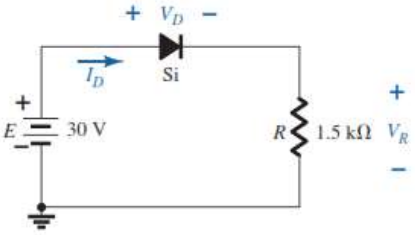
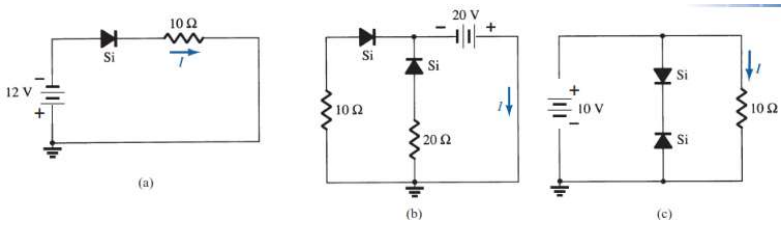
Sheet (2) Diodes Applications

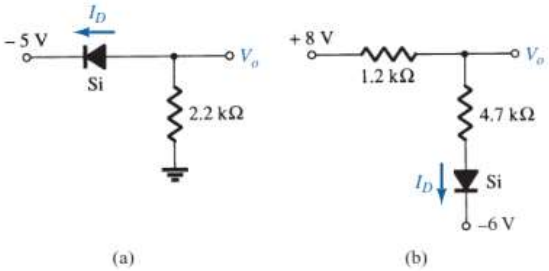
1. (a) Using the approximate characteristics for the Si diode, determine V_D, I_D, and V_R for the circuit of fig. below:
(b) Perform the same analysis as part (a) using the ideal model for the diode.
(c) Do the results obtained in parts (a) and (b) suggest that the ideal model can provide a good approximation for the actual response under some conditions?

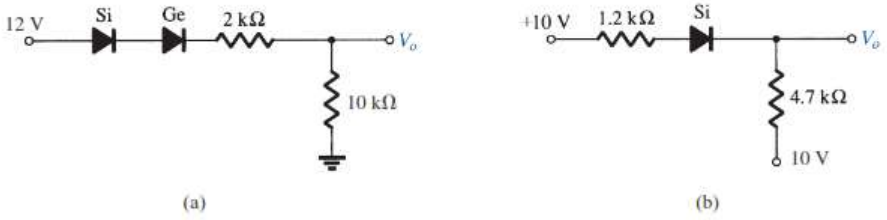


2. Determine the current I for each of the configurations of Fig. below using the approximate equivalent model for the diode.

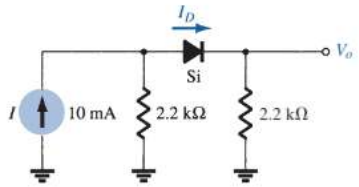


3. Determine V_o and I_D for the networks of Figs. below

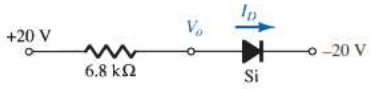




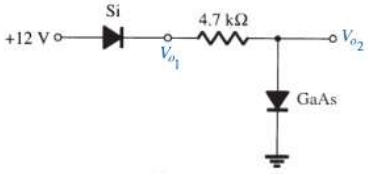
4. Determine V_o and I_D for the networks of Figs. below (some Figs. find V_{o1} V_{o2})



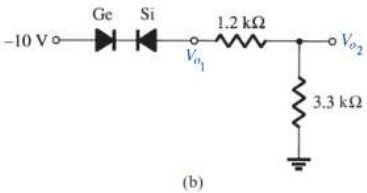
(a)



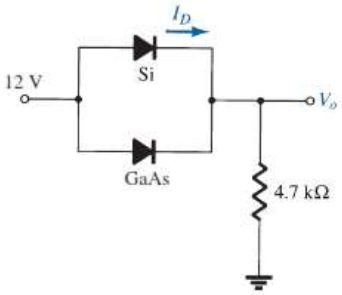
(b)



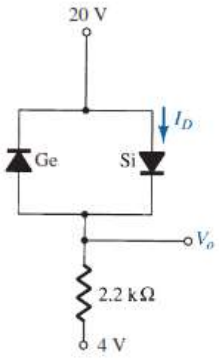
(a)



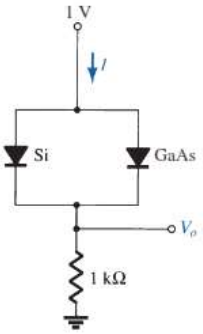
(b)



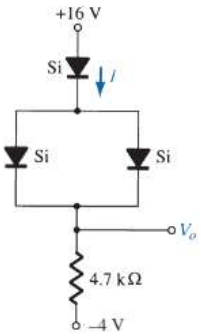
(a)



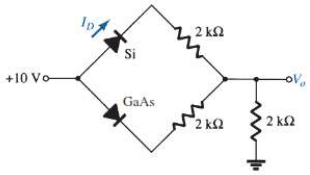
(b)

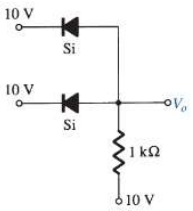


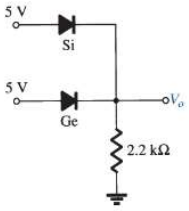
(a)



