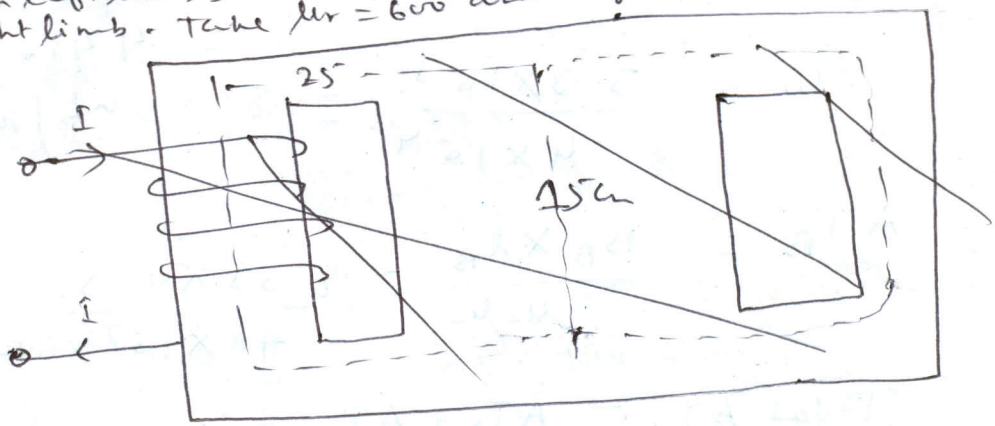
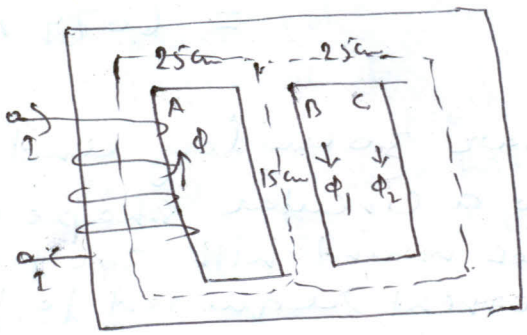
5@ A Cast steel magnetic structure made of a bar of section 2Cm x 2Cm is shown in fig. Find the current that the 500 turn magnetising Coil on left limb should carry so that a flux of 2mwb is produced in right limb. Take $\mu_r = 600$ and neglect leakage.





Flux created by magnetising Coil say Φ is divided at junction point into two paths depending upon the reluctances of portion B and C respectively.

$$S_B = \frac{l_B}{\mu_0 \mu_r \times a} = \frac{0.15}{\mu_0 \mu_r a}$$

$$S_C = \frac{l_C}{\mu_0 \mu_r a} = \frac{0.25}{\mu_0 \mu_r a}$$

$$\Phi_C = 2 \text{ mwb} = .002 \text{ wb}.$$

$$\Phi_B = \Phi_C \times \frac{S_C}{S_B} = \frac{2 \times 10^{-3} \times 0.25 / \mu_0 \mu_r a}{0.15 / \mu_0 \mu_r a}$$

$$= 3.33 \times 10^{-3} \text{ wb}.$$

Total flux in portion A, $\Phi = \Phi_B + \Phi_C$

$$= 3.33 \times 10^{-3} + 2 \times 10^{-3}$$

$$= 5.33 \times 10^{-3} \text{ wb}.$$

$$B_A = \frac{\Phi}{a} = \frac{5.33 \times 10^{-3}}{4 \times 10^{-4}} = 13.33 \text{ wb/m}^2$$