Circuit challenge [Simulation]

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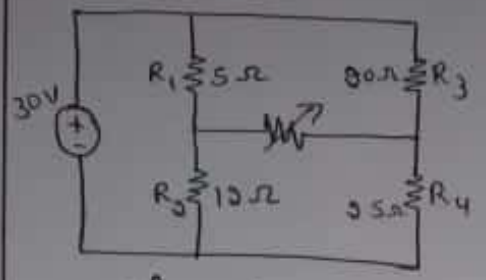
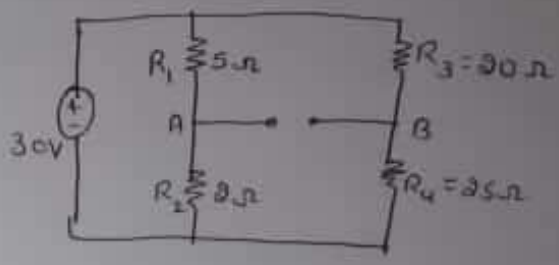
→ Max. power transfer:-



Disconnect the load resistance from the load terminals a & b. To represent the given ckt as Thevenin's equivalent. We have to determine V_{th} & R_{TH}.

The thevenin's voltage @ voltage across the terminal AB is $V_{AB} = V_A - V_B$



$$V_A = V \times \frac{R_2}{(R_1 + R_2)} = 30 \times \frac{12}{(5+12)}$$

$$V_A = 21.7\ V$$

$$V_B = V \times \frac{R_4}{(R_3 + R_4)} = 30 \times \frac{35}{(20+35)}$$

$$V_B = 16.66\ V$$

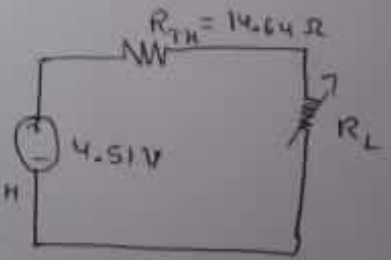
$$\therefore V_{TH} = V_{AB} = V_A - V_B = 4.51\ V$$

. To calculate R_{TH}: By replacing source with their internal resistance.

$$R_{TH} = R_{AB} \cdot \left(\frac{R_1 R_2}{R_1 + R_2}\right) + \left(\frac{R_3 R_4}{R_3 + R_4}\right)$$

$$R_{TH} = 14.64\ \Omega$$

where $R_L = R_{TH} = 14.64\ \Omega$



And the max. power transmitted to load R_L. is,

$$P_{max} = V_{TH}^2 / 4R_{TH}$$

$$= \frac{(4.51)^2}{4 \times 14.64}$$

$$= 343.3\ mW.$$

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CIRCUIT LAB File Edit Run Help

DC

P(RL) 347.3 mW

Add Expression

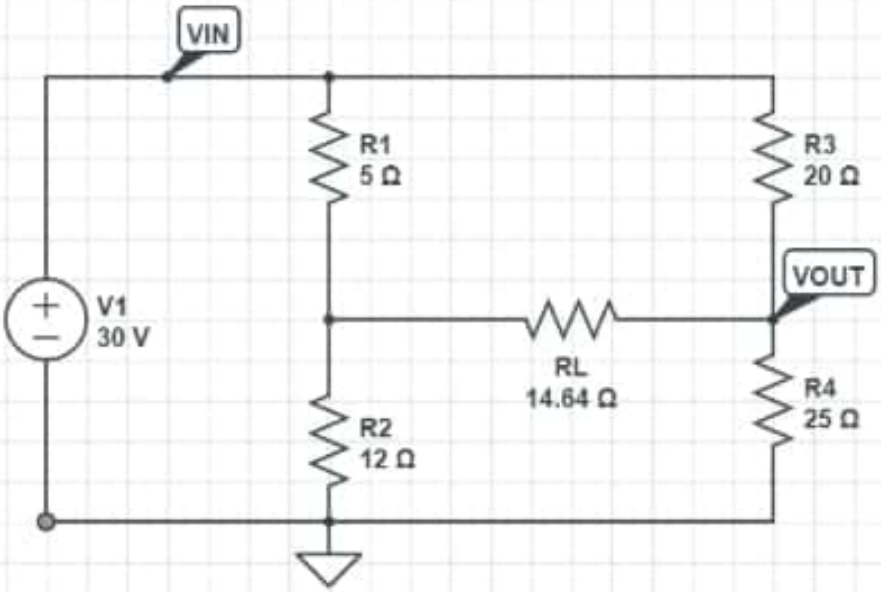
Export Results

Run DC Solver

DC Sweep

Time Domain

Frequency Domain



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