$$R_{g3} = \frac{l_{g3}}{\mu_0 A_{g3}} = 44232.13$$

$$R_{eq} = 102814.465$$

Now;

$$\phi = \frac{mmf}{R_{eq}}$$

or, $mmf = \phi \times R_{eq} = 77.11$ Amp-turn

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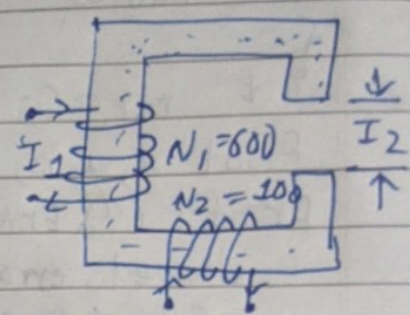
H(ω) 1. Solution;

$A = 16\,cm^2$, $I_g = 0.06cm$

$t_c = 40\,cm$

$\mu_r = 6000$

$B = 1T$, $\phi = BA = 16 \times 10^{-4}\,Wb$



$R_c = \frac{t_c}{\mu A} = 3.316 \times 10^{4}\,AT/Wb$

$R_g = \frac{l_g}{\mu_0 A} = \frac{0.06 \times 10^{-2}}{\mu_0 \times 16 \times 10^{-4}} = 29.8 \times 10^{4}\,AT/Wb$

Applying KVL on the equivalent magnetic circuit

$N_2 I_2 - \phi R_g - N_1 I_1 - \phi R_{core} = 0$

$\Rightarrow 1000 - (16 \times 10^{-4}) \times (29.842 \times 10^{4}) - 6000 I_1 - (16 \times 10^{-4}) \times (3.31 \times 10^{4}) = 0$

$\Rightarrow I_1 = 0.078A$

Q.2 Solution;

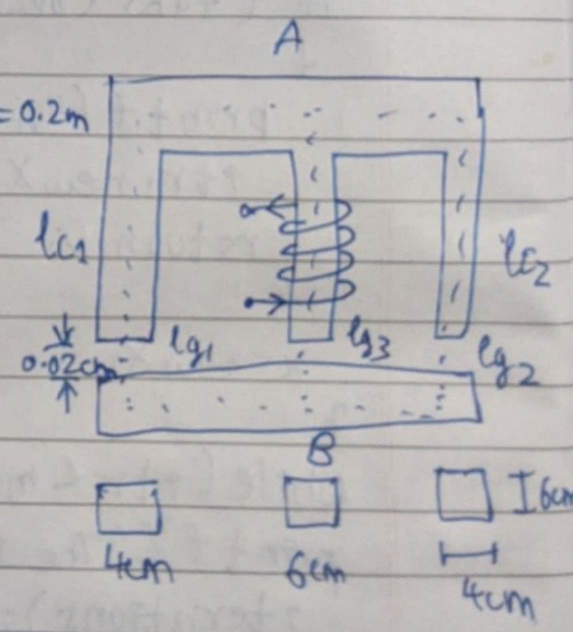
Mean length A to B (outer) = 0.5m and (inner) = 0.2m

Here, $l_{c_1} = 0.5m = l_{c_2}$

$l_{c_3} = 0.2m$

$\phi = 0.75 \times 10^{-3}\,Wb$

$\mu_r = 5000$



$R_{c_1} = \frac{l_{c_1}}{\mu_r \mu_0 A_{c_1}} = 533157.27$

$R_{g_1} = \frac{l_{g_1}}{\mu_0 A_{g_1}} = 66314.56$

$R_{c_1} = R_{c_2}$ and $R_{g_1} = R_{g_2}$

so,

$R_{c_3} = \frac{l_{c_3}}{\mu_r \mu_0 A_{c_3}} = 8846.62$