

- This is a closed book exam.
- The exam has 7 questions in three pages, answer all of them.
- Good Luck!

1. Determine  $v_1$  and  $v_2$  in the circuit of Figure 1.

[30 marks]

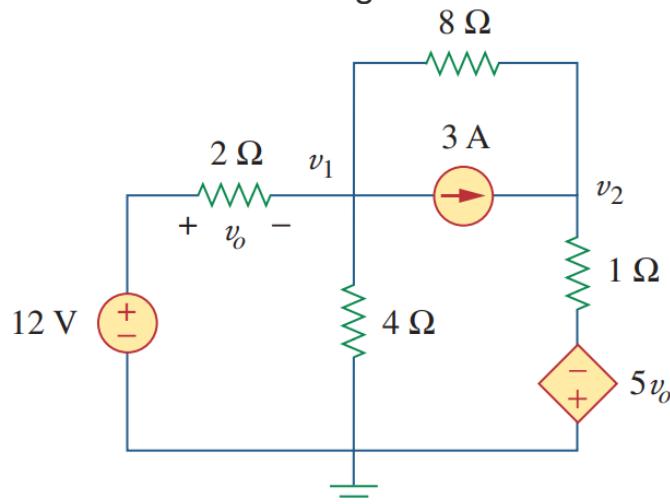


Figure 1

2. Find the Thévenin equivalent circuit for the network external to branch  $a-a'$  in Figure 2.

[30 marks]

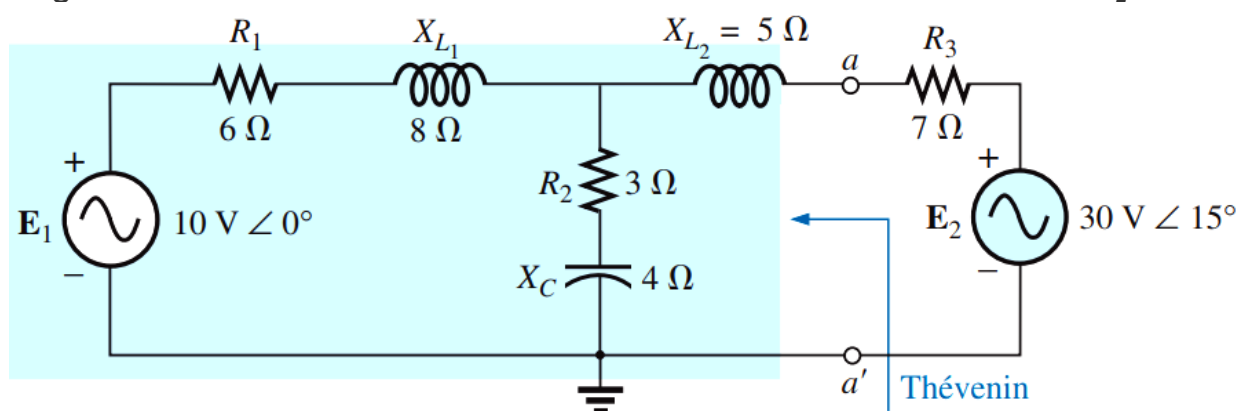


Figure 2

3. The power produced by a 120 V(rms), 60 Hz generator is to be transmitted to a 1 Ω load via 52.8 km transmission line having a resistance of 0.025 Ω per 100 m

a) If the voltage at the generator end of the transmission line is 10 kV (rms), find the load voltage and the efficiency. [15 marks]

b) Compare with the case in which the power is transmitted directly without using any transforms. [10 marks]

4. Determine  $i_o$  and  $v_o$  in the circuit in Figure 3.

[30 marks]

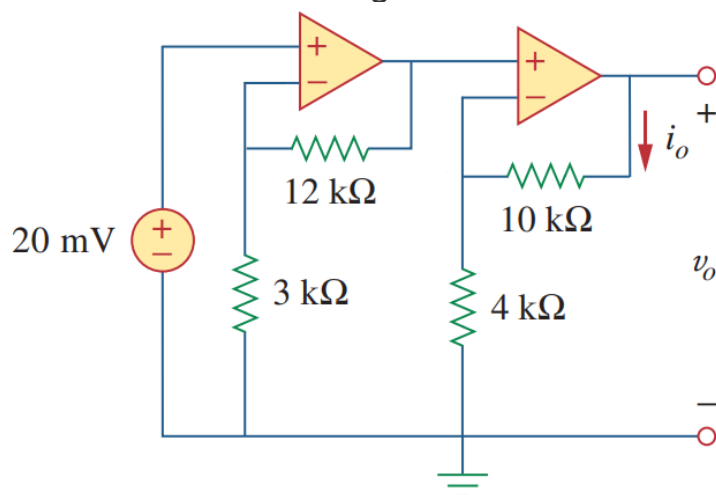


Figure 3

5. For the network shown in Figure 4, find  $v(t)$  for  $t > 0$ .

[35 marks]

