Faculty	**FACULTY OF ELECTRICAL ENGINEERING**	
Subject : **MAKMAL KEJ. ELEKTRIK** Subject Code : **SKEU 3741**	Review Release Date Last Amendment Prosedure No	: **4** : **Julai 2011** : **Jun 2010** : **PK-UTM-FKE-(O)-08**

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SKEU 3741
ELECTROTECHNIC LABORATORY

(Experiment 1)
SERIES AND PARALLEL RESONANCE CIRCUIT CHARACTERISTICS

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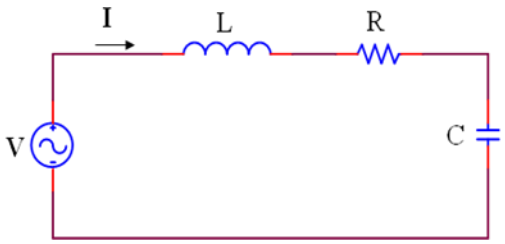
I. PRELIMINARY EXERCISE (10 marks)

Important Note: ***You are required to do this exercise BEFORE the lab session. Each question carries 5 marks***

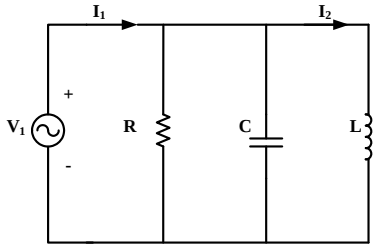
1. For a circuit in Figure 1.0
   a) Calculate the total impedance *(polar form), voltage across each element* and power factor *to fill up Tables 1.1and 1.3.*
   b) Draw graph Z vs freq *and calculate resonance frequency*.
   c) Draw the phasor diagram of the voltage for each element before, during and after resonance.(Use current as reference)



V = 0.5 volt; R = 50Ω; L = 4 mH; C = 0.06 μF

Figure 1.0

2. For a circuit in Figure 2.0,
   a) Calculate the total admittance *(polar form), current, I_1 and I_2 and power factor to fill up Table 2.1.*
   b) Draw graph admittance, Y versus frequency.
   c) Draw the phasor diagram of the currents for each element before, during and after resonance.(Use voltage as reference)



I_1 = 1 mA; R = 10 kΩ; L = 5 mH; C = 100 nF

Figure 2.0

3. List at least 3 applications of resonance in practice

Recommended Reference:

1. Alexander & Sadiku, *'Fundamentals of Electric Circuits'*, 4th edition, McGraw Hill.

II. EXPERIMENT:

"Measurement Of Series And Parallel Resonance Characteristics"

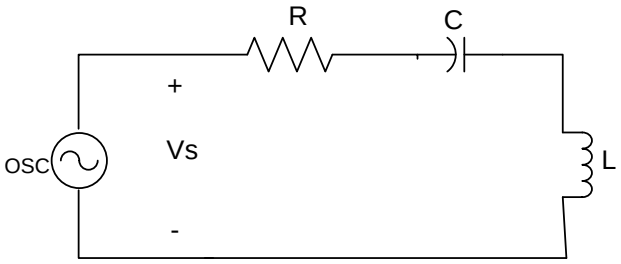
1. **Aims:**

   i. To investigate series and parallel resonance characteristics
   ii. To identify resonant parameters

2. **Equipments:**

   i. Signal generator
   ii. Volt meter
   iii. Decade inductor (L)
   iv. Decade resistor (R)
   v. Decade capacitor (C)

3. Figure 1.0 shows a series resonance circuit connection.



R=(refer to Table 1.1 in the Lab Sheet), L=4mH, C=0.06µF
Figure 1.0

4. Procedure:

<u>Precaution:</u> Ask your lab instructor to check your circuit connection before you start the experiment.

i. Connect the circuit as shown in Figure 1.0.

ii. Set the value of R according to the signal generator model (OSC).You can use either of the signal generator listed below (Table 1.0):

Table 1.0

No.	Type/Model of Signal Generator	Set the value of R to :
1.	Jupiter 500	35 Ω
2.	Mei Li	50 Ω
3.	Trio	50 Ω
4.	Levell TG 152DM	0 Ω

iii. Select the sinusoidal waveform from the signal generator output. Set the amplitude so that the voltage across the source, V_S is constant at 0.5 volt.

iv. Fixed the capacitor at 0.06µF and set L = 4mH. Varies the value of freq and record the voltage readings V_R, V_L and V_C as in the Table 1.2. For each value of freq, the source has to be adjusted so that the voltage of the source, V_S is fixed at 0.5 volt.

v. Now**,** fixed the freq at 10 kHz and maintaining L = 4mH. Varies the value of capacitor and record the voltage readings V_R, V_L and V_C as in the Table 1.4. For each value of capacitance, the source has to be adjusted so that the voltage of the source, V_S is fixed at 0.5 volt.

5. **Figure 2.0 shows a parallel resonance circuit connection.**

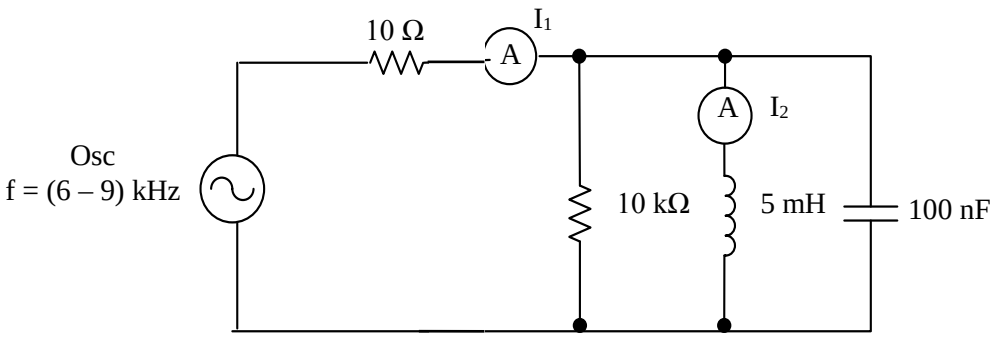


Figure 2.0

6. Procedure:

Precaution: ***Ask your lab instructor to check your circuit connection before you start the experiment***

i. Connect the circuit as shown in Figure 2.0.

ii. Select the sinusoidal waveform from the signal generator output. Set the amplitude so that the ammeter I_1 is constant at 1mA. Record the reading of ammeter I_2 for the frequencies range between 6 kHz to 9 kHz as in Table 2.2.