

Because of the 0.7 V across the conducting diode, the actual dc load voltage will be closer to 16 V than to 17 V.

PRACTICE PROBLEM 4-7 Using Fig. 4-15, change R_L to 2 k Ω and calculate the new ideal dc load voltage and ripple.

Example 4-8

MultiSim

What is the dc load voltage and ripple in Fig. 4-16? Compare the answers with those in the two preceding examples.

SOLUTION Since the transformer is 5:1 step-down as in the preceding example, the peak secondary voltage is still 34 V. Assuming an ideal diode and small ripple, the dc load voltage is:

$$V_L = 34 \text{ V}$$

The dc load current is:

$$I_L = \frac{34 \text{ V}}{5 \text{ k}\Omega} = 6.8 \text{ mA}$$

Now, Eq. (4-10) gives:

$$V_R = \frac{6.8 \text{ mA}}{(120 \text{ Hz})(100 \mu\text{F})} = 0.566 \text{ V pp} \approx 0.57 \text{ V pp}$$

Because of the 1.4 V across two conducting diodes and the ripple, the actual dc load voltage will be closer to 32 V than to 34 V.

We have calculated the dc load voltage and ripple for the three different rectifiers. Here are the results:

Half wave: 34 V and 1.13 V

Full wave: 17 V and 0.288 V

Bridge: 34 V and 0.566 V

For a given transformer, the bridge rectifier is better than the half-wave rectifier because it has less ripple, and it's better than the full-wave rectifier because it produces twice as much output voltage. Of the three, *the bridge rectifier has emerged as the most popular.*

Figure 4-16 Bridge rectifier and capacitor-input filter.

