

Fakulti:	<b>FAKULTI KEJURUTERAAN ELEKTRIK</b>		
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**FAKULTI KEJURUTERAAN ELEKTRIK  
UNIVERSITI TEKNOLOGI MALAYSIA  
KAMPUS SKUDAI  
JOHOR**

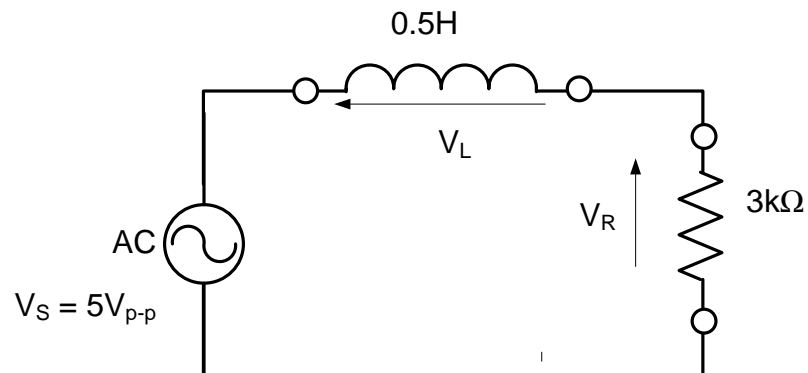
# **SKEU 3741 ELECTROTECHNIC LABORATORY**

## **(Experiment 6) AC CIRCUIT**

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**I. PRELIMINARY EXERCISE**

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



Find

- i. The total impedance of the circuit above
- ii. The impedance angle
- iii.  $V_R$  and  $V_L$
- iv. Draw AC waveform of  $V_S$ ,  $V_R$  and  $V_L$  for one full cycle.

**Recommended Reference:**

Sadiku, Fundamental of Electric Circuit 4<sup>th</sup> edition,

## II. EXPERIMENT:

### 'AC Circuit'

#### 1. Aims:

- i. To determine the value of inductance and capacitance voltage of AC circuit.
- ii. To observe the leading and lagging effect caused by capacitor and inductor.
- iii. To calculate the phase different from the oscilloscope.

#### 2. Equipments:

