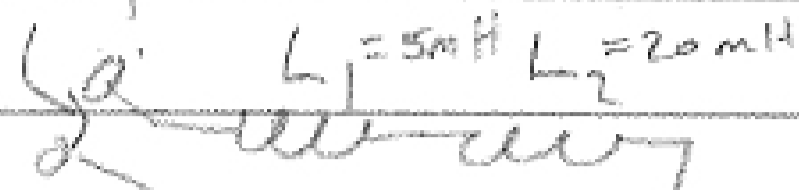


7-36

$L_{eq}$



$L_8$   
= 35mH

$L_7$   
= 7mH

12mH

$L_6$

$L_5 = 50mH$

= 180mH

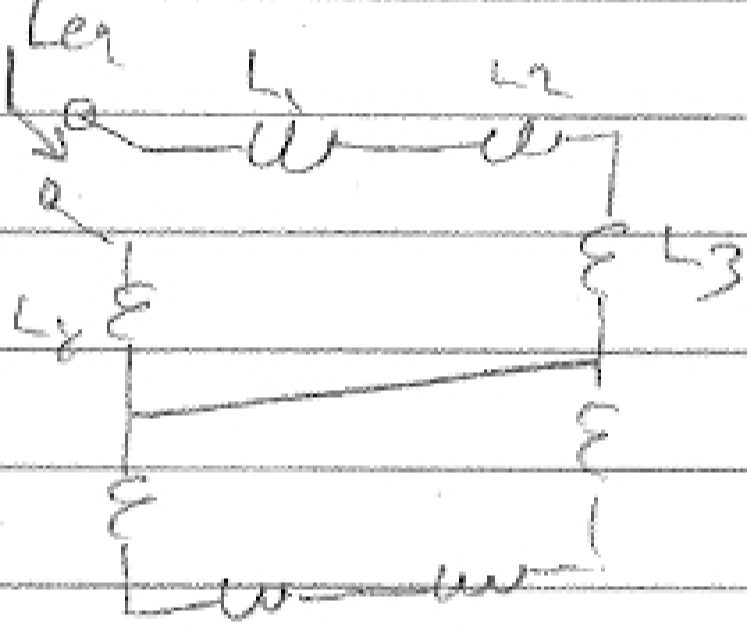
$L_3 = 40mH$

$L_4 = 150mH$

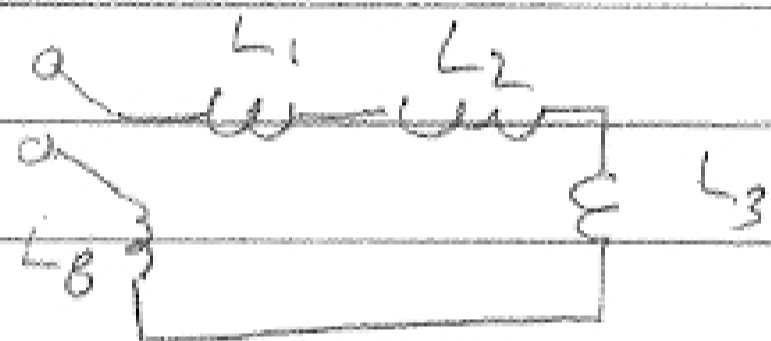
$$L_{eq} = L_1 + L_2 + L_3 + L_4 + L_5 + L_6 + L_7 + L_8 = 600mH$$

(a)

