

Lab 3: Capacitors in Series and Parallel

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1 Purpose

The purpose of this lab is to gain a working understanding of the real-world behavior of capacitors, and experimentally finding the equivalent capacitance of various combinations of series and parallel capacitors.

2 Theory

3 Experiment Analysis

4 Procedure

4.1 Measurement of Capacitance Using a Multi-Meter

4.2

5 Data and Graphs

5.1 Part 1

[Table 5.1] Stated Value Versus Actual Value of Capacitors

	Stated Value of Capacitance	Experimental Value Measured	Percent Error
C_1	$5\mu F$	$5.62\mu F$	12.4%
C_2	$8\mu F$	$9.96\mu F$	24.5%
C_3	$10\mu F$	$11.2\mu F$	12%
C_4	$15\mu F$	$16.8\mu F$	12%
C_5	$25\mu F$	$28.6\mu F$	14.4%

5.2 Part 2-5

	$C_{eq(measured)}$	$C_{eq(calculated)}$	Percent Error
Part 2	$2.71\mu F$	$2.72\mu F$	0.37%
Part 3	$26.8\mu F$	$26.78\mu F$	0.075%
Part 4	$10.87\mu F$	$10.89\mu F$	0.184%
Part 5	$21.4\mu F$	$21.38\mu F$	0.093%

5.3 Part 6

	Nominal Capacitance Value	Measured Voltage	Charge (μC)	Electric Potential Energy (μJ)
C_1	$5\mu F$	3.967V	19.8	39.3
C_2	$10\mu F$	3.968V	39.7	78.7
C_3	$8\mu F$	3.967	31.7	62.9

6 Calculations and Results

6.1 Part 1

6.2 Part 2

6.3 Part 3

6.4 Part 4

6.5 Part 5

6.6 Part 6

7 Questions

7.1 Part 1

7.2 Part 2

7.3 Part 3

7.4 Part 4

8 Conclusion