

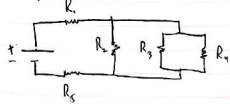
Course Number and Name: CECS 211: Principles of Computer Engineering I	
Semester and Year: Fall 2016	
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Date of Report Submitted: 09/15/2016	Grade:

Section 1: Calculations by Hand

IT	3.1128mA
I1	3.1128Ma
I2	589 μ A
I3	1.26 mA
I4	1.26 mA
VR1	3.1128 V
VR2	2.77 V
VR3	2.77 V
VR4	2.77 V
VR5	3.1128 V

Calculations for the values above are below:

Step 1 - Calculations



$$R_1 = [R_1 + (R_2 \parallel (R_3 R_4)) + R_5]$$

$$R_1 = [R_1 + (R_2 \parallel (\frac{2.2(1.1)}{4.4})) + R_5]$$

$$R_1 = [R_1 + (R_2 \parallel R_{34}) + R_5]$$

$$R_1 = [R_1 + (\frac{4.7(1.1)}{5.8}) + R_5]$$

$$R_1 = [R_1 + R_{34} + R_5]$$

$$R_1 = [1 + 0.8913 + 1]$$

$$R_1 = 2.8913 \text{ k}\Omega$$

$$R_{34} = 1.1 \text{ k}\Omega$$

$$R_2 = 4.7 \text{ k}\Omega$$

$$R_{34} = 0.8913 \text{ k}\Omega$$

$$V_1 = I_T R_1$$

$$I_T = \frac{V_1}{R_1} = \frac{9 \text{ V}}{2.8913 \text{ k}\Omega} = \frac{9}{2891.3} = 0.00311279 \text{ A} = 3.1128 \text{ mA}$$

	R1	R2	R3	R4	R5	Total
V	3.1128V	2.77V	2.77V	2.77V	3.1128V	9V
I	3.1128mA	589uA	1.26mA	1.26mA	3.1128mA	3.1128mA
R	1kΩ	4.7kΩ	2.2kΩ	2.2kΩ	1kΩ	2.891kΩ

$$I_T = \frac{V_T}{R_T} = \frac{9 \text{ V}}{2.891 \text{ k}\Omega} \approx 3.1128 \text{ mA}$$

$$R_{34} = \frac{R_3 R_4}{R_3 + R_4} = \frac{2.2 \text{ k}\Omega \times 2.2 \text{ k}\Omega}{2.2 \text{ k}\Omega + 2.2 \text{ k}\Omega} = 1.1 \text{ k}\Omega$$

$$R_{34} = \frac{R_3 \times R_4}{R_3 + R_4} = 891.3 \Omega$$

$$I_1 = I_T = 3.1128 \text{ mA}$$

$$I_2 = I_T = 3.1128 \text{ mA}$$

$$V_1 = I_T \times R_1 = 3.1128 \text{ mA} \times 1 \text{ k}\Omega = 3.1128 \text{ V}$$

