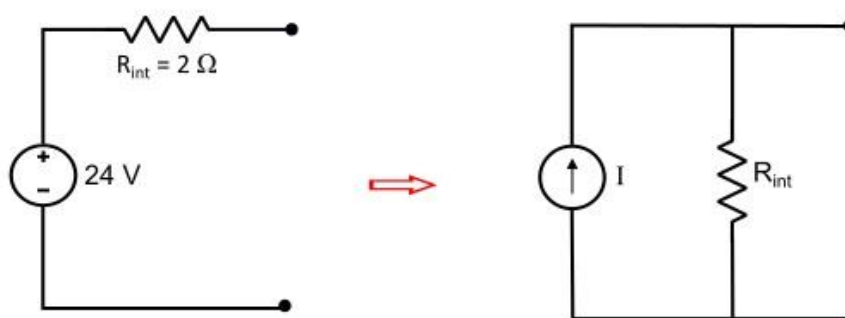


Convert a voltage source of 24 V having a series internal resistance of 2 Ω into an equivalent current source.

Solution



Here, the source current of equivalent current source is

$$I = V/R_{int} = 24/2 = 12A$$

The internal resistance R_{int} of the equivalent current source has the same value as the original voltage source, thus

$$R_{int} = 2\Omega$$



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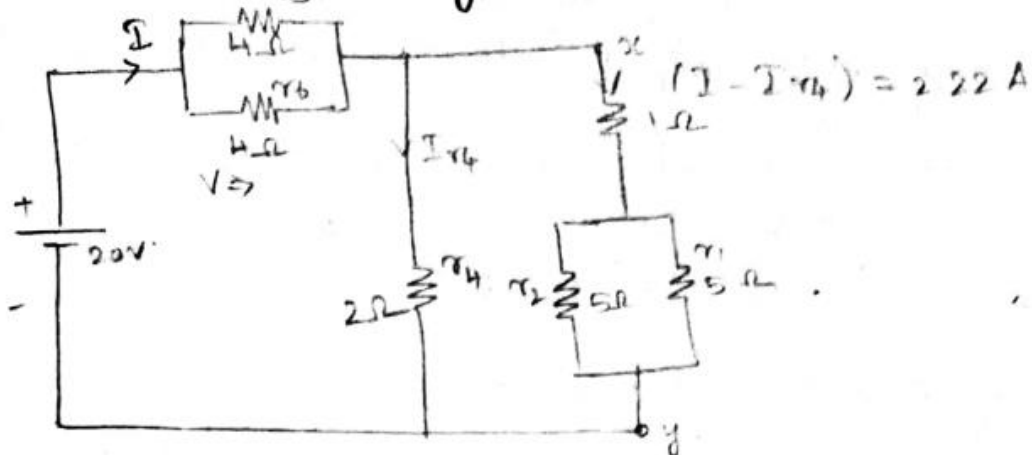
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Find the voltage across 1Ω resistor and power loss across 2Ω resistor in Fig



Equivalent resistance of r_1 and r_2 .

$$r_1 || r_2 = 2.5\Omega$$

$$R_{x-y} = 2.5 + 1 = 3.5\Omega$$

$$r_4 || R_{x-y} = \frac{1}{\frac{1}{3.5} + \frac{1}{2}} = 1.27\Omega$$

$$r_5 || r_6 = 2\Omega$$

$$R_{eq} = 2 + 1.27 = 3.27$$

$$I = \frac{V}{R} = \frac{20}{3.27} = 6.12A$$

The current through r_4

$$I_{r_4} = I \times \frac{R_{x-y}}{R_{x-y} + 2r_4} = 6.12 \times \frac{3.5}{3.5 + 2} \approx 3.9A$$



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Power loss in 2Ω .

$$P = I^2 R = (3.9)^2 \times 2 \\ = 30.4 \text{ W}$$

$$V_{x-y} \Rightarrow 2\Omega \rightarrow (2 \times 3.9) \Omega - (6.12 \times 2) \\ = 7.76 \text{ V}$$

$$V_{r3} = 7.76 - (2.22 \times 2.5) \\ = 2.21 \text{ V}$$