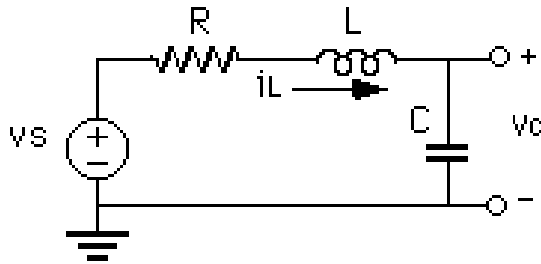


Lab 2 – Step response of RLC circuit lab report requirement document

Here is what I am expecting in the Lab 2 report:

- i) **Calculation of Critically damped Resistor** value for a series RLC circuit after assuming suitable values (preferably the one you get in the Lab kit) of L and C

Circuit:



For example:

$$L = 1\text{mH}$$

$$C = 0.1\mu\text{F}$$

Value of R for critically damped response can be found out using the below formula

$$\omega^2 = \alpha^2 \rightarrow (1)$$

$$\text{Where } \omega = 1/\sqrt{LC}$$

$$\alpha = R/(2L)$$

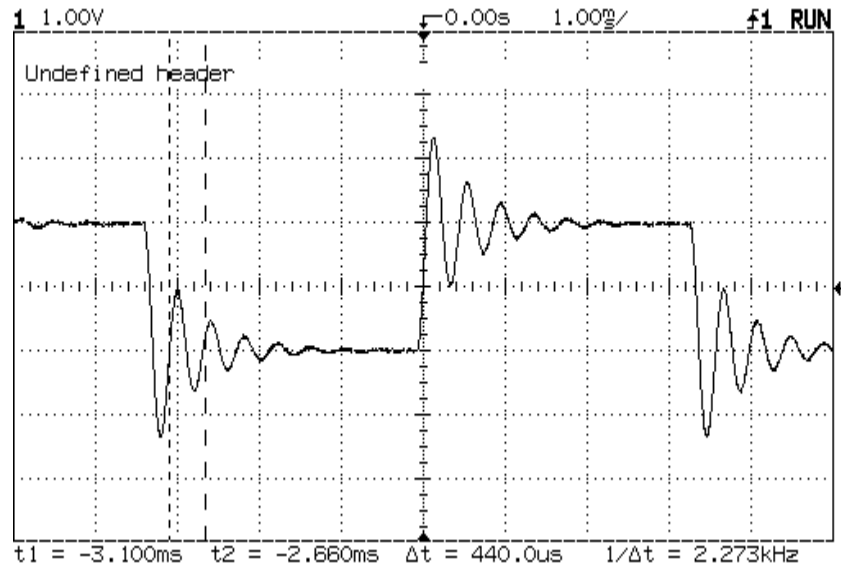
So using the above relation and substituting the assumed values in (1) we get the value of R as:

$$R = \sqrt{\frac{4L}{C}} \text{ in } \Omega$$

$$R = \sqrt{\frac{4 \cdot 1 \cdot 10^{-3}}{0.1 \cdot 10^{-6}}} \text{ in } \Omega = 200 \Omega$$

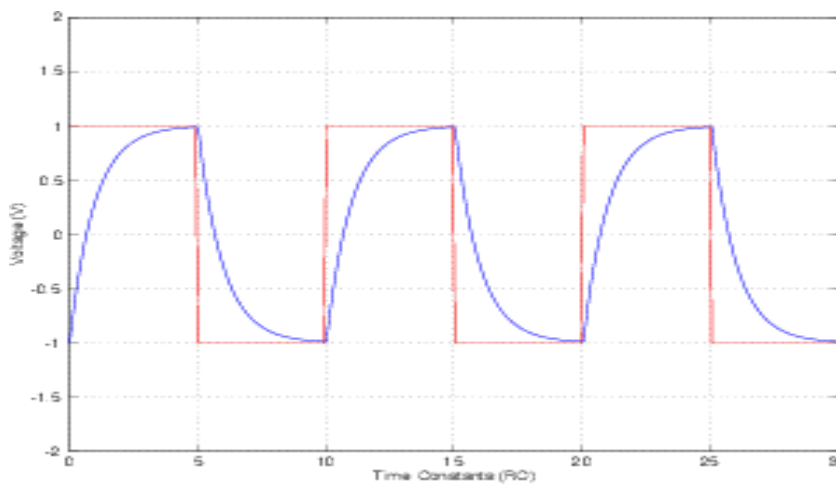
- ii) Then use a lower value resistor compared to what you found in step (i) for under-damped response (say 10 ohms). Include both LTSpice sims and built circuit response.

It should look something like this



- Then use a higher value resistor compared to what you found in step (i) for over-damped response (say 3.3K ohms). Include both LTSpice sims and built circuit response.

It should look something like this



Created by Suraj JK (TA)

Simulation settings to create square wave source from LTSpice:

Example:

Choose voltage source , click on advanced and select on pulse and enter the following values for example: 1KHz

Vinitial = 0V

Von = 10V

Tdelay = 1n

Trise = 1n

Tfall = 1n

Ton = 0.5m

Tperiod = 1m

Ncycles = 150