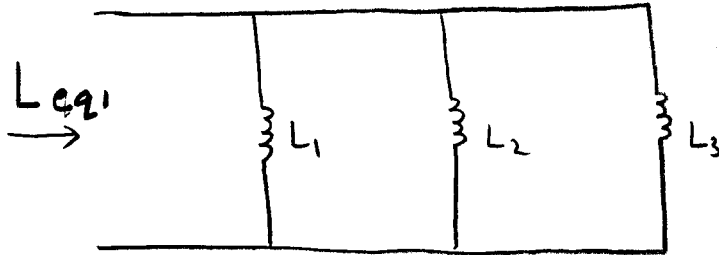


6.47 Determine the values of inductance that can be obtained by interconnecting a 4-mH inductor, a 6-mH inductor, and a 12-mH inductor.

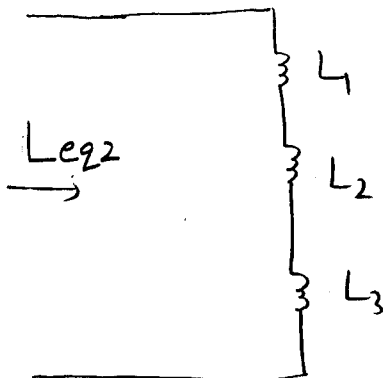
SOLUTION:

$$L_1 = 4\text{mH}, L_2 = 6\text{mH}, \text{ and } L_3 = 12\text{mH}$$



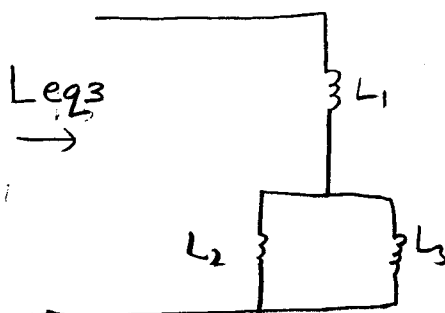
$$L_{eq1} = \frac{1}{\frac{1}{L_1} + \frac{1}{L_2} + \frac{1}{L_3}}$$

$$L_{eq1} = 2\text{mH}$$



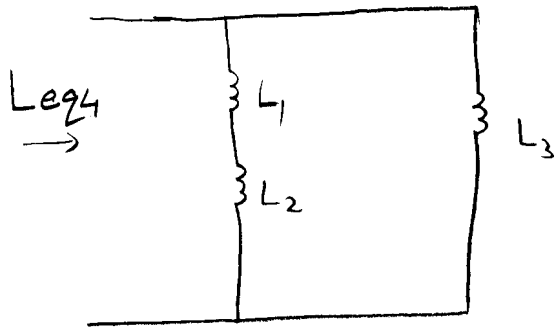
$$L_{eq2} = L_1 + L_2 + L_3$$

$$L_{eq2} = 22\text{mH}$$



$$L_{eq3} = \frac{L_2 L_3}{L_2 + L_3} + L_1$$

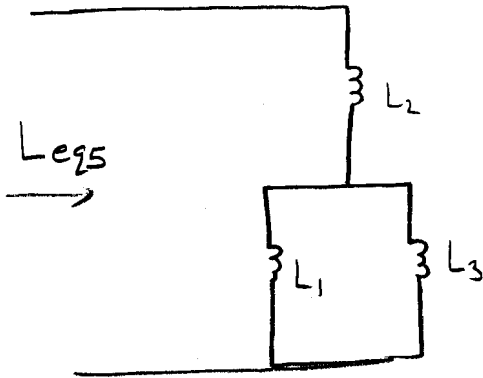
$$L_{eq3} = 8\text{mH}$$



$$Leq4 = (L1 + L2) \parallel L3$$

$$Leq4 = \frac{(L1 + L2)(L3)}{L1 + L2 + L3}$$

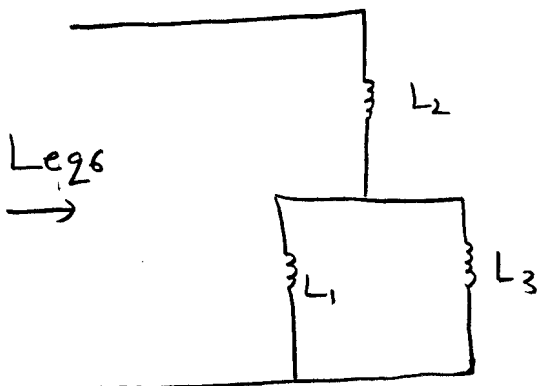
$$Leq4 = 5.45 \text{ mH}$$



$$Leq5 = (L1 \parallel L2) + L3$$

$$Leq5 = \frac{L1 L2}{L1 + L2} + L3$$

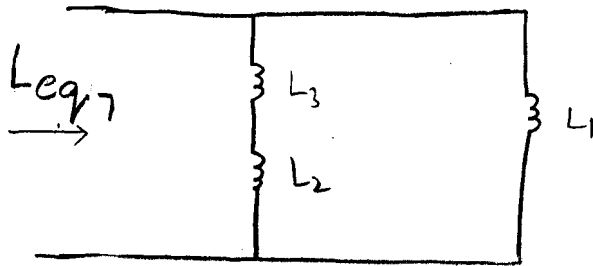
$$Leq5 = 14.4 \text{ mH}$$



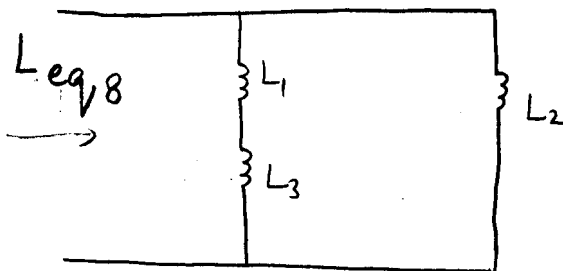
$$Leq6 = (L1 \parallel L3) + L2$$

$$Leq6 = \frac{L1 L3}{L1 + L3} + L2$$

$$Leq6 = 9 \text{ mH}$$



$$L_{eq7} = \frac{(L_2 + L_3)L_1}{L_1 + L_2 + L_3} = 3.27 \text{ mH}$$



$$L_{eq8} = \frac{(L_1 + L_3)L_2}{L_1 + L_2 + L_3} = 4.36 \text{ mH}$$

Inductance values possible:

$$\begin{aligned} L_{eq1} &= 2 \text{ mH} \\ L_{eq2} &= 22 \text{ mH} \\ L_{eq3} &= 8 \text{ mH} \\ L_{eq4} &= 5.45 \text{ mH} \end{aligned}$$

$$\begin{aligned} L_{eq5} &= 14.4 \text{ mH} \\ L_{eq6} &= 9 \text{ mH} \\ L_{eq7} &= 3.27 \text{ mH} \\ L_{eq8} &= 4.36 \text{ mH} \end{aligned}$$