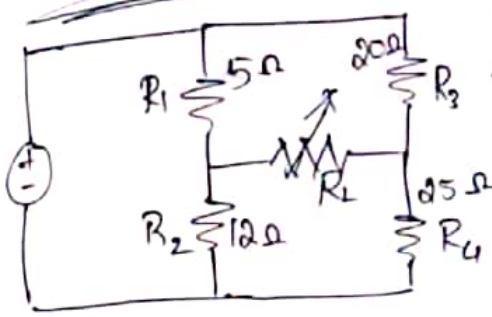
# Circuit Challenge (SIMULATION) (using circuit lab)

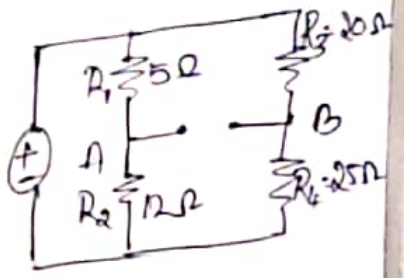
## Max Power transfer:




Disconnect the load resistance from the load terminals a and b. To represent the given circuit as thevenins equivalent we have to determine the thevenins voltage $V_{th}$ and Thevenins equivalent

- The thevenins voltage or voltage across the terminal AB is $V_{AB} = V_A - V_B$

$$V_A = V \times R_2 / (R_1 + R_2)$$
$$= 30 \times 12 / (5 + 12)$$
$$V_A = 21.17V$$



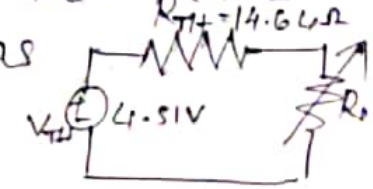

$$V_B = V \times R_4 / (R_3 + R_4)$$
$$= 30 \times 25 / (20 + 25)$$
$$V_B = 16.66V$$

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

To calculate the thevenin's equivalent circuit $R_{TH}$ by replacing source with their internal resistance

$$R_{TH} = R_{AB} = (R_1 R_2 / (R_1 + R_2)) + (R_3 R_4 / (R_3 + R_4))$$
$$R_{TH} = 14.64\Omega$$

By reconnecting the load resistance the thevenins equivalent circuit can be obtained as




For the maximum power transfer theorem, RL value must be equal to $R_{TH}$ to deliver maximum power to the load $\therefore R_L = R_{TH} = 14.64\Omega$

And the maximum Power transferred to load $R_L$ is

$$P_{max} = V_{TH}^2 / 4 R_{TH}$$
$$P_{max} = (4.51)^2 / 4 \times 14.64 = 347.3 watt$$

CIRCUIT LAB File Edit Run Help harshitapoojary

DC

| | |
|---|---|
| V(VIN) | 30.00 V |
| V(VOUT) | 18.38 V |
| I(RL.nA) | -154.0 mA |
| V(RL.nB) | 20.63 V |
| I(RL.nB) | 154.0 mA |

+ Add Expression

Export Results...

Run DC Solver

DC Sweep

Time Domain

Frequency Domain