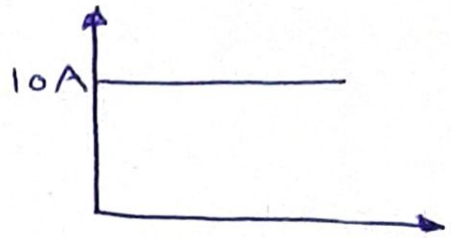
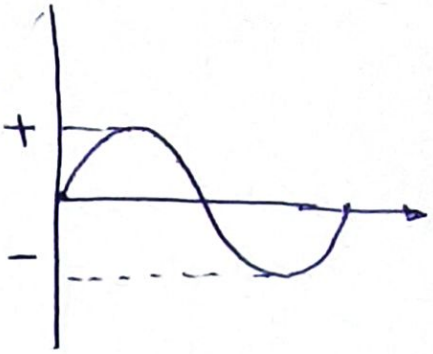
Fundemetal of Electrical Engineering

DC: Direct Current

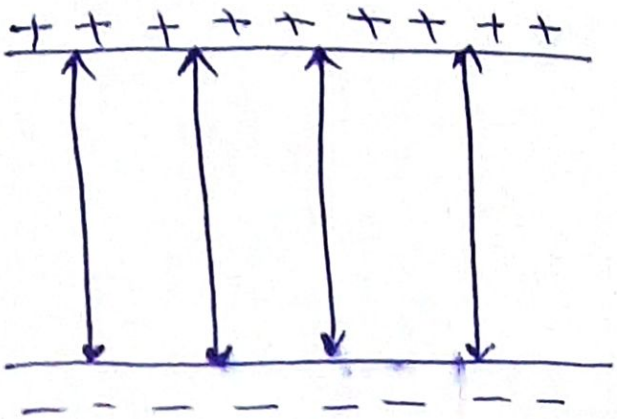


AC : Alternative Current

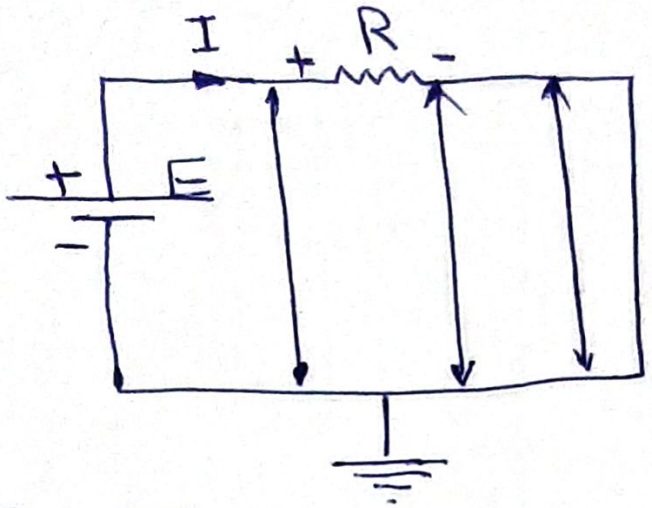


Voltage [v] : The potential defference between tow points.

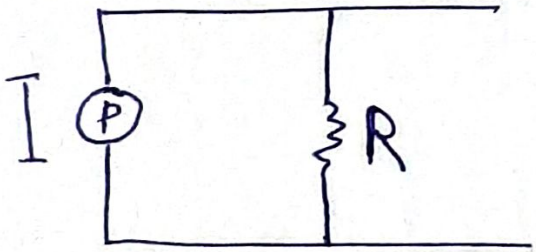
Current [I] : The rate of Charge moving in a Certain metal.



Voltage Source



Current Source

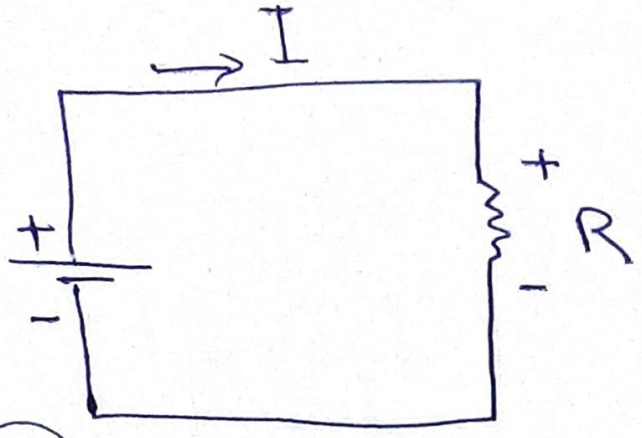


ohms law

$$R = \frac{V}{I} \quad , \quad I = \frac{V}{R} \quad , \quad V = I \cdot R$$

R [Ω] , V [V] , I [A]

