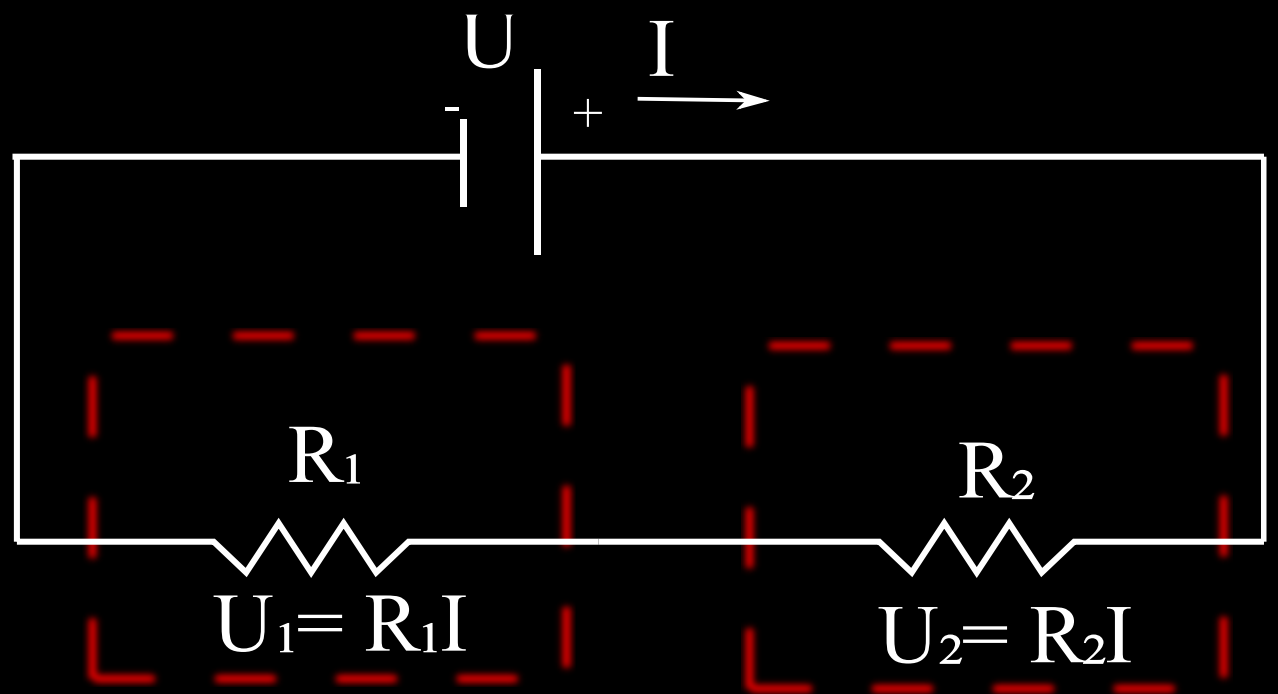
[I] = Ampere

OHM'S LAW



U= RI

OHM'S LAW- RESISTANCES IN SERIES



$$U = U_1 + U_2$$

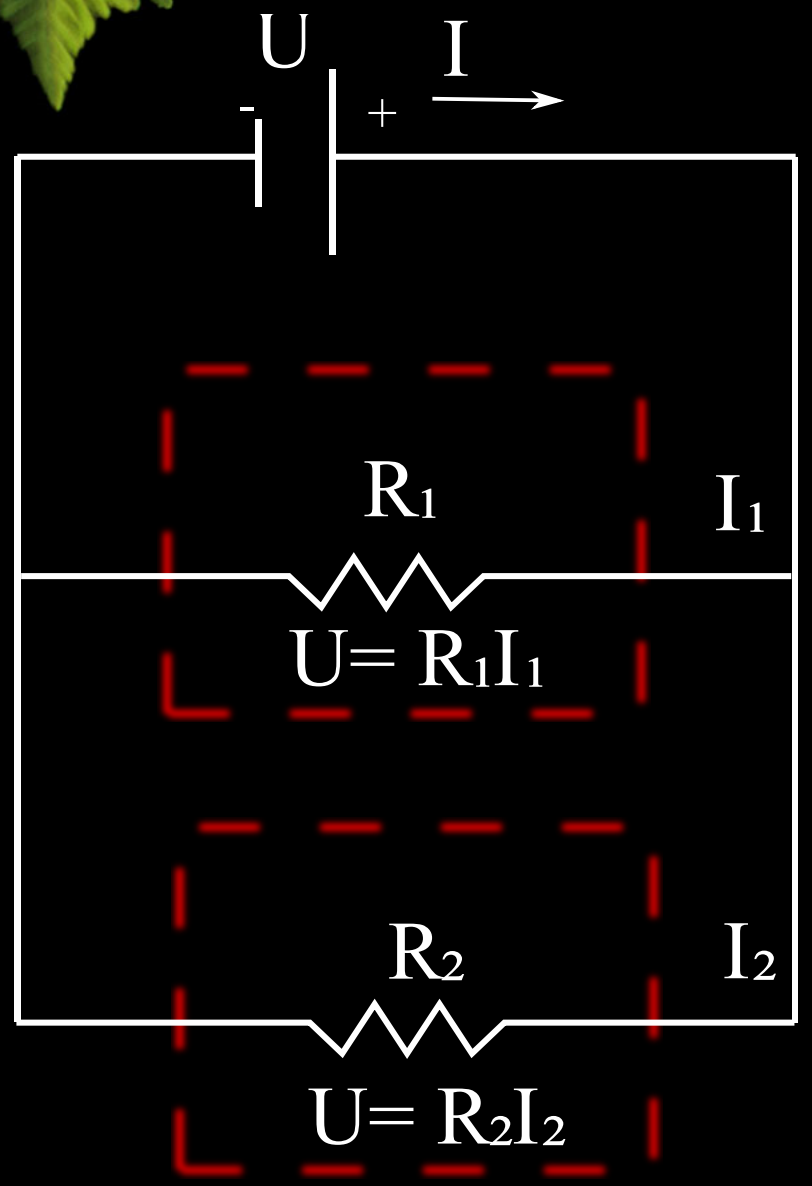
OHM'S LAW- PARALLEL RESISTANCES

