Sheet 1
Subject: Electronics

---

1. The term *bias* means
(a) the ratio of majority carriers to minority carriers
(b) the amount of current across a diode
(c) a dc voltage is applied to control the operation of a device
(d) neither (a), (b), nor (c)

2. To forward-bias a diode,
(a) an external voltage is applied that is positive at the anode and negative at the cathode
(b) an external voltage is applied that is negative at the anode and positive at the cathode
(c) an external voltage is applied that is positive at the *p* region and negative at the *n* region
(d) answers (a) and (c)

3. When a diode is forward-biased,
(a) the only current is hole current
(b) the only current is electron current
(c) the only current is produced by majority carriers
(d) the current is produced by both holes and electrons

4. Although current is blocked in reverse bias,
(a) there is some current due to majority carriers
(b) there is a very small current due to minority carriers
(c) there is an avalanche current

5. For a silicon diode, the value of the forward-bias voltage typically
(a) must be greater than 0.3 V
(b) must be greater than 0.7 V
(c) depends on the width of the depletion region
(d) depends on the concentration of majority carriers

6. When forward-biased, a diode
(a) blocks current **(b)** conducts current
(c) has a high resistance **(d)** drops a large voltage

7. A diode is normally operated in
(a) reverse breakdown **(b)** the forward-bias region
(c) the reverse-bias region **(d)** either (b) or (c)

8. Every known element has:
(a) the same type of atoms (b) the same number of atoms
(c) a unique type of atom (d) several different types of atoms

9. The atomic number of silicon is
(a) 8 (b) 2 (c) 4 (d) 14

10. The atomic number of germanium is
(a) 8 (b) 2 (c) 4 (d) 32

11. The most widely used semiconductor material in electronic devices is
(a) germanium (b) Carbon (c) copper (d) silicon

12. The current in a semiconductor is produced by
(a) electrons only (b) holes only (c) negative ions (d) both electrons and holes

13. The process of adding an impurity to an intrinsic semiconductor is called
(a) doping (b) recombination (c) atomic modification (d) ionization

14. The majority carriers in n - type semiconductor are
(a) holes (b) valence electrons
(c) conduction electrons (d) protons

15. The average value of a half-wave rectified voltage with a peak value of 200 V is
(a) 63.7 V **(b)** 127.2 V **(c)** 141 V **(d)** 0 V

16. When a 60 Hz sinusoidal voltage is applied to the input of a half-wave rectifier, the output frequency is
(a) 120 Hz **(b)** 30 Hz **(c)** 60 Hz **(d)** 0 Hz

17. The peak value of the input to a half-wave rectifier is 10 V. The approximate peak value of the output is
(a) 10 V **(b)** 3.18 V **(c)** 10.7 V **(d)** 9.3 V

18. The average value of a full-wave rectified voltage with a peak value of 75 V is
(a) 53 V **(b)** 47.8 V **(c)** 37.5 V **(d)** 23.9 V

19. When a 60 Hz sinusoidal voltage is applied to the input of a full-wave rectifier, the output frequency is
(a) 120 Hz **(b)** 60 Hz **(c)** 240 Hz **(d)** 0 Hz

20. The total secondary voltage in a center-tapped full-wave rectifier is 125 V rms. Neglecting the diode drop, the rms output voltage is
(a) 125 V **(b)** 177 V **(c)** 100 V **(d)** 62.5 V

21. When the peak output voltage is 100 V, the PIV for each diode in a center-tapped full-wave rectifier is (neglecting the diode drop)
(a) 100 V **(b)** 200 V **(c)** 141 V **(d)** 50 V

22. When the rms output voltage of a bridge full-wave rectifier is 20 V, the peak inverse voltage across the diodes is (neglecting the diode drop)
(a) 20 V **(b)** 40 V **(c)** 28.3 V **(d)** 56.6 V

