

EE23BTECH11047 - Deepakreddy P

44 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)

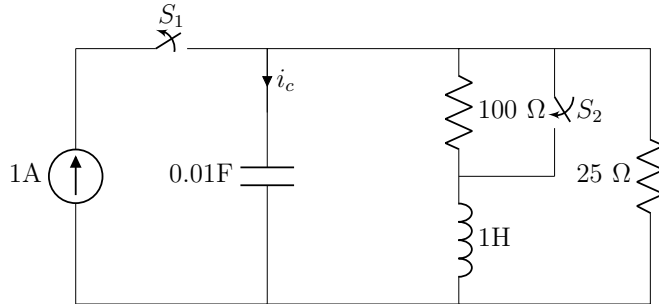


Fig. 1. Circuit 1

Solution:

1) Switch S_1 was closed and S_2 was open

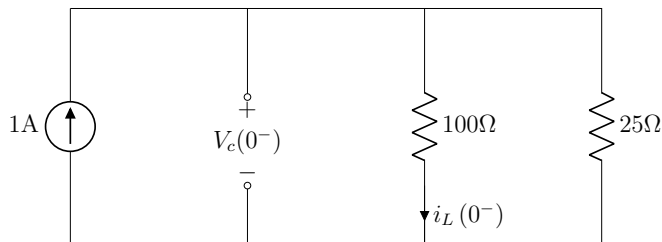


Fig. 2. Circuit 2

$$R_{eff} = 5\Omega \quad (1)$$

$$i_L(0^-) = \frac{\frac{25}{125}}{\frac{1}{s}} = \frac{0.2}{s} \quad (2)$$

$$i_L(0^-) = i_L(0^+) \quad (3)$$

$$V_c(0^-) = 20V \quad (4)$$

2) Switch S_1 is open and S_2 was closed

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

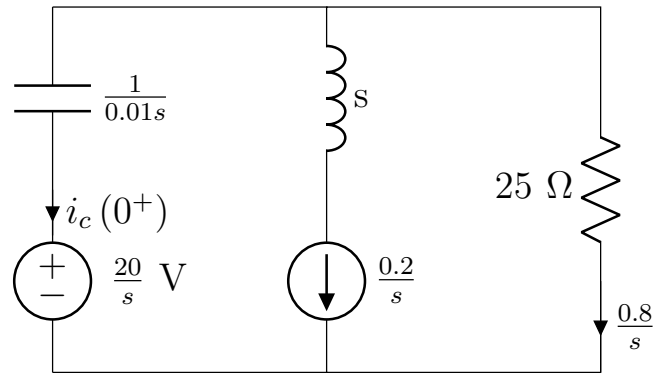


Fig. 3. Circuit 3

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

Taking Inverse Laplace Transform

$$i_c(0^+) = -1A \quad (6)$$

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

TABLE I
PARAMETERS