

## ELG3331: Tutorial for Chapter 9

### Problem 9.11

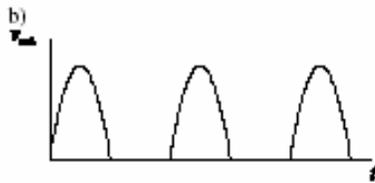
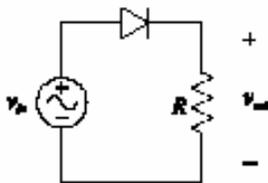
$$I_{F \max} = \frac{50\sqrt{2} - 0.7}{220} = 318 \text{ mA}$$

$$V_{\text{Rev}} = 50\sqrt{2} = 70.7 \text{ V}$$

### Problem 9.26

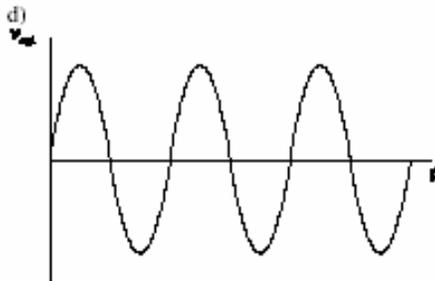
The capacitor will charge to  $5 \text{ V} - 0.7 \text{ V} = 4.3 \text{ V}$ . Accordingly, the average value of the output will be  $4.3 \text{ V}$ .

### Problem 28



c)

$$v_{\text{ave}} = 0.318 v_{\text{peak}} = 50 \Rightarrow v_{\text{peak}} = 157.2 \text{ V}$$



e)

$$V_{\text{rms}} = \frac{157.2}{\sqrt{2}} = 111.2 \text{ V}$$

**Problem 9.32**

At  $\omega t = 0$ ,  $D_1$  is on and when  $\omega t = \pi$ ,  $D_1$  is off and the reverse voltage across it maximum.

$$V_s = 170 \times 0.1 = 17 \text{ V}$$

**KVL:**

$$V_{s1} + V_{D1} + V_L = 0$$

$$\text{At } \omega t = 0, V_p = 17 - 0.7 = 16.3 \text{ V}$$

$$\text{At } \omega t = \pi, V_{D1} = -17 - 16.3 = -33.3 \text{ V}$$

The actual peak reverse voltage (33.3 V) is greater than the rated peak reverse voltage (30 V). Therefore, the diodes are not suitable for the specification.

**Problem 9.37**

$$V_s = V_{line} = 50 \cos(\omega t)$$

$$V_{sp} = 50 \text{ V}$$

At  $\omega t = 0$  ( $D_1$  and  $D_3$  are conducting) and  $D_2$  and  $D_4$  are off.

**KVL:** Consider  $V_{D1} = V_{D2} = 0.7 \text{ V}$

$$\begin{aligned} -V_s + V_{D1} + V_L + V_{D2} &= 0 \\ &= 48.6 \text{ V} \end{aligned}$$

At  $\omega t = \pi$

$$\begin{aligned} V_{D1}(\pi) + V_{D3}(\pi) &= -V_s - V_m \\ V_{D1} &= V_{D3} \\ V_{D13} &= \frac{-50 - 48.6}{2} = -49.3 \text{ V} \end{aligned}$$