Assignment

30/6/21

(Q1) The magnetic flux threading a coil changes from 12×10^{-3} Wb to 6.0×10^{-3} Wb in 0.01 s. Calculate the induced emf.

Ans : 0.6 V

(2) The magnetic flux through a coil perpendicular to its plane and directed into the page varies with time t (in second) according to the relation.

$$\phi = 6t^2 + 7t + 1 \text{ milliweber.}$$

Find the magnitude of the emf induced in the coil at $t = 2$ sec. Also find the current and its direction in the resistance R if $R = 10\,\Omega$.

Ans : 31 mV.
3.1 mA

(3) A coil having 100 turns and area 0.20 m^2 is placed normally in a magnetic field. The field changes from 0.20 Wb m^{-2} to 0.60 Wb m^{-2} uniformly over a period of 0.01 s. Calculate the emf induced in the coil.

Ans: $|\varepsilon| = 800$ V

(Q4) A coil of wire enclosing an area of 100 cm^2 is placed at an angle of 70° with a magnetic field B of 10^{-1} Wb m^{-2}. What is the flux through the coil? If B is reduced to zero in 10^{-3} sec. What emf is induced in the coil.?

Ans: 0.94 V

(5) 5.5×10^{-4} magnetic flux lines are passing through a coil of resistance 10 ohm (Ω) and number of turns 1000. If the number of flux lines reduces to 5×10^{-5} in 0.1 sec, find the emf and the charge flowing through the coil.

$e = 5V$

$i = 0.5A$

$q = 0.05C$

(6) A given wire is bent into a rectangular loop of size 15 cm x 5 cm and placed perpendicular to a magnetic field of 1.0 T. Within 0.5 second, the loop is changed into a 10 cm square and the field increases to 1.4 T. Compute the emf induced in the coil.

$|e| = 0.013 V$

(7) A coil of area 0.04 m^2 having 1000 turns is suspended perpendicular to a magnetic field of 5.0×10^{-5} Wb/m^2. It is rotated through 90° in 0.2 sec. Calculate the average emf induced in it.

$e = 0.01 V$

Q. on Self Induction:

1 Q) A 200 turn coil of self inductance 20 mH carries a current of 4 mA. Find the magnetic flux linked with each turn of the coil.

Ans: $\Phi = 4 \times 10^{-7}$ Wb

(2) In a 0.4 mH coil, the current rises uniformly from zero to 250 mA in 0.1 second. Find the self-induced emf in the coil.

Ans: $e = -1$ mV

(3) The current in the coil of a large ~~EP~~ electro-magnet falls from 6A to 2A in ~~10 mA~~ 10 ms. The induced emf across the coil is 100 V. Find the self-inductance of the coil.

Ans: $L = 0.25$ H

(4) ~~The~~ Calculate the self-inductance of an air-cored solenoid, 1 m long and 0.05 m in diameter, having 1400 turns

Ans: $L = 4.8$ mH