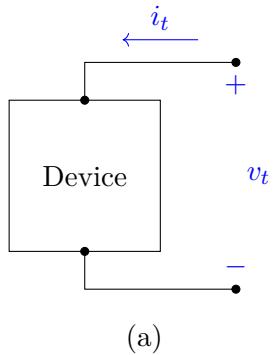


ECE 2260 hw01

1. Basic model

The voltage and current were measured at the terminals of the device shown in Fig. 1 (a). The results are tabulated in Fig. 1 (b).



(a)

v_t (V)	i_t (A)
50	0
66	2
82	4
98	6
114	8
130	10

(b)

Figure 1: Device under test

- Construct a circuit model for this device using an ideal voltage source in series with a resistor.
- Use the model to predict the value of i_t when v_t is zero.

2. Power dissipated in resistor

Find the power dissipated in the 5Ω resistor in the current divider circuit in Fig. 2.

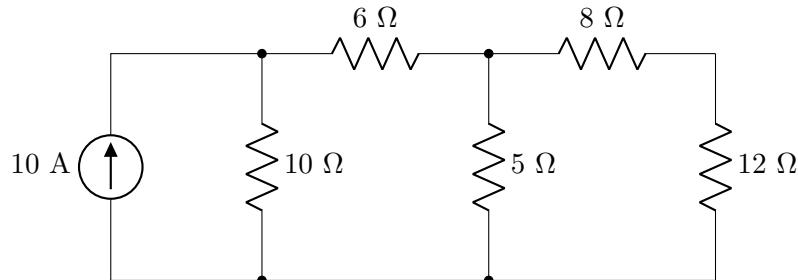


Figure 2: circuit

3. Specifying resistors in current divider

Specify the resistors in the current divider circuit in Fig. 3 to meet the following design criteria:

$$i_g = 50 \text{ mA}; \quad v_g = 25 \text{ V}; \quad i_1 = 0.6i_2;$$

$$i_3 = 2i_2; \quad \text{and} \quad i_4 = 4i_1.$$

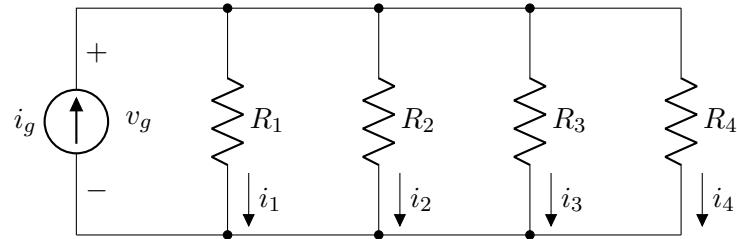


Figure 3: current divider circuit

4. Node-voltage method power dissipation

Use the node-voltage method to find the total power dissipated in the circuit in Fig. 4.

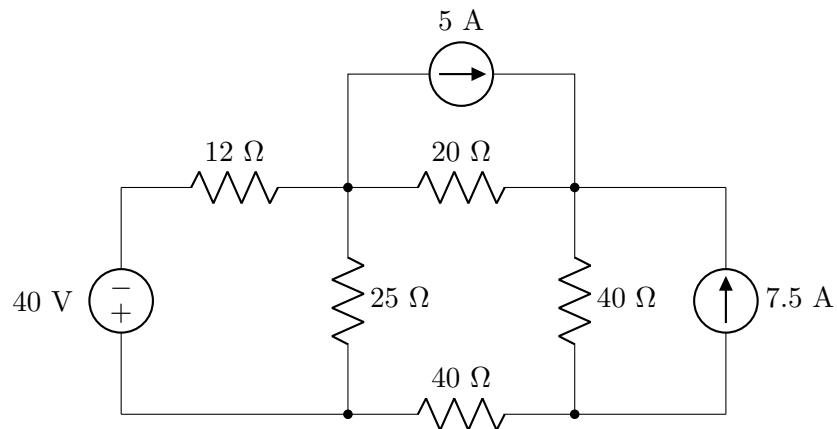


Figure 4: Node voltage circuit

5. Node-voltage method branch currents

Use the node-voltage method to find the branch currents i_1 , i_2 , and i_3 in the circuit in Fig. 5.

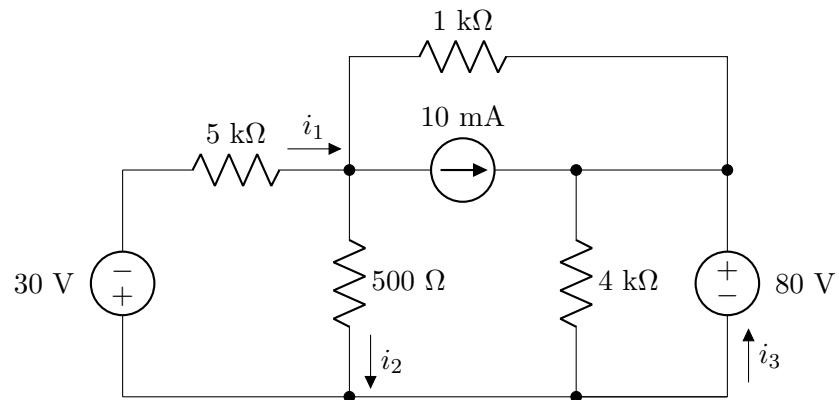


Figure 5: Circuit

6. DC Thevenin equivalent

Find the Thevenin equivalent with respect to the terminals a,b for the circuit seen in Fig. 6.

