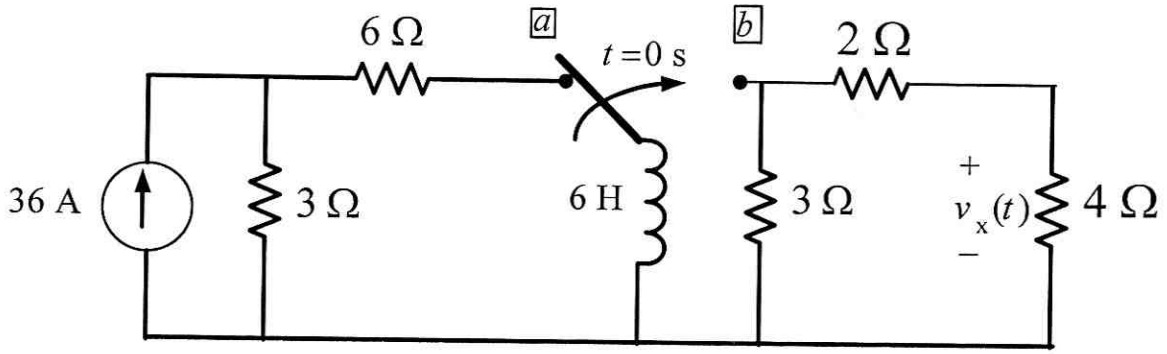
EE 202-01 – Fall 2012(122)

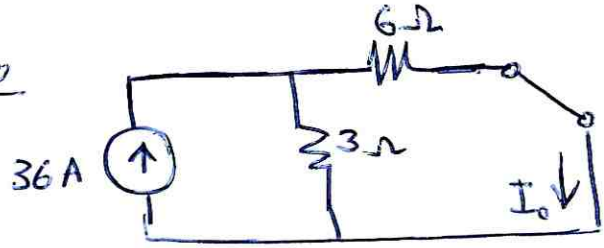
Quiz 4

SER	ID	NAME KEY



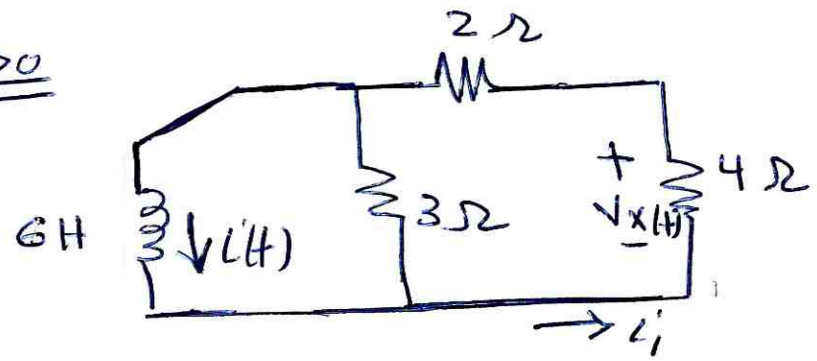
For the circuit shown above , the switch was in position **a** for a long time. At t =0 s the switch is moved to position **b** . Find $v_x(t)$ for all time ?

$t<0$



$$I_o = \frac{3}{3+6}\,36 = 12\ A$$

$t>0$



$(2+4)\,//\,3 = 2\ \Omega$

$$\tau = \frac{L}{R_{eq}} = \frac{6}{2} = 3\ s \Rightarrow i(t) = 12\,e^{-\frac{t}{3}}\ A$$

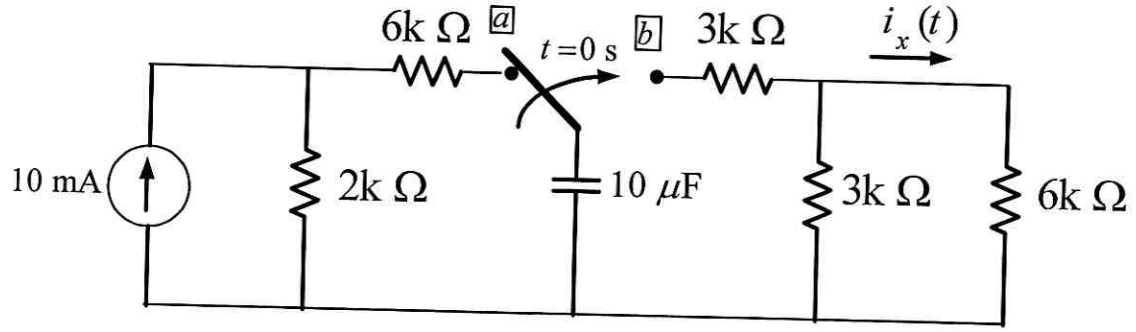
$$\Rightarrow i_1(t) = \frac{3}{(2+4)+3}\,i(t) = \frac{3}{9}\,12\,e^{-\frac{t}{3}} = 4\,e^{-\frac{t}{3}}\ A$$

