Homework in Theory of Electrical Engineering. Sinusoidal steady state circuits analysis. University of Ruse Angel Kanchev.

HOMEWORK №2.

**Problem 1.** Present the sinusoidal waveforms as phasors (**5 points**):

1) $i_1(t)=0.2\sin(\omega t+25°)[A]$
2) $u_1(t)=220\sin(\omega t-180°)[V]$
3) $i_2(t)=-10\sin(\omega t+180°)[A]$
4) $i_3(t)=2\sin(\omega t-45°)[A]$
5) $u_2(t)=12\sin(\omega t)[V]$

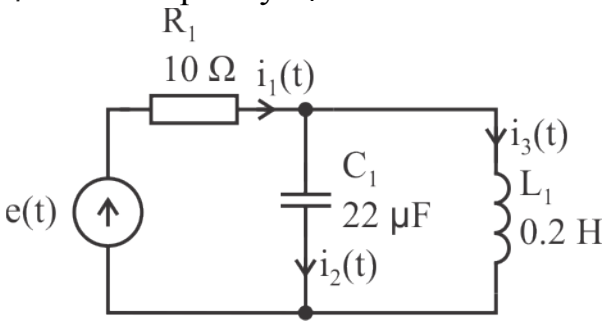
**Problem 2.** Obtain the sinusoids of the phasors (**5 points**):

1) $\dot{I}_1=0{,}25e^{j30°}[A]$
2) $\dot{I}_2=7e^{-j105°}[A]$
3) $\dot{U}_1=25+j11[V]$
4) $\dot{U}_2=-5-j1{,}25[V]$
5) $\dot{I}_3=1{,}5[A]$

**Problem 3.** Obtain the reactances (reactive resistance) of the conductors/capacitors (**5 points**):

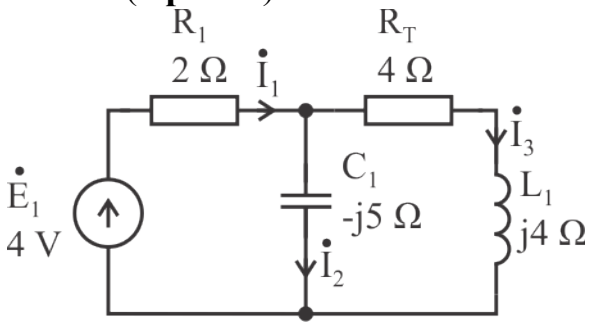
1) $L_1=100\,mH$ at frequency $f=60\,Hz$
2) $C_1=22mF$ at frequency $f=200\,Hz$
3) $L_2=300\,\mu H$ at frequency $f=20\,kHz$
4) $C_2=2{,}2\,\mu F$ at frequency $f=300\,kHz$
5) $C_3=2{,}2\,\mu F$ at frequency $f=10\,MHz$

**Problem 4.** The circuit below is powered by a sinusoidal source $e(t)=2\sin(\omega t+90°)[V]$ with frequency $f=50\,Hz$ :

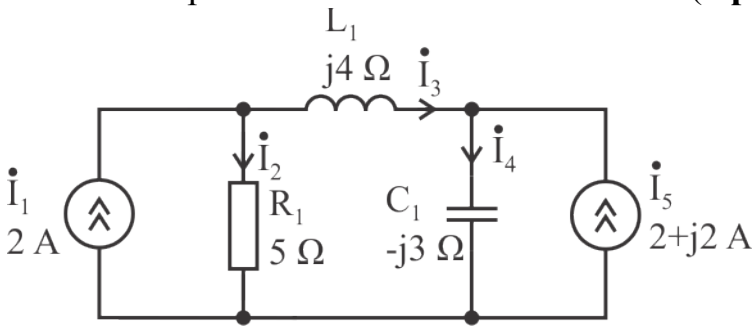



1) Obtain the reactances and create an equivalent circuit with complex numbers (**3 points**);
2) Obtain the complex currents in the circuit (**5 points**);
3) Present the currents in sinusoidal form (**2 points)**.

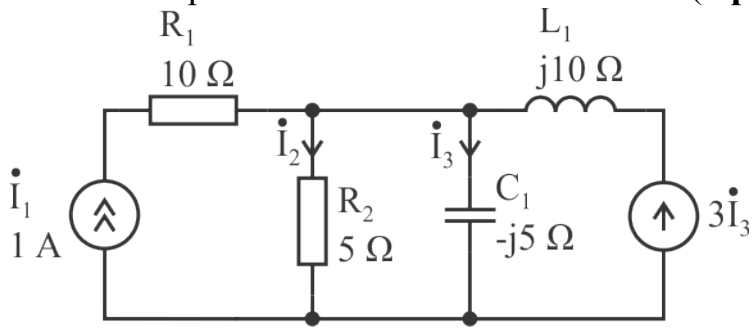
**Problem 5.** In the circuit below the quantities are presented in complex form. Obtain the complex currents (**5 points**).




**Problem 6.** Obtain the complex currents in the circuit below (**5 points**).




**Problem 8.** Obtain the complex currents in the circuit below (**5 points**).




**Problem 8.** For the circuit below draw an equivalent circuit with dependent sources (without mutually coupled inductors). Obtain the complex currents (**5 points**).