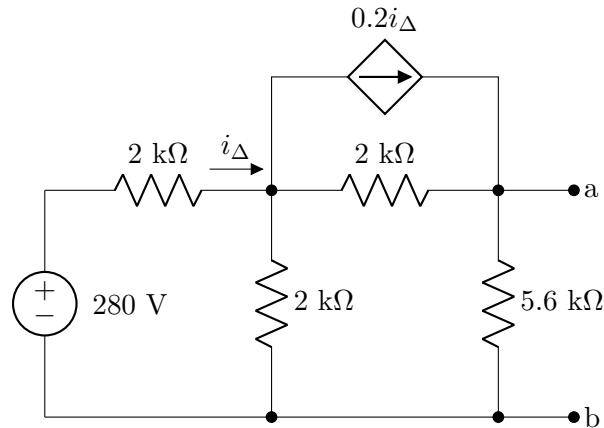


Figure 6: Circuit for Thevenin equivalent problem

7. AC Thevenin equivalent

Use source transformations to find the Thévenin equivalent circuit with respect to the terminals a,b for the circuit shown in Fig. P9.45.

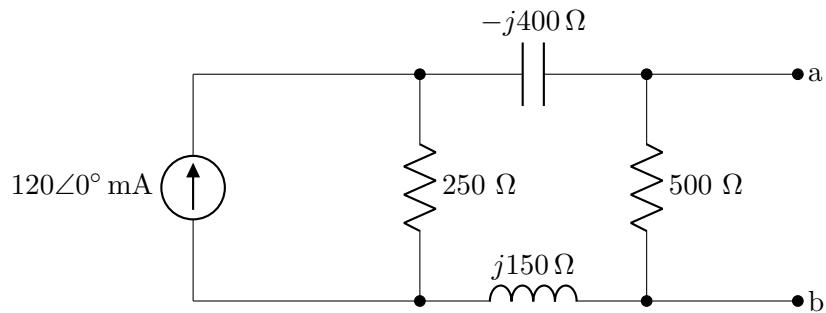


Figure 7: Circuit for AC Thevenin equivalent problem

8. Phasor voltage

Find the phasor voltage \mathbf{V}_g and phasor current \mathbf{I}_g in the circuit shown in Fig. 8.

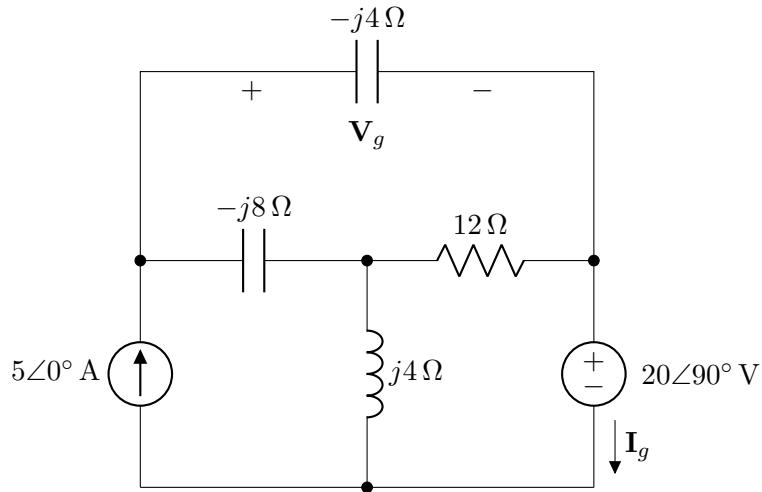


Figure 8: Circuit for phasor voltage problem

9. AC power transfer

The load impedance Z_L for the circuit shown in Fig. 9 is adjusted until maximum average power is delivered to Z_L . What is the impedance Z_L in ohms?

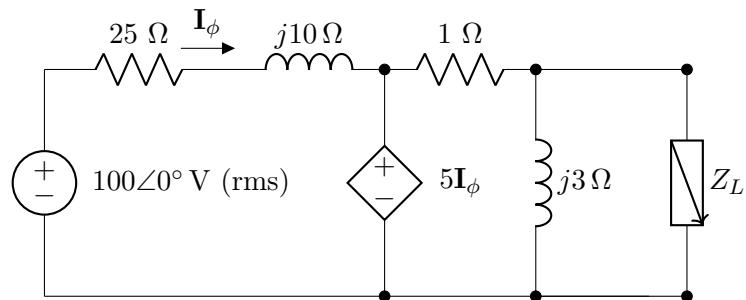


Figure 9: Circuit for AC power transfer problem

10. AC Thevenin equivalent

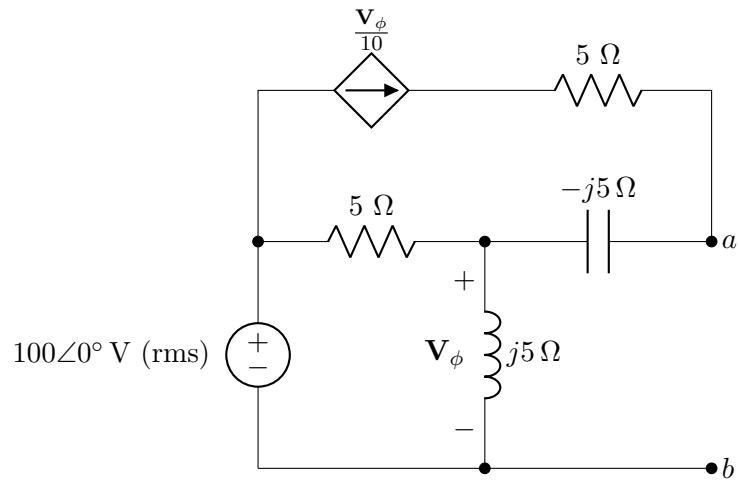


Figure 10: Circuit for AC for Thevenin equivalent problem