Parameters of the Thevenin circuit

Finding V_{th}:

The voltage between the terminal a-b , when no load is connected. ($V_{o.c.}$)

Finding R_{th}:

- Using short circuit current method:

or

$$R_{th} = \frac{V_{o.c}}{I_{s.c}}$$

- Using input resistance method
  (for circuits with independent sources)

or

$$R_{th} = R_{input}$$

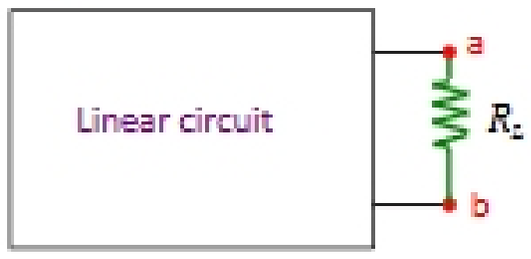
- Using test voltage method

$$R_{th} = \frac{V_T}{I_T}$$

Power Transfer

Consider a linear circuit consisting of resistors, independent and dependant sources connected between nodes (a) and (b).

Connect a resistive load R_L to the circuit as shown.

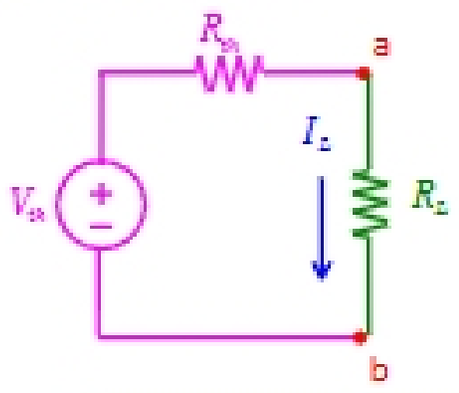


Find the power transferred from the circuit to the load.

Replace the linear circuit be the Thevenin equivalent

Power transferred to the load is:

$$P_L = (I_L)^2 (R_L)$$

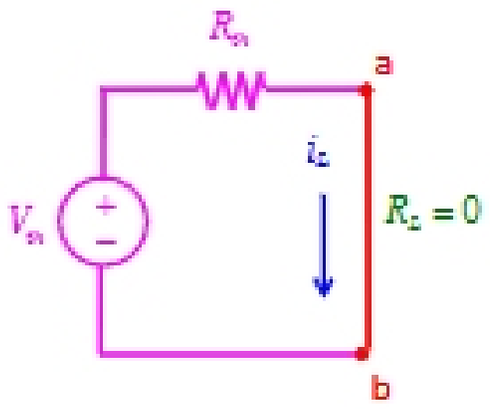


$$P_L = \left[\frac{V_{th}}{R_{th} + R_L}\right]^2 (R_L)$$

Note: For a given circuit the values of V_{th} and R_{th} are defined

The value of P_L varies as function of the value of R_L

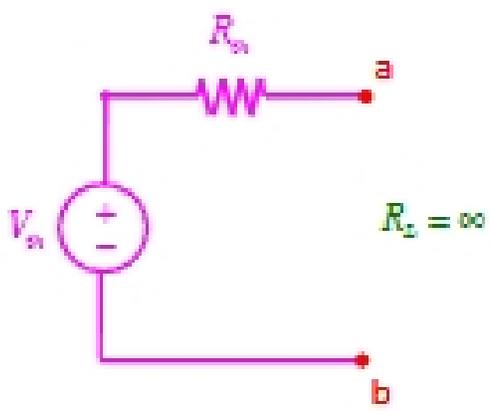
Case (1): $R_L = 0$ (short circuit)



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

$$P_L = \left[\frac{V_{th}}{R_{th} + 0}\right]^2 (0) = 0$$

Case(2): $R_L = \infty$ (Open circuit)



$i_L = 0$

$P_L = 0$