

# GATE: 51.2023

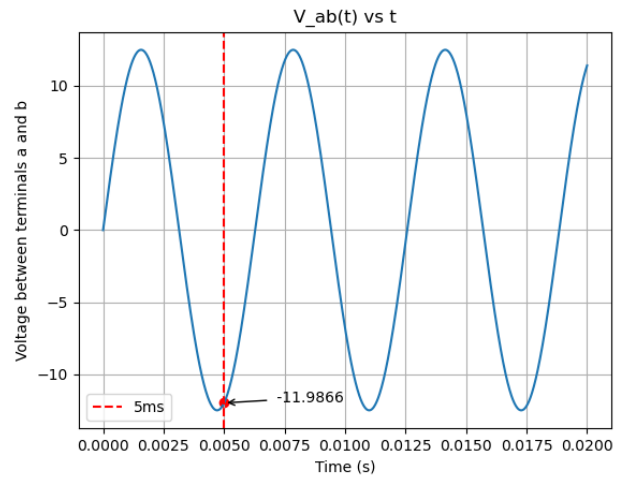
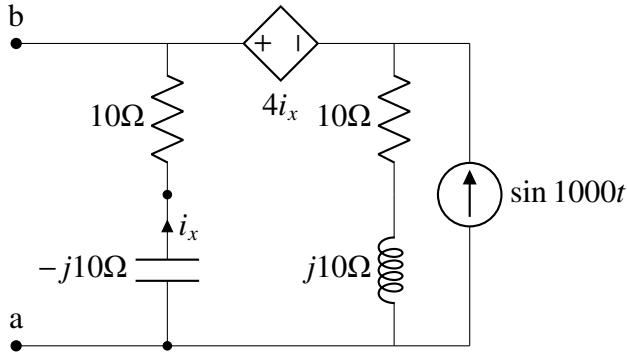
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**Question:** For the circuit shown, if  $i = \sin 1000t$ , the instantaneous value of the Thevenin's voltage (in volts) across the terminals a and b at time  $t=5\text{ms}$  is

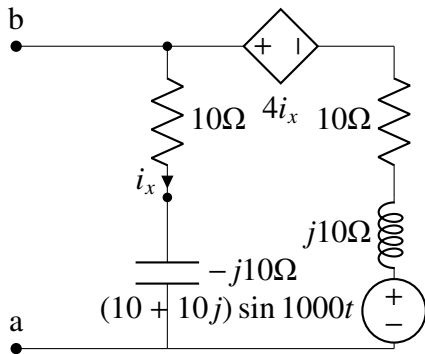
$$t = 5\text{ms}$$

(7)

$$\therefore V_{th} = -11.985V$$



**Solution:** By source transforming the given circuit we get



Applying KVL in the loop,

$$10 + j10 + 4i_x - (j10 + 10 + 10 - j10)i_x = 0 \quad (1)$$

$$10 + j10 + 4i_x - 20i_x = 0 \quad (2)$$

$$i_x = 0.884 \angle 45^\circ \quad (3)$$

$$V_{th} = i_x(10 - j10) \quad (4)$$

$$= 12.5 \angle 0^\circ \quad (5)$$

$$V_{th} = 12.5 \sin 1000t \quad (6)$$