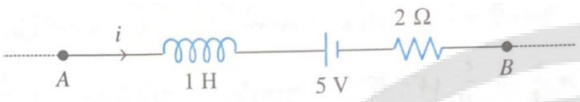
Ch—06 Electromagnetic Induction

Daily Practice Problem 07

Q1. AB is a part of circuit. Find the potential difference $V_A - V_B$, if



(a) current $i = 2\,A$ and is constant

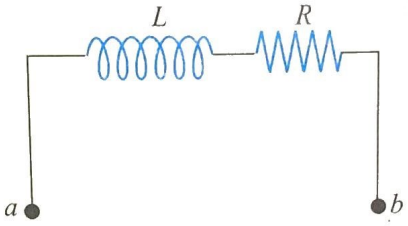
(b) current $i = 2\,A$ and is increasing at the rate of $1\,A\,s^{-I}$

(c) current $i = 2\,A$ and is decreasing at the rate $1\,A\,s^{-1}$.

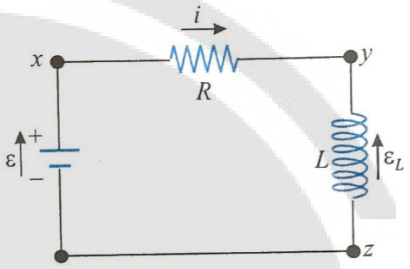
Q2. When the current in the portion of the circuit shown in figure is $2.00\,A$ and increases at a rate of $0.500\,A/s$, the measured voltage is $\Delta V_{ab} = 9.00\,V$. When the current is $2.00\,A$ and decreases at the rate of $0.500\,A/s$, the measured voltage is $\Delta V_{ab} = 5.00\,V$. Calculate the values of

(a) L and

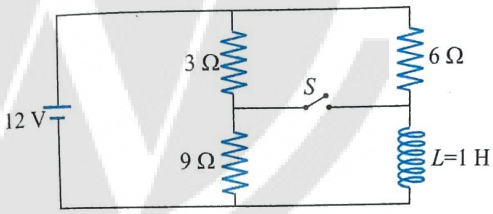
(b) R.



Q3. Suppose the emf of the battery in the circuit shown in figure varies with time t so that the current is given by $i(t) = 3.0 + 5.0t$, where i is in amperes and t is in seconds. Take $R = 4.0\,n$ and $L = 6.0\,H$, and find an expression for the battery emf as a function of t.



Q4. In the circuit shown, the switch $'S'$ has been closed for a long time and them o[ens at $t = 0$

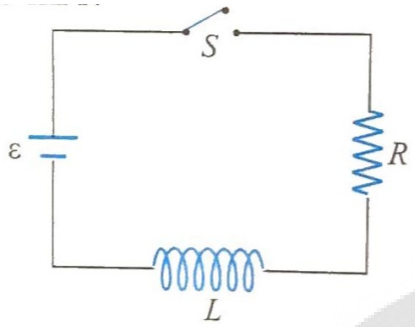


(a) Find the current through the inductor just before the switch is opened.

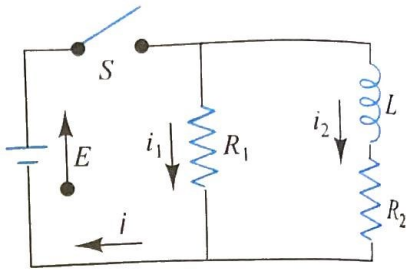
(b) Find the current through the inductor a long time after the switch is opened.

(c) Find current through the inductor as a function of time after the switch is opened. Also write the current through the cell as a function of time.

Q5. In given figure, $R = 4.0\ k\Omega,\ L = 8.0\ \mu H$, and the ideal battery has $E = 20\ V$. How long after switch S is closed is the current $2.0\ mA$?



Q6. In the circuit shown in figure, $E = 10V$, $R_1 = 5\Omega,\ R_2 = 10\Omega\ and\ L = 5\ H$. For the two separate conditions, **(i)** switch S is just closed and **(ii)** switch S is closed for a long time, calculate



(a) current i_1 through R_1,

(b) current i_2 through R_2,

(c) current i through the switches,

(d) the potential difference across R_2,

(e) the potential difference across L,

(f) di_2/dt.

ANSWERS

1.(a) $9V$

(b) $10\ V$

(c) $8\ V$

2.(a) $4.0\ H$

(b) $3.5\ \Omega$

3. $(42 + 20t)V$

4.(a) 6 A

(b) 3A

(c) $2 + 4e^{-2t}$

5. $1.0\ ns$

6.(a) 2 A

(b) 1 A

(c) 3 A

(d) 10 V

(e) 0 V

(f) 0