==========

23. Draw the output voltage waveform for each circuit in Figure 1 and include the voltage values.

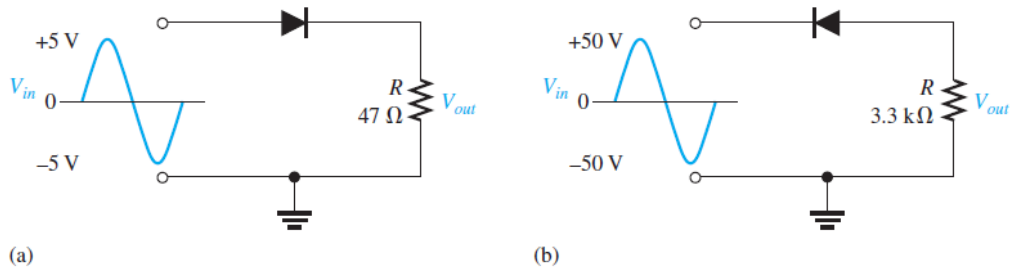


Fig. 1

24. Find the average value of each voltage in Figure 2.

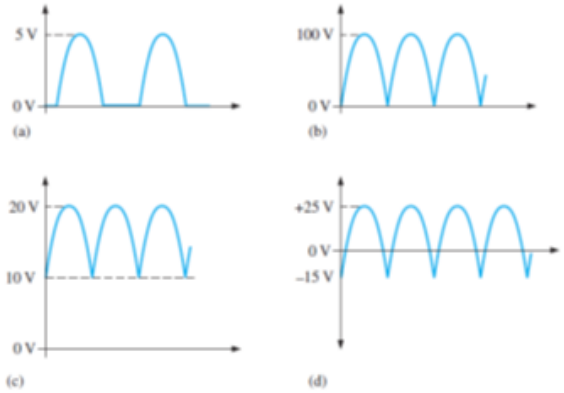


Fig. 2

25. Consider the circuit in Figure 3.

(a) What type of circuit is this?
(b) What is the total peak secondary voltage?
(c) Find the peak voltage across each half of the secondary.
(d) Sketch the voltage waveform across R_L.
(e) What is the peak current through each diode?
(f) What is the PIV for each diode?

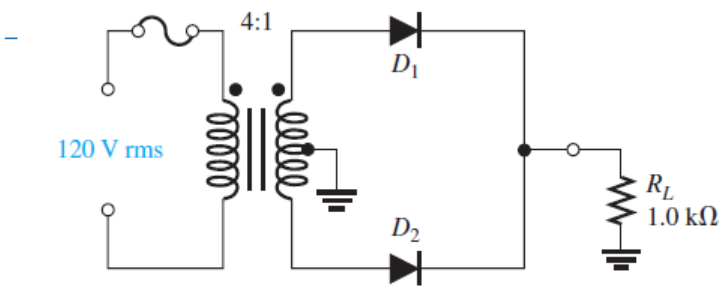


Fig. 3

26. A certain full-wave rectifier has a peak output voltage of 30V. A 50 uF capacitor-input filter is connected to the rectifier. Calculate the peak-to-peak ripple and the dc output voltage developed across a 600 ohm load resistance.

