



Alexandria University

Faculty of Engineering

Electrical Engineering Department

ECE: Principles and Applications of Electronic Engineering

Sheet 2

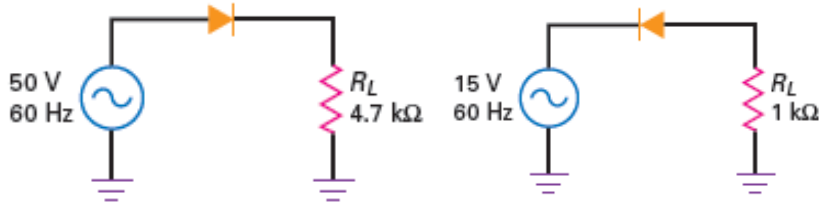


Figure 1

Figure 2

1. What is the peak output voltage in Fig. 1 if the diode is ideal? The average value? The dc value? Sketch the output waveform.
2. Repeat the preceding problem for Fig. 2.
3. What is the peak output voltage in Fig. 1 using the second approximation of a diode? The average value? The dc value? Sketch the output waveform.
4. Repeat the preceding problem for Fig. 2.

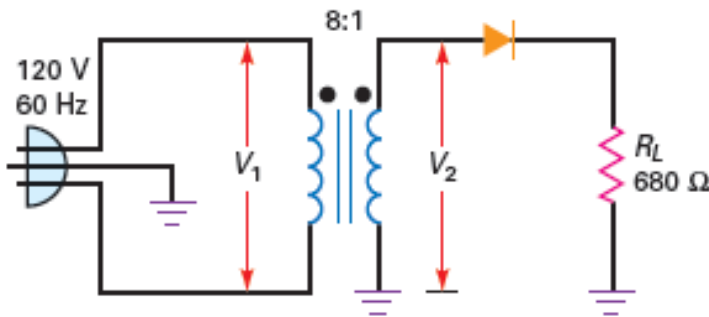


Figure 3

5. If a transformer has a turns ratio of 6:1, what is the rms secondary voltage? The peak secondary voltage? Assume a primary voltage of 120 V_{rms}.
6. If a transformer has a turns ratio of 1:12, what is the rms secondary voltage? The peak secondary voltage? Assume a primary voltage of 120 V_{rms}.
7. Calculate the peak output voltage and the dc output voltage in Fig. 3 using an ideal diode.
8. Calculate the peak output voltage and the dc output voltage in Fig. 3 using the second approximation.

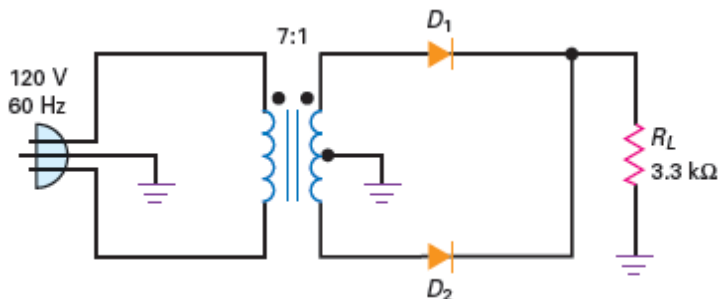


Figure 4

9. A center-tapped transformer with 120 V input has a turns ratio of 4:1. What is the rms voltage across the upper half of the secondary winding? The peak voltage? What is the rms voltage across the lower half of the secondary winding?
10. What is the peak output voltage in Fig. 4 if the diodes are ideal? The average value? The dc value? Sketch the output waveform.
11. Repeat the preceding problem using the second approximation.

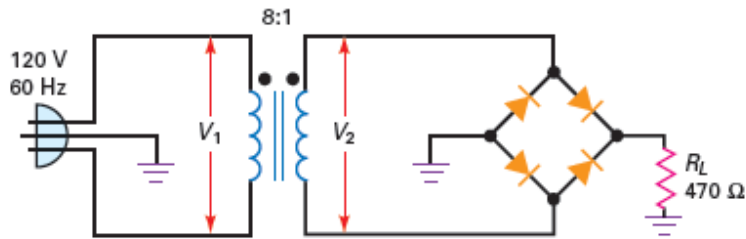


Figure 5

12. In Fig. 5, what is the peak output voltage if the diodes are ideal? The average value? The dc value? Sketch the output waveform.
13. Repeat the preceding problem using the second approximation.
14. If the line voltage in Fig. 5 varies from 105 to 125 V_{rms}, what is the minimum dc output voltage? The maximum?
15. A half-wave signal with a peak of 20 V is the input to a choke-input filter. If $X_L = 1 \text{ k}\Omega$ and $X_C = 25 \text{ V}$, what is the approximate peak-to-peak ripple across the capacitor?
16. A full-wave signal with a peak of 14 V is the input to a choke-input filter. If $X_L = 2 \text{ k}\Omega$ and $X_C = 50 \text{ V}$, what is the approximate peak-to-peak ripple across the capacitor?

