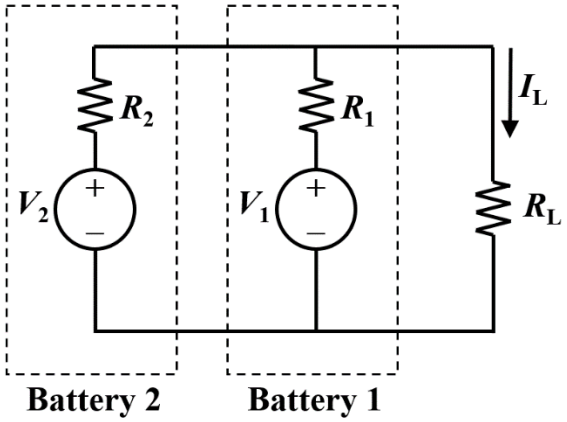
CG1111 Engineering Principles and Practice I

Tutorial for Week 4

DC Circuit Principles – Thevenin Equivalent Circuits

1. Consider a battery with its circuit shown in the figure below.



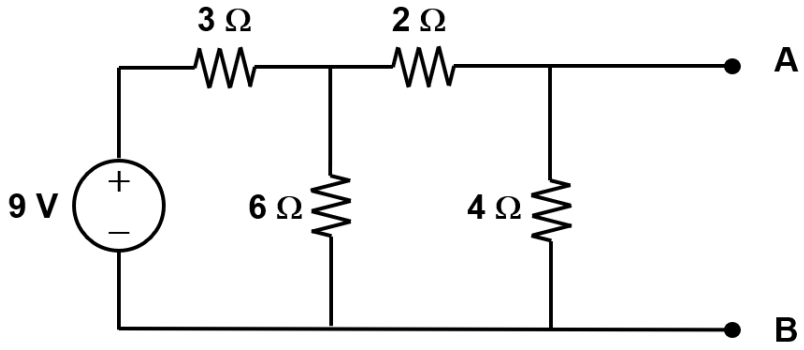
(i) If $V_1 = V_2 = 12$ V, $R_1 = 0.15\ \Omega$, $R_2 = 0.28\ \Omega$, find the Thevenin equivalent circuit as seen by the load R_L.

(ii) If the load $R_L = 2.5\ \Omega$, find the load current I_L, and the voltage across the load R_L.

(iii) Is the load voltage higher or lower compared to the cases where the load were to be powered by just battery 1 or battery 2 alone?

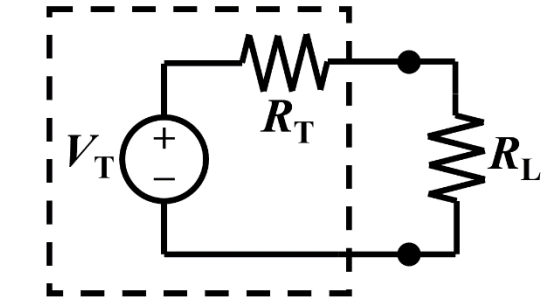
Ans: (i) $V_T = 12$ V, $R_T = 0.098\ \Omega$, (ii) $I_L = 4.62$A, 11.5 V, (iii) higher

2. Find the Thevenin equivalent circuit as seen across node A and node B for the figure below.



Ans: $V_T = 3$ V, $R_T = 2\ \Omega$

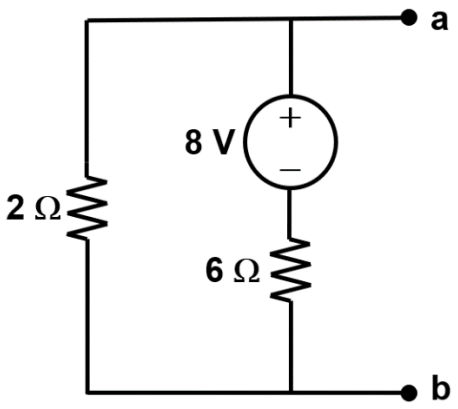
3. For the Thevenin equivalent circuit shown below, derive the value of R_L that causes maximum power transfer from the source to the load R_L.



Thevenin equivalent circuit

Ans: $R_L = R_T$

4. For the circuit shown in the figure below, determine the value of the load resistance R_L to be placed across the nodes **a** and **b**, in order for the load to draw maximum power. What is the value of this maximum power that the load R_L consumes?



Ans: $R_L = 1.5\ \Omega$, $P_{max} = 0.67$ W