$$I = I_1 + I_2 = \frac{U}{R_1} + \frac{U}{R_2} = \frac{U}{R}$$

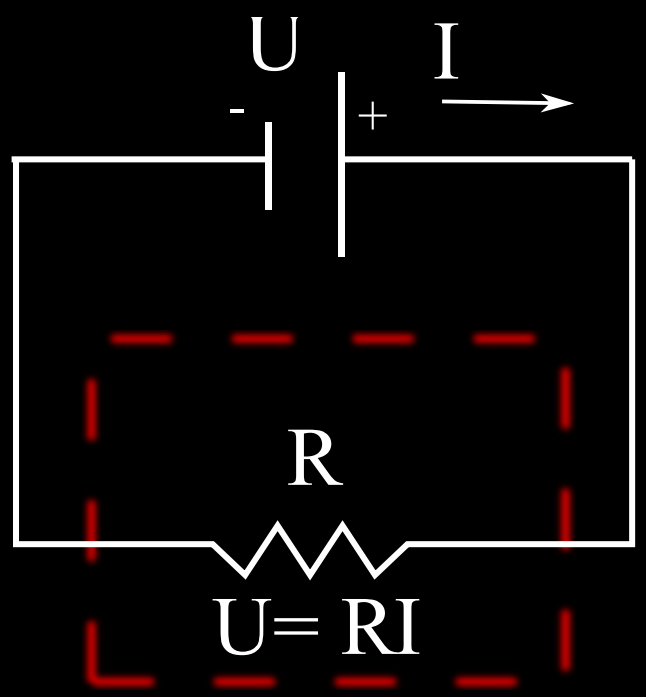
$$\frac{R}{U} = \frac{1}{U\left(\frac{1}{R_1} + \frac{1}{R_2}\right)}$$

