13:55

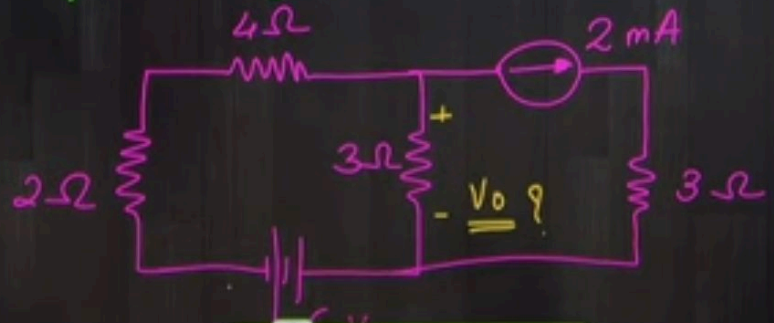
Superposition Theorem.

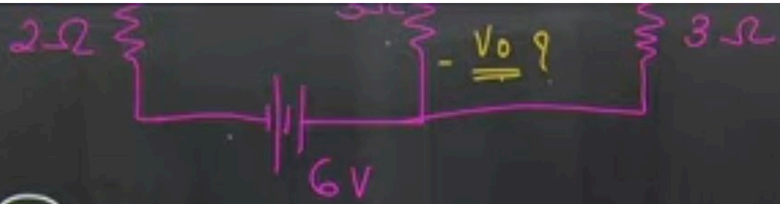
The principle of superposition helps to analyze a linear circuit with more than one current or voltage source by considering the effect of one source at a time by replacing the other source with their internal resistances.

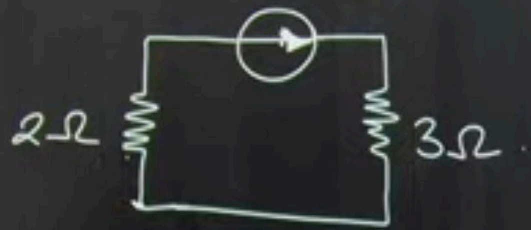
Superposition theorem statement

Superposition theorem statement

Any linear, bilateral two terminal network consisting of more than one sources, the total current or voltage in any part of a network is equal to the algebraic sum of currents or voltages in the required branch with each source acting individually and voltage being replaced by short circuit & current source by open circuit.







$$\frac{1}{R_p} = \frac{1}{6} + \frac{1}{3}$$

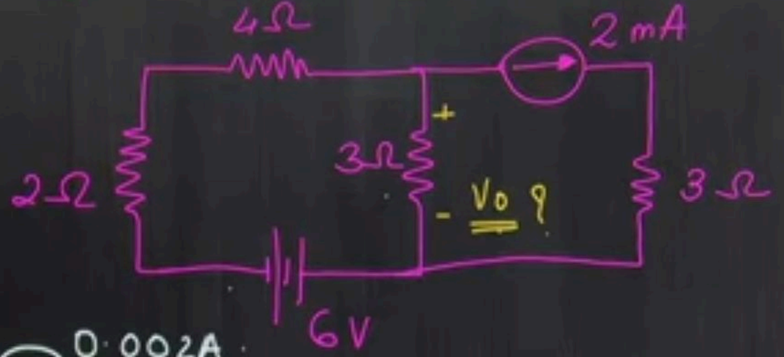
$$\frac{1}{R_p} = \frac{1}{6} + \frac{2}{6}$$

$$R_p = \frac{6}{3}$$

$$R_p = 2\Omega$$

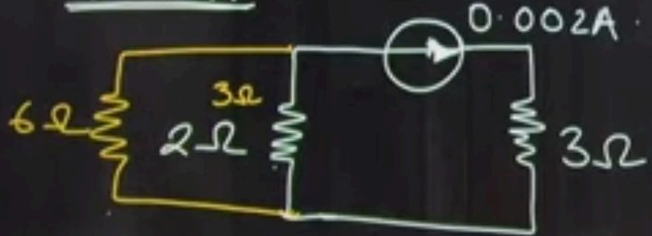
voltage being replaced by short circuit & current source by open circuit

