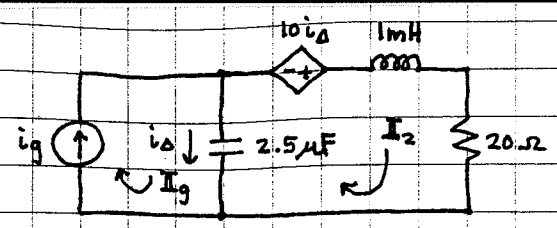

$i_g = 15 \cos(10k \cdot t)$ A

Find ave pwr dissipated in 20Ω R.

sol'n: $\mathbb{I}_g = 15\angle 0°$ A

$j\omega L = j \cdot 10k \cdot 1m = j10\,\Omega$

$-j/\omega C = -j/10k\,2.5\mu = -j/25m = -j40$

Use mesh currents:

$i_\Delta = \mathbb{I}_g - \mathbb{I}_2$ constraint eq'n

$\mathbb{I}_2(-j40) - 10(\mathbb{I}_g - \mathbb{I}_2) + \mathbb{I}_2\, j10\Omega + \mathbb{I}_2\, 20\Omega = 0V$

$-\mathbb{I}_g(-j40)$

or $\mathbb{I}_2(-j40\Omega + 10 + j10\Omega + 20\Omega) = \mathbb{I}_g(-j40\Omega + 10)$

$$\mathbb{I}_2 = \mathbb{I}_g \frac{(10 - j40\Omega)}{30\Omega - j30\Omega} = \frac{\mathbb{I}_g}{3} \frac{1 - j4\Omega}{1 - j\Omega}$$

$$= \frac{\mathbb{I}_g}{3} \frac{1 - j4\Omega}{1^2 + 1^2} \frac{1 + j\Omega}{} = \frac{\mathbb{I}_g}{3 \cdot 2}\left[(1+4) + j(1-4)\right]$$

$$= \frac{\mathbb{I}_g}{6}(5 - j3) = \frac{15}{6}(5 - j3)\,A = \frac{5}{2}(5 - j3)\,A$$

$$= \frac{25}{2} - j\frac{15}{2}\,A$$

$$= 14.6\angle -31°\,A$$

$V_{20\Omega} = \mathbb{I}_2 \cdot 20\Omega = 292\angle -31°$ A

$\theta_v - \theta_i = -31° - -31° = 0°$ (Always 0° for an R)

$P_{20\Omega} = \frac{i_m v_m}{2} \cos(\theta_v - \theta_i)$ $\quad i_m = |\mathbb{I}_2| = 14.6$

$v_m = |V_{20\Omega}| = 292$

$\therefore P_{20\Omega} = \frac{14.6 \cdot 292}{2}(\cos 0° = 1) = 2130$ W