UNITED STATES AIR FORCE ACADEMY
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

ECE 332 Laboratory Exercise 7d
RLC Circuit Design

YOUR NAME HERE

1. Objective

State the objectives of the lab.

2. Specifications and Limitations

Define exactly what your design is supposed to.

3. General Approach

Discuss how you plan to go from the given specifications to the final build.

4. Design

a. Mathematical Equation

Discuss the theory behind the response of an RLC circuit, including the governing equations. Include in this section a graph of your theoretical circuit response.

Note you might want to include the different data points on your graphs.

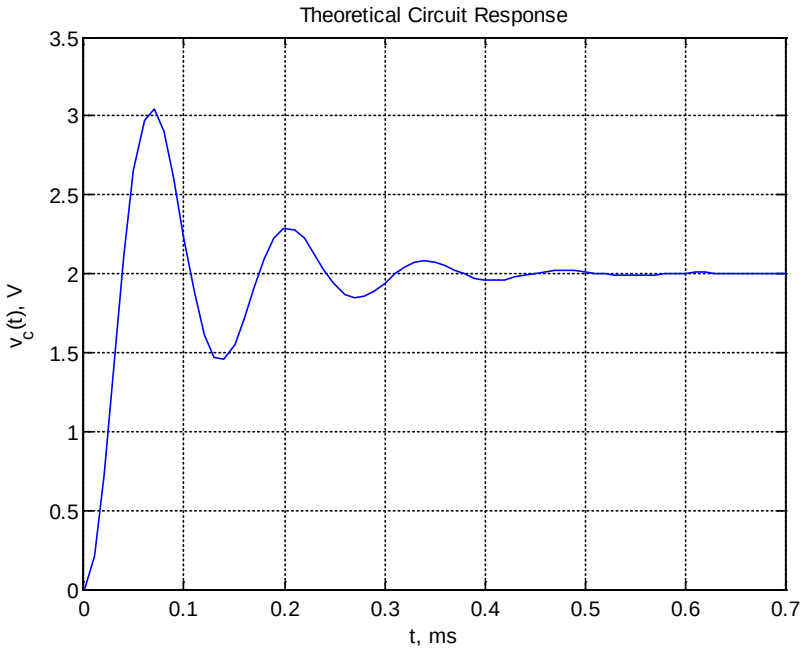

Figure 1. Theoretical Response

Use the waveform to determine if your equation meets the specifications (it should.)

b. Circuit Simulation

Discuss how you came up with your circuit values. Include all relevant equations and any assumptions. Include a graph that includes both the graph from Figure 1 and the Multisim graph (shown below)

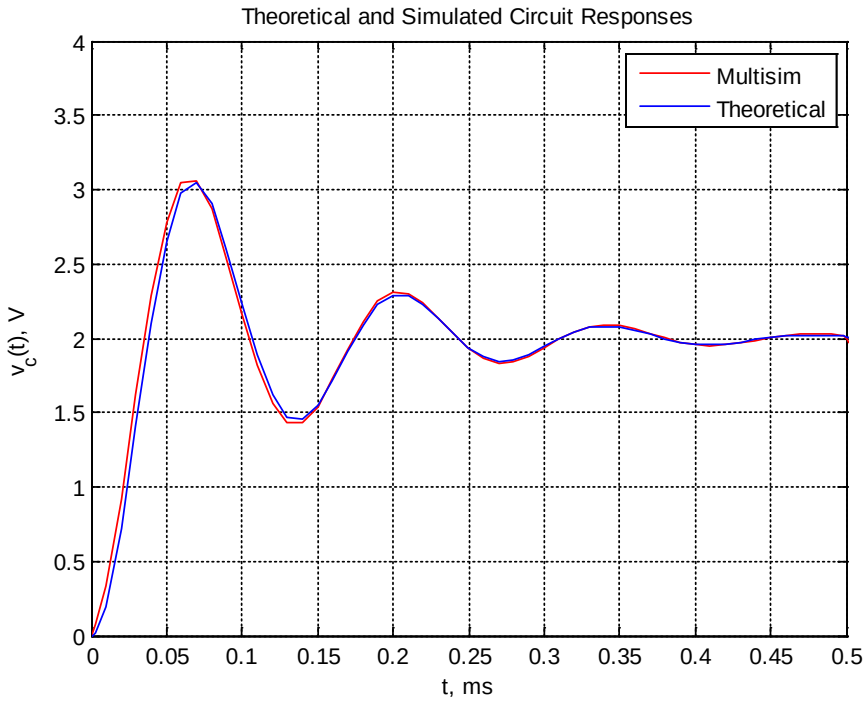

Figure 2. Simulated Circuit Results

c. Realistic Values

State how you came up with the realistic values. Include all three graphs on the same plot, as shown below.