14:02



$2mA \rightarrow 2\times10^{-3}\,A$

$= \underline{0.002A}$



$\frac{1}{R_p} = \frac{1}{6} + \frac{1}{3}$

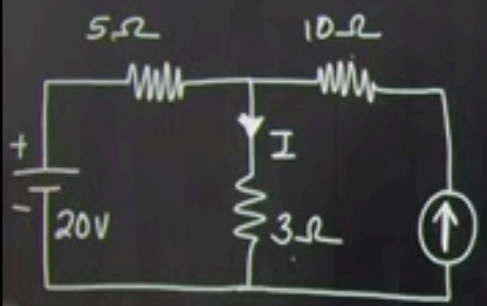
$\frac{1}{R_p} = \frac{1}{6} + \frac{2}{6}$

$V = IR$

$= (0.002)(5)$

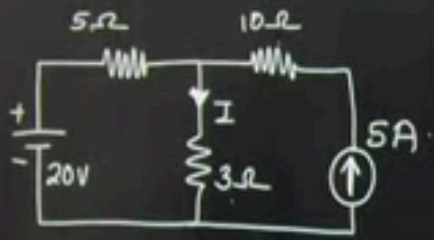
$= 0.01V$

Q. By using superposition theorem find I in the circuit.



14:33

Q. By using superposition theorem find I in the circuit.

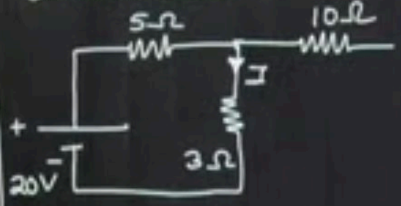


Total current in

$3\Omega = 2.5A + 3.125A$

$= 5.625A$ //

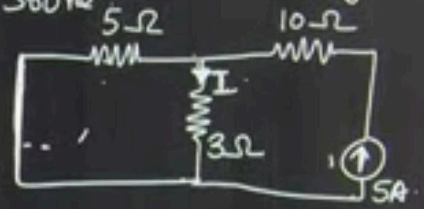
Open circuit the current source



$I = \frac{V_T}{R_T} = \frac{20}{(5+3)}$

$= \underline{2.5A\ (\downarrow)}$

Short circuit voltage source



$R_T = 5\Omega \| 3\Omega + 10\Omega$

$= \frac{1}{\left(\frac{1}{5} + \frac{1}{3}\right)}$

$R = 1.875\Omega$. $I_T = 5A$

$V_T = I_T \times R_T$

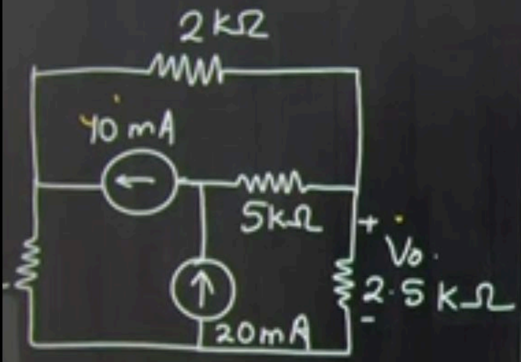
$= 9.375\ V$

$I_3 = \frac{V_T}{R} = \frac{9.375}{3}$

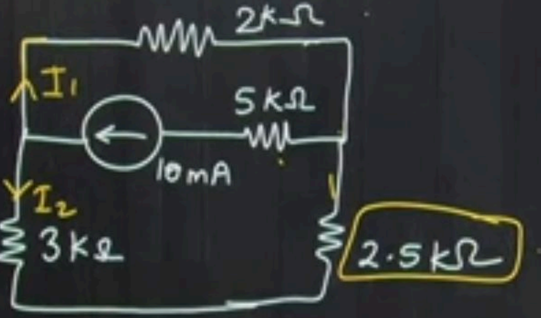
$I = \underline{3.125}$ // $(\downarrow)$

ng superposition Theorem. find the voltage (V_0).

