EE 333

Third and Final exam solutions SPRING 1990

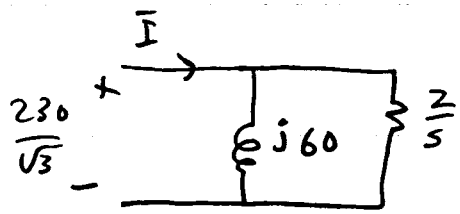
#1 (a) $I_\ell = \dfrac{4500}{\sqrt{3}\,480} = \underline{5.4 \text{ amps}}$

(b) $|\bar{S}| = 4500 \quad P = 4500 \times .8 = 3600 \quad Q = \sqrt{4500^2 - 3600^2}$

$Q = 2700 \quad X_C = \dfrac{480^2}{900} = 256\ \Omega \quad \underline{C = 10.36\ \mu F}$

(c) $I_\ell = \dfrac{3600}{\sqrt{3}\,480} = \underline{4.3 \text{ amps}}$

#2

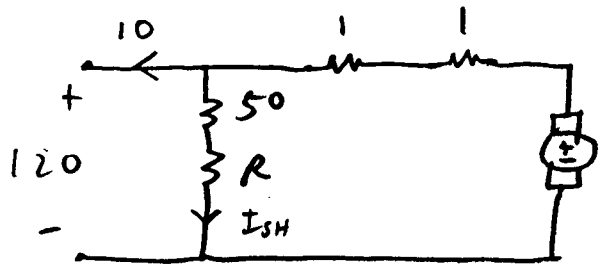


$T = \dfrac{3 \times \left(\frac{230}{\sqrt{3}}\right)^2 \frac{5}{2}}{377/3} = 210.5\ s \overset{\text{must}}{=} 23$

$s = .109 \qquad \bar{I} = \left(\dfrac{230}{\sqrt{3}} / j60\right) + \left(\dfrac{230}{\sqrt{3}} / 18.35\right)$

$\bar{I} = 7.24 - j2.2 \qquad \underline{|\bar{I}| = 7.57 \text{ amps}}$

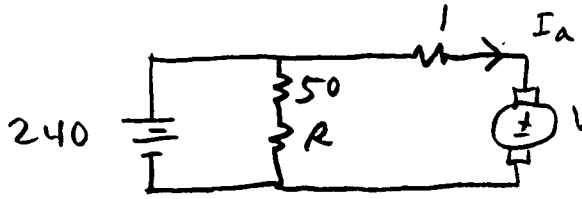
#3



$5 + 125\left(\dfrac{120}{50+R}\right) + 1\left(10 + \dfrac{120}{50+R}\right)$

$5 + \dfrac{125 \times 120}{50+R} + 10 + \dfrac{120}{50+R} = 2\left(10 + \dfrac{120}{50+R}\right) + 120 \Rightarrow \underline{R = 69\ \Omega}$

#4



$$\begin{cases} 10 + 115 I_{SH} & 0 \le I_{SH} \le 2 \\ 240 + 80(I_{SH} - 2) & I_{SH} \ge 2 \end{cases}$$

(a) $I_a = 0, \quad V_a\big|_{1000} = 240, \quad V_a\big|_{1200} = 288\ V = 240 + 80 I_{SH} - 160, \quad I_{SH} = 2.6\ A, \quad \underline{R = 42\ \Omega}$

(b) $240 = (10-2)(1) + V_a \qquad V_a\big|_{rpm} = 232 = \dfrac{rpm}{1200} 288 \Rightarrow \underline{rpm = 967}$