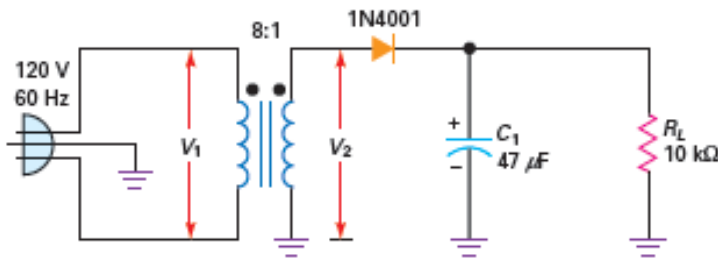


Figure 6

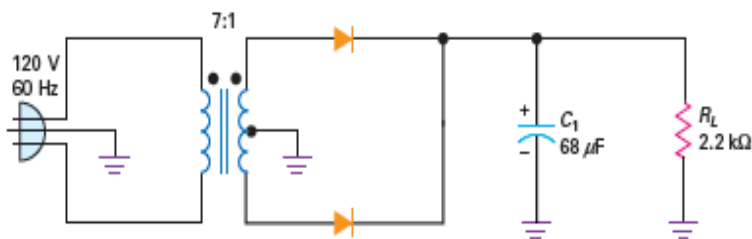


Figure 7

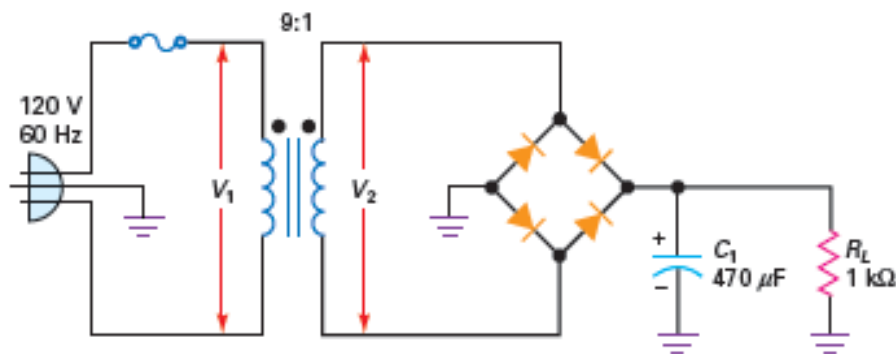


Figure 8

17. What is the dc output voltage and ripple in Fig. 6? Sketch the output waveform.
18. In Fig. 7, calculate the dc output voltage and ripple.
19. What happens to the ripple in Fig. 6 if the capacitance value is reduced to half?
20. In Fig. 6, what happens to the ripple if the resistance is reduced to 500 Ω?
21. What is the dc output voltage in Fig. 8? The ripple? Sketch the output waveform.
22. If the line voltage decreases to 105 V in Fig. 8, what is the dc output voltage?

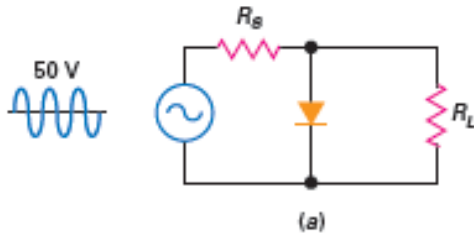


Figure 9

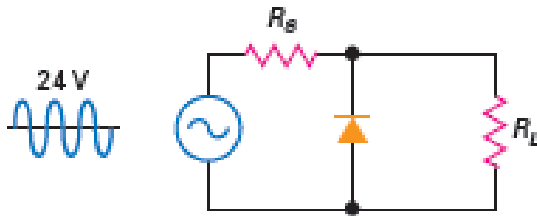


Figure 10

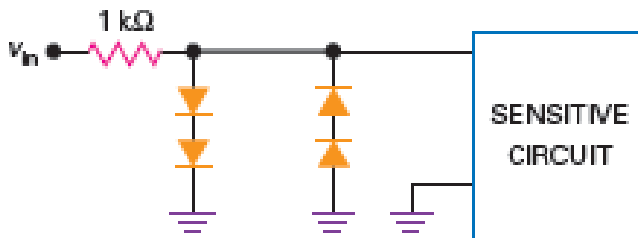


Figure 11

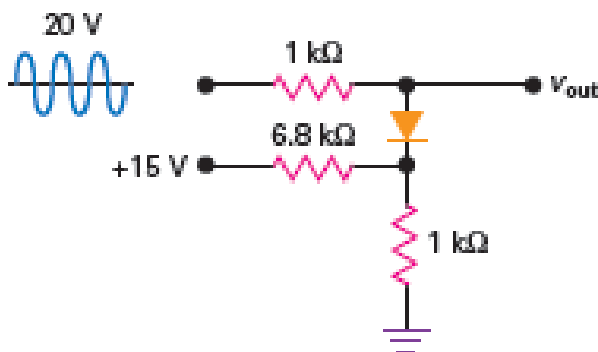


Figure 12

23. In Fig. 9, sketch the output waveform. What is the maximum positive voltage? The maximum negative?
24. Repeat the preceding problem for Fig. 10.
25. The diode clamp of Fig. 11 protects the sensitive circuit. What are the limiting levels?
26. In Fig. 12, what is maximum positive output voltage? Maximum negative output voltage? Sketch the output waveform.
27. If the sine wave of Fig. 12 is only 20 mV, the circuit will act as a diode clamp instead of a biased clipper. In this case, what is the protected range of output voltage?