14:56



Open circuit
current source.



$I_T = 10\ mA$

$R_{current} = 2.5 + 3\ k\Omega$

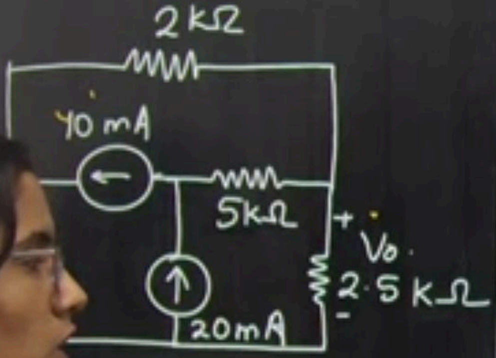
$R_{other} = 2\ k\Omega$

$$I_2 = I_T \times \left(\frac{R_{other}}{R_{other} + R_{current}}\right)$$

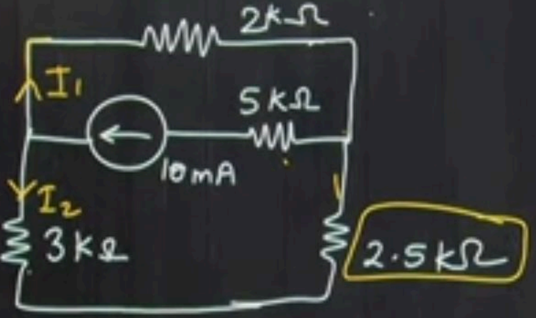
$$I_2 = 10 \times \left(2 \right.$$

ng superposition Theorem. find the voltage (V_0).

14:57



Open circuit current source.



