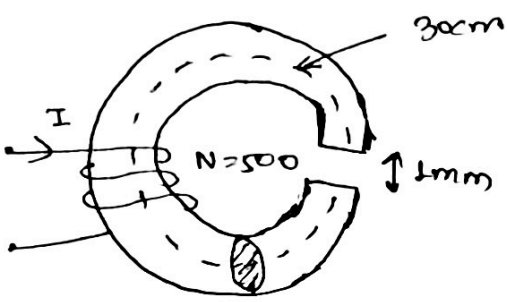
Assignment - 01

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

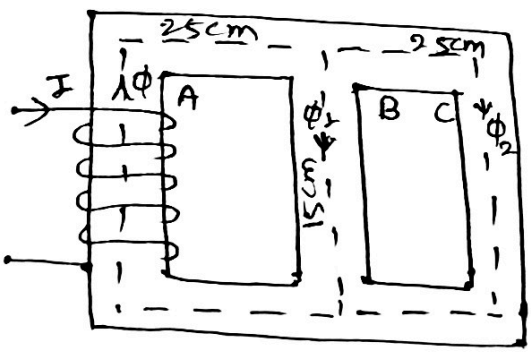


Ans :- I = 2.72 A

Q.2) A ring of iron has a mean diameter of 15cm, a cross section of 1.5 cm^2 and has a radial air gap of 0.5mm cut in it. It is uniformly wound with 1500 turns of insulated wire and a current of 1.2 A produces a flux of 0.1 mwb across the air gap. Calculate the relative permeability of iron on the assumption that there is no magnetic leakage.

Ans :- 163

Q.3) A cast steel magnetic structure made of a bar of section 2cm × 2cm is shown in fig. Determine the current that the 500 turns magnetizing coil on the left limb should carry so that a flux of 2 mwb is produced in the right limb. Take μ_r = 600 and neglect leakage.



length of section A = 25cm
length of section B = 15cm
length of section C = 25cm.

Ans :- I = 12.15 A

Q.4) A ferromagnetic core whose mean path length is 40cm. There is small gap of 0.05 cm in the structure. The cross-sectional area of the core is 12 cm^2, the relative permeability of the core is 4000, and the coil of wire on the core has 400 turns. Assume that fringing in the air gap increases the effective cross sectional area of the air gap by 5%. Given this information find i) the total reluctance and ii) the current required to produce a flux density of 0.5T in the air gap.

Ans:- $S_{eq} = 382098.2$

Q.5) In the magnetic circuit shown below, the core has a relative permeability of 1500.

a) Determine flux density in the air gap

b) Determine the inductance of the coil.