

Answer on Question #61357-Physics-Electromagnetism

19) A single turn coil of cross-sectional area 7.2cm^2 is in the a magnetic field of flux desity 0.45T . The field which is perpendicular to the coil, is steadily reduced to 0.0T in 5s . Calculate the induced emf.

a) 0.72ÖV

b) 0.52ÖV

c) 0.47ÖV

d) 0.65ÖV

Solution

$$\varepsilon = -\frac{\Delta\Phi}{\Delta t} = -A \frac{\Delta B}{\Delta t} = 7.2 \cdot 10^{-4} \frac{0.45}{5} = 65 \cdot 10^{-6}\text{V}.$$

20) What is the self - inductance of an air-core solenoid, 1m long and 0.05m in diameter, if it has 1400 turns?

a) 5.23mH

b) 4.84mH

c) 3.63mH

d) 2.42mH

Solution

The inductance of a coil of wire is given by

$$L = \frac{\mu_0 N^2 A}{l}.$$

$$A = \frac{\pi d^2}{4}.$$

$$L = \frac{\mu_0 \pi N^2 d^2}{4l} = \frac{4\pi \cdot 10^{-7} \pi (1400)^2 (0.05)^2}{4(1)} = 4.84 \text{ mH}$$