

## Chapter 25 continued

- a. What is the  $V_{\text{eff}}$  in a circuit placed across the generator?

$$V_{\text{eff}} = \frac{V_{\text{max}}}{\sqrt{2}} = \frac{425 \text{ V}}{\sqrt{2}} = 3.01 \times 10^2 \text{ V}$$

- b. The resistance is  $5.0 \times 10^2 \Omega$ . What is the effective current?

$$I_{\text{eff}} = \frac{V_{\text{eff}}}{R} = \frac{3.01 \times 10^2 \text{ V}}{5.0 \times 10^2 \Omega} = 0.60 \text{ A}$$

8. If the average power dissipated by an electric light is 75 W, what is the peak power?

$$P = \frac{1}{2} P_{\text{max}}$$

$$P_{\text{max}} = (2)P = (2)(75 \text{ W}) = 1.5 \times 10^2 \text{ W}$$

## Section Review

### 25.1 Electric Current from Changing Magnetic Fields pages 671–678

#### page 678

9. **Generator** Could you make a generator by mounting permanent magnets on a rotating shaft and keeping the coil stationary? Explain.

**Yes, only relative motion between the coil and the magnetic field is important.**

10. **Bike Generator** A bike generator lights the headlamp. What is the source of the energy for the bulb when the rider travels along a flat road?

**the stored chemical energy of the bike rider**

11. **Microphone** Consider the microphone shown in Figure 25-3. When the diaphragm is pushed in, what is the direction of the current in the coil?

**clockwise from the left**

12. **Frequency** What changes to the generator are required to increase the frequency?

**increase the number of magnetic pole pairs**

13. **Output Voltage** Explain why the output voltage of an electric generator increases

when the magnetic field is made stronger. What else is affected by strengthening the magnetic field?

**The magnitude of the induced voltage is directly related to the strength of the magnetic field. A greater voltage is induced in the conductor(s) if the field strength is increased. The current and the power in the generator circuit also were affected.**

14. **Generator** Explain the fundamental operating principle of an electric generator.

**Michael Faraday discovered that a voltage is induced in a length of electric wire moving in a magnetic field. The induced voltage may be increased by using a stronger magnetic field, increasing the velocity of the conductor, or increasing the effective length of the conductor.**

15. **Critical Thinking** A student asks, "Why does AC dissipate any power? The energy going into the lamp when the current is positive is removed when the current is negative. The net is zero." Explain why this reasoning is wrong.

**Power is the rate at which energy is transferred. Power is the product of  $I$  and  $V$ . When  $I$  is positive, so is  $V$  and therefore,  $P$  is positive. When  $I$  is negative, so is  $V$ ; thus,  $P$  is positive again. Energy is always transferred in the lamp.**

## Practice Problems

### 25.2 Changing Magnetic Fields Induce EMF pages 679–685

#### page 684

*For the following problems, effective currents and voltages are indicated.*

16. A step-down transformer has 7500 turns on its primary coil and 125 turns on its secondary coil. The voltage across the primary circuit is 7.2 kV. What voltage is being applied across the secondary circuit? If the current in the secondary circuit is 36 A,