University of Jordan
School of Engineering
Electrical Engineering Department

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EE 204
Electrical Engineering Lab

EXPERIMENT 2 REPORT & PRE-LAB
RESISTORS AND DC CIRCUITS

Section # _____ Group # _____

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EXPERIMENT 2
RESISTORS AND DC CIRCUITS

PROCEDURE A - RESISTORS

Table 1

	1200 + 390 R_1	R_2	R_3	R_{series}	$R_{parallel}$
Nominal Value	1600Ω	1200Ω	1000Ω	3800Ω	406.78Ω
Color Code	orange-white-brown-gold + brown-red-red-gold	brown-red-red-gold	brown-black-red-gold		
Tolerance (%)	± 79.5	± 60	± 50		
Measured Value	1549.1 Ω	1160.9 Ω	992.8 Ω	3734.2 Ω	399.77 Ω
Deviation (%)	3.18%	3.25%	0.72%	1.73%	1.72%

3. Does the deviation you calculated reside within the tolerance declared by the color code?

Yes it is

5. Now connect the three resistors in parallel on the breadboard, and measure the equivalent resistance $R_{parallel}$. Record the nominal, measured and deviation values in Table 1. What is the equation you used to calculate $R_{parallel}$?

$$R_{parallel} = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}}$$

6. Are the series and parallel equivalent resistances close to the measured values or not?

Yes

PROCEDURE B - VOLTAGE AND CURRENT DIVISION

3. Use theoretical analysis to determine the expected current I and record it in Table 2. What equation did you use?

$I = \frac{V_s}{R_{series}}$, $R_{series} = R_1 + R_2 + R_3$

4. What is the voltage divider equation for the voltage across R_1?

$V_1 = \frac{R_1}{R_{series}} V_s$

Table 2

I Theory (mA)	I point a (mA)	I point b (mA)	I point c (mA)
2.37	2.37	2.37	2.37

Table 3

	V_{ab} (V)	V_{bc} (V)	V_{ce} (V)	$V_{ab}+V_{bc}+V_{ce}$	V_S (V)
Theory	3.79	2.84	2.37	9 V	9 V
Measured	3.82	2.81	2.41	9.04 V	9 V

9. What is the current divider equation for the current in resistor R_1?

$I_1 = \frac{R_{parallel}}{R_1} I_S$

Table 4

	I_1 (mA)	I_2 (mA)	I_3 (mA)	$I_1+I_2+I_3$	I (mA)	V_{ae} (V)
Theory	5.625	7.9	9	22.525	22.525	9
Measured	5.69	7.68	9.02	22.39	~~22.43~~ 22.21	9.035

PROCEDURE C – CAPACITORS AND INDUCTORS IN DC CIRCUITS

3. What is the current divider equation for the current in resistor R_1?

$I_1 = \frac{Z_{parallel} * I}{Z_1} = \frac{V}{(R_1+Z_L)\left(\frac{1}{R_1+Z_L}+\frac{1}{R_2}+\frac{1}{Z_C+R_3}\right)}$

$= I_S * \frac{R_1 R_2}{(R_1+R_2)R_1}$

Table 5

	I_1 (mA)	I_2 (mA)	I_3 (mA)	$I_1+I_2+I_3$	I (mA)	V_{ae} (V)
Theory	5.625	7.5	0	13.125	13.125	9
Measured	5.48	~~7.74~~ 7.74	0.00023	13.22	12.92	9.034

5. What happens to inductors in DC circuits?

It become a short circuit

6. What happens to capacitors in DC circuits?

It became an open circuit

PROCEDURE D – NODAL AND MESH ANALYSIS

3. What was the nodal equation you wrote at node *b*?

$\frac{V_b}{R_2} + \frac{V_b}{R_3} + \frac{V_b+14}{R_4} + \frac{V_b-9}{R_1} = \emptyset$

Table 6

	V_{ae} (V)	V_{be} (V)	V_{ce} (V)	V_{de} (V)
Theory	9	-0.429	-0.429	-14
Measured	9.034	-0.441	-0.441	-14.07
Deviation (%)	0.38%	2.8%	2.8%	0.5%

5. What was the mesh equation you wrote for the *left* mesh?

$-9 + 1200I_1 + 2200I_2 = 0$

Table 7

	I_1 (mA)	I_2 (mA)	I_3 (mA)	I_4 (mA)
Theory	7.857	-0.195	-0.429	8.531
Measured	7.79	-0.2	-0.392	8.47
Deviation (%)	0.86 %	2.5 %	8.6 %	0.71 %

CONCLUSIONS

Summarize in clear but concise format what you learned from this experiment:

....we learned from this experimant how to find the value ~~for~~ of a different types of resistors by using color code, then find the equivalent resistor value for different pattern of connections (series and /or parallel), also measure and calculate the related values like current and voltages according to these connections, notice the effect of capacitor and inductor on the circuit, finally, apply mesh analysis, nodal analysis, current division and voltage division in mathmatical and practical way.

** End **