$$v_x(t) = -4\,i_1(t) = -16\,e^{-\frac{t}{3}}\ V$$

EE 202-02 – Fall 2012(122)

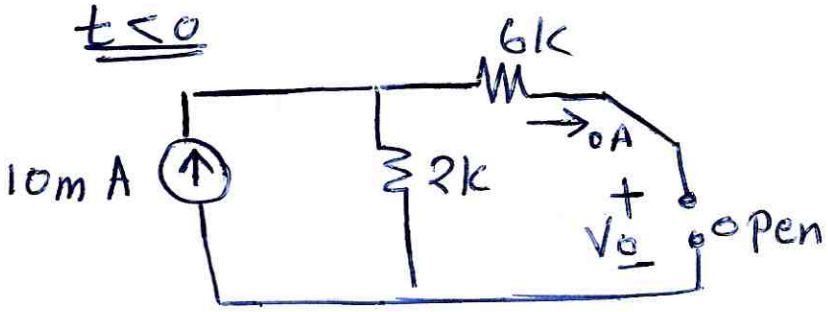
Quiz 4

SER	ID	NAME KEY



For the circuit shown above , the switch was in position **a** for a long time. At t =0 s the switch is moved to position **b** . Find $i_x(t)$ for all time ?

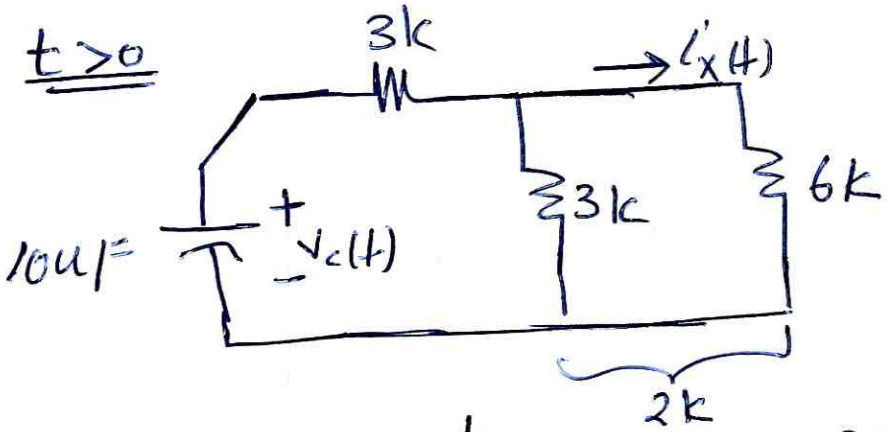
t<0

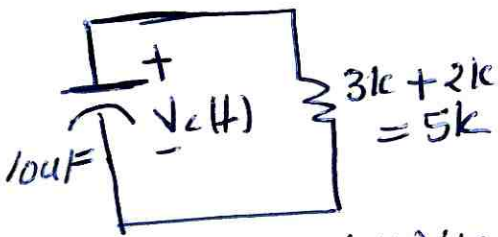


$V_o = V_{2k\Omega} = (2k)(10mA)$

$= 20\ V$

t>0

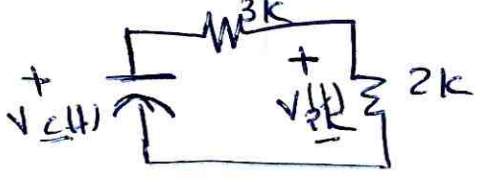




$\tau = RC = (5k)(10uF)$

$= 50\ ms$

$V_c(t) = 20\, e^{-\frac{t}{50ms}} = 20\, e^{-20t} \quad t>0$



$V_{2k}(t) = \frac{2k}{3k+2k} V_c(t) = \frac{3}{5} 20\, e^{-20t} = 12\, e^{-20t}\ V$

$i_x(t) = \frac{V_{2k}(t)}{6k} = 2\, e^{-20t}\ mA$