Basic Electronics

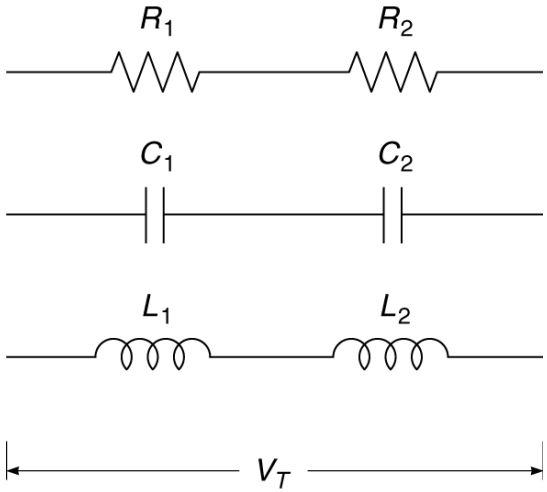
A Sign in Penacook, New Hampshire

I, V Relations for R, L and C

(Table 4.1)

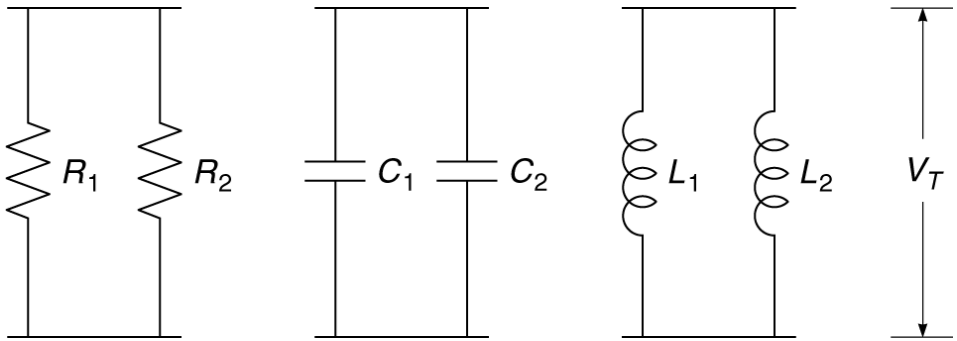
Element	**Unit Symbol**	**I(t)**	**V(t)**	**$V_{I=const}$**
Resistor	R	$V(t)/R$	$RI(t)$	RI
Capacitor	C	$C\frac{dV(t)}{dt}$	$\frac{1}{C}\int I(\tau)d\tau$	It/C
Inductor	L	$\frac{1}{L}\int V(\tau)d\tau$	$L\frac{dI(t)}{dt}$	0

R, L and C Combinations



Series:

R, L and 1/C add



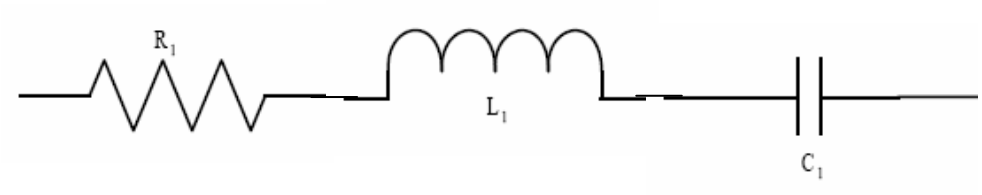
Parallel:

1/R, 1/L and C add

Figures 4.5 and 4.6

Basic Electronics – R, C and L

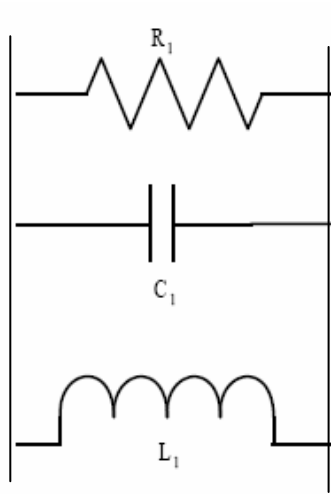
- For R, C, and L combination in *series*:



Potential Difference:

Current:

- For R, C, and L combination in *parallel*:



Potential Difference:

Current:

Basic Electronics – R, C and L

Current related to charge

DC: direct current →

DC: alternating current →

Determine the DC potential difference across
2 inductors in parallel:

Kirchhoff's Laws

Node: a point in a circuit where any two of more elements meet

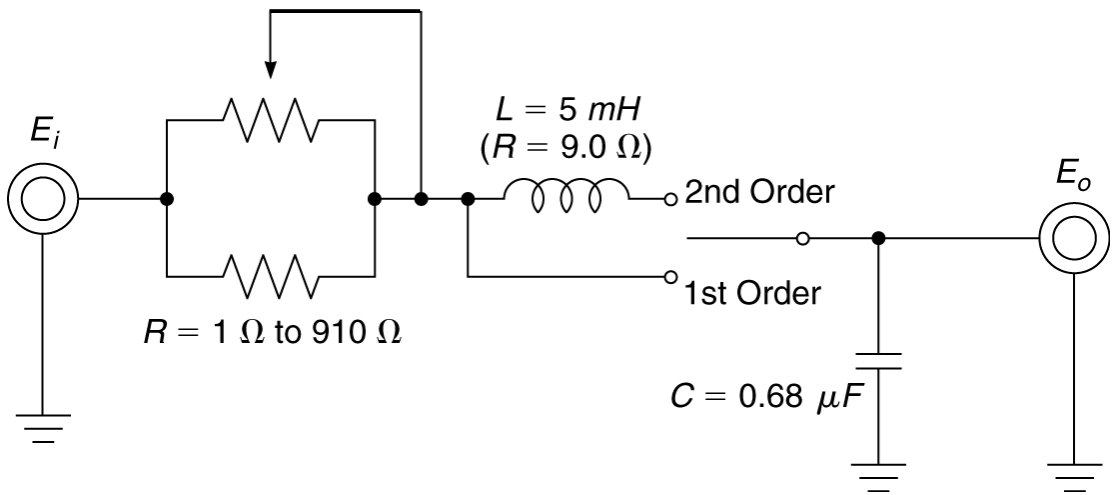
Loop: a closed path going from one circuit node back to itself without passing through any intermediate node more than once

