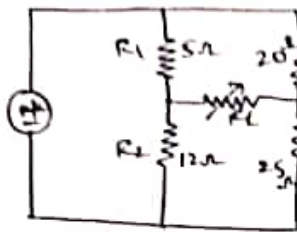# CIRCUIT CHALLANGE (SIMULATION) [USING CIRCUIT LAB]

→ Max. power transfer

GULBI GOURI SHANKER

4AL18EC018

Disconnect the load resistance from the load terminals a and b. To represent the given circuit as Thevenin's equivalent, we are to determine the thevenine voltage V_{TH} and Thevenins equivalent resistance R_{TH}

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

$$V_A = V \times R_2/(R_1 + R_2)$$

$$= 30 \times 12/(5 + 12)$$

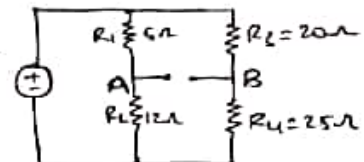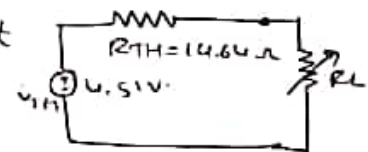$$V_A = 21.17 V$$

$$V_B = V \times R_4/(R_3 + R_4)$$

$$= 30 \times 25/(20 + 25)$$

$$V_B = 16.66 V$$
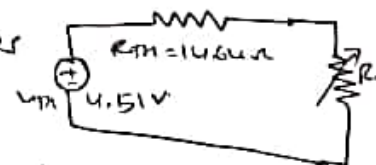
$$\therefore V_{TH} = V_{AB} = V_A - V_B = 4.51 V.$$

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 obtain as

for the maximum power transfer theorem, R_L 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 transfered to load R_L is

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

$$P_{max} = (4.51)^2 / 4 \times 4.64$$

$$P_{max} = 347.3 \, m \, watt.$$

CIRCUIT LAB   File   Edit   Run   Help

DC

P(RL)   347.3 mW

+ Add Expression

Run DC Solver

▸ DC Sweep

▸ Time Domain

▸ Frequency Domain

VIN

R1
5 Ω

R3
20 Ω

VOUT

V1
30 V

RL
14.64 Ω

R4
25 Ω

R2
12 Ω