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so many fake sites. this is the first one which worked! Many thanks

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Power Electronics Hart Solutions Chapter 7

$$V_s = 120 \quad E = 20 \quad T = \frac{1}{f} \quad T = 10^{-3} = 10.67$$

$$Z = \sqrt{R^2 + (X_L - X_C)^2} \quad Z = 4.34$$

$$\theta = \tan^{-1}\left(\frac{X_L - X_C}{R}\right) \quad \theta = 0.4$$

(a)
$$Y = \sqrt{\frac{V_s}{Z}} \sin(\omega t - \theta) \left[\frac{1 + \cos\left(\frac{\pi}{2} - \theta\right)}{1 + \cos\left(\frac{\pi}{2} + \theta\right)} \right] \frac{E}{R} + \frac{E}{R} - \sqrt{\frac{V_s}{Z}} \sin(\omega t)$$

$$Y = 0.02$$

$$i_d(t) = \sqrt{\frac{V_s}{Z}} \sin(\omega t - \theta) + (Y) \left[\frac{E}{R} - \left(\frac{E}{R}\right) \right] \frac{E}{R}$$

$$i_d(t) = 10.27$$

(b) The average diode current can be found from Equation 3-18 as

$$I_d = \frac{1}{\pi} \int_0^\pi \frac{120}{\sqrt{2}} \frac{1}{4.34} \sin(\omega t - 0.4) dt \quad I_d = 11$$

(c) The rms diode current can be found using Equation 3-16

$$I_d = \left(\frac{1}{\pi} \int_0^\pi \left(\frac{120}{\sqrt{2}} \frac{1}{4.34} \sin(\omega t - 0.4) \right)^2 dt \right)^{\frac{1}{2}} \quad I_d = 17.04$$

(d) The rms output current can then be found by