

EE204(062) HW 10 solution

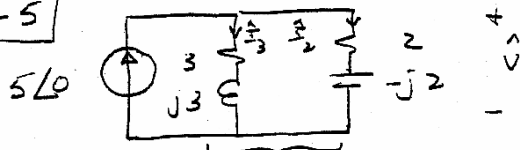
6.6-1 (a) $P_{AV} = \frac{1}{2} \times 10 \times 2 \cos(30+60) = \boxed{0W}$

(b) $P_{AV} = \frac{1}{2} \times 20 \times 5 \cos(30-45) = \boxed{48.3W}$

(c) $P_{AV} = \frac{1}{2} \times 8 \times 5 \cos(-35+80) = \boxed{14.14W}$

(d) $P_{AV} = \frac{1}{2} \times 25 \times 10 \cos(45-60) = \boxed{120.74W}$

6.6-5



$$\frac{(3+j3)(2-j2)}{3+j3+2-j2} = \frac{12}{5+j1} = 2.35 \angle -11.31^\circ$$

$$\hat{V} = 5\angle 0 \times 2.35 \angle -11.31^\circ = 11.77 \angle -11.31^\circ$$

$$P_{AV} = \frac{1}{2} \times 5 \times 11.77 \cos(0+11.31) = \boxed{28.85W}$$

$$\hat{I}_3 = \frac{\hat{V}}{3+j3} = 2.77 \angle -36.31^\circ \quad \hat{I}_2 = \frac{\hat{V}}{2-j2} = 4.16 \angle 33.69^\circ$$

$$P_{AV_{3\Omega}} = \frac{1}{2} |\hat{I}_3|^2 \times 3 = 11.51W \quad P_{AV_{2\Omega}} = \frac{1}{2} |\hat{I}_2|^2 \times 2 = 17.32W$$

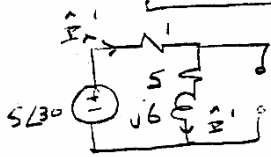
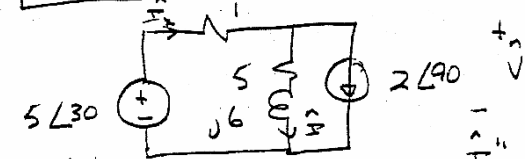
$$P_{AV} = P_{AV_{3\Omega}} + P_{AV_{2\Omega}} \quad \checkmark$$

6.6-14 $V_{RMS} = \sqrt{\frac{1}{2} \left[\int_0^1 (5t)^2 dt + \int_1^2 (5)^2 dt \right]}$

$$= \sqrt{\frac{1}{2} \left[\frac{25}{3} + 25 \right]} = \boxed{4.08V}$$

$$P_{AV} = \frac{V_{RMS}^2}{2} = \boxed{8.33W}$$

6.6-17 $2 \cos(3t) = 2 \sin(3t + 90)$

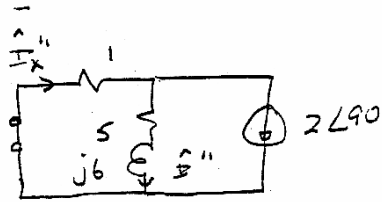


$$\hat{I}' = \hat{I}_x' = \frac{5 \angle 30}{6 + j6}$$

$$= 0.51 - j0.15$$

$$\hat{V} = (5 + j6) \hat{I}'$$

$$= 3.98 \angle 12.05$$



$$\hat{I}_x'' = \frac{5 + j6}{6 + j6} 2 \angle 90$$

$$= 1.84 \angle 95.19$$

$$= -0.17 + j 1.93$$

$$\hat{I}'' = -\frac{1}{6 + j6} 2 \angle 90$$

$$= -0.24 \angle 45$$

$$= -0.17 - j 0.17$$

$$\hat{I} = \hat{I}' + \hat{I}'' = 0.51 \angle -38.14 \quad \hat{I}_x = \hat{I}_x' + \hat{I}_x'' = 1.73 \angle 76.61$$

$$P_{AV} = \frac{1}{2} \times 5 \times 1.73 \cos(30 - 76.61) = \boxed{2.97 \text{ W}}$$

