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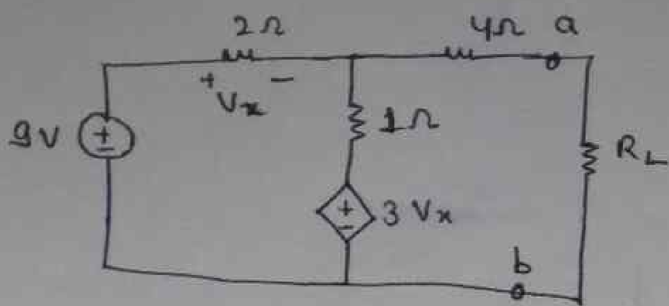
Answer

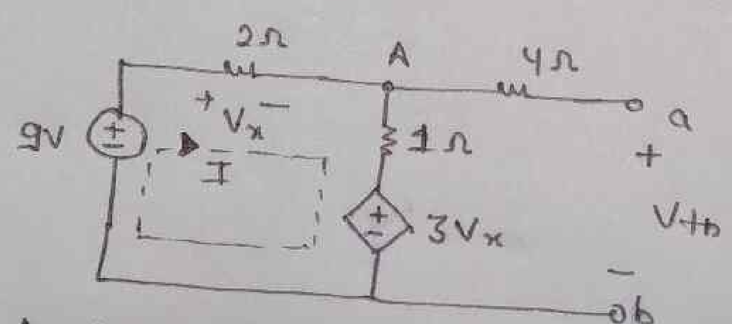


To draw the maximum power from the circuit R_L should be equal to R_{th} which is thevenin equivalent resistance.

Thevenin equivalent resistance in this case can be find out by formula given below -

$R_{th} = \dfrac{V_{th}}{I_N}$ where V_{th} is open circuit voltage across ab terminal and I_N is Norton equivalent short circuit current through ab

To find V_{th} open circuit the ab terminal and then find voltage across it.



Applying KVL across dotted path as shown above

$9 - 2I - I - 3V_x = 0$

$\Rightarrow 9 = 3I + 3V_x$

$\Rightarrow 9 = 3I + 3\times(2I)$ $\{V_x = 2I\}$

$\Rightarrow 9 = 3I + 6I$

$\Rightarrow 9I = 9$

$\Rightarrow \quad I = 1\,A$

$V_{th} = 1 \times I + 3V_x$

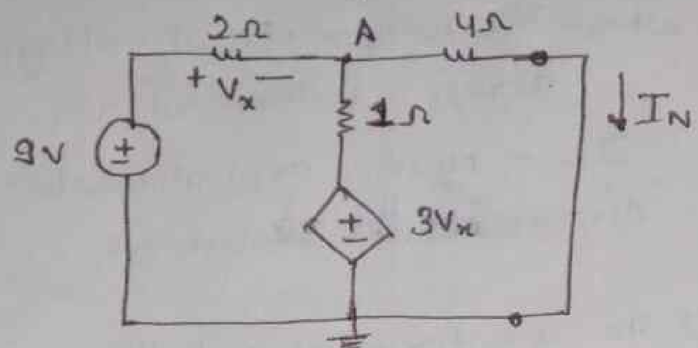
$\Rightarrow V_{th} = 1 \times 1 + 3 \times 2 \times I \quad \{V_x = 2I\}$

$\Rightarrow V_{th} = 1 + 6$

$\Rightarrow V_{th} = 7V$

Now,

To find Norton equivalent short circuit current remove the R_L resistance and short circuit the ab terminal and then find current through it.



Applying nodal analysis at node A, we get

$$\frac{V_A - 3V_x}{1} + \frac{V_A}{4} + \frac{V_A - 9}{2} = 0$$

$$\Rightarrow V_A\left[1 + \frac{1}{4} + \frac{1}{2}\right] - 3V_x - 9/_2 = 0$$

$$\Rightarrow V_A\left[\frac{4+1+2}{4}\right] - 3(9 - V_A) - \frac{9}{2} = 0 \quad \{V_x = 9 - V_A\}$$

$$\Rightarrow \frac{7V_A}{4} - 27 + 3V_A - \frac{9}{2} = 0$$

$$\Rightarrow \frac{7V_A + 12V_A}{4} = \frac{54 + 9}{2}$$

$$\Rightarrow \frac{19V_A}{4} = \frac{63}{2}$$

$$\Rightarrow \quad V_A = \frac{126}{19}$$

$$I_N = \frac{V_A}{4}$$

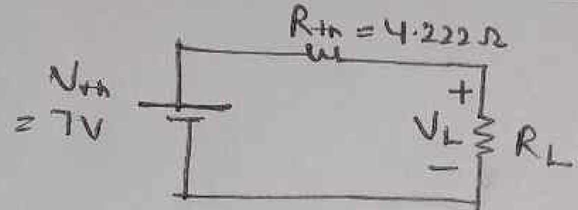
$$\Rightarrow I_N = \frac{126}{76} \text{ A}$$

$$R_{th} = \frac{V_{th}}{I_N}$$

$$\Rightarrow R_{th} = \frac{7 \times 76}{126}$$

$$\Rightarrow \boxed{R_{th} = 4.222 \Omega}$$

Thevenin equivalent circuit



For drawing maximum power $R_L = R_{th}$

Using voltage divider formula

$$V_L = V_{th} \times \frac{R_L}{R_L + R_L}$$

$$\Rightarrow V_L = \frac{V_{th}}{2}$$

Maximum power drawn by load $= \dfrac{V_L^2}{R_L}$

$$= \frac{(V_{th}/2)^2}{R_{th}}$$

$$= \frac{(7/2)^2}{4.222}$$

$$= 2.901 \text{ W}$$

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