EE2210 Electric Circuits **Fall 2022**

Homework 1 (Lecture 1 – Lecture 3)

Please write down clearly the calculation/thinking process of each question. Unit is needed when applicable.

Due: October 12th (Wed), before 10:00am to EECS Room 518. No late homework accepted.

1. In Figure 1, R is a linear resistor, and the voltage source $v = 2*V_0*\cos\omega t$, a sinusoidal voltage with a peak amplitude of $2*V_0$ and frequency ω in rad/sec. What is the average power dissipated in R? (10%)

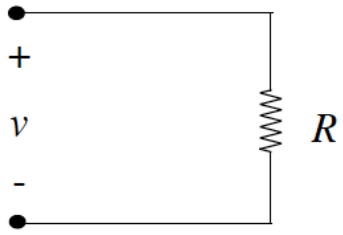
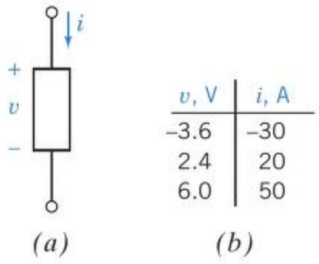


Figure 1.

2. An electric element has voltage v and current i as shown in Figure 2(a) and the corresponding values of v and i are shown in the table in Figure 2(b). (a) Show if the element is linear. (5%) (b) Predict the value of v corresponding to a current of $I = 40$ mA. (5%)



v, V	i, A
–3.6	–30
2.4	20
6.0	50

Figure 2.

3. Plot the i-v characteristics for the following circuits in Figure 3(a) and 3(b). Label intercepts and slopes. (12%)
   Hint: i-v characteristics is the plot where voltage is on the x-axis and current is on the y-axis that describes the characteristics of the circuit.

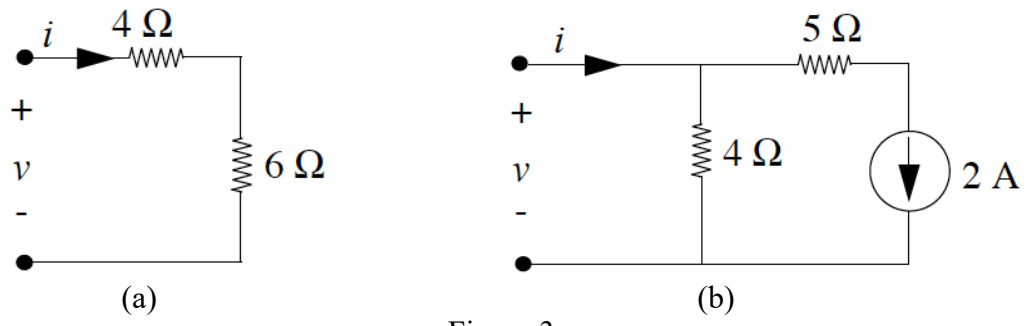


Figure 3.

4. Use node method to determine the current i_0 in Figure 4. (10%)

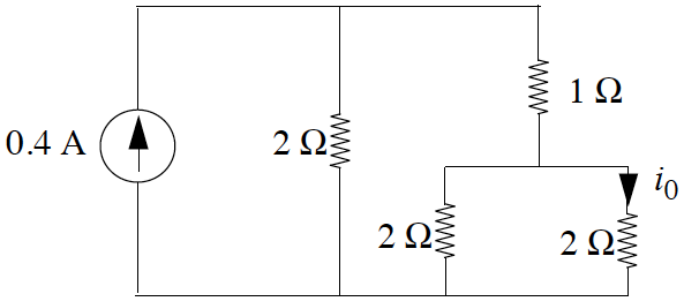


Figure 4.

5. (a) Use mesh current method to determine v_c, v_a, i_b, and i_d in Figure 5. (10%)
   (b) Find the power supplied by the voltage source in Figure 5. (10%)

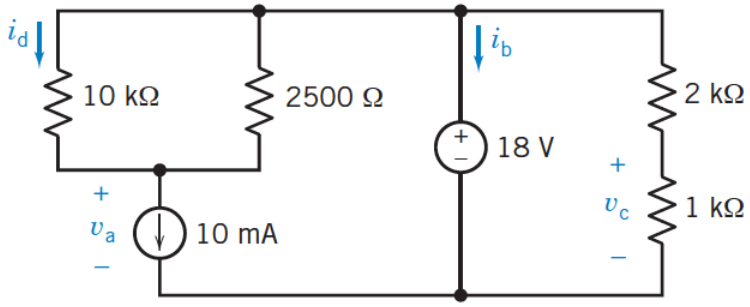


Figure 5.

6. Determine the value of A and i_a in Figure 6 such that $v_o = 2*v_s + 9$. (10%)

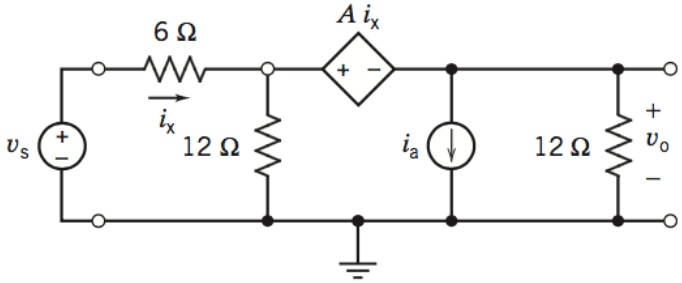


Figure 6.

7. Find the Thevenin and Norton equivalent circuits as seen from the terminals a, b in Figure 7. (10%)

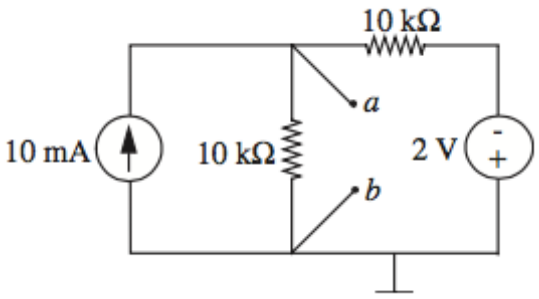


Figure 7.

8. Use superposition to find the voltage v in Figure 8. (10%)

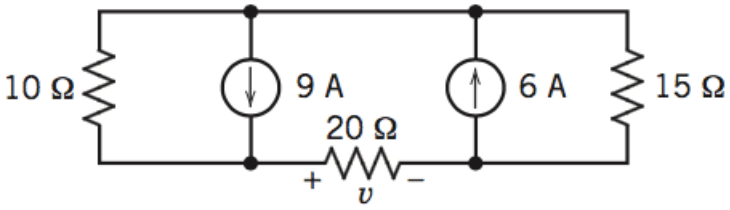


Figure 8.

9. Determine the voltage v_5 in Figure 9. (8%)

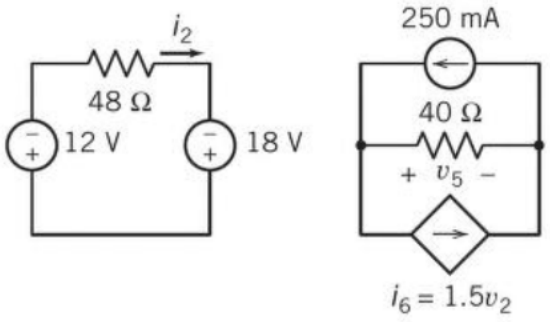


Figure 9.