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)

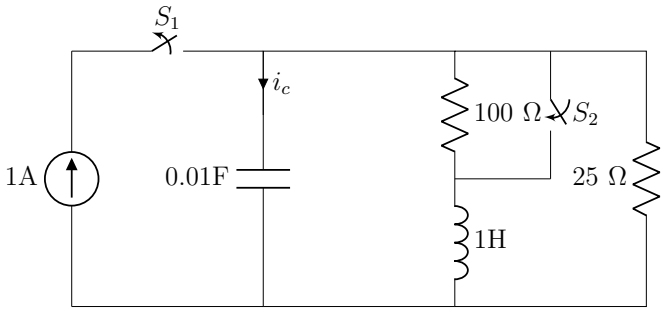

Fig. 1. Circuit 1

Solution:

1) Switch S_1 was closed and S_2 was open

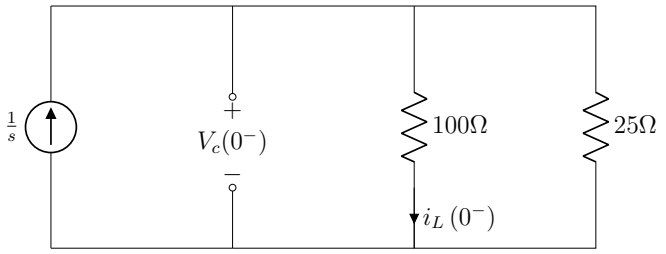

Fig. 2. Circuit 2

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

$$i_L\left(0^-\right) = \frac{\frac{25}{s}}{125} = \frac{0.2}{s} \tag{2}$$

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

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

2) Switch S_1 is open and S_2 was closed

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

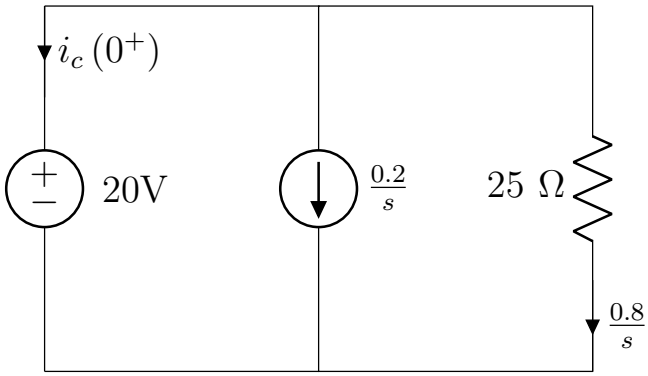

Fig. 3. Circuit 3

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

Taking Inverse Laplace Transform

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

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

TABLE I
PARAMETERS