↓ ohm ↓ volt ↓ Amp



Power

$$P = V \cdot I \qquad \because R = \frac{V}{I}$$

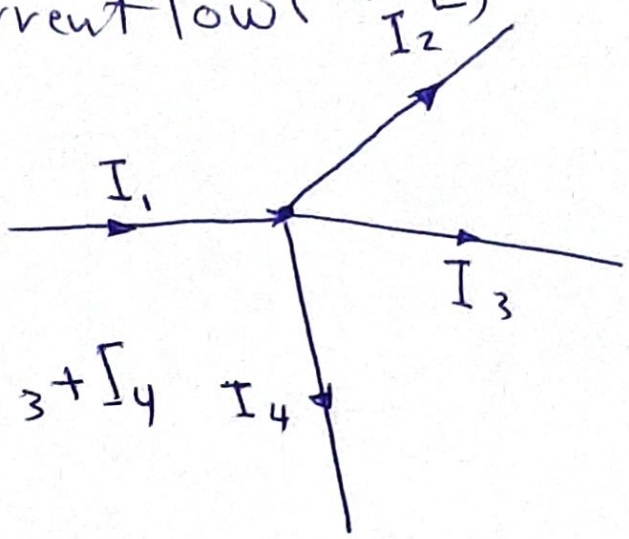
$$\therefore P = I^2 \cdot R$$

or

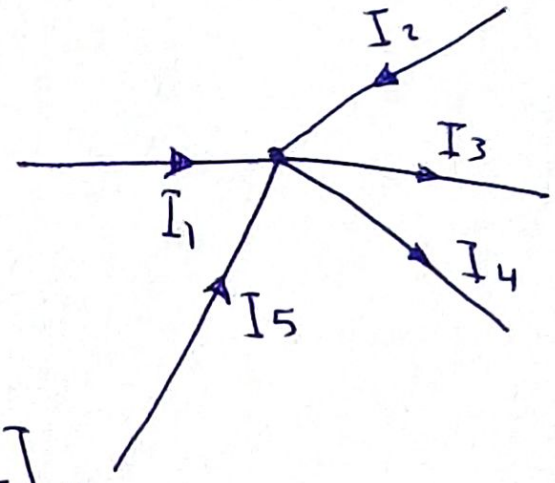
$$P = \frac{V^2}{R}$$

Kirchoff's law

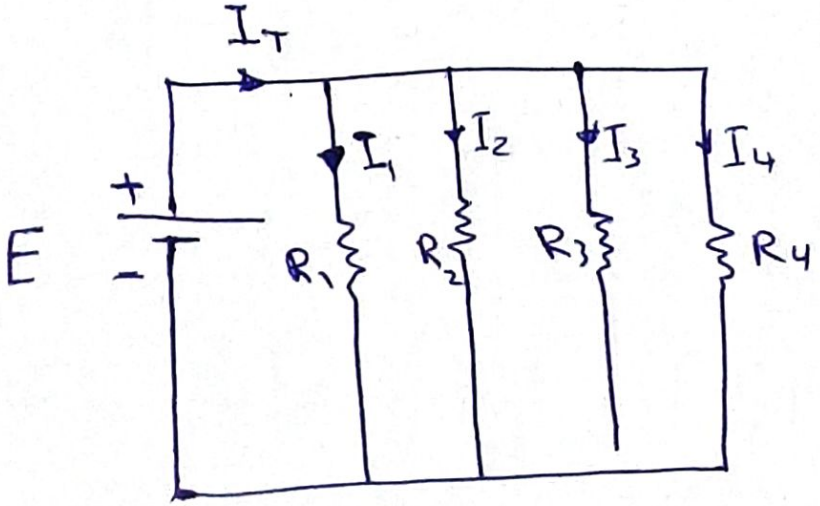
1) Kirchoff's Current low (KCL)



