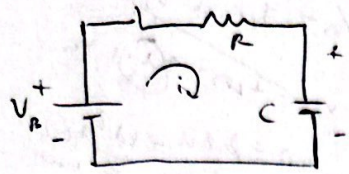
Ans. 1



$V_B = 100V$

$R = 100\Omega$, $C = 1\mu F$

$$i(0^+) = \frac{V_B}{R} \Rightarrow 0.1A$$

$$V_B = iR + V_c \qquad V_c = \int \frac{I}{C}\,dt$$

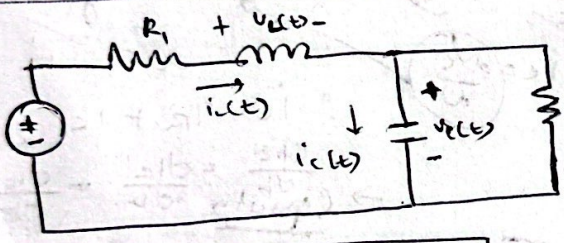
differentiate $V_B = iR + \int \frac{I}{C}\,dt$

$$\frac{dV_B}{dt}^{0} = R\frac{di}{dt} + \frac{I}{C} \Rightarrow \boxed{\frac{di}{dt} \Rightarrow -\frac{I}{RC} \Rightarrow \frac{-0.1}{1m} \Rightarrow -100}$$

Again differentiate

$$0 = R\frac{di^2}{dt^2} + \frac{dI}{dt}\frac{1}{C} \Rightarrow \boxed{\frac{di^2}{dt^2} \Rightarrow -\frac{dI}{dt}\frac{1}{(RC)} \Rightarrow +100{,}000}$$

Ans. 2



$V_c(0^-) \Rightarrow 1V$

$i_L(0^-) \Rightarrow 2A$

$R_1 = R_2 = 2\Omega$

$$\boxed{i_{R_2}(t=0^+) \Rightarrow \frac{V_c(0^+)}{R_2} \Rightarrow 0.5A}$$

$$\boxed{i_c(t=0^+) = 2 - 0.5 \Rightarrow 1.5A}$$

$$V_B = I_L R_1 + V_L + V_c$$

$$10 \Rightarrow 2\times 2 + V_L + 1$$

$$\boxed{V_L\big|_{t=0^+} = 5V}$$

$$i_c(0^+) = C\frac{dv_c}{dt}$$

$$\frac{i_c(0^+)}{C} \Rightarrow \frac{dv_c}{dt}$$

$$\boxed{\frac{1.5}{C} = \frac{dv_c}{dt}}$$

$$V_L = L\frac{di_L}{dt}$$

$$\boxed{\frac{5}{L} = \frac{di_L}{dt}}$$

$$V_B = i_L R_1 + L\frac{di_L}{dt} + V_c \rightarrow KVL$$

$$\frac{dV_B}{dt}^{0} \Rightarrow \frac{di_L}{dt}R_1 + L\frac{d^2i_L}{dt^2} + \frac{dv_c}{dt}$$

$$L\frac{d^2i_L}{dt^2} = -\frac{dv_c}{dt} - R_1\frac{di_L}{dt}$$

$$\boxed{\frac{di_L^2}{dt^2} = -\frac{1}{L}\left(\frac{1.5}{C} + \frac{5R_1}{L}\right)}$$

$$i_L = i_c + i_R \rightarrow KCL$$

differentiate

$$\frac{di_L}{dt} = C\frac{dv_c^2}{dt^2} + \frac{dv_c}{dt}\frac{1}{R_2}$$

$$\boxed{\frac{1}{C}\left(\frac{5}{L} - \frac{1.5}{CR_2}\right) \Rightarrow \frac{d^2v_c}{dt^2}}$$