Answer on Question #40337, Physics, Electromagnetism

The magnetic induction and the intensity of magnetic field inside an iron core of an electromagnet are 1 Wb/m^2 and 150 A/m respectively. The relative permeability of iron is- A)10^6/4π B)10^5/6π C)10^3/4π D) 10^3/6π.

Solution:

Given:

The magnetic induction is B = 1 Wb/m^2,

the intensity of magnetic field H = 150 A/m

Commonly used form for the relationship between B and H is

$$B = \mu_m H$$

where

$$\mu_m = K_m \mu_0$$

μ_0 being the magnetic permeability of space and K_m the relative permeability of the material.

The magnetic constant has the exact value $\mu_0 = 4\pi \times 10^{-7}$ H·m^{-1}

Thus,

$$K_m = \frac{B}{\mu_0 H}$$

$$K_m = \frac{1}{4\pi \cdot 10^{-7} \cdot 150} = \frac{10^7}{600\pi} = \frac{10^5}{6\pi} \ \text{N/A}^2$$

Answer. B)10^5/6π.