(b)  $L_{eq}$

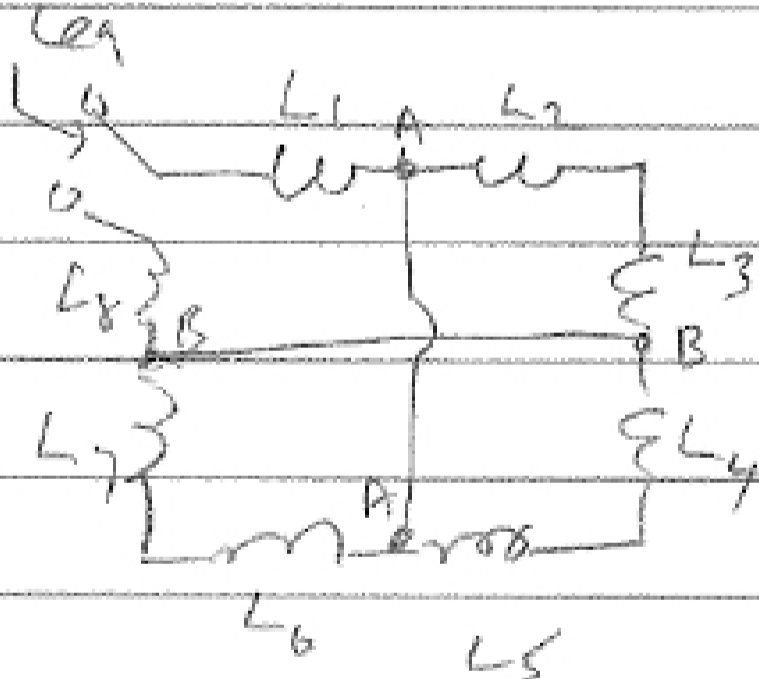


$\Rightarrow$

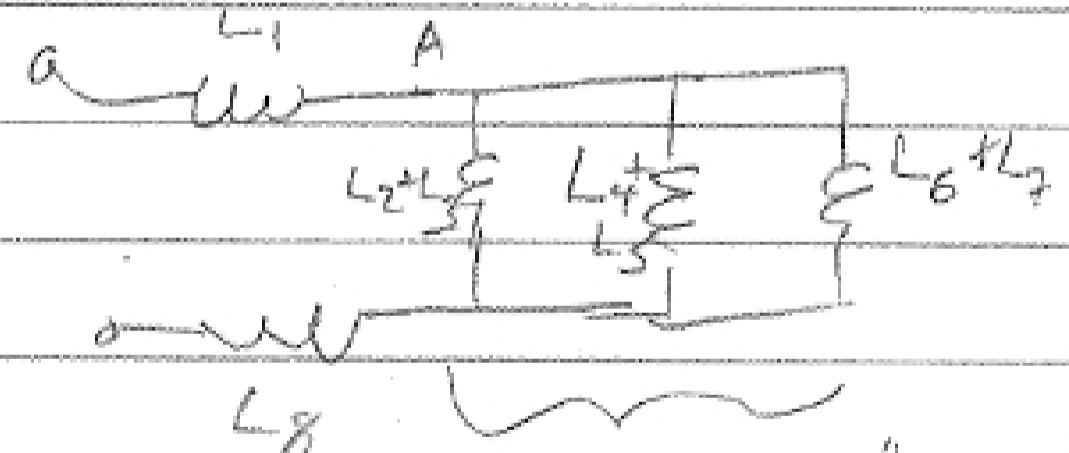


$$L_{eq} = L_1 + L_2 + L_3 + L_8 = 100mH$$

(c)



$\Rightarrow$



$$60mH // 200mH // 300mH = 40mH$$

$$L_{eq} = L_1 + 40mH + L_8 = 80mH$$

## Problem 38

(a)

Starting from the right end and combining the inductors in series and parallel consecutively, we get  $L_{eq}$  as

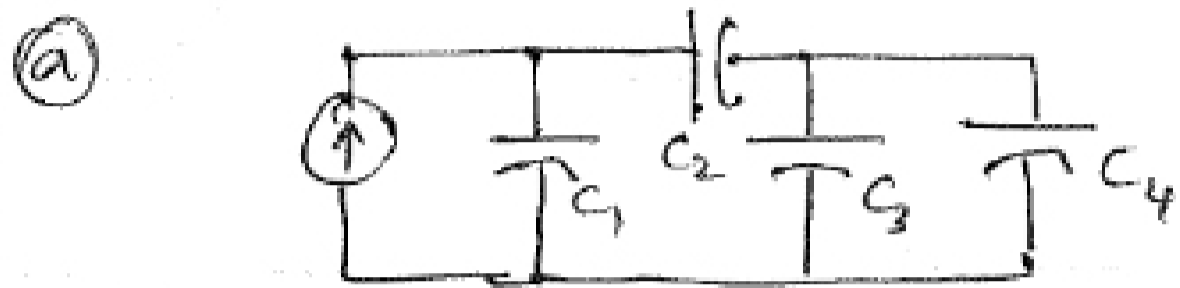
$$\begin{aligned}L_{eq} &= 4 + ((36) \parallel (10 + ((1 + 5) \parallel (3)))) \\ &= 4 + ((36) \parallel (10 + ((6) \parallel (3)))) \\ &= 4 + ((36) \parallel (10 + (2))) \\ &= 4 + ((36) \parallel (12)) \\ &= 4 + 9 \\ &= 13 \text{ mH}\end{aligned}$$

(b)

Clearly, the given circuit has 1.2 mH and 0.6 mH in parallel, and this combination is in series with 2.4 mH, the equivalent of which is in parallel with 7 mH. Thus

$$\begin{aligned}L_{eq} &= 7 \parallel (2.4 + (1.2 \parallel 0.6)) \\ &= 7 \parallel (2.4 + 0.4) \\ &= 7 \parallel 2.8 \\ &= 2 \text{ mH}\end{aligned}$$

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(i)  $C_3, C_4$  are in  $\parallel^l$

$$\Rightarrow C_{34} = C_3 + C_4$$

(ii)  $C_2$  &  $C_{34}$  are in series

$$\Rightarrow C_{234} = \frac{C_2 \cdot (C_3 + C_4)}{C_2 + C_3 + C_4}$$

(iii)  $C_1$  &  $C_{234}$  are in  $\parallel^l$

$$\Rightarrow C_{1234} = C_{eq} = C_1 + \frac{C_2 (C_3 + C_4)}{C_2 + C_3 + C_4}$$

Substituting for  $C_1, C_2, C_3$  &  $C_4$ , we get  $6 \mu F$

$$i_s(t) = 10 \cos(10^4 t)$$

$$i_s(t) = C_{eq} \frac{dV_s}{dt} \Rightarrow \frac{1}{6 \times 10^{-6}} \int_{-\infty}^t i_s(t) dt = V_s(t)$$

$$= \frac{1}{6 \times 10^{-6}} \times 10 \frac{\sin(10^4 t)}{10^4} = \frac{10^3}{6} \sin(10^4 t) \text{ mV}$$

$$V_s(t) = \frac{1}{6} \sin(10^4 t) \text{ V}$$

(zero initial conditions)