

3. Open & Closed Circuits, Source Transformation

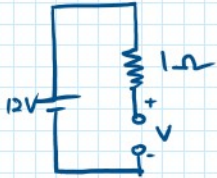
09 February 2024 09:56

OPEN CIRCUIT

Resistance: INFINITE

Current: zero

Voltage: any finite value

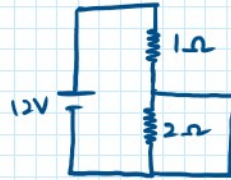


SHORT CIRCUIT

Resistance: zero

Current: any finite value

Voltage: zero



NUMERICALS

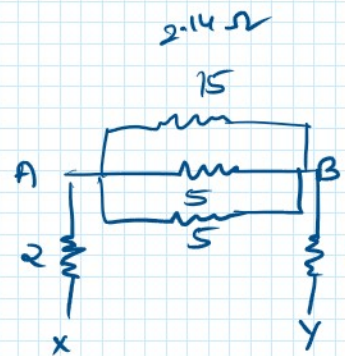
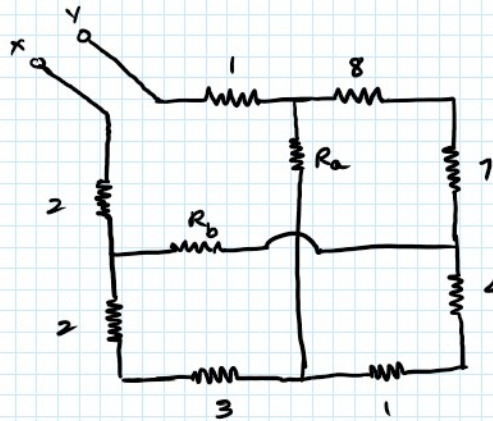
① Find equivalent resistance between X and Y if

(i) $R_a = \infty$, $R_b = \infty$

(ii) $R_a = 0$, $R_b = \infty$

(iii) $R_a = \infty$, $R_b = 0$

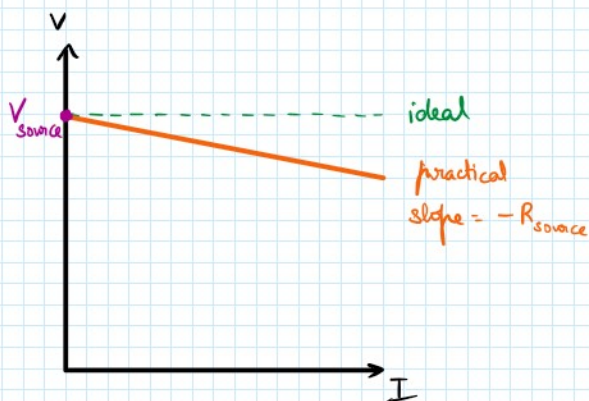
(iv) $R_a = 0$, $R_b = 0$



PRACTICAL VOLTAGE SOURCE

Ideal voltage source in series with internal resistance

- Internal resistance very small
- Internal resistance = 0 \rightarrow ideal

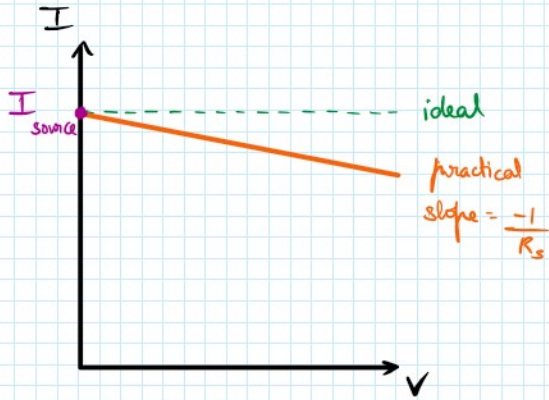


$$V = V_S - IR_S$$

PRACTICAL CURRENT SOURCE

Ideal current source in parallel with internal resistance

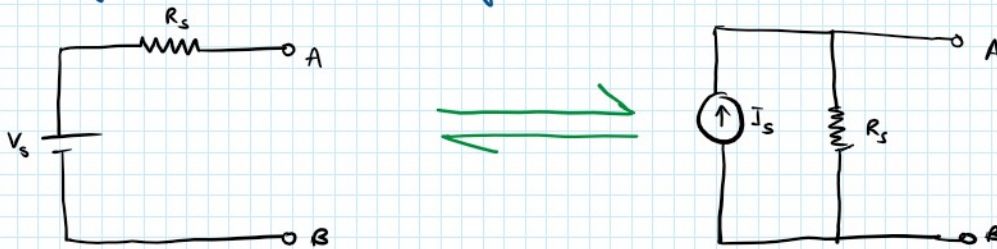
- Internal resistance very high (few Mega ohms)
- Internal resistance = $\infty \rightarrow$ ideal source



$$I = I_s - \left(\frac{V}{R_s}\right)$$

SOURCE TRANSFORMATION

- Only for practical sources
- Voltage source can be changed to a current source and vice versa



Other characteristics should not be changed, i.e.:

- Same terminal voltage across load
- Same terminal current from source
- Same power delivery