MANDATORY EXPERIMENTS

Experiment 1

Propose an experiment to measure the open circuit voltage, short circuit current, and Thevenin resistor of the Thevenin and Norton equivalent circuits for the linear resistive one-port shown in Fig. 1.

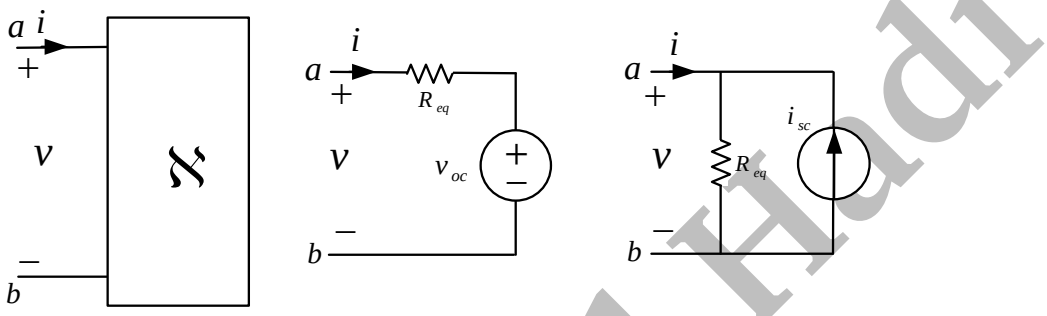

Figure 1: Experimental measurement of the Thevenin and Norton equivalent circuits.

Experiment 2

Devise an experiment to calculate the value of the load resistor taking the maximum power from the resistive one-port shown in 2.

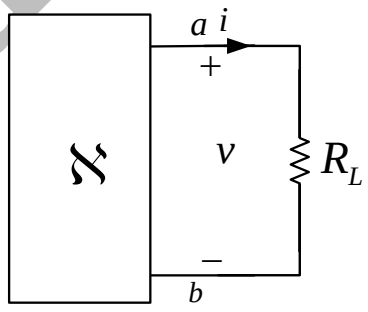

Figure 2: A resistive one-port connected to a load resistor.

Experiment 3 continued on next page...

Experiment 3

A Zener diode is a special type of diode designed to reliably allow current to flow backwards when a certain set reverse voltage, known as the Zener voltage, is reached. The characteristic curve of a typical Zener diode is shown in Fig. 3. Explain how a Zener diode can be used as a voltage source. Is there any practical or analytical limitation on a voltage source created by a Zener diode?

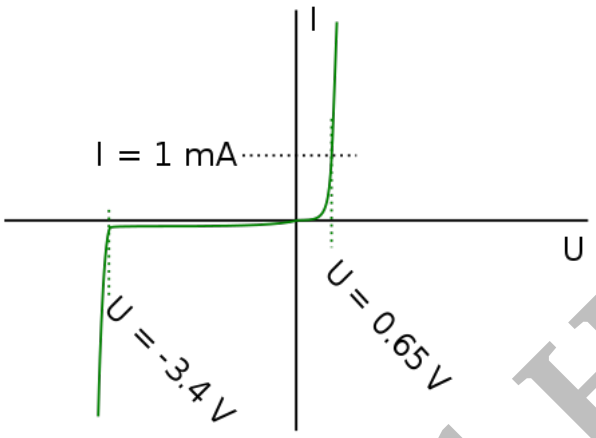

Figure 3: Typical characteristic of a Zener diode.

Experiment 4

Consider the typical characteristic curve of a Zener diode.

(a) Propose a piecewise linear approximation for the characteristic curve using vertical and/or horizontal lines. The forward and (Zener) breakdown voltages should be included in the approximation.

(b) Use the proposed piecewise linear approximation to suggest a model for the Zener diode. You may use ideal diodes, independent sources, or passive LTI resistors in your model.

(c) Use PSpice simulation to verify the accuracy of the suggested model for D02CZ10 zener diode with the forward and breakdown voltages around 0.7 and -10 V.

BONUS EXPERIMENTS

Experiment 5

Return your answers by filling the LaTeXtemplate of the manual.