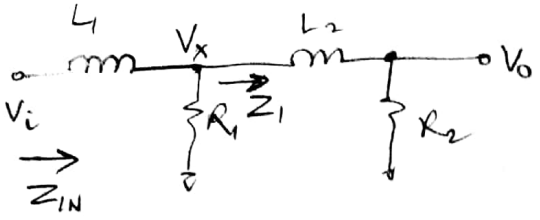

$$Z_1 = j\omega L_2 + R_2$$

$$Z_{IN} = j\omega L_1 + \frac{R_1(j\omega L_2 + R_2)}{R_1 + j\omega L_2 + R_2} \Rightarrow V_x = \frac{V_i}{Z_{IN}} \cdot \frac{R_1(j\omega L_2 + R_2)}{R_1 + j\omega L_2 + R_2}$$

$$= j\omega L_1 + \frac{R_1 Z_1}{R_1 + Z_1} \qquad = \frac{V_i}{Z_{IN}} \frac{R_1 Z_1}{R_1 + Z_1}$$

$$V_x = \frac{V_i}{\left(\frac{j\omega L_1}{R_1 Z_1/(R_1+Z_1)} + 1\right)} \qquad V_o = \frac{V_x R_2}{Z_1}$$

$$\Rightarrow V_o = \frac{V_i}{Z_1\left(\frac{j\omega L_1}{R_1 Z_1/(R_1+Z_1)} + 1\right)} \qquad R_2 = \frac{V_i R_2}{\frac{j\omega L_1}{R_1}(R_1+Z_1) + Z_1}$$

Denominator is:

$$j\omega L_1 + \frac{j\omega L_1 R_2}{R_1} + \frac{\omega^2 L_1 L_2}{R_1} + j\omega L_2 + R_2 = \left(R_2 - \frac{\omega^2 L_1 L_2}{R_1}\right) + j\left[\omega L_1\left(1 + \frac{R_2}{R_1}\right) + \omega L_2\right]$$

$$= A e^{j\theta}$$

where $$A = \sqrt{\left(R_2 - \frac{\omega^2 L_1 L_2}{R_1}\right)^2 + \left[\omega L_1\left(1 + \frac{R_2}{R_1}\right) + \omega L_2\right]^2}$$

$$\theta = \tan^{-1}\left(\frac{\omega L_1\left(1 + \frac{R_2}{R_1}\right) + \omega L_2}{R_2 - \frac{\omega^2 L_1 L_2}{R_1}}\right)$$

$$\therefore V_o = \frac{V_i R_2}{A} e^{-j\theta}$$

For your problem:

$L_1 = 0.1 \times 10^{-3}\ H \quad R_1 = 10\Omega \quad \omega = 5kHz \times 2\pi$

$L_2 = 0.2 \times 10^{-3} H \quad R_2 = 50\Omega$

$$\omega L_1\left(1+\frac{R_2}{R_1}\right)+\omega L_2 = 2\pi 5k \times 0.1m\left(1+\frac{50}{10}\right) + 2\pi 5k\, 0.2m$$

$$= 2\pi 5k \times 0.1m\,(1+5+2)$$

$$= 2\pi 5k \times 0.8m = 25.13$$

$$R_2 - \frac{\omega^2 L_1 L_2}{R_1} = 50 - \frac{(2\pi 5k)^2\, 0.02\mu}{10} = 48.03$$

$$\text{Magnitude} = V_i \frac{R_2}{A} = \frac{1 \times 50}{\sqrt{25.13^2 + 48.03^2}} = 0.922$$

$$\text{Angle} = \theta = \tan^{-1}\frac{25.13}{48.03} = 27.62^\circ$$

For the Book's problem:

$L_1 = 1 \times 10^{-3}\ H \quad R_1 = 10\Omega \quad \omega = 5KHz \times 2\pi$

$L_2 = 2 \times 10^{-3} H \quad R_2 = 50\Omega$

$$\omega L_1\left(1+\frac{R_2}{R_1}\right)+\omega L_2 = 2\pi\, 5k \times 1m \times 8 = 251.33$$

$$R_2 - \frac{\omega^2 L_1 L_2}{R_1} = 50 - \frac{(2\pi 5k)^2\, 2\mu}{10} = -147.39$$

$$\text{Magnitude} = V_i \frac{R_2}{A} = \frac{1 \times 50}{\sqrt{251.33^2 + 147.39^2}} = 0.172$$

$$\text{Angle} = \theta = \tan^{-1}(251.33/(-147.39)) = 120.39$$