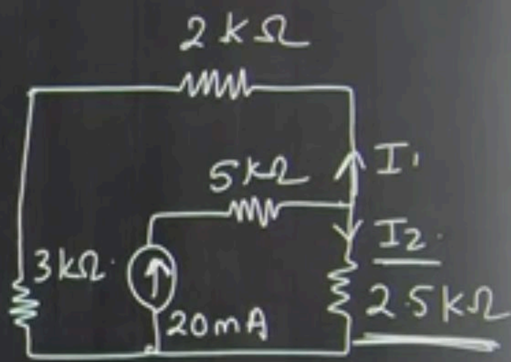
$I_T = 10\,mA$

$R_{current} = 2.5 + 3\ k\Omega$

$R_{other} = 2\ k\Omega$

$I_2 = I_T \times \left(\frac{R_{other}}{R_{other} + R_{current}} \right)$

$I_2 = 10 \times \left(\frac{2}{\ } \right.$

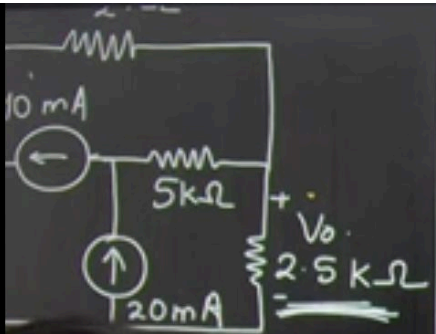


$I_T = 20mA$

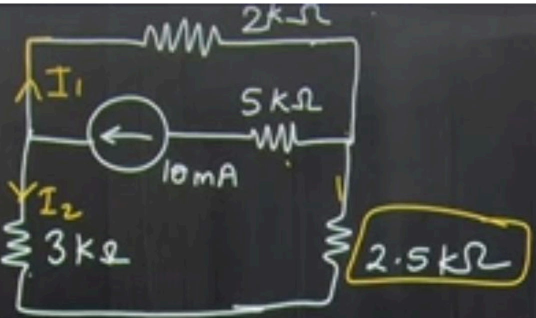
$R_{current} = 2.5$

$R_{other} = 2+3$

14:59



$-I_2'$



$I_T = 10\,mA$

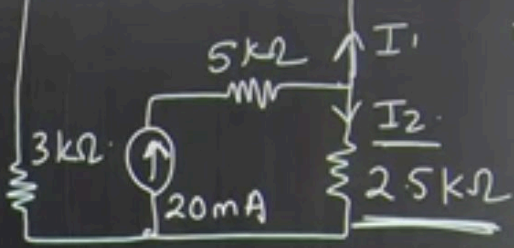
$R_{current} = 2.5+3\ k\Omega$

$R_{other} = 2\ k\Omega$

$$I_2 = I_T \times \left(\frac{R_{other}}{R_{other}+R_{current}}\right)$$

$$I_2 = 10 \times \left(\frac{2}{2+5.5}\right)$$

$$= 2.667\ mA(\uparrow)$$



$I_T = 20mA$

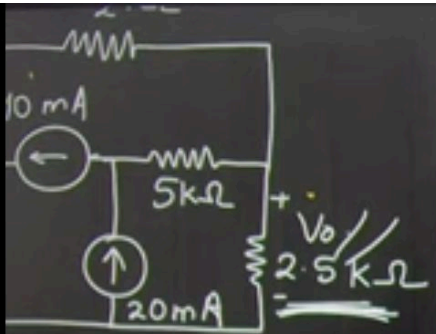
$R_{current} = 2.5\ k\Omega$

$R_{other} = 2+3\ k\Omega$

$$I_2' = I_T \times \left(\frac{R_{other}}{R_{other}+R_{current}}\right)$$

$$= 20 \times \left(\frac{5}{5+2.5}\right)$$

$$= 13.33\ A(\downarrow)$$



$I_T = I_2 - I_2'$

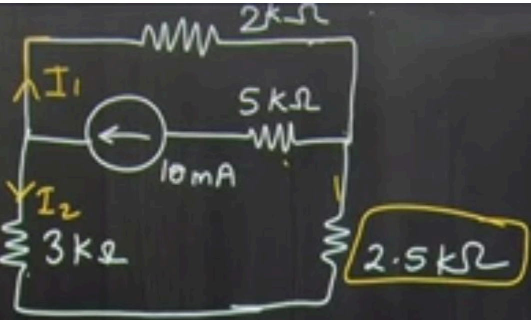
$= 2.667 - 13.33$

$= -10.663 (\downarrow)$

$V_1 = \overset{mA}{I} \times \overset{k\Omega}{R}$

$= 10.663 \times 2.5$

$= 26.665$ V



$I_T = 10$ mA

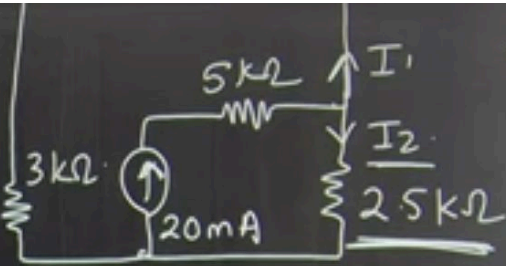
$R_{current} = 2.5 + 3$ kΩ

$R_{other} = 2$ kΩ

$$I_2 = I_T \times \left(\frac{R_{other}}{R_{other} + R_{current}}\right)$$

$$I_2 = 10 \times \left(\frac{2}{2+5.5}\right)$$

$= 2.667$ mA $(\uparrow)$



$I_T = 20$ mA

$R_{current} = 2.5$ kΩ

$R_{other} = 2+3$ kΩ

$$I_2' = I_T \times \left(\frac{R_{other}}{R_{other} + R_{current}}\right)$$

$$= 20 \times \left(\frac{5}{5+2.5}\right)$$

$= 13.33$ A $(\downarrow)$