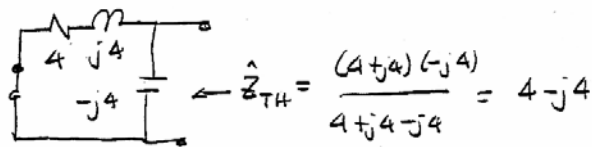
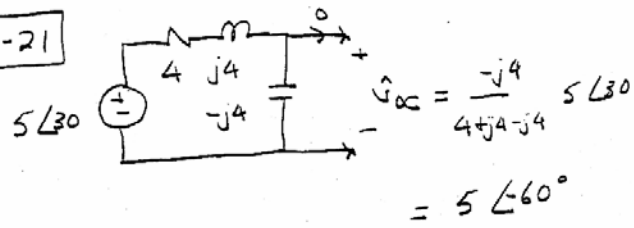
$$P_{AV_I} = -\frac{1}{2} \times 2 \times 3.98 \cos(90 - 12.05) = \boxed{-0.83 \text{ W}}$$

$$P_{AV_{1\Omega}} = \frac{1}{2} |\hat{I}_x|^2 \times 1 = 1.5 \text{ W}$$

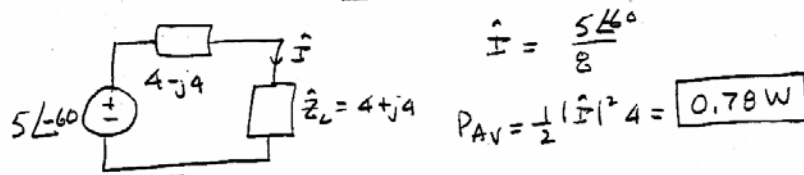
$$P_{AV_{5\Omega}} = \frac{1}{2} |\hat{I}|^2 \times 5 = 0.65 \text{ W}$$

} 2.15 W

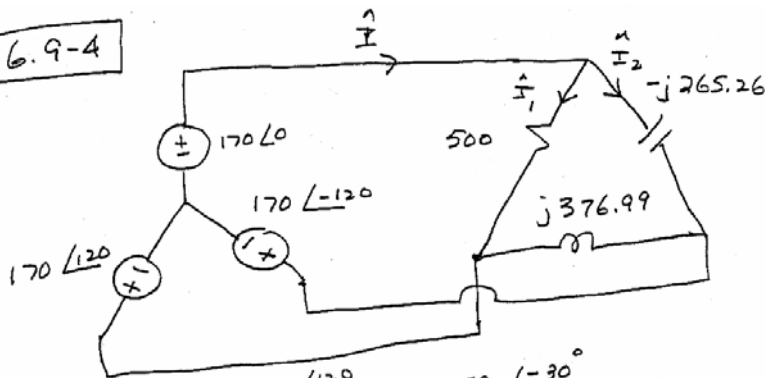
6.6-21



$$\therefore \hat{Z}_L = \hat{Z}_{TH} = \boxed{4 + j4 \Omega}$$



6.9-4



$$\hat{I}_1 = \frac{170 \angle 0 - 170 \angle -120}{500} = 0.59 \angle -30^\circ$$

$$\hat{I}_2 = \frac{170 \angle 0 - 170 \angle -120}{-j265.26} = \frac{294.45 \angle 30}{265.26 \angle -90} = 1.11 \angle 120^\circ$$

$$\hat{I} = \hat{I}_1 + \hat{I}_2$$

$$= 0.67 \angle 93.78^\circ$$

$$\therefore i(t) = 0.67 \cos(120\pi t + 93.78^\circ) \text{ A}$$

$$P_{AV} = \frac{1}{2} |\hat{I}|^2 500$$

$$= \boxed{87.03 \text{ W}}$$