**Q1.** Find the average value of the full-wave rectified voltage shown below.
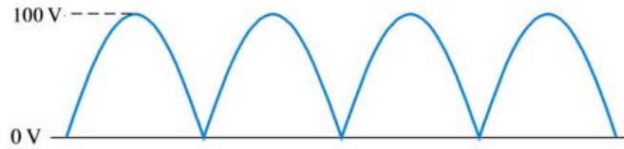


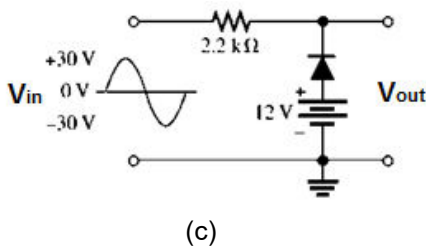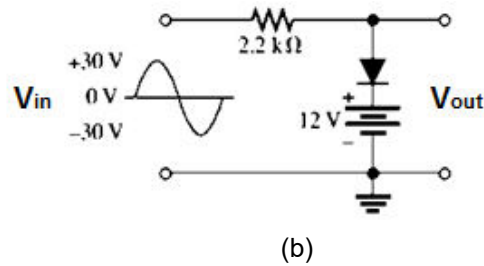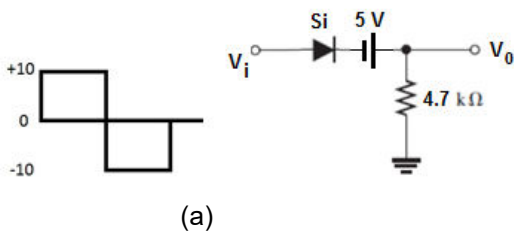**Q2.** A diode with $V_F = 0.7$ V is connected as a half-wave rectifier. The load resistance is 470 $\Omega$ and the ac input is 2 V from the secondary of transformer. Determine the peak output voltage, peak load current and the diode peak reverse voltage.

**Q3.** Determine the output waveform of the following circuits for the given input signals.



(a)



(b)



(c)



(d)



(d)



(e)
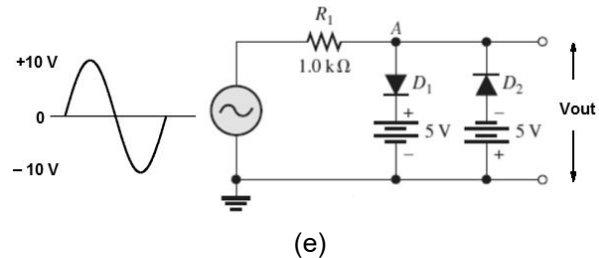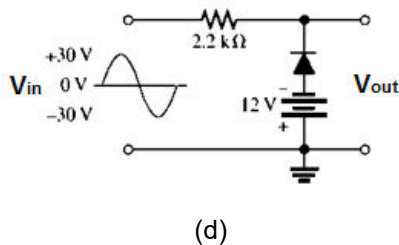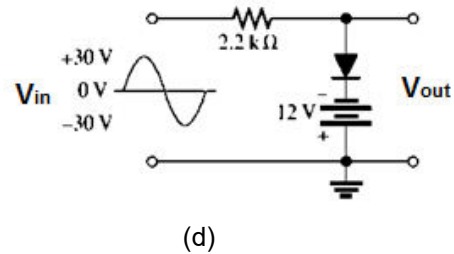
**Q4.** For a certain Zener diode, $V_Z = 10$ V at $I_{ZT} = 30$mA. If $Z_Z = 8\Omega$, what is the terminal voltage at $I_Z = 50$mA?

**Q5.** A Zener regulator has an input voltage that may vary from 22 to 30 V. If the regulated output voltage is 12V and the load resistance varies from 140 $\Omega$ to 10 k$\Omega$, what is the maximum allowable series resistance?

**Q6.** A Zener regulator has an input voltage ranging from 15 to 20 V and a load current ranging from 5 to 20 mA. If the Zener voltage is 6.8 V, what is the maximum allowable series resistance?

**Q7.** A Zener diode whose nominal voltage is 10 V at 10 mA has an incremental resistance of 50 $\Omega$.
   a) What is the value of $V_{Z0}$ in the Zener model?
   b) What voltage do you expect if the diode current is doubled?

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