Kirchhoff's first (or current) law: at a circuit node, the current flowing into the node equals the current flowing out (charge is conserved)

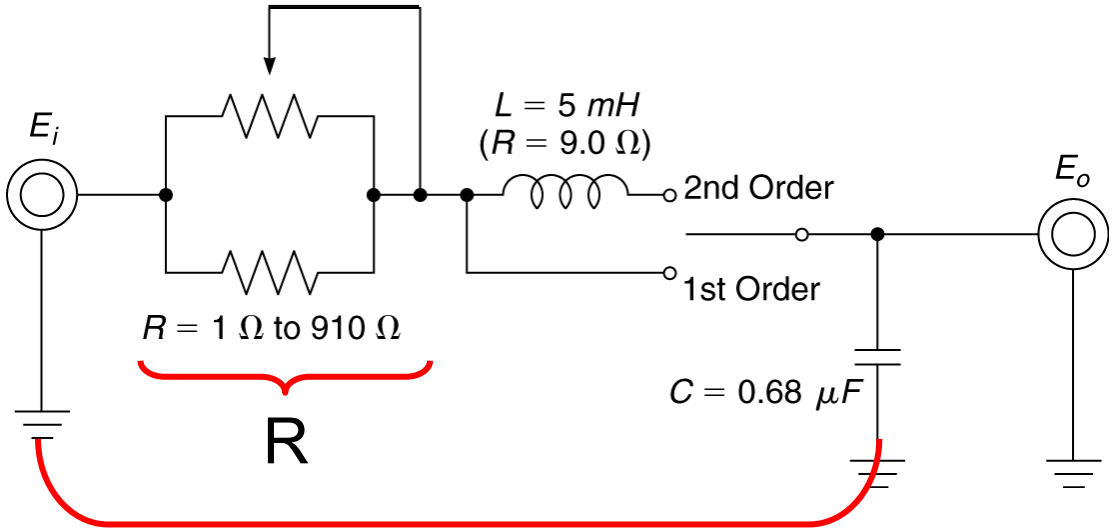
Kirchhoff's second (or voltage) law: around a circuit loop, the sum of the voltages equal zero (energy is conserved)

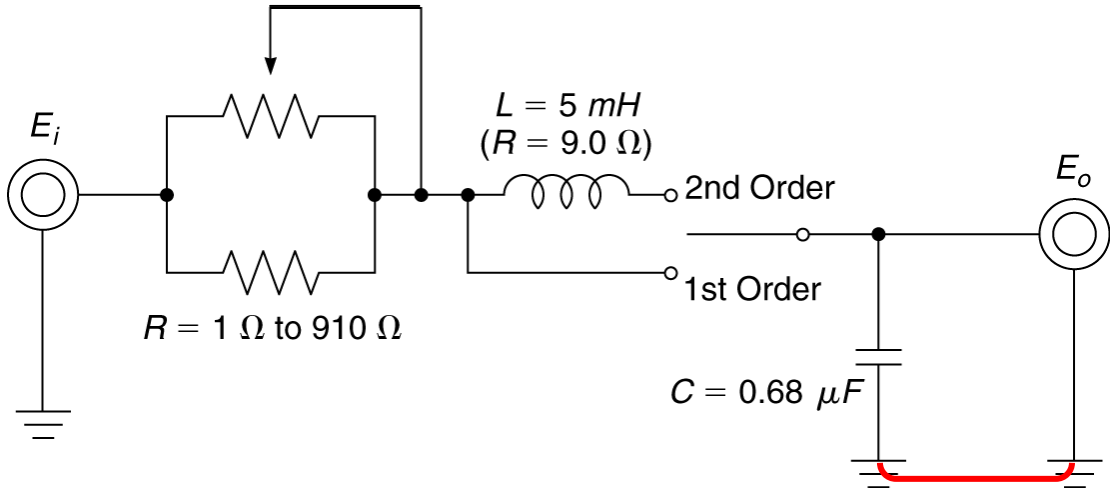
Example RLC Circuit

- Consider a RLC circuit used in your 'Dynamic System Response' laboratory exercise.



- Using Kirchoff's Voltage Law, determine the expression for this circuit that relates E_o to E_i.


E_i
$L = 5\ mH$
$(R = 9.0\ \Omega)$
2nd Order
1st Order
E_o
$R = 1\ \Omega$ to $910\ \Omega$
R
$C = 0.68\ \mu F$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