Chapter 6, Solution 57.

$$\text{Let } v = L_{eq}\frac{di}{dt} \tag{1}$$

$$v = v_1 + v_2 = 4\frac{di}{dt} + v_2 \tag{2}$$

$$i = i_1 + i_2 \longrightarrow i_2 = i - i_1 \tag{3}$$

$$v_2 = 3\frac{di_1}{dt} \text{ or } \frac{di_1}{dt} = \frac{v_2}{3} \tag{4}$$

and

$$-v_2 + 2\frac{di}{dt} + 5\frac{di_2}{dt} = 0$$

$$v_2 = 2\frac{di}{dt} + 5\frac{di_2}{dt} \tag{5}$$

Incorporating (3) and (4) into (5),

$$v_2 = 2\frac{di}{dt} + 5\frac{di}{dt} - 5\frac{di_1}{dt} = 7\frac{di}{dt} - 5\frac{v_2}{3}$$

$$v_2\left(1 + \frac{5}{3}\right) = 7\frac{di}{dt}$$

$$v_2 = \frac{21}{8}\frac{di}{dt}$$

Substituting this into (2) gives

$$v = 4\frac{di}{dt} + \frac{21}{8}\frac{di}{dt}$$

$$= \frac{53}{8}\frac{di}{dt}$$

Comparing this with (1),

$$L_{eq} = \frac{53}{8} = \mathbf{6.625\ H}$$