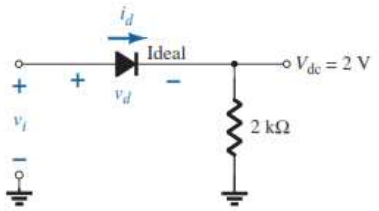
(b)



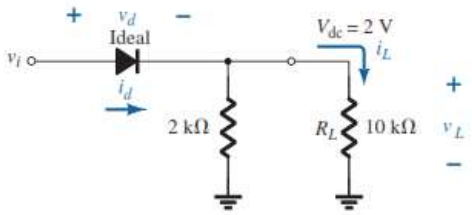




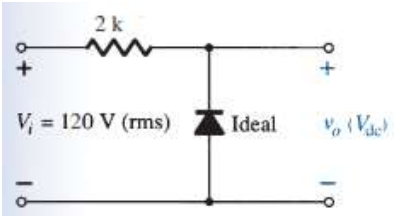
5. Assuming an ideal diode, sketch v_i, v_d, and i_d for the half-wave rectifier of Fig. The input is a sinusoidal waveform with a frequency of 60 Hz. Determine the profit value of v_i from the given dc level.
   - Repeat with a silicon diode (V_K =0.7 V).



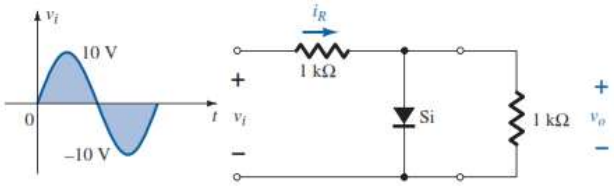
6. Repeat with a 10 kohm load applied as shown in Fig. Sketch v_L and i_L



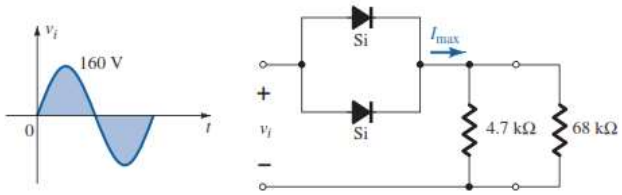
7. For the shown figures find remarked quantities.



8. Sketch v_O and i_R

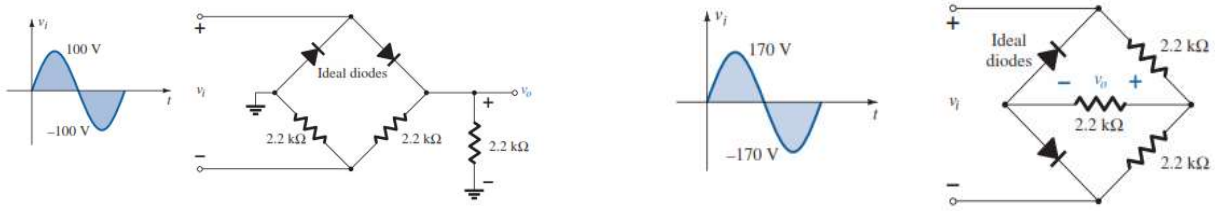


9. Given P_{max} = 14 mW for each diode at Fig. below, determine the maximum current rating of each diode (using the approximate equivalent model).
   b. Determine I_{max} for the parallel diodes.
   c. Determine the current through each diode at V using the results of part (b).
   d. If only one diode were present, which would be the expected result?

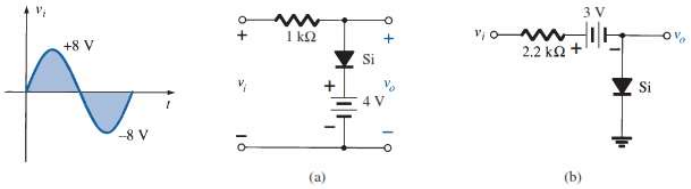


10. A full-wave bridge rectifier with a 120-V rms sinusoidal input has a load resistor of 1kohm.
   a. If silicon diodes are employed, what is the dc voltage available at the load?
   b. Determine the required PIV rating of each diode.
   c. Find the maximum current through each diode during conduction.
   d. What is the required power rating of each diode?

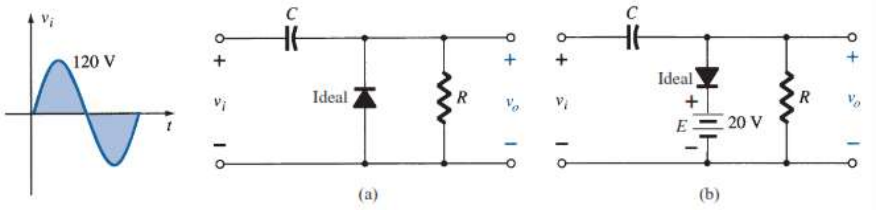
11. Sketch v_o for the network of Figure below and determine the dc voltage available.



12. Determine v_o for each network of Figure below for the input shown.



13. Sketch v_o for each network of Figure below for the input shown.



14. **a.** Determine V_L, I_L, I_Z, and I_R for the network of Figure below if R_L=180 ohm
    b. Repeat part (a) if R_L = 470 ohm.
    c. Determine the value of R_L that will establish maximum power conditions for the Zener diode.
    d. Determine the minimum value of R_L to ensure that the Zener diode is in the "on" state.