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$$

$$R = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2}}$$



JOULE'S LAW



U= RI

$$P = UI$$

$$[P] = W$$

$$U = RI$$

$$P = RI^2$$

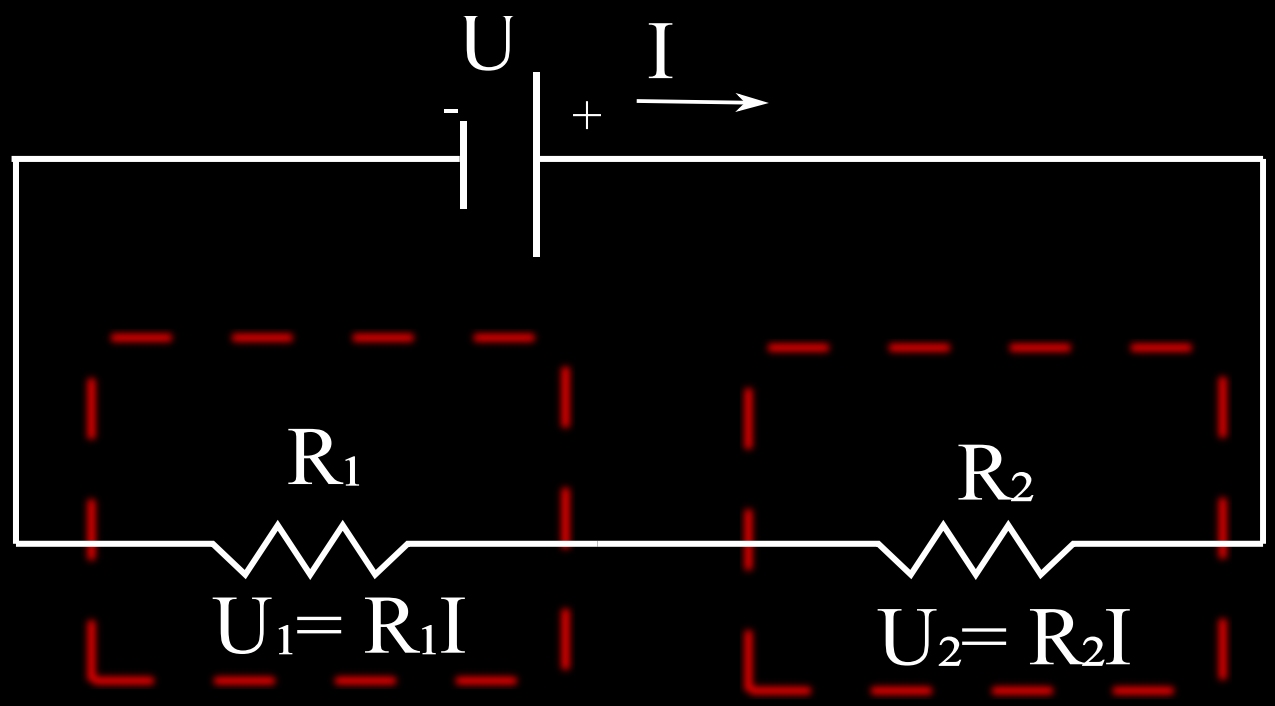
$$P = \frac{U^2}{R}$$

JOULE'S LAW

$$P_1 = R_1 I^2$$

$$P_2 = R_2 I^2$$

$$P = (R_1 + R_2) I^2$$



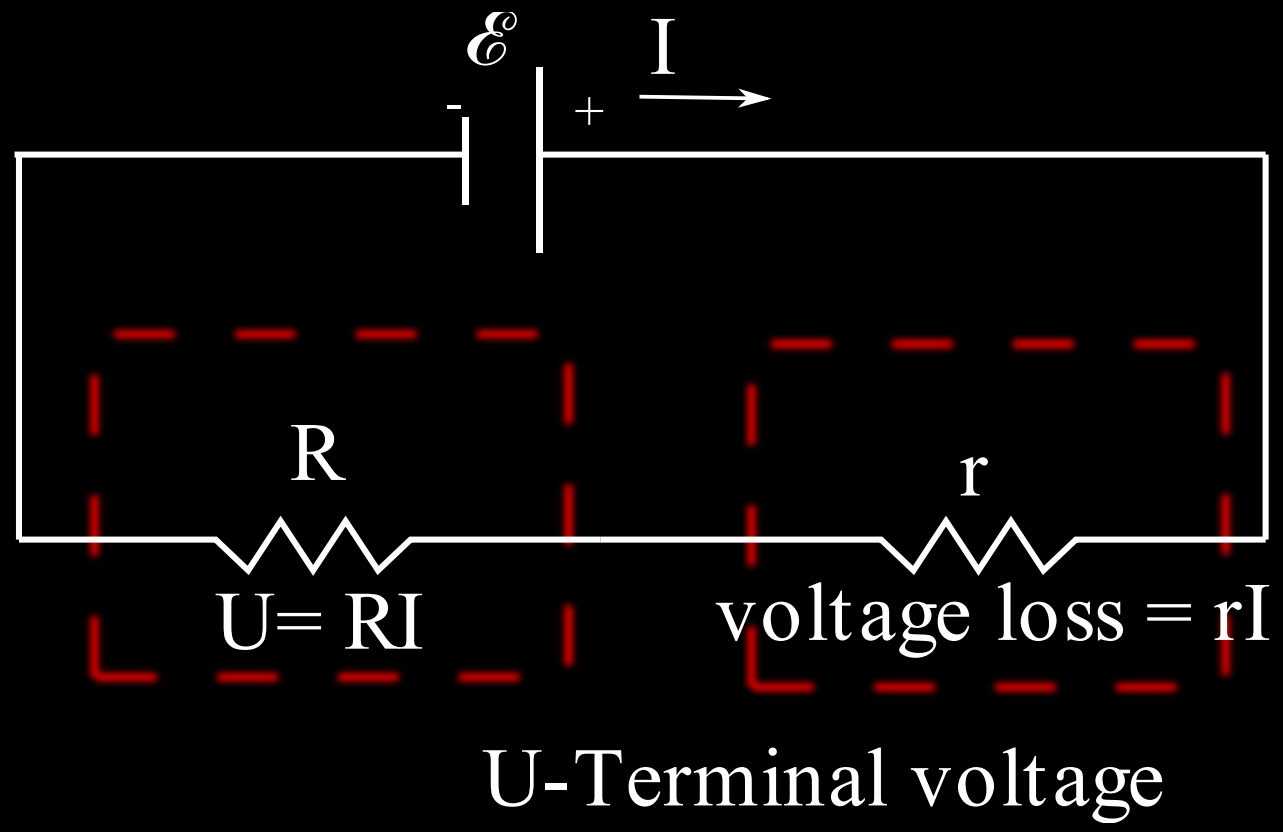
$$U = U_1 + U_2$$

ELECTROMOTIVE FORCE - EMF

- Ideal voltage that the device creates without any resistances
- Device itself has an internal resistance
- 1.5 V battery has terminal voltage of 1.5 V, but the electromotive force is more than that
- Denoted by $\mathcal{E}$
- $[\mathcal{E}] = \mathrm{V} \qquad \mathrm{Volt}$

INTERNAL RESISTANCE

- Internal resistance
- U – Terminal voltage

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