

Lab 3. (25 points total)

3-1 LC Resonant Circuit (3 points)

(Label and put these together, input and output and measurement of frequency must all be on screen)

1 point for screenshot of sine wave before resonance

1 point for screenshot of sine wave at resonance

1 point for screenshot of sine wave after resonance

3-1 Finding Fourier Components of a Square Wave (6 points)

(Label and put these together, input and output and measurement of frequency must all be on screen)

1 point for screenshot of square wave at resonance

3 points for 3 screenshots of three terms of the Fourier series

1 point for screenshot of ringing

1 point for "Why does it decay? Does it appear to decay exponentially?"

3-2 Half-wave Rectifier (2 points)

1 point for screenshot of input and output with 2.2K load

1 point for (both) "Is it what you expect? Polarity? What happens if you reverse the direction of the diode?"

3-3 Full-Wave Bridge Rectifier (6 points)

1 point for screenshot of output waveform only

1 point for why you should not connect a second channel to your transformer to attempt to measure your input

1 point for "Do you see why diodes in this circuit usually fail in pairs?"

1 point for screenshot of flat region with width-measurement on screen

1 point for explanation of the flat region (Please say more than "the diode doesn't conduct.")

1 point for what happens if you reverse any of the four diodes (Please say more than just "they'll blow up." Which one would blow up first? Why would they blow up in the first place?)

2 extra credit points for a single screenshot that has A, B, V_{out}, and the transformer output, all on the same screen

1 extra credit point for explaining the shapes of A, B, and V_{out}.

3-4 Ripple (2 points)

1 point for screenshot of output with 15 μ F with measurement of both ripple amplitude and discharge time on screen (Do not use AC coupling)

1 point for screenshot of output with 470 μ F with measurement of both ripple amplitude and discharge time on screen (Use AC coupling for

this)

3-5 Signal Diodes (2 points)

1 point for screenshot of input square wave and output at ~10kHz and ~1V. (The output should be visible and look like a part of the derivative of the input.)

1 point for explaining what the 2.2K actually does and what happens when you remove it

3-6 Diode Clamp (1 point)

1 point for screenshot of input (sine wave with 10V amplitude) and output

3-7 Diode Limiter (3 points)

1 point for screenshot of input (sine wave with 10V amplitude) and output

1 point for saying what the circuit does

1 point for explaining how the circuit works