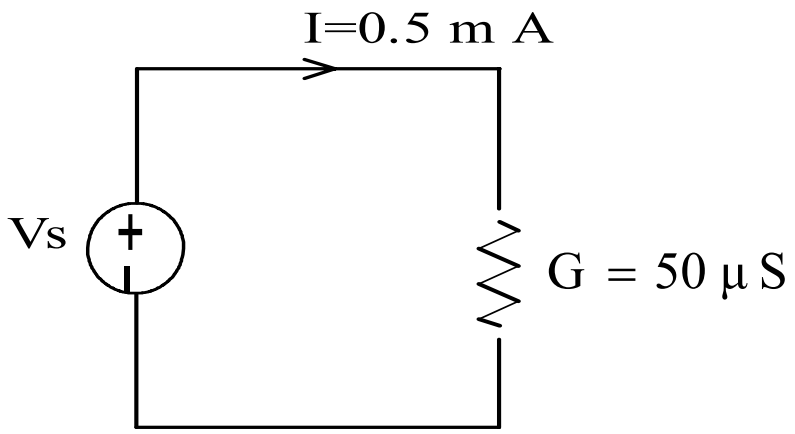
Example :

Find the value of the voltage source and the power absorbed by the resistance



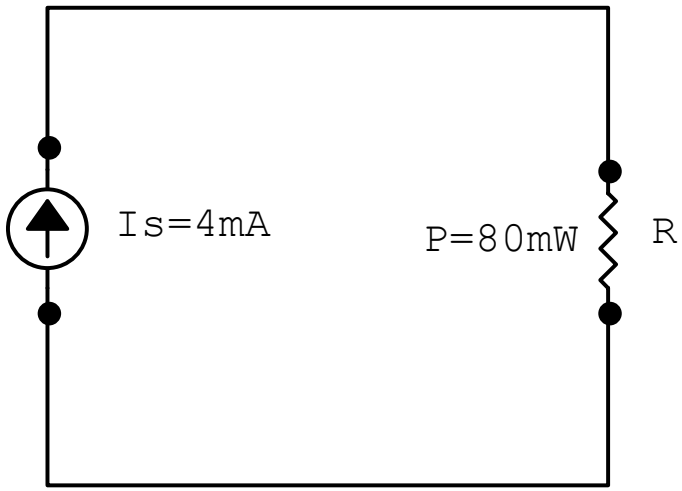
$$G = 50\,\mu S \Longrightarrow R=1/G = 2*10^4$$

$$V_s = I\,R = (0.5\,\text{m A})\,(20*10^4\,\Omega) = 10\,\text{V}$$

$$P_R = IV = (10\,\text{V})\,(0.5\,\text{mA}) = 5\,\text{m W}$$

Example :

Find R and the voltage across The resistor?



$$P = V\,Is$$

$$V = \frac{P}{Is} = \frac{80*10^{-3}\ W}{4*10^{-3}\ A}$$

$$V = 20V.$$

$$V = IR = (4*10^{-3}\ A)R$$

$$R = \frac{V}{I} = \frac{20\ V.}{4*10^{-3}\ A} = 5k\Omega$$

Kirchoff's Laws:

(1) kirchoff's current law (KCL) :

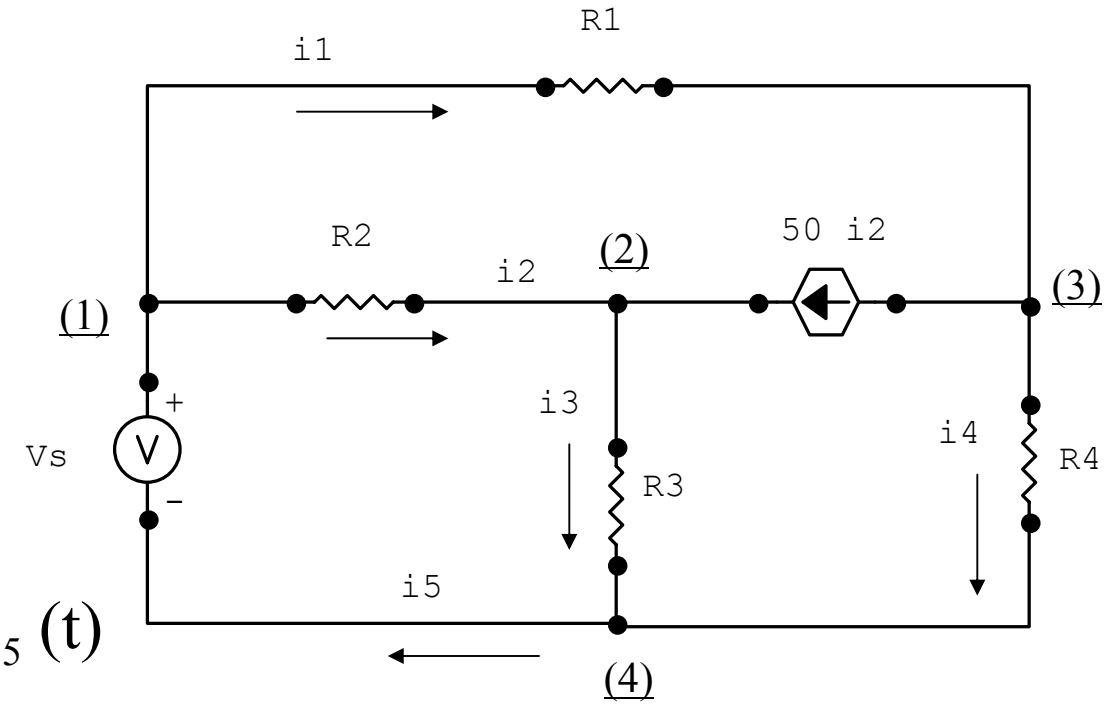
the sum of all currents entering any node is zero.