27. Determine the output waveform for the circuit of Figure 4.

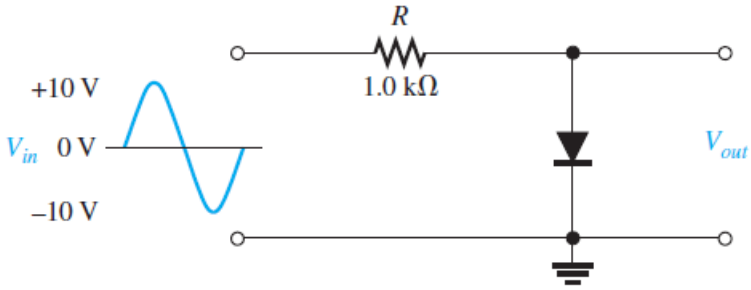
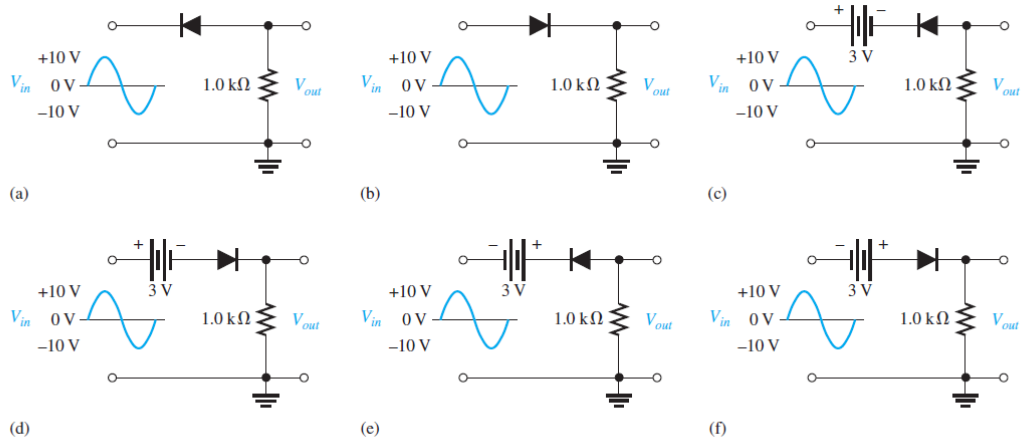


Fig. 4

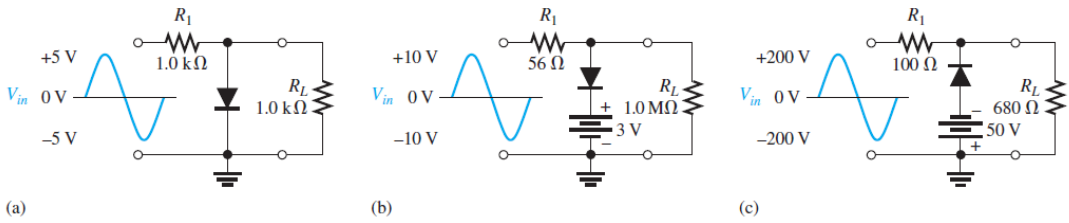
28. Determine the output voltage waveform for each circuit in Figure 5.



