

SCHOOL OF ELECTRICAL ENGINEERING	
Subject ELECTRICAL ENGINEERING LABORATORY	Review : 6
Subject Code SKEE 2742	Release Date : February 2020
	Last Amendment : January 2020
	Procedure Number : PK-UTM-FKE-(O)-08


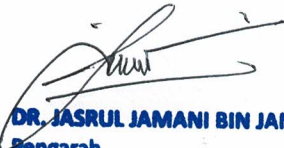


UTM
UNIVERSITI TEKNOLOGI MALAYSIA

**SCHOOL OF ELECTRICAL ENGINEERING
FACULTY OF ENGINEERING
UNIVERSITI TEKNOLOGI MALAYSIA**

**SKEE 2742
ELECTROTECHNIC LABORATORY
EXPERIMENT 4**

RLC SERIES TRANSIENT CIRCUIT

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<p>Tarikh : 05 February 2020</p>	<p>Tarikh : 05 February 2020</p>

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I. PRELIMINARY EXERCISE (10 marks)

Important Note: You are required to do this exercise **BEFORE** the lab session.

- i. Briefly discuss the three types of responses in a series RLC circuit. Write down the conditions for the three responses in terms of the *neper frequency*, α , and undamped natural frequency (or resonant frequency), ω_o .
- ii. A series RLC circuit is connected to a voltage source that steps from 0V to 5V at $t = 0$ s. The values of L and C are 100mH and 0.1 μ F respectively, while R ranges from 200 Ω to 5 k Ω . Assume zero initial conditions.
 - a. Write down the expression of the voltage across the capacitor for the three types of responses (for the three different values of R).
 - b. Verify your answers in (a) using *PSpice* or MATLAB. You need to demonstrate this to the lab instructor during the lab session.

Important Note: Student required to bring their laptop to **VERIFY** all simulations result
Student required to bring **USB drive** to capture output from the oscilloscope

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II. EXPERIMENT:

‘RLC Series Transient Circuit’

IMPORTANT: You need to complete the PRELIMINARY EXERCISE before the laboratory session

1. Aims:

To construct and study the type of responses in a series RLC circuit.

2. Equipment:

A signal generator, an oscilloscope, a decade resistor box, a decade inductor box and a decade capacitor box

3. Instructions:

Precaution:

- *Ensure that the ground of the oscilloscope probes is connected to the same point and also connected to the negative terminal of the signal generator. Failure to follow this will damage the oscilloscope.*
- *Ask your lab instructor to check your circuit connection before you start the experiment.*

- i. Design a series RLC circuit using the available equipment to produce the undamped natural frequency, ω_o , of 7161 rad/s for the THREE types of responses. Set the value of L to 150 mH, and you need to choose the suitable values of C and R.
- ii. Using the oscilloscope, save and print the voltage waveform across the capacitor for the three different types of responses. For the underdamped response, obtain the natural damping frequency, ω_d , from the waveform.
 - a. Simulate the series RLC circuits that you have designed in step (a). Compare the simulation results with the experimental results.

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- b. Your short report should contain the following discussion:
- i. The selections of parameters (C and R) to obtain the three types of responses.
 - ii. Waveforms of the capacitor voltage that you have saved using the oscilloscope (for the three types of responses).
 - iii. Comparison between the experimental and simulation results – explain the reasons for the differences.