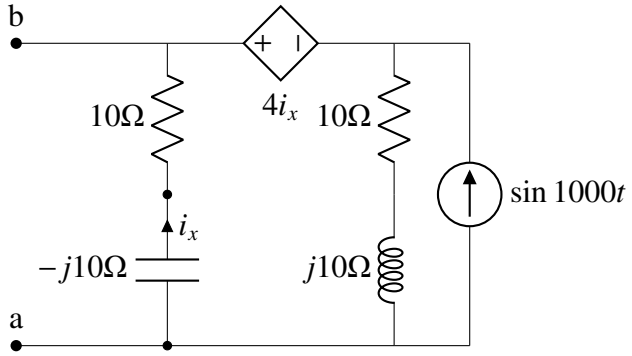
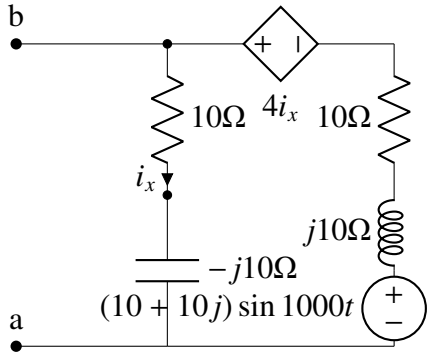
GATE: 51.2023

EE22BTECH11005- Ambati Krishna Kaustubh*

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



Solution: By source transforming the given circuit we get



Applying KVL in the loop,

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

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

$$i_x = 0.884\angle 45^0 \quad (3)$$

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

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

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

$$t = 5ms \quad (7)$$

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