

Agst H.

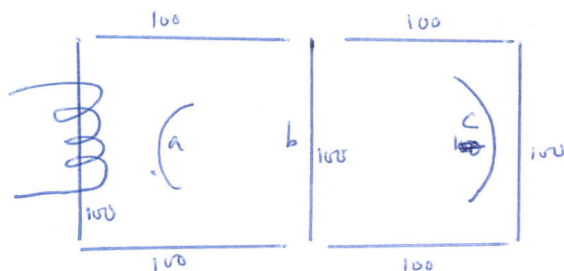
$$1. (a) S = \frac{l}{\mu A} = \frac{1}{1000 \times 4\pi \times 10^{-7} \times 25 \times 10^{-6}} = 31,830,989 \text{ At/Wb.} \quad [10]$$

$$(b) L = \frac{N^2}{S} \Rightarrow N = \sqrt{LS} = \sqrt{2 \times 31,830,989} = 7979 \quad [10]$$

$$(c) S = 31,830,989 + \frac{10^{-3}}{4\pi \times 10^{-7} \times 25 \times 10^{-6}} = 63,661,977 \text{ At/Wb.} \quad [10]$$

$$(d) L = \frac{N^2}{S} = \frac{7979^2}{63,661,977} = 1 \text{ H.} \quad [10]$$

2.



$$S_a = S_c = 3S_b$$

$$S_b = \frac{l}{\mu A} = \frac{100 \times 10^{-3}}{10^{-3} \times 100 \times 10^{-6}} = 10^6 \text{ At/Wb}$$

$$I = 10 \text{ A, } N = 100, \quad F = NI = 1000$$

$$\Phi_T = \frac{F}{S_a + S_b \parallel S_c} = \frac{1000}{\left(3 + \frac{1 \times 3}{4}\right) \times 10^6} = 2.67 \times 10^{-4} \text{ Wb}$$

$$\Phi_a = \frac{2.67 \times 10^{-4} \text{ Wb}}{[15]}$$

$$\Phi_b = 2.67 \times 10^{-4} \times \frac{S_c}{S_b + S_c} = 2.67 \times 10^{-4} \times \left(\frac{3}{1+3}\right) = 2 \times 10^{-4} \text{ Wb} \quad [15]$$

$$\Phi_c = \frac{0.67 \times 10^{-4} \text{ Wb}}{[15]}$$

$$L = \frac{N^2}{S} = \frac{100^2}{S_a + S_b \parallel S_c} = \frac{100^2}{3.75 \times 10^6} = 2.67 \times 10^{-3} \text{ H} = 2.67 \text{ mH.} \quad [15]$$