AT required for portion A

$$= AT_A = \frac{B_A \times l_A}{\mu_0 \mu_r} = \frac{13.33 \times 0.25}{4\pi \times 10^{-7} \times 600}$$

$$= 4416$$

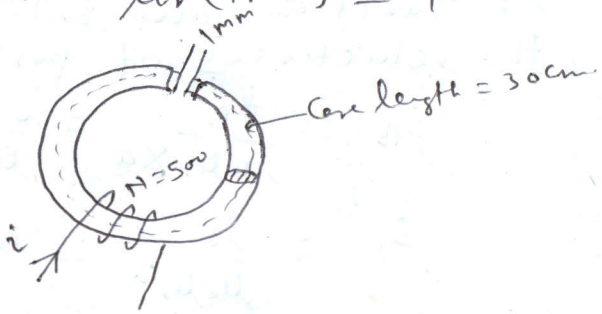
$$\phi_B = \frac{3.3 \times 10^{-3}}{4 \times 10^{-4}} = 8.33 \text{ wb/m}^2$$

$$AT_B = \frac{B_B \times l_B}{\mu_0 \mu_0} = \frac{8.33 \times 0.15}{4\pi \times 10^{-7} \times 600} = 1658$$

$$\text{Total } AT = AT_A + AT_B = 4416 + 1658$$

$$= 6074 \text{ Amp.}$$

6 Q:- A wrought iron bar 30 cm long and 2 cm in dia is bent into a circular shape as shown in fig. It is then wound with 500 turns of wire. Find the current required to produce a flux of 0.5 mwb in magnetic ckt with an air gap of 1 mm. μ_r (iron) = 4000.



Ans:- Flux to be produced = $\phi = 0.5 \text{ mwb} = 0.5 \times 10^{-3} \text{ wb}$.

Area of Cross Section = $\pi \times 10^{-4} \text{ m}^2$

$$B = \phi/a = \frac{0.5 \times 10^{-3}}{\pi \times 10^{-4}}$$

$$= 5/\pi = 1.5915 \text{ T}$$

Airgap length = 1 mm = $l_g = 0.001$ m.

Core length l_i = 30 cm = .3 m

$$\text{Total AT required} = \frac{B}{\mu_0} l_g + \frac{B}{\mu_0 \mu_r} l_i = \frac{1.5915}{4\pi \times 10^{-7}} \times .001 + \frac{1.5915}{4\pi \times 10^{-7}} \times .3$$

$$= 1361$$

$$\therefore I = \frac{AT}{N} = \frac{1361}{500} = 2.72 \text{ A}.$$