Lab 5 – Results: Transient Analysis

*ECE203: Electrical Circuits II*

|  |  |  |
| --- | --- | --- |
| Name | Student ID | CCID |
|  |  |  |

# Series RC Circuit

|  |  |  |  |
| --- | --- | --- | --- |
| **Rising edge** (1kΩ and 100nF) / (Vin = 0V-4V) | | | |
|  | **Input Voltage** (V1) | **Output Voltage** (R1) | **Capacitor Voltage** (C1) |
| **time** *(us)* | **C1** *(V)* | **C2** *(V)* | **M1** *(V)* |
| **-1** |  |  |  |
| **1** |  |  |  |
| **10** |  |  |  |
| **20** |  |  |  |
| **50** |  |  |  |
| **100** |  |  |  |
| **200** |  |  |  |
| **500** |  |  |  |
| **1000** |  |  |  |

|  |  |
| --- | --- |
| **Time Constant (τ)** (1kΩ and 100nF) | |
| **Measured** *(us)* | **Calculated** *(us)* |
|  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Falling edge** (1kΩ and 100nF) / (Vin = 4V-0V) | | | |
|  | **Input Voltage** (V1) | **Output Voltage** (R1) | **Capacitor Voltage** (C1) |
| **time** *(us)* | **C1** *(V)* | **C2** *(V)* | **M1** *(V)* |
| -1 |  |  |  |
| 1 |  |  |  |
| 10 |  |  |  |
| 20 |  |  |  |
| 50 |  |  |  |
| 100 |  |  |  |
| 200 |  |  |  |
| 500 |  |  |  |
| 1000 |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Rising edge** (1kΩ and 220nF) / (Vin = 0V-4V) | | | |
|  | **Input Voltage** (V1) | **Output Voltage** (R1) | **Capacitor Voltage** (C1) |
| **time** *(us)* | **C1** *(V)* | **C2** *(V)* | **M1** *(V)* |
| -1 |  |  |  |
| 1 |  |  |  |
| 10 |  |  |  |
| 20 |  |  |  |
| 50 |  |  |  |
| 100 |  |  |  |
| 200 |  |  |  |
| 500 |  |  |  |
| 1000 |  |  |  |

|  |  |
| --- | --- |
| **Time Constant (τ)** (1kΩ and 220nF) | |
| **Measured** *(us)* | **Calculated** *(us)* |
|  |  |

# Series RL Circuit

|  |  |  |  |
| --- | --- | --- | --- |
| **Rising edge** (1kΩ and 10mH) / (Vin = 0V-4V) | | | |
|  | **Input Voltage** (V1) | **Output Voltage** (R1) | **Inductor Voltage** (L1) |
| **time (us)** | **C1** *(V)* | **C2** *(V)* | **M1** *(V)* |
| **-0.2** |  |  |  |
| **0.2** |  |  |  |
| **2** |  |  |  |
| **5** |  |  |  |
| **10** |  |  |  |
| **20** |  |  |  |
| **50** |  |  |  |
| **100** |  |  |  |

|  |  |
| --- | --- |
| **Time Constant (τ)** (1kΩ and 10mH) | |
| **Measured** *(us)* | **Calculated** *(us)* |
|  |  |

# Series RLC Circuit

|  |  |  |  |
| --- | --- | --- | --- |
| **Rising edge (100Ω, 10mH and 100nF)** / (Vin = 0V-4V) | | | |
| **cycle** |  | **t** *(us)* | **Vout** *(V)* |
|  | **Position** | **C2** |
| **1st** | **Initial rising zero** |  | **0 V** |
| **positive peak** |  |  |
| **falling zero** |  | **0 V** |
| **negative peak** |  |  |
| **2nd** | **rising zero** |  | **0 V** |
| **positive peak** |  |  |
| **falling zero** |  | **0 V** |
| **negative peak** |  |  |
| **3rd** | **rising zero** |  | **0 V** |
| **positive peak** |  |  |
| **falling zero** |  | **0 V** |
| **negative peak** |  |  |
| **rising zero** |  | **0 V** |

|  |  |
| --- | --- |
| **Cycle Frequency** (Series RLC ringing) | |
| **Cycle** | **Frequency** *(Hz)* |
| **1st** |  |
| **2nd** |  |
| **3rd** |  |

|  |
| --- |
| **Calculated Resonant Frequency** *(Hz)* |
|  |

The following pages have been left for you to include the plots that you are required to create as part of your post-lab.

To create your plots you can use whichever software you would like (Excel, Matlab, etc), export your plot as an image and import it into your Lab 2 - Results sheet in the appropriate place.

Your plots should include:

* A Plot title
* Label your axes and show what unit of measure is used.
* Include a marking for your data-points.
* Include a line between your data-points in the same series.
* Include a legend.
* Make sure your scales are appropriate and visible.

# Series RC Circuit (1kΩ and 100nF/220nF) - Rising Edge

< Insert your plot here >

Delete all the light grey text and insert your plot.

Series RC Circuit (100nF) – Rising Edge: Plot the source voltage, resistor voltage and capacitor voltage vs. time.

Series RC Circuit (220nF): Add the capacitor voltage vs. time.

# Series RC Circuit (1kΩ and 100nF) - **Falling** Edge

< Insert your plot here >

Delete all the light grey text and insert your plot.

Series RC Circuit (100nF) – Falling Edge: Plot the source voltage, resistor voltage and capacitor voltage vs. time.

# Series RL Circuit (1kΩ and 10mH) - Rising Edge

< Insert your plot here >

Delete all the light grey text and insert your plot.

Series RL Circuit (10mH) – Rising Edge: Plot the source voltage, resistor voltage and capacitor voltage vs. time.

# Series RLC Circuit (Ringing) - Absolute Peaks

# < Insert your plot here >

Delete all the light grey text and insert your plot.

Series RLC Circuit (Ringing) - Absolute Peaks: Plot the absolute value of the voltage peaks you measured across the resistor vs. time.