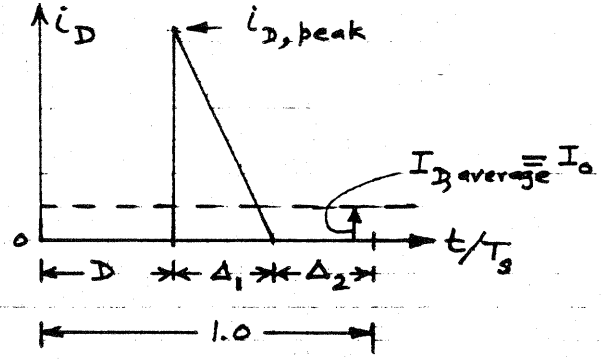
From Prob. 7-15,

$$\Delta V_o = \frac{1}{470\text{x}10^{-6}} \left[\left(1 - \frac{0.395 \cdot 12}{15}\right) \frac{0.25}{20\text{x}10^{3}} + \frac{150\text{x}10^{-6}\text{x}0.25}{2\text{x}60} \right] = 18.86 \text{ mV}$$

Problem 7-14

D = 0.395 from Problem 7-13.



$$i_{D,peak} = \frac{V_d}{L} DT_s = \frac{12}{150\text{x}10^{-6}} \text{ x } 0.395 \text{ x } 50 \text{ x } 10^{-6} = 1.58\text{A}$$

Calculate Δ_1:

$$\Delta_1 T_s = \frac{L i_{D,peak}}{V_o} \quad \therefore \quad \Delta_1 = \frac{L i_{D,peak}}{V_o T_s} = \frac{150\text{x}10^{-6}\text{x}1.58}{15\text{x}50\text{x}10^{-6}} = 0.316$$

From the figure above; using the definition of rms (same as in Prob. 5-9)

$$I_D(\text{rms}) = i_{D,peak} \sqrt{\frac{\Delta_1}{3}} = 1.58 \sqrt{\frac{0.316}{3}} = 0.513\text{A}$$

$$i_D = I_{D,average} + i_{ripple} = I_o + i_{ripple}$$

$$\therefore \quad I_{ripple}(\text{rms}) = [\, I_D^2(\text{rms}) - I_o^2 \,]^{1/2} = \sqrt{0.513^2 - 0.25^2} = 0.448 \text{ A}$$