

Quiz 6 Solution (Thévenin & Norton)

Electrical Circuits 1

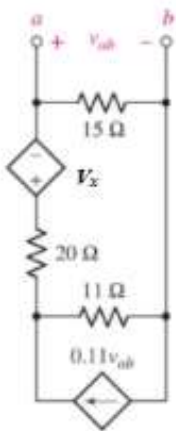
TE1002

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Determine the Thévenin and Norton equivalents of the given circuit, as seen by an unspecified element connected between terminals a and b . In the given circuit, $V_x = 0.2v_{ab}$.



Explanation:

Rotate the diagram 90° clockwise. Connect a 1 A source between a and b such that the head of the arrow points to terminal a . Define a clockwise mesh current i_2 flowing into the '+' reference of the dependent voltage source. Then,

$$11(i_2 - 0.11v_{ab}) + 20i_2 + 0.2v_{ab} + 15(i_2 + 1) = 0$$

where

$$v_{ab} = 15(i_2 + 1)$$

Solving, we get

$$\begin{aligned} V_{th} &= 15.0729 \text{ Volts} \\ R_{th} &= V_{th}/1A = 15.0729 \text{ ohm} \end{aligned}$$