EE23BTECH11047 - Deepakreddy P

The switch S_1 was closed and S_2 was open for a long time. At t=0, switch S_1 is opened and S_2 is closed, simultaneously. The value of $i_c(0^+)$, in amperes, is (GATE EC 44)

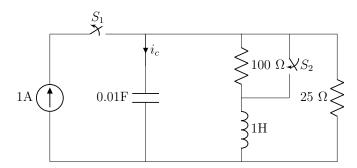


Fig. 1. Circuit 1

Solution:

1) Switch S_1 was closed and S_2 was open

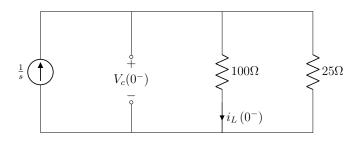


Fig. 2. Circuit 2

$$R_{eff} = 5\Omega \tag{1}$$

$$i_L\left(0^-\right) = \frac{\frac{25}{s}}{125} = \frac{0.2}{s}$$

$$i_L\left(0^-\right) = i_L\left(0^+\right)$$
(2)

$$i_L\left(0^-\right) = i_L\left(0^+\right) \tag{3}$$

$$V_c\left(0^-\right) = 20V\tag{4}$$

2) Switch S_1 is open and S_2 was open

At $t = 0^+$ The capacitor is charged. Thus, it acts as a voltage source. The inductor acts as current source.

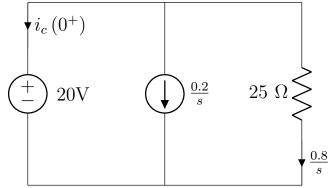


Fig. 3. Circuit 3

$$i_c\left(0^+\right) = -\frac{1}{s}\tag{5}$$

Taking Inverse Laplace Transform

$$i_c\left(0^+\right) = -1A\tag{6}$$

Parameter	Description	Remarks
$V_c(0^-)$	Voltage across capacitor in case 1	20V
$i_L(0^-)$	current across inductor in case 1	0.2 s
$i_L(0^+)$	current across inductor in case 2	0.2 s
C	Capacitance	0.01F

TABLE I Parameters