$$\Longrightarrow \qquad \sum_{k=1}^{N} i_k(t) = 0$$

Where N= number of currents.

Example:

Write the KCL equation



Here we have (4) nodes:

At node (1) : $i_1(t)+i_2(t)=i_5(t)$

At node (2) : $i_2(t)+50\,i_2(t)=i_3(t)$

At node (3) : $50\,i_2(t)+i_4(t)=i_1(t)$

At node (4) : $i_3(t)+i_4(t)=i_5(t)$

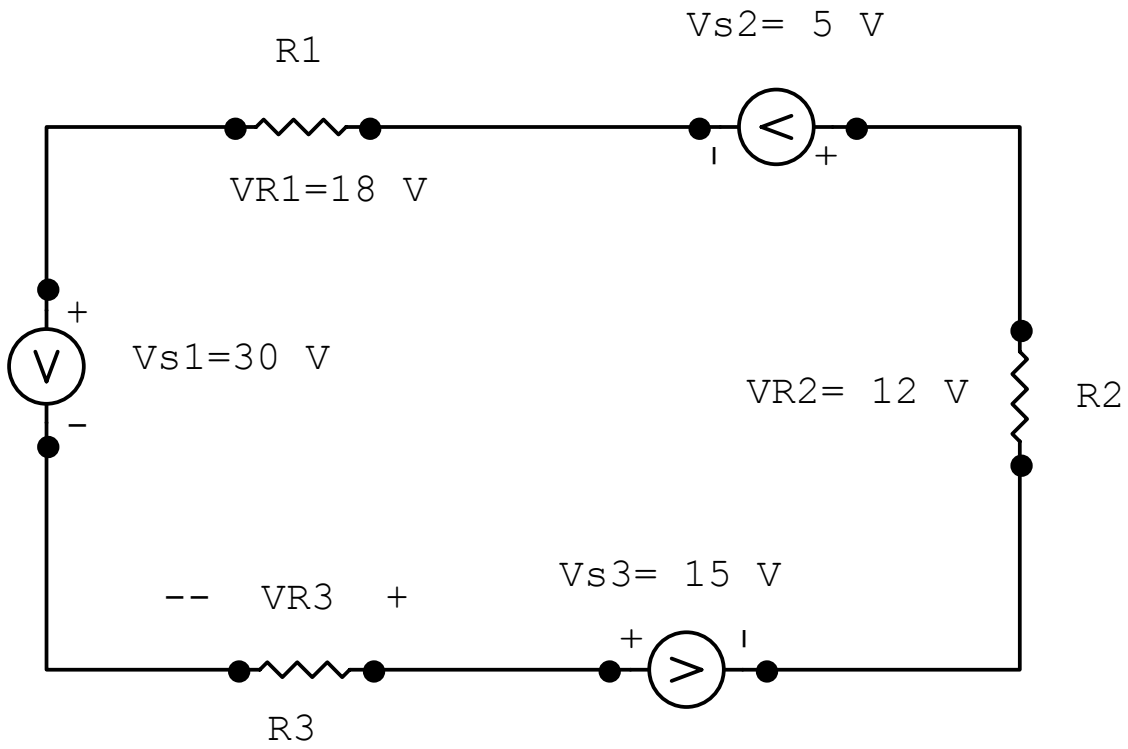
(2) Kirchoff's voltage Law (KVL):

The sum of the voltage around any loop is zero.

$$\sum_{k=1}^{N} v_k(t) = 0 \quad \Longrightarrow \quad N = \#\text{ of voltage}$$

Example:

Find V_{R3} ? using KVL



$-30+18-5+12-15+V_{R3} = 0$

$V_{R3} = 20$ V

Example :

Find the KVL equation for the two paths abda and bcdb

Path abda:

$$v_{R1} + v_{R2} - v_s = 0$$

Path bcdb:

$$20\, v_{R1} + v_{R3} - v_{R2} = 0$$