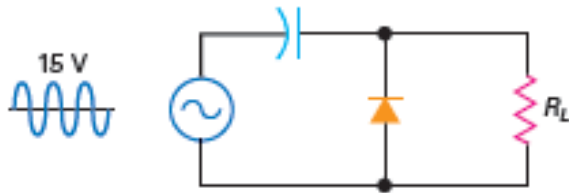


Figure 13

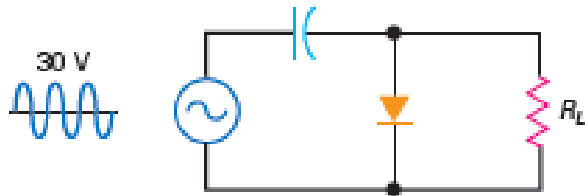


Figure 14

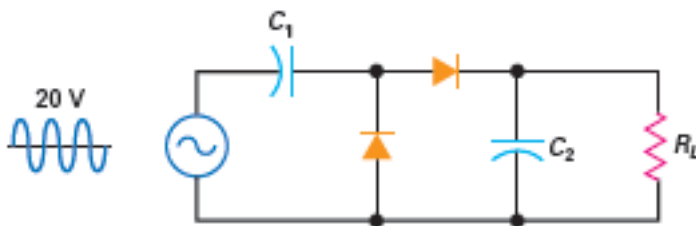


Figure 15

28. In Fig. 13, sketch the output waveform. What is the maximum positive voltage? The maximum negative?
29. Repeat the preceding problem for Fig. 14.
30. Sketch the output waveform of the clamper and final output in Fig. 15. What is the dc output voltage with ideal diodes? To a second approximation?

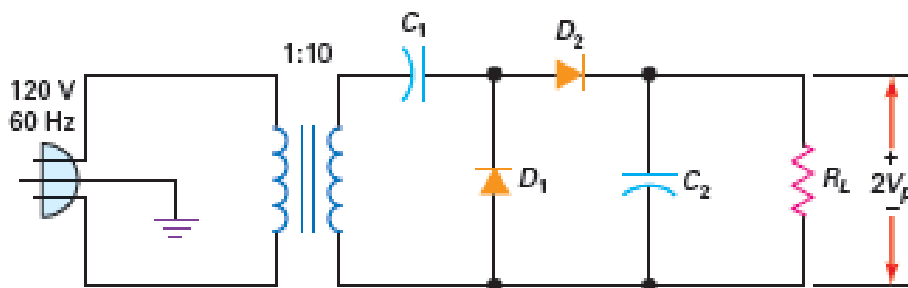


Figure 16

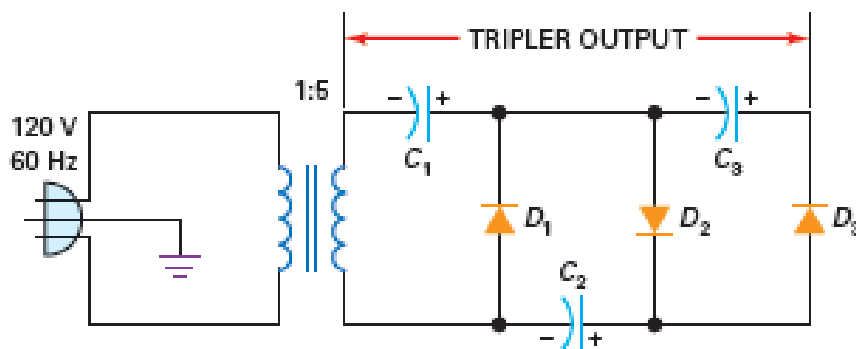


Figure 17

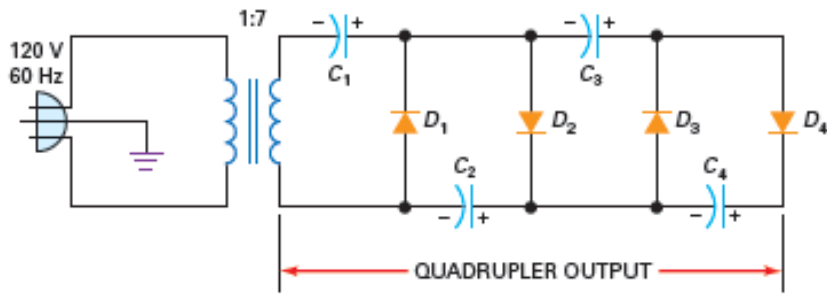


Figure 18

31. Calculate the dc output voltage in Fig. 16.
32. What is the tripler output in Fig. 17?
33. What is the quadrupler output in Fig. 18?