▲ FIGURE 2–101

Fig. 5

29. Determine the RL voltage waveform for each circuit in Figure 6.



▲ FIGURE 2–102

Fig. 6

30. Draw the output voltage waveform for each circuit in Figure 7.

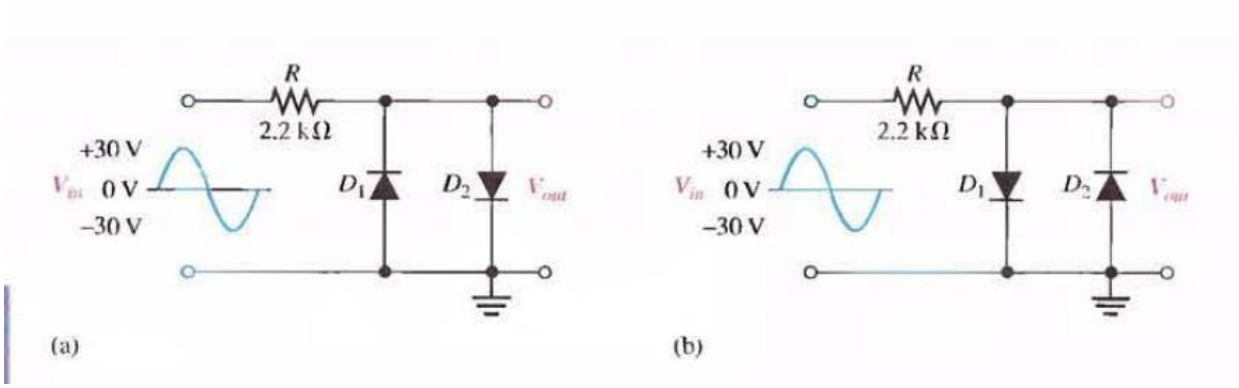


Fig. 7

31. Determine the peak forward current through each diode in Figure 8.

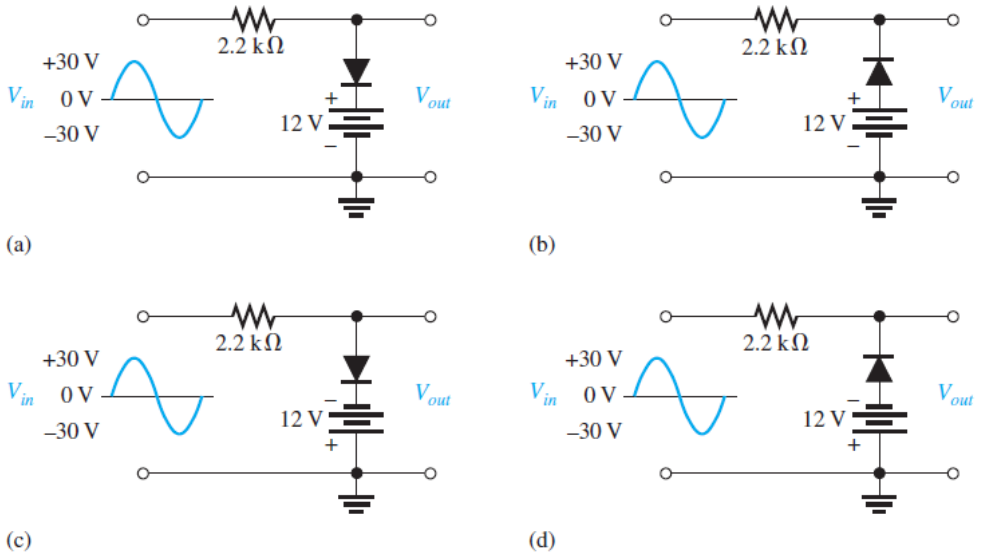


Fig. 8

32. Describe the output waveform of each circuit in Figure 9. Assume the RC time constant is much greater than the period of the input.

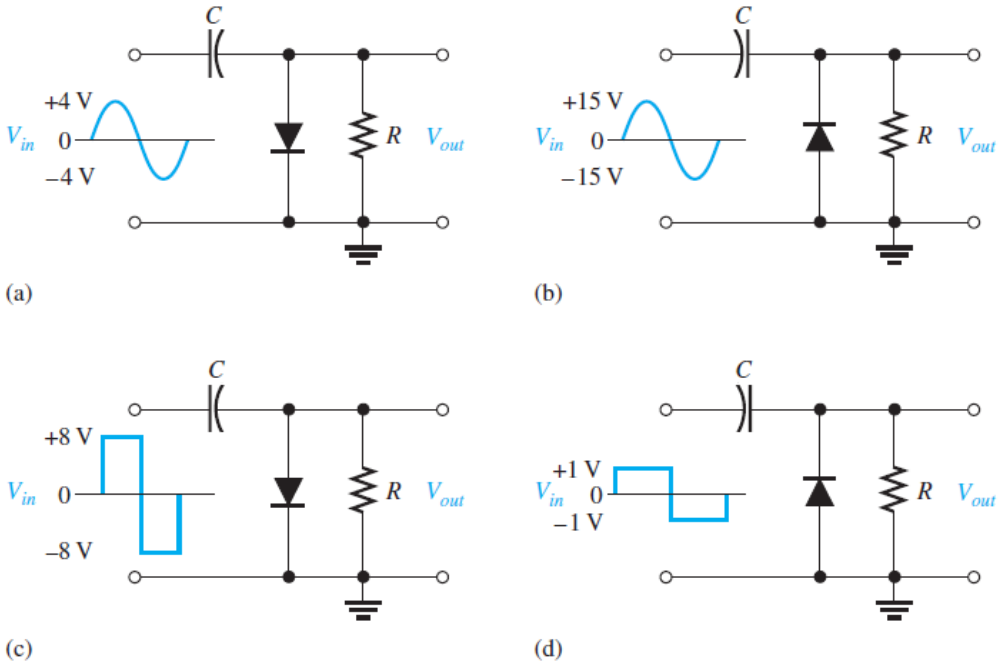


Fig. 9