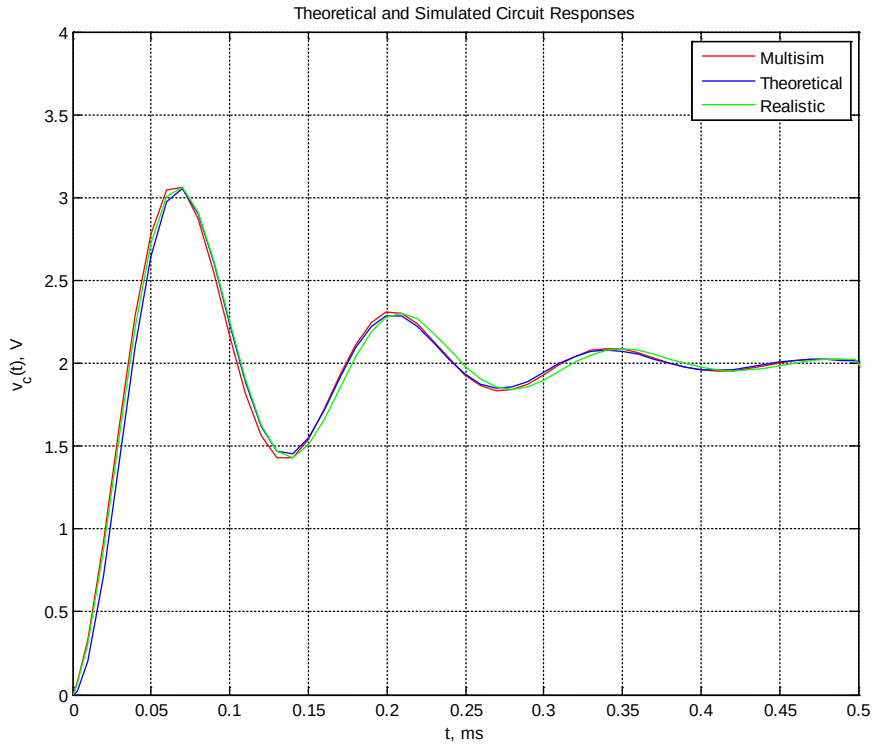

Figure 3. Theoretical, Ideal, and Realistic Responses

Ensure your realistic simulation meets your specifications. Include an error analysis to prove it.

Table 1. Percent Error Using Realistic Values.

Parameter	Ideal Value	Realistic Value	Percent Error
ζ			
f_0			
v(∞)			

5. Implementation

Talk about building your circuit. Include relevant schematics and any type of measurements you performed to determine parasitic values.

Figure 4. Circuit Model

(Include a schematic of your final design)

Figure 5. Schematic

Include photographs of your actual circuit.

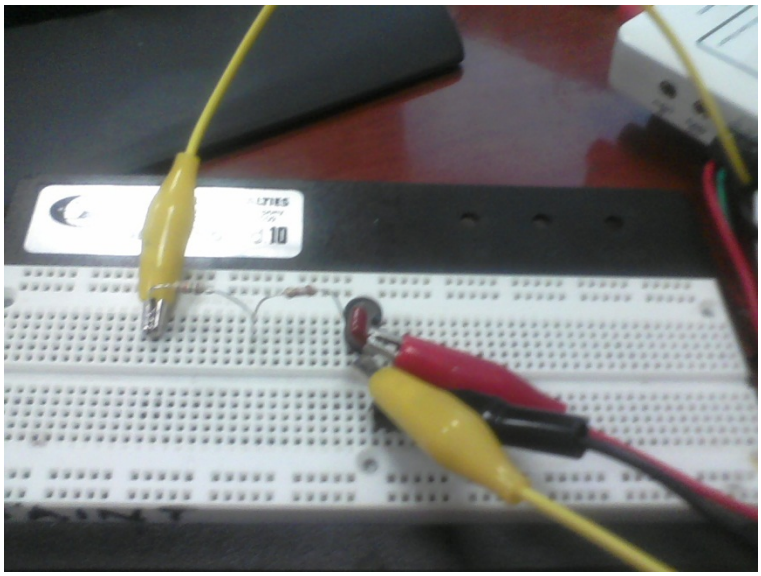

Figure 6. myDAQ Circuit

6. Analysis and Testing

Talk about how you tested your circuit. You can include screen captures from the myDAQ instruments. However, you will want to include the myDAQ results and the Multisim results on the same graph, as shown below.

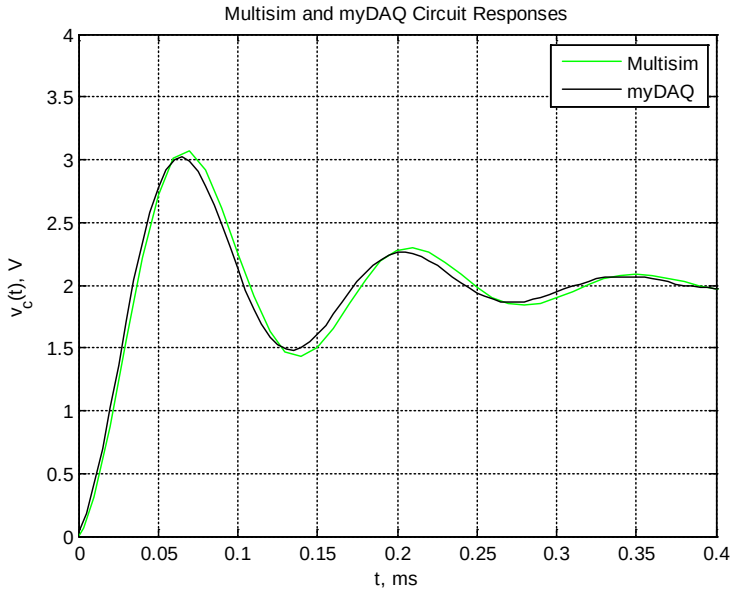

Figure 7. Built Circuit Response.

Measure the myDAQ data (whether it be in Matlab or using the cursors on the scope). Perform an error analysis.

Parameter	Ideal Value	Designed-to Value	Built Value	Percent Error Specified Values	Percent Error Designed Values
ζ					
f_o					
$v(\infty)$					

Table 2. Percent Error of Realized Circuit.

Perhaps include possible sources of error

Device	Component Value	Measured Value	% Difference
Inductor			
Capacitor			
Resistor			
Resistor			

Table 3. Actual Component Values

For some final analysis, you should graph the theoretical response USING YOUR MEASURED COMPONENT VALUES and plot against your measured response. Sometimes they match up, sometimes they do not.

5. Conclusions

Summarize your design's performance, lessons learned, etc.

Appendices

Include any Matlab code—I don't need everything. Basic code used to generate plots is fine.