

ECE 35, Spring 2020

Quiz 3

/ 10

Last name

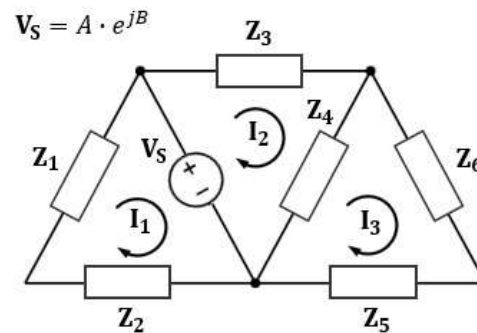
First + middle  
name(s)

PID

(1) (5 points)

Consider the circuit below. The system is in steady state and represented in phasor form.

- Find the mesh currents  $\mathbf{I}_1$ ,  $\mathbf{I}_2$  and  $\mathbf{I}_3$  (expressed in polar form).
- Find the complex power supplied by  $\mathbf{V}_S$ .



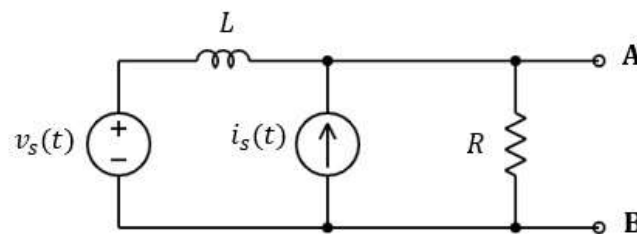
$A: 6 \text{ V}$   
 $B: 90 \text{ degrees}$   
 $Z_1: 1$   
 $Z_2: 2$   
 $Z_3: 1$   
 $Z_4: 2$   
 $Z_5: -2j$   
 $Z_6: 2+2j$

(2) (5 points)

Consider the circuit below. The system is in steady state.

- Find the average power received by resistor  $R$ .
- What load can we place between A and B that would result in maximum average power received by that load? Give your result as two elements in series (with their values).

$$v_S(t) = A_1 \cos(10t) \quad i_S(t) = A_2 \cos(10t)$$

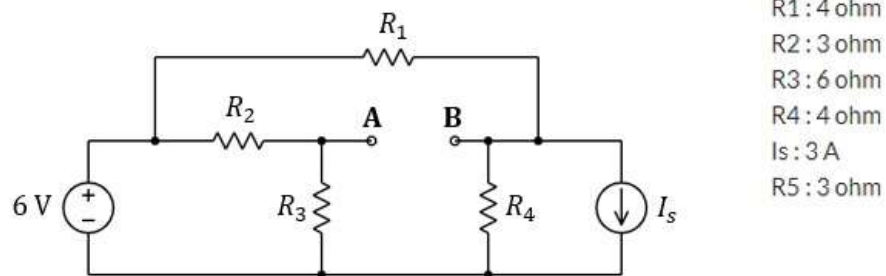


$A_1: 4 \text{ V}$   
 $A_2: 3 \text{ A}$   
 $L: 0.2 \text{ H}$   
 $R: 2 \text{ ohm}$

(3) (5 points)

Consider the circuit below.

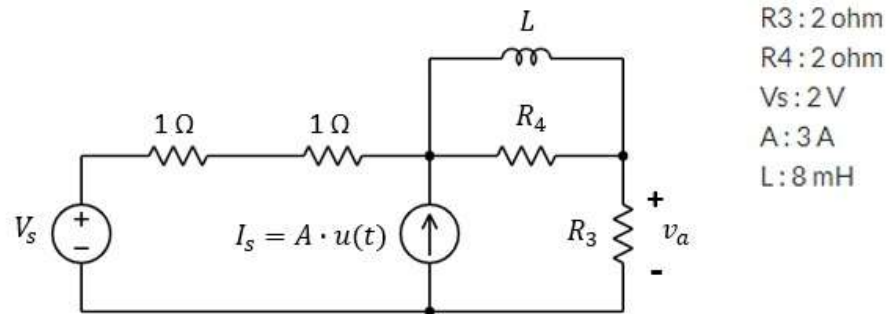
- (a) Find the Thevenin equivalent model between A and B. Make sure to label A and B in your model as well.
- (b) If we were to place a resistor  $R_5$  between A and B, what is the current through that resistor (measured from A to B)?



(4) (5 points)

Consider the circuit below. For  $t < 0$  s, you may assume the system has reached steady state.

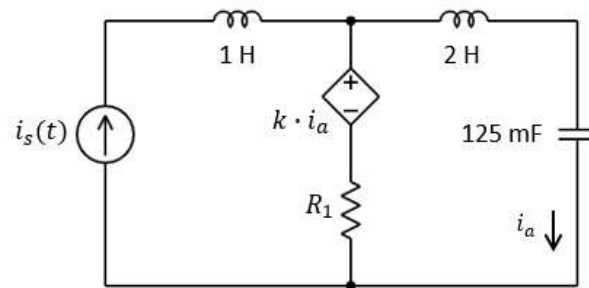
- (a) Find  $v_a(t)$  for  $t > 0$  s.
- (b) Sketch the waveform  $v_a(t)$  for  $t > 0$  s. Include where you can observe the time constant.



(5) (5 points)

Consider the circuit below. The system is in steady state.  
Find  $i_a(t)$ .

$$i_s(t) = A_1 \cos(2t + B_1) + A_2 \cos(4t + B_2)$$



A1: 2 A  
B1: 60 degrees  
A2: 4 A  
B2: 0 degrees  
R1: 9 ohm  
k: 3 V/A