Problem Set #4

3.11 a) Find the voltage v_x in the circuit in Fig. P3.11.

b) Replace the 30 V source with a general voltage source equal to V_s. Assume V_s is positive at the upper terminal. Find v_x as a function of V_s.

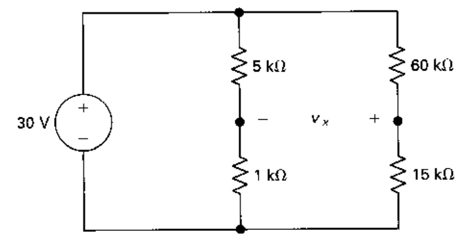

Figure P3.11

3.16 In the voltage-divider circuit shown in Fig. P3.16, the no-load value of v_o is 6 V. When the load resistance R_L is attached across the terminals a and b, v_o drops to 4 V. Find R_L.

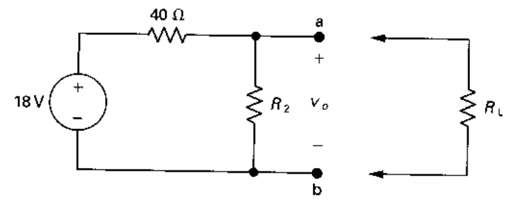

Figure P3.16

3.18 The no-load voltage in the voltage-divider circuit shown in Fig. P3.18 is 150 V. The smallest load resistor that is ever connected to the divider is 60 kΩ. When the divider is loaded, v_o is not to drop below 100 V.

a) Design the divider circuit to meet the specifications just mentioned. Specify the numerical value of R_1 and R_2.

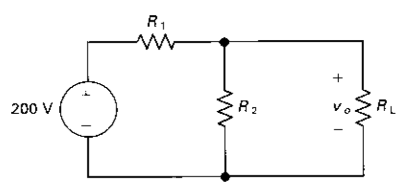

Figure P3.18

3.37 Design a d'Arsonval voltmeter that will have the three voltage ranges shown in Fig. P3.37.

a) Specify the values of R_1, R_2, and R_3.

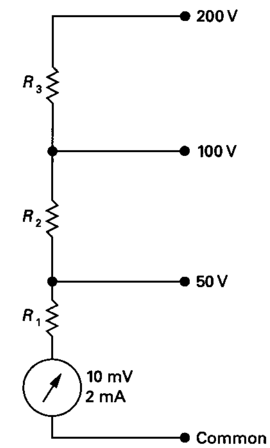

Figure P3.37

4.3 Use the node-voltage method to find v_1 and the power delivered by the 60 V voltage source in the circuit in Fig. P4.3.

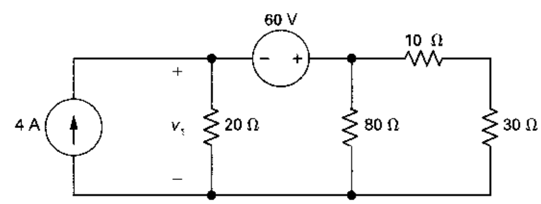

Figure P4.3

4.7 Use the node-voltage method to find v_1 and v_2 in the circuit shown in Fig. P4.7.

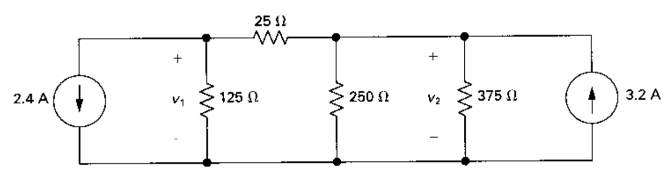

Figure P4.7

4.20 Use the node-voltage method to find v_o in the circuit in Fig. P4.20.

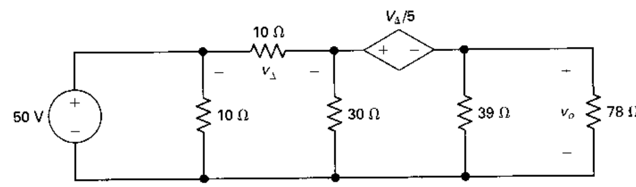

Figure P4.20

4.30 a) Use the mesh-current method to find the branch currents i_a, i_b, and i_c in the circuit in Fig. P4.30.

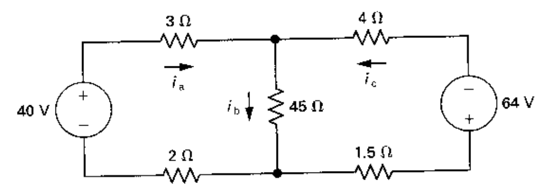

Figure P4.30

4.45 The circuit in Fig. P4.45 is a direct-current version of a typical three-wire distribution system. The resistors R_a, R_b, and R_c represent the resistances of the three conductors that connect the three loads R_1, R_2, and R_3 to the 125/250 V voltage supply. The resistors R_1 and R_2 represent loads connected to the 125 V circuits, and R_3 represents a load connected to the 250 V circuit.

a) Calculate v_1, v_2, and v_3.

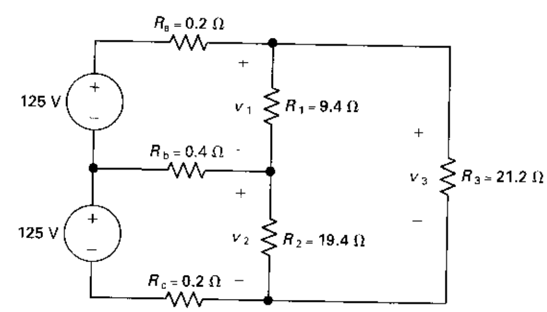

Figure P4.45