

STEP-UP CONVERTERS

Problem **7-7**

$$V_d = 8V \text{ to } 16V, \quad V_o = 24V, \quad f_s = 20 \text{ kHz}, \quad C = 470 \mu\text{F}, \quad P_o \geq 5W,$$

$$I_o = \frac{5W}{24V} = 0.2083A.$$

Solution: Case 1: $V_d = 8V$; $\frac{24V}{8V} = 3 = \frac{1}{1-D}$, $\therefore D = \frac{2}{3} = 0.667$

From Eq. 7-29,

$$0.2083 = \frac{24 \cdot 0.667(1-0.667)^2}{2 \cdot 20,000 L} ; \therefore L = 0.213 \text{ mH}$$

Case 2: $V_d = 16V$; $\therefore D = \frac{1}{3} = 0.333$

From Eq. 7-29

$$0.2083 = \frac{24 \cdot 0.333(1-0.333)^2}{2 \cdot 20,000 L} ; \therefore \boxed{L = 0.427 \text{ mH}}$$