Basics: Power

1. The non-ideal voltage source shown below contains an ideal voltage source $V_s$ in series with parasitic resistance $R_s$. Calculate the power supplied and consumed by the load $R_L$. Hence calculate the efficiency of the circuit. Efficiency is defined as the ratio of load power to power delivered by source.

![Circuit Diagram](image)

Basics: Equivalent Resistance and Circuit topology

In the circuit shown below find the equivalent resistance looking in at terminals A-B if the terminals C-D are i) open and ii) short circuited. Also determine the equivalent resistance looking in at terminals C-D is terminals A-B are i) open and ii) short circuited.

![Circuit Diagram](image)
**Basics: Kirchoff’s Current Law**

2. Given $i_a = 1mA$, $i_b = 2mA$, $R_1 = 1k\Omega$, $R_2 = 500\Omega$, $R_3 = 2.2k\Omega$, $R_4 = 4.7k\Omega$ in the circuit below, calculate the voltages $V_a$, $V_b$. Hint: Use Nodal Analysis.

![Circuit Diagram](image)

**Basics: Kirchoff’s Voltage Law**

Given the circuit as below, use KVL to calculate the current $I_x$. Hint: Use Mesh analysis.

![Circuit Diagram](image)

**Answers.**

1. $V_T = 7V$, $\nu = 58.33\%$

2. c-d open, $R_{eq} = 400\Omega$, c-d shorted $R_{eq} = 390\Omega$; a-b open, $R_{eq} = 360\Omega$, a-b shorted $R_{eq} = 351\Omega$

3. $V - a = 1.66V, V_b = 2V$

4. 2A

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