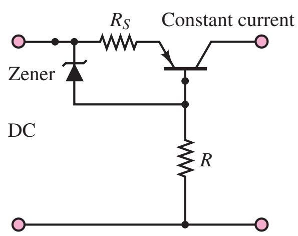

Figure P12.2

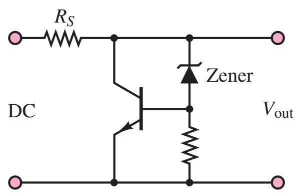

Figure P12.3

Section 12.4: Power Amplifiers

12.4 The circuit of Figure P12.4 is a very effective battery charger. Its operation is simple, and the TIP-33C *n-p-n* power transistor can sink A0 A amps if a big enough heat sink is used. Assuming that the transistor is in the linear operating region, determine the power delivered to the 1.2 V rechargeable battery in the circuit.

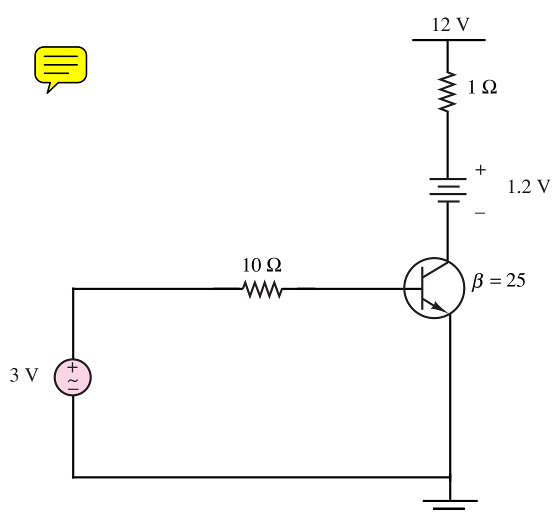

Figure P12.4

12.5 An IGBT can be modeled as shown in the circuit of Figure P12.5. With $V_T = 4$ and $K = 0.01$ A/V^2 for MOSFET, and $\beta = 200$ for the BJT, determine the current through R_L and the voltage across it. Let $V_G = 8$ V.

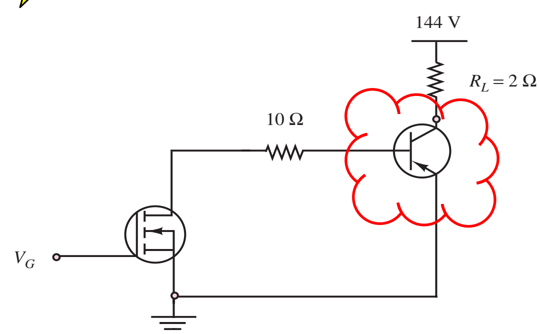

Figure P12.5

Section 12.5: Rectifiers and Controlled Rectifiers (AC-DC Converters)

12.6 For the circuit shown in Figure 12.19 in the text, if the *LR* load is replaced by a capacitor, draw the output waveform and label the values.

12.7 Draw $v_L(t)$ and label the values for the circuit in Figure 12.19 in the text if the diode forward resistance is 50 Ω, the forward bias voltage is 0.7 V, and the load consists of a resistor $R = 10\ \Omega$ and an inductor $L = 2$ H.

12.8 For the circuit shown in Figure P12.8, v_{AC} is a sinusoid with 10-V peak amplitude, $R = 2$ kΩ, and the forward-conducting voltage of D is 0.7 V.

a. Sketch the waveform of $v_L(t)$.

b. Find the average value of $v_L(t)$.

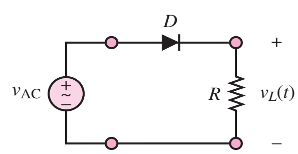

Figure P12.8

12.9 A vehicle battery charge circuit is shown in Figure P12.9. Describe the circuit, and draw the output waveform (L_1 and L_2 represent the inductances of the windings of the alternator).

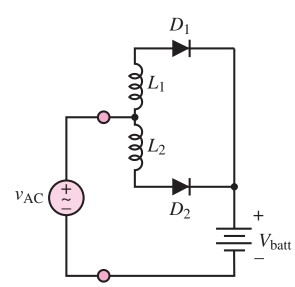

Figure P12.9