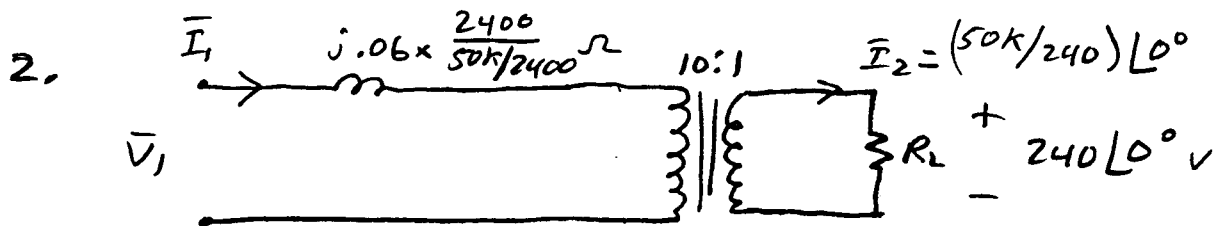


1. (a) $P_1 = P_2 = P_3 = \left(\frac{480}{\sqrt{3}}\right)^2 / 100 = 768 \text{ W}$

(b) $P_1 = P_2 = 480^2 / 100 = 2304 \text{ W}$, $P_3 = 0 \text{ W}$



(a) $\bar{V}_1 = \left(\frac{50k}{2400} \angle 0^\circ\right) j6.912 + 2400 \angle 0^\circ = 2400 + j144 = 2404 \angle 3.4^\circ \text{ V}$

(b) $\bar{I}_{1sc} = \frac{2404 \angle 3.4^\circ}{j6.912} = 347.8 \angle -86.6^\circ \text{ A}$

3. (a) $T_{\text{shut}} = \frac{P_{\text{To}}}{P_{\text{To}} \text{ max}} = \frac{3 \times |\bar{I}_2|^2 \frac{1}{s}}{2\pi 60 / 2} = \frac{3 \times \left| \frac{120}{1 + \frac{1}{s} + j2} \right|^2 \frac{1}{s}}{2\pi 60 / 2} = \frac{229}{s[(1 + \frac{1}{s})^2 + 4]} \text{ NM}$

(b) max when $\frac{1}{s} = \pm \sqrt{1 + 4}$ $s = \pm 0.447$

(c) $T_{\text{max mot}} = \frac{229}{0.447[(1 + 2.236)^2 + 4]} = 35.4 \text{ NM}$ $T_{\text{max gen}} = \frac{229}{-0.447[(1 - 2.236)^2 + 4]} = -92.7 \text{ NM}$

4. (a) $Q_{\text{cap}} \approx 120^2 \times 2\pi 60 C = 2000$ $C \approx 368 \mu\text{F}$

(b) $\bar{V}_L = (-j7.2) \left(\frac{120 \angle 0^\circ}{j1 - j7.2} \right) = 139.4 \angle 0^\circ \text{ V}$

(c) $Q_{\text{cap}} = (120\sqrt{3})^2 2\pi 60 C = 2000$ $C = 123 \mu\text{F}$