Paper 1, TDC Part-1
Source Transformation

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Source Transformation

Source Conversion

A practical voltage source is always with a series resistance of small value. A practical voltage source will be considered as much as ~~good~~ better voltage source as ~~much~~ low is the value of the series resistance. This series resistance is called internal resistance of the practical voltage source.

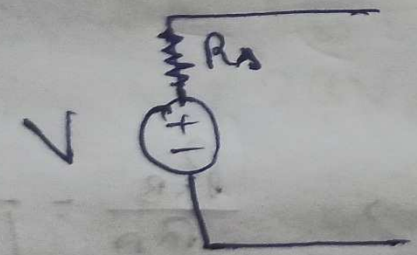

Figure (2.1) A practical voltage source with series resistance Rs.

Source Transformation

Figure (2.1) A practical voltage source with series resistance R_s.

Let the current I flows through the resistor 'Rs' when the voltage source is connected with any load resistor 'R_L'. So the actual voltage supplied by the practical voltage source is

$V' = V - I R_s$

where $I R_s$ is voltage drop across the internal resistance R_s.

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Similarly a practical current source is always considered to be a current source with a shunt resistance R_p as shown below.

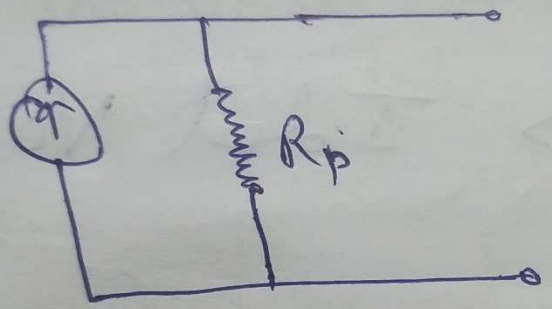

Figure 2.2 → A practical current source with shunt resistance R_p.

For a good practical current source the value of the shunt resistor R_p should be as much high as possible, so that the minimum

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current flows through this IInd resistor R_p and most of the current delivered by the current source should be ~~de~~ available to the load resistor R_L. The actual current ~~source~~ available to load resistor by the practical current source is,

$$I' = I - \frac{I \times R_p}{(R_L + R_p)} = I\left(1 - \frac{R_L}{R_L + R_p}\right)$$

$$= I\left(\frac{R_p}{R_L + R_p}\right)$$

On other hand

A ideal voltage source is that voltage source whose internal resistance (i.e. series resistance) value is zero. The maximum voltage ~~delive~~ supplied by ideal voltage source is 'V'.

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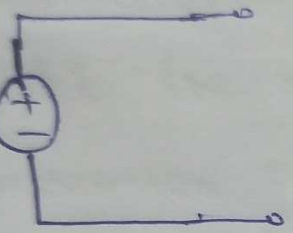
A ideal voltage source can be represented as shown below :-



→ Ideal Voltage Source

Ideally an ideal current source is that current source whose parallel resistance is infinite (i.e. parallel resistor $R_p = \infty$) or we can say it to be open circuited. So the current delivered by Ideal current source to load resistor is I.

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current delivered by Ideal current source to load resistor is I.

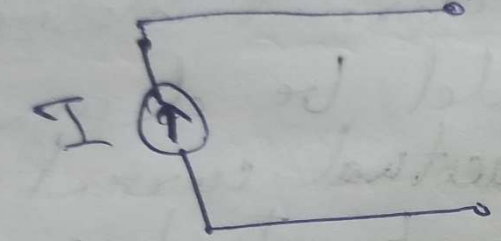

fig 2.3 → Ideal current source

A given practical voltage source with a series resistance (R_s) can be converted ~~into~~ and replaced by equivalent practical current source. Conversely, a practical current source with a ||el resistance (R_p) can be

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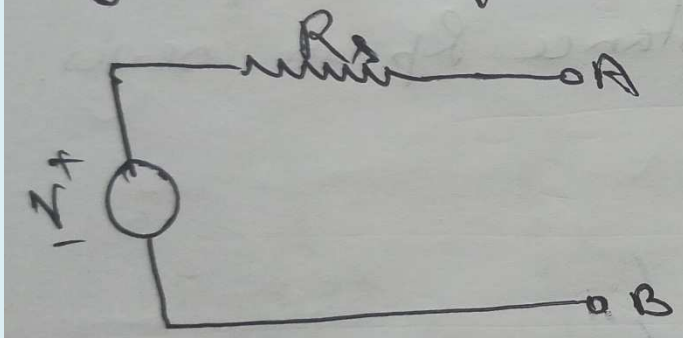
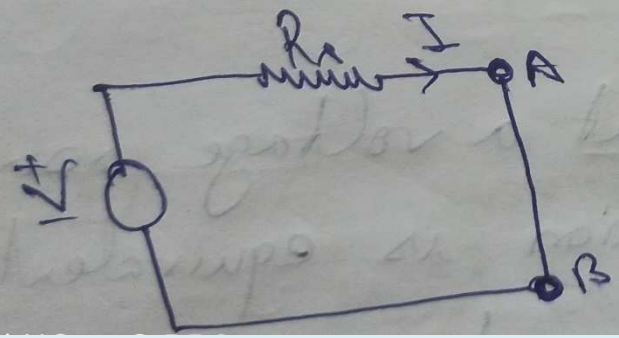
converted into a voltage source with a series resistance, R_s.

Convert the voltage source shown in below figure to equivalent current source.



First we will short the terminal A and B to find the current supplied by the source voltage V.



Current I due to voltag source is $I = \frac{V}{R_s}$

Mesh and Nodal Analysis in Passive Circuits

For any query contact- 9771474020

Thank You

Contd. In next lecture