$$KVL = V_T - V_1 - V_5 = V_{34}$$

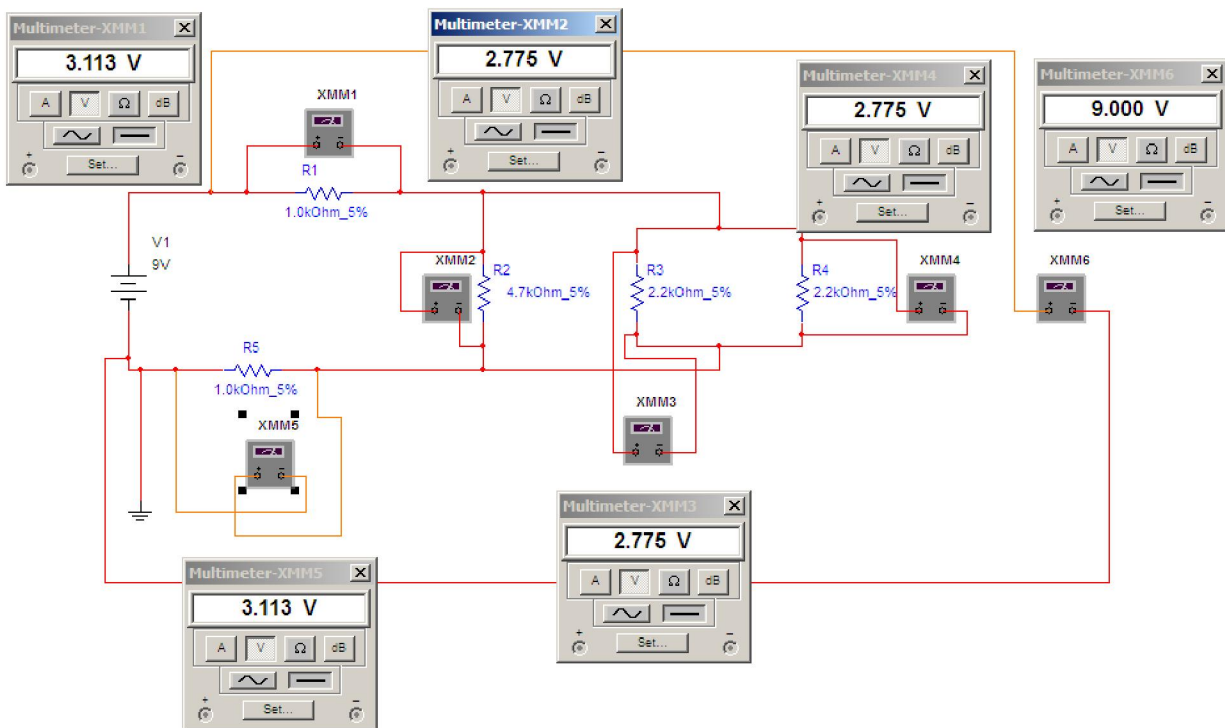
$$9 \text{ V} - 3.1128 - 3.1128 = 2.7744 \text{ V}$$

$$I_2 = \frac{V_2}{R_2} = \frac{2.77 \text{ V}}{4.7 \text{ k}\Omega} = 589 \mu \text{A}$$

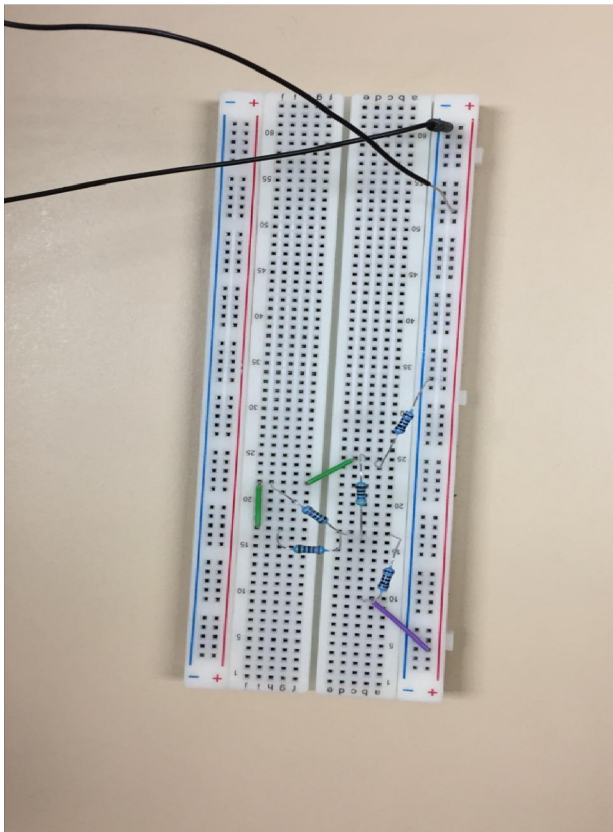
$$I_3 = \frac{V_3}{R_3} = \frac{2.77 \text{ V}}{2.2 \text{ k}\Omega} = 1.26 \text{ mA}$$

$$I_4 = \frac{V_4}{R_4} = \frac{2.77 \text{ V}}{2.2 \text{ k}\Omega} = 1.26 \text{ mA}$$

Section 2: Multisim Screenshot



Section 3: Snapshot of the Circuit



Section 4: Measurements from DMM

Measure with ohmmeter of DMM	Resistance
R1	0.92 k Ω
R2	4.3 k Ω
R3	2.1 k Ω
R4	2.2 k Ω
R5	0.93 k Ω
RT	2.78 k Ω
Measure with current meter of DMM	Current
IT	3.23 mA
I1	3.27 mA
I2	623 μ A
I3	1.27 mA
I4	1.22 mA
Measure with voltmeter of DMM	Voltage
VR1	3.01 V
VR2	2.68 V
VR3	2.68 V
VR4	2.68 V
VR5	3.01 V