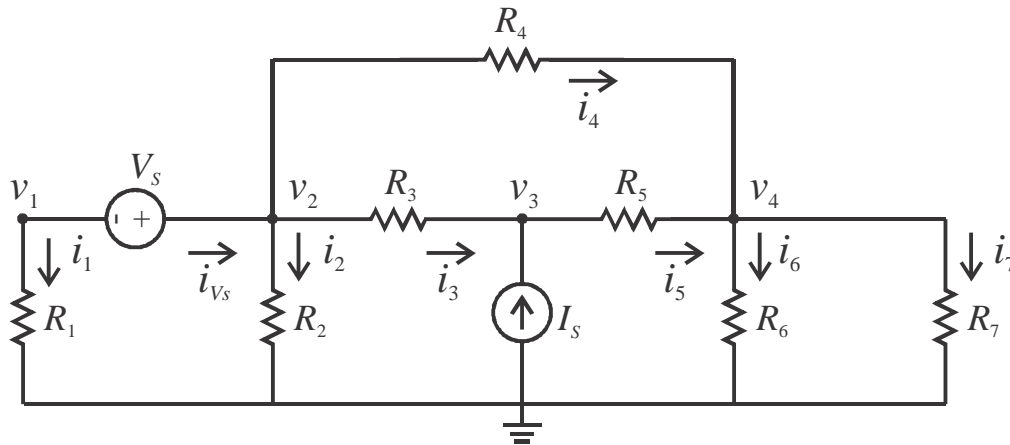


## EE 220/220L Circuits I (Fall 2017)

### Laboratory 4 Nodal Analysis



#### PRELIMINARY

- 1) Use **nodal analysis** to find the labeled node voltages  $v_1$ ,  $v_2$ ,  $v_3$ , and  $v_4$  with respect to the reference node (ground). Given:  $V_s = 8\text{ V}$ ,  $I_s = 45\text{ mA}$ ,  $R_1 = 330\ \Omega$ ,  $R_2 = 680\ \Omega$ ,  $R_3 = 1\text{ k}\Omega$ ,  $R_4 = 220\ \Omega$ ,  $R_5 = 470\ \Omega$ ,  $R_6 = 1.5\text{ k}\Omega$ , and  $R_7 = 1\text{ k}\Omega$ . **SHOW ALL WORK IN LOGBOOK!**
- 2) Use the results of part 1 to find the labeled branch currents  $i_1$  through  $i_7$ , as well as  $i_{V_s}$ .
- 3) Calculate the power absorbed by each resistor and source (remember passive sign convention). Does the power absorbed by any resistor exceed  $0.25\text{ W}$ ? If so, which one(s)?
- 4) Have the lab instructor sign off on your preliminary before you begin the experiment.

#### EXPERIMENT

- 1) Measure and record the actual values of each resistor.
- 2) Build the circuit on the pegboard with the resistors in the same arrangement as shown in the circuit. If necessary, ask the lab instructor or a TA for help in configuring the sources.
- 3) Measure and record the actual source current & voltage, node voltages, and branch currents.
- 4) Have the lab instructor or a TA sign-off on your data before you tear down the circuit.

#### SUMMARY/CONCLUSIONS

- Prepare four neat tables in your logbook listing: 1) resistor values & source values, 2) node voltages, 3) branch currents, and 4) power absorbed by each circuit element. Format: Variable name in first column, analytic (i.e., calculated or nominal) values in the second column, measured values in the third column, and percent difference between the calculated/nominal and measured values in the fourth column. **Note:** % difference =  $| \text{measured} - \text{analytic} | / | \text{analytic} | * 100\%$ .
- Analyze the data and discuss the results, e.g., explain differences between predicted and measured values.