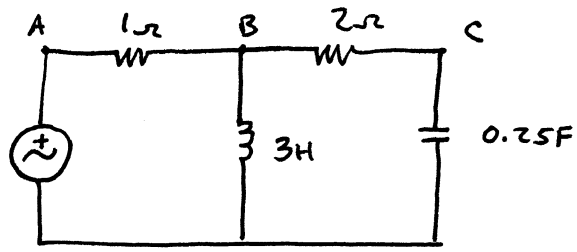
GIVEN:

$16\cos(2t-40^\circ)$ V



FIND: P_{AVE} FOR EACH PASSIVE ELEMENT

SOLN: USING FREQ. DOMAIN NODAL ANALYSIS...

$$V_A = 16\angle{-40^\circ}$$

$$\frac{V_B - V_A}{1\angle 0} + \frac{V_B}{6\angle 90} + \frac{V_B - V_C}{2\angle 0} = 0$$

$$\frac{V_C - V_B}{2\angle 0} + \frac{V_C}{2\angle{-90}} = 0$$

$$V_B = 12.77\angle{-43.8^\circ}\ \text{V}$$

$$V_C = 9.03\angle{-88.8^\circ}\ \text{V}$$

$P_{AVE} = 0$ FOR BOTH 3H & 0.25F !

$$I_{1\Omega} = \frac{V_A - V_B}{1\angle 0} = 3.365\angle{-25.4^\circ}\ \text{A} \qquad I_{2\Omega} = \frac{V_B - V_C}{2\angle 0}$$

$$P_{1\Omega} = \frac{1}{2} V_{AB} I_{1\Omega} \cos(\theta_V - \theta_I) = \frac{1}{2}(3.365)(3.365)\cos(0)$$

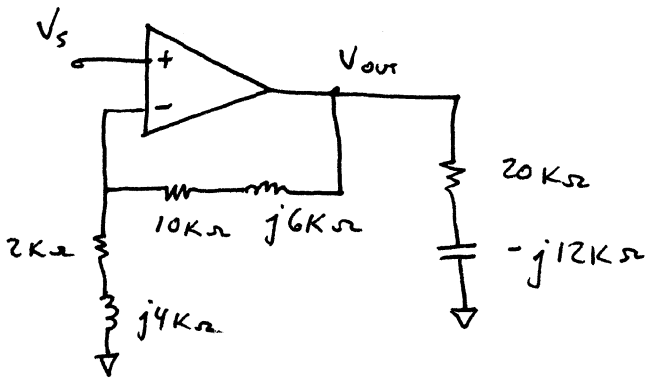
$$= \underline{5.66\ \text{W}}$$

$$P_{2\Omega} = \frac{1}{2}(9.031)(4.515)\cos(0)$$

$$= \underline{20.39\ \text{W}}$$

TOPS 35510 - 100 sheets 35520 - 200 sheets

GIVEN:



$V_s = 2\angle 30^\circ$ V

FIND: P_{AVE} FOR 20KΩ

SOLN: RECALL, FOR A NON-INVERTING OP AMP...

$$V_{OUT} = \left(1 + \frac{Z_F}{Z_{(-)}}\right) V_{(+)}$$

$$= \left(1 + \frac{(10+j6)}{(2+j4)}\right) 2\angle 30$$

$$V_{OUT} = 6.4\angle 6.4^\circ \text{ V}$$

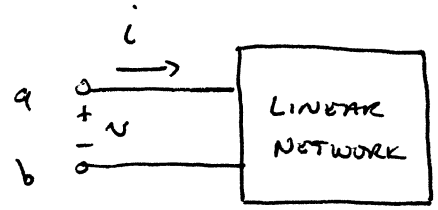
$$I_{20K} = \frac{V_{OUT}}{(20-j12)\text{K}\Omega} = 274 \angle 37.3^\circ \ \mu\text{A}$$

$$P_{20K} = \frac{1}{2}(274\,\mu)^2(20\text{K})$$

$$= 751\,\mu\text{W}$$

TOPS 35510 - 100 sheets 35520 - 200 sheets

GIVEN:



$$Z_{ab} = \frac{R}{\sqrt{1+\omega^2 R^2 C^2}} \angle -\tan^{-1}(\omega RC)$$

$R = 10\,K\Omega \qquad C = 200\,nF \qquad i = 25\sin(377t + 22^\circ)\ mA$

FIND: P_{AVE}

SOLN: LET $\underline{I} = 2\angle 22^\circ\ mA$

$$Z_{ab} = \frac{10\,K}{\sqrt{1+(377)^2(10K)^2(200n)^2}} \angle -\tan^{-1}(377(10K)200n)$$

$$Z_{ab} = 7984.6 \angle -37^\circ\ \Omega$$

SO, $V_{ab} = I Z_{ab} = 15.97 \angle -15^\circ\ V$

AND $P_{AVE} = \frac{1}{2}(15.97)(2m)\cos(-15-22)$

$= \underline{12.75\ mW}$

35510 - 100 sheets
35520 - 200 sheets
TOPS