

Answers to Review Questions

UNIT 1

- 1 or 2
- 7 or 8
- silicon, germanium
- A lattice structure is an ordered arrangement of atoms in the atomic structure of a material.
- Add a material which has only 3 valence electrons to a pure semiconductor material.
- Add a material which has 5 valence electrons to a pure semiconductor material.
- Silicon
- The thickness and manner in which the P- and N-type materials are joined together determine the components.
- Composition carbon, metal film, carbon film, wire wound
- Metal film resistors do not change their ohmic value with age.
- Wire wound resistors have a higher power rating.
- Yes ($0.01 \times 0.01 \times 2000 = 0.2$ watts)
- No ($24 \times 24 / 350 = 1.645$ watts)
- 360,000, 5 percent
- 10,500 and 9500 ($10,000 \times 0.05 = 500 \Omega$)
- Yes
- A variable resistor used to control voltage.

UNIT 2

- 6
- 62.5
- 12.96
- The heat sink increases the surface area of the component, which permits air to remove heat at a faster rate.
- It produces a good thermal bond between two components.
- 2 watts
- $12 \times 0.250 = 3$ watts
- $0.025 \times 0.025 \times 2700 = 1.6875$ watts
- No. $120 \times 120 / 1000 = 14.4$ watts
- $0.7 \times 16 = 11.2$ watts

UNIT 3

- Voltage
- Time
- Amplitude of voltage
- 5000 Hz (1/0.000200)
- 275 volts (approximately)

6. 30 volts peak, 6250 Hz
7. To show the position of the trace if it is off the display
8. The alternate mode alternates sweeps between channel 1 and channel 2. The cop mode alternates the sweep between the two channels several times during one sweep.
9. It will burn a spot on the face of the CRT.
10. It permits the oscilloscope to trigger on the positive or negative half of the waveform.
11. $5\text{ M}\Omega$ ($20,000 \times 250$)
12. $9600\ \Omega$ ($20,000 \times 12 = 240,000\ \Omega$) ($1/10,000 + 1/240,000 = 1/0.000104167$)
13. Digital ohmmeter
14. 2.09 mA ($4.6/2200$)
15. Digital voltmeter

UNIT 4

1. 2
2. Silicon and germanium
3. 0.6 to 0.7
4. Positive
5. The amount of voltage it can hold off in the reverse direction.
6. The diode should show continuity through it when the positive lead of the ohmmeter is connected to the anode but not to the cathode.

UNIT 5

1. Light-emitting diode
2. DC
3. 1.7 volts
4. Light being emitted by the device
5. $2000\ \Omega$
6. 0.45 volts
7. Arrows point away from the device when the symbol represents an LED. Arrows point toward the device when the symbol represents a photodiode.
8. The photodiode can operate at a greater speed.
9. In darkness
10. The light would be turned on during the daylight hours and off at night.

UNIT 6

1. A device that changes AC voltage into DC voltage.
2. The half-wave rectifier
3. The two-diode type of rectifier
4. The bridge rectifier
5. 8.1 volts ($18/2 = 9$, $9 \times 0.9 = 8.1$)
6. The two-diode type