**This question has been answered**



## Question

TOPIC: MAGNETISM 3. A circular coil of wire of 3,000 turns and diameter 6.0 cm is situated in magnetic
field so that the major plane of the coil is normal to the field. If the flux density in the coil changes uniformly from 0.5 to 1.7 Wb/m2 in 3.14 min, what emf is induced in the coil?
4. An inductive coil has a resistance of 9.50 Ω. A battery of 115 V is suddenly connected to the coil. After the current has risen to 10.0 A, it is changing at the rate of 160 A/s. what is the self-inductance of the coil?

## Answered by Expert Tutors

3) $e = 5.41 * 10^{-2}\ volts$

4) L= 0.719 Henry

### Step-by-step explanation

3)

No of turns, N= 3000

Circular coil diameter, d= 6 cm

Thus, radius, r= 6/2 = 3 cm= 0.03 m.

Now, area of the coil, $A = \pi r^2 = \pi * (0.03)^2 = 2.83 * 10^{-3}\ m^2$

Flux density changes by $\Delta B = 1.7 - 0.5 = 1.2\ wb/m^2 = 1.2\ wb/m^2$ in time $\Delta t = 3.14\ min = 3.14 * 60 = 188.4\ s$

So, the induced emf is given by,

$e = NA * \frac{\Delta B}{\Delta t=} = \frac{3000*2.83*10^{-3}*1.2}{188.4} = 5.41 * 10^{-2}\ volts$ (Answer).

4) Given, Battery voltage, v= 115 V

Current change, $\frac{dI}{dt} = 160\ A/s$

Now, the self inductance L of the coil is given by,

$L = \frac{v}{\frac{dI}{dt}} = \frac{115}{160} = 0.719\ Henry$

**Is this answer helpful?** Helpful Unhelpful

Subject: Physics, Science