$$I_1 = I_2 + I_3 + I_4$$



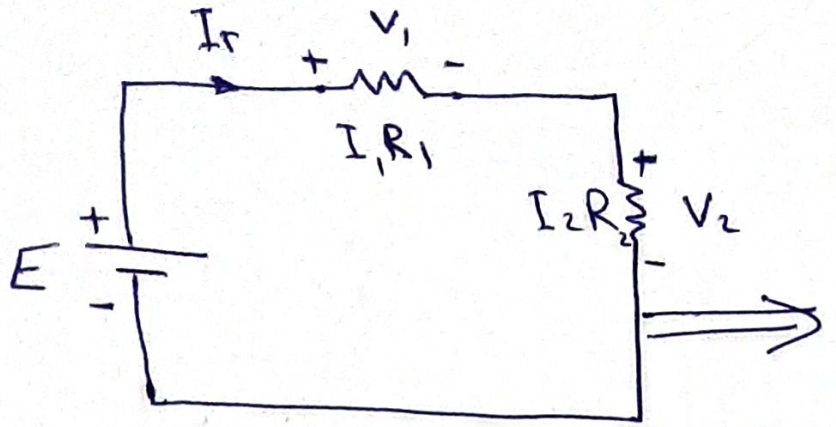
$$I_1 + I_2 + I_5 = I_3 + I_4$$



⟹ Parallal

توازي

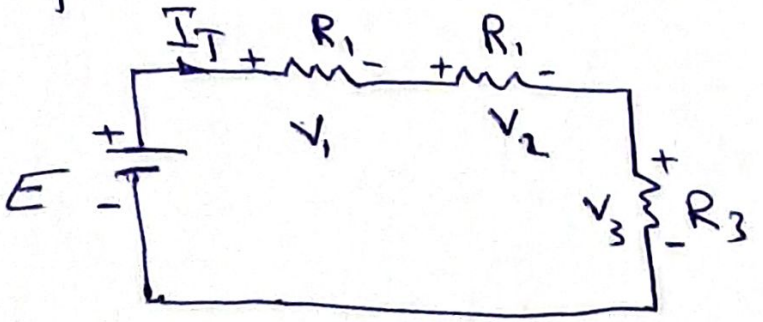
② KerChoffi's voltage law [KVL]



Series
توالي

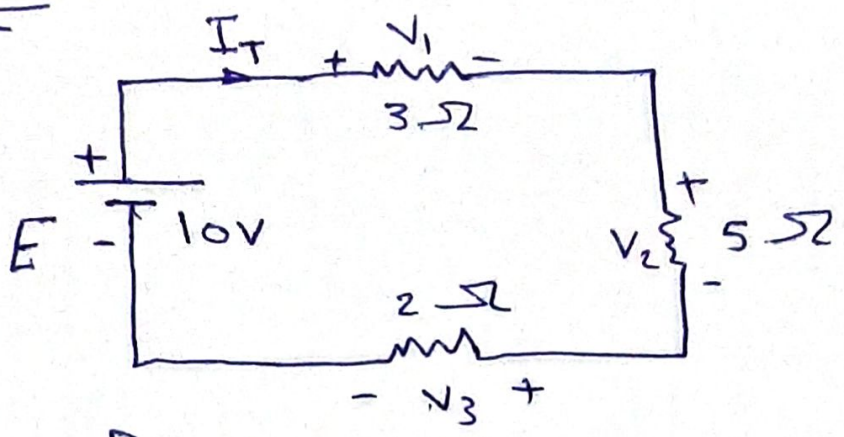
$$E = V_1 + V_2 \Rightarrow E - V_1 - V_2 = 0$$

* ملاحظة / المقاومات على التوالي يتم جمعها لإيجاد المقاومة الكلية



$$R = \frac{V}{I} \Rightarrow I_T = \frac{E}{R_T} \qquad R_T = R_1 + R_2 + R_3$$

Ex, for the Circuit Shown:



Find The voltage V_1, V_3

Sol $R_1 = \frac{V_1}{I_1}$, $R_2 = \frac{V_2}{I_2}$, $R_3 = \frac{V_2}{I_2}$

$I_T = I_1 = I_2 = I_3$

$I_T = \frac{E \rightarrow 10\,V}{R_T \; ?}$

$R_T = R_1 + R_2 + R_3$

$= 3 + 5 + 2$

$RT = 10$

$I_T = \frac{10}{10} = 1\,A$

$V_1 = I_T * R_1$

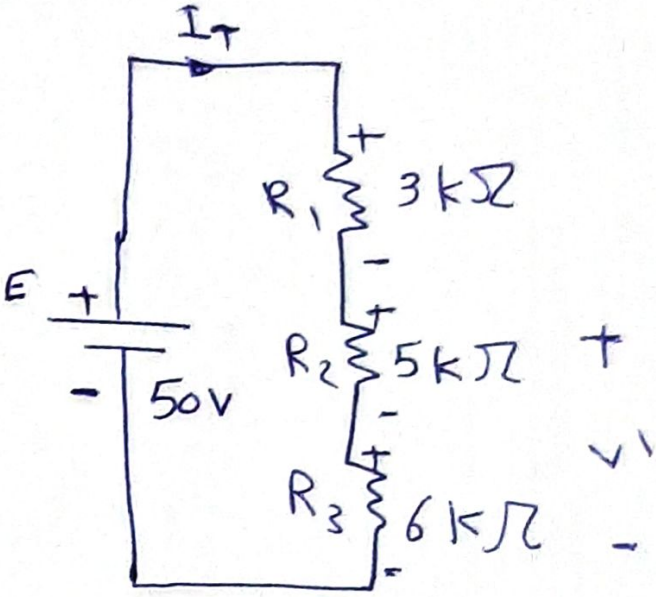
$V_1 = 1 * 3 = 3\,V$

$V_3 = 1 * 2 = 2V$

Voltage divider rule (VDR)

$$V_x = \frac{E \cdot R_x}{R_T}$$

Ex. Determine the voltages V_1, V_2 and V' for the circuit shown



$$V_1 = \frac{E \cdot R_1}{R_T}$$

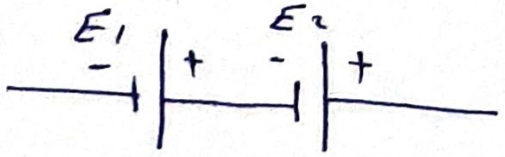
$$V_1 = \frac{50 * 3}{14} = 10.7\,V$$

$$V_2 = \frac{50 * 5}{14} = 17.85\,V$$

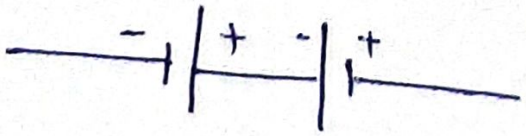
$$V' = \frac{E \cdot R'}{R_T} = \frac{50 * 11}{14} =$$

$$= 39.28\,V$$

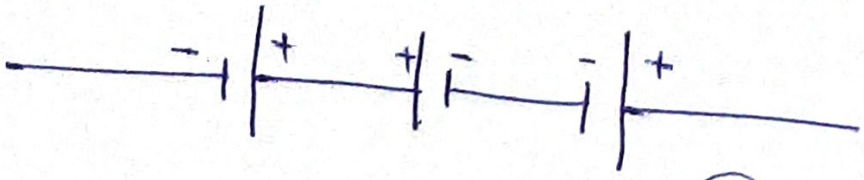
موضوع / في حالة تعدد المصادر



$\therefore E_T = E_1 + E_2$

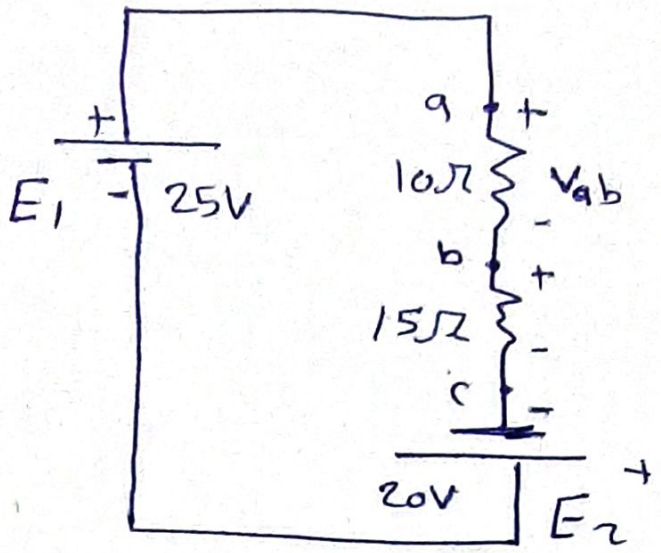


$E_T = E_1 - E_2$



$E_T = E_1 - E_2 + E_3$

EX Find V_{ab} and V_{ac} for the Circuit Shown



$V_{ab} = ?$

$V_{ac} = ?$

$E_T = E_1 + E_2 = 45V$

$R_T = R_{ab} + R_{bc} = 25\,\Omega$

$$V_{ab} = \frac{E_T \cdot R_{ab}}{R_T} = \frac{45 * 10}{25} = 18V$$

$$V_{ac} = \frac{E_T \cdot R_{ac}}{R_T} = \frac{45 * 25}{25} = 45V$$