EXPERIMENT 5

RECIPROCITY AND MAXIMUM POWER THEOREMS

OBJECTIVE: The purpose of this experiment is to verify experimentally Reciprocity and Maximum Power Theorems

PRELIMINARY WORK

P1 If R_L in Figure 5.1 is a variable load resistor, for what value of R_L the maximum power is transferred to the load.
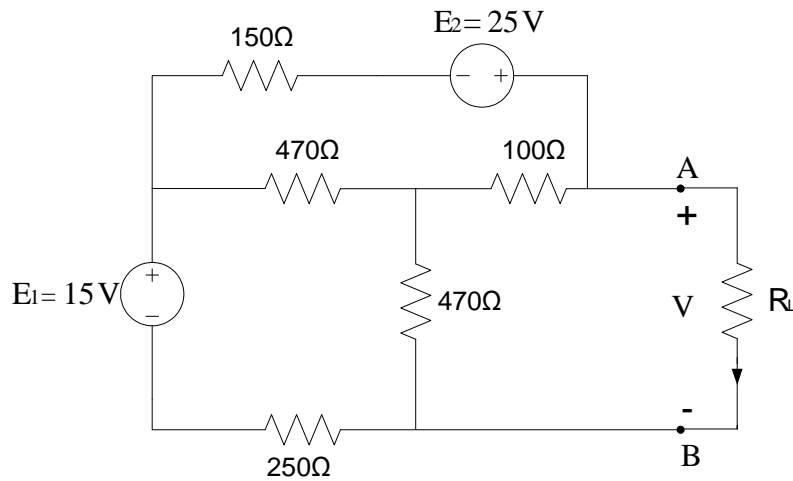

Figure 5.1

P2 Calculate the current I in the network of Figure 5.2 a) and the current I' in the Figure 5.2 b). Compare the results by considering the reciprocity theorem.
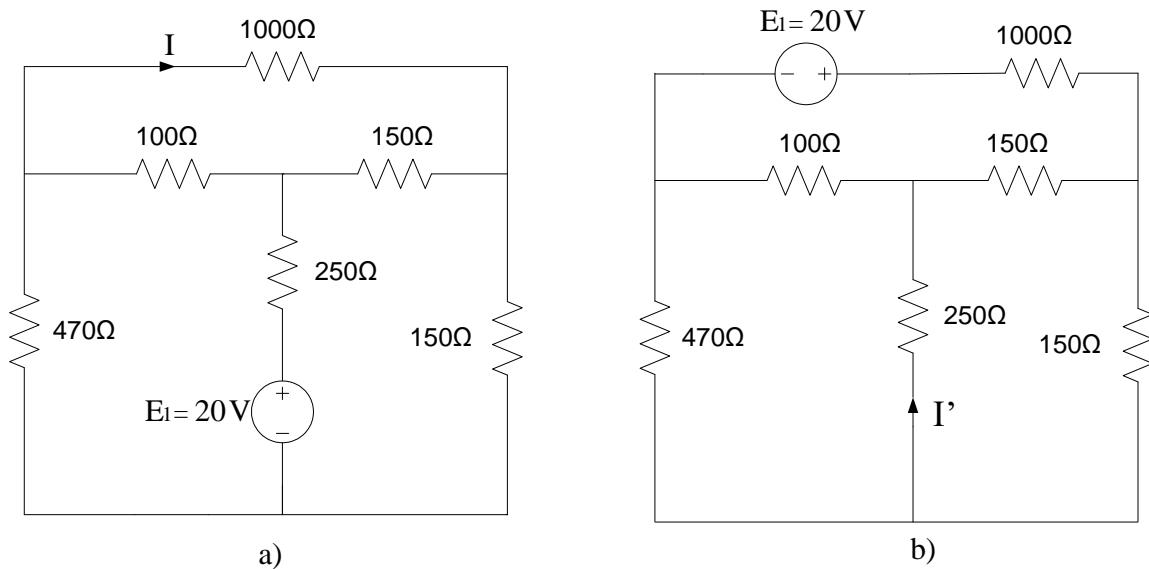

a)   b)

Figure 5.2

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P3 Calculate the voltage V in the network of Figure and the voltage V′ in the network given in Figure 5.3. Compare the results in connection with the reciprocity theorem.
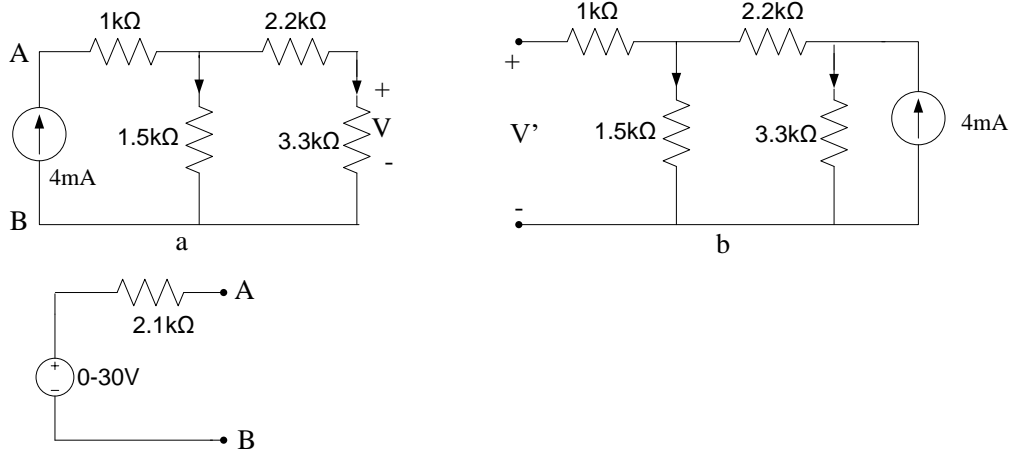

Figure 5.3

EQUIPMENT

Digital Multimeter (DMM)
Avometer (AVO8)
Power Supply
Resistors

EXPERIMENTAL WORK

E1 Replace resistor R_L in Figure 5.1 by a 1500Ω rheostat. For at least 10 different values of R_L, record the voltage and current. Open circuit, short circuit and maximum power transfer conditions must be indicated

Calculate the power $P=VI$ and the load resistance $R_L=V/I$, and plot P against R_L. By using the obtained results calculate the Thevenin resistance, Thevenin voltage and Norton current.

E2 Set up the circuit given in Figure 5.2 a) and measure I. set up also the circuit given in Figure 5.2 b) and measure I′.

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E3 Set up the circuit given in Figure 5.3 a) and measure V. Set up the circuit in Figure 5.3 b) and measure V′.

CONCLUSIONS

C1 Compare the results obtained in P1 with the ones obtained in the experimental work. State the possible reasons for the differences.

C2 Compare the currents I and I′ measured in E2. Comment on the result in the view of reciprocity theorem.

C3 Repeat C2 for the voltages V and V′ measured in E3

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