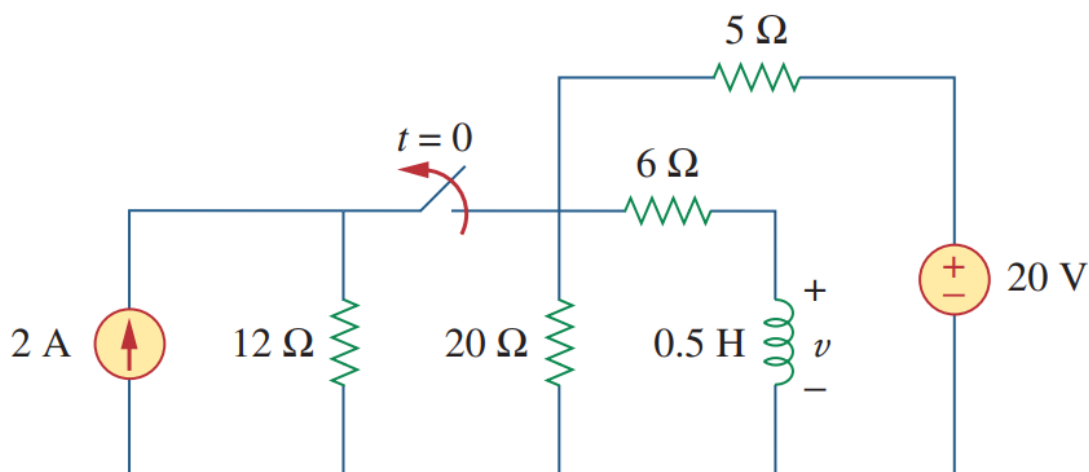


Figure 4

6. Determine the values of  $L_1$  and  $L_2$  in Figure 5 to pass a signal with a frequency of 1200 kHz and stop (reject) a signal with a frequency of 456 kHz.

[30 marks]

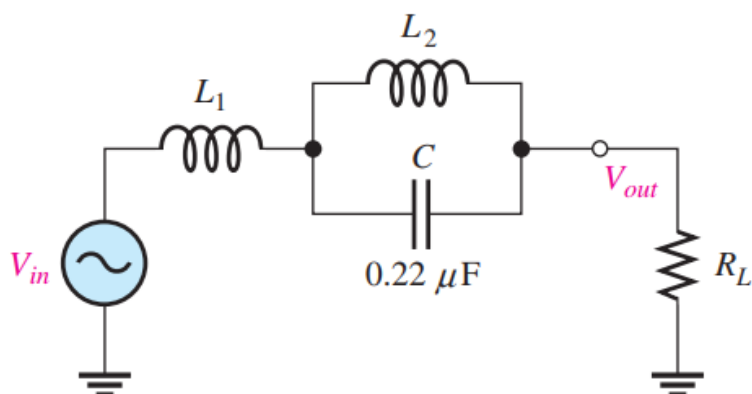


Figure 5

**7. Choose the correct answers:**

**[20 marks]**

- i. In a series R-L-C circuit at resonance  
a) impedance is maximum.                      b) admittance is maximum.  
c) impedance is purely reactive.              d) current is minimum.
- ii. Average of instantaneous power over one period is called  
a) Instantaneous power    b) Average power    c) Continuous power    d) Total power
- iii. When a sinusoidal voltage is applied across R-L parallel circuit so  $R = X_L$  the phase angle will be  
a)  $90^\circ$  lead.              b)  $45^\circ$  lag.              c)  $45^\circ$  lead.              d) none of these.
- iv. When Q-factor of a circuit is high, then  
a) power factor of the circuit is high.  
b) impedance of the circuit is high.  
c) bandwidth is large.  
d) none of these.
- v. The main function of a transformer is to change  
a) power                      b) frequency              c) voltage level    d) power factor
- vi. A piece of resistive material has a length of 10 mm, a cross sectional area of  $7 \text{ mm}^2$  and a resistivity of  $4700 \times 10^{-8} \Omega\text{-m}$ . What is its resistance?  
a)  $67 \mu\Omega$                       b)  $67 \text{ m}\Omega$                       c)  $30.4 \Omega$                       d)  $30.4 \text{ k}\Omega$
- vii. An op amp circuit that combines several inputs and produces an output that is weighted sum of inputs is called  
a) Noninverting Amplifier                      b) Inverting Amplifier  
c) Summing Amplifier                              d) Ideal Amplifier
- viii. Inductor does not allow the sudden change of  
a) current                      b) voltage                      c) power                      d) None of the above
- ix. Active filter consists of  
a) Capacitor                      b) Inductor                      c) op-amp and capacitor    d) op-amp
- x. An RL circuit has  $R = 2 \Omega$  and  $L = 4 \text{ H}$  The time needed for the inductor current to reach 40 percent of its steady-state value is:  
a) 0.5 s                              b) 1 s                              c) 2s                              d) none of the above

*With my best wishes*

*H.S. Mogahed*