Ch—06 Electromagnetic Induction

Daily Practice Problem 06

Q1. A magnetic flux of $8 \times 10^{-4} Wb$ is linked with each turn of a $200 - turn$ coil when there is an electric current of $4\,A$ in it. Calculate the self-inductance of the coil.

Q2. The self-inductance of an inductor coil having $100\,turns$ is $20\,mH$. Calculate the magnetic flux through the cross-section of the coil corresponding to a current of $4\,mA$. Also, find the total flux.

Q3. An average induced emf of $0.4\,V$ appears in a coil when the current in it is changed from $10\,A$ in one direction to $10\,A$ in opposite direction in $0.40\,second$. Find the coefficient of self-induction of the coil.

Q4. What is the self-inductance of a solenoid of length $40\,cm$, area of cross-section $20\,cm^2$ and total number of turns 800?

Q5. The current in a solenoid of $240\,turns$, having a length of $12\,cm$ and a radius of $2\,cm$, changes at the rate of $0.8\,As^{-1}$. Find the emf induced in it.

Q6. A 12 V battery connected to a $6\,\Omega$, $10\,H$ coil through a switch drives a constant current through the circuit. The switch is suddenly opened. If it takes $1\,ms$ to open the switch, find the average emf induced across the coil.

Q7. An air-cored solenoid with length $30\,cm$, area of cross-section $25\,cm^2$ and number of turns 500, carries a current of $2.5\,A$. The current is suddenly switched off in a brief time of 10^{-3} s. How much is the average back emf induced across the ends of the open switch in the circuit?

Q8. A 0.5 m long solenoid of $10\,turns/cm$ has area of cross-section $1cm^2$. Calculate the voltage induced across its ends if the current in the solenoid is changed from $1\,A$ to $2\,A$ in $0.1\,s$.

ANSWERS

1. $4 \times 10^{-2} H$

2. $8 \times 10^{-7}\ Wb, 8 \times 10^{-5} Wb$

3. 8 mH

4. 4.02 mH

5. $6 \times 10^{-4}\ V$

6. $20{,}000\ V$

7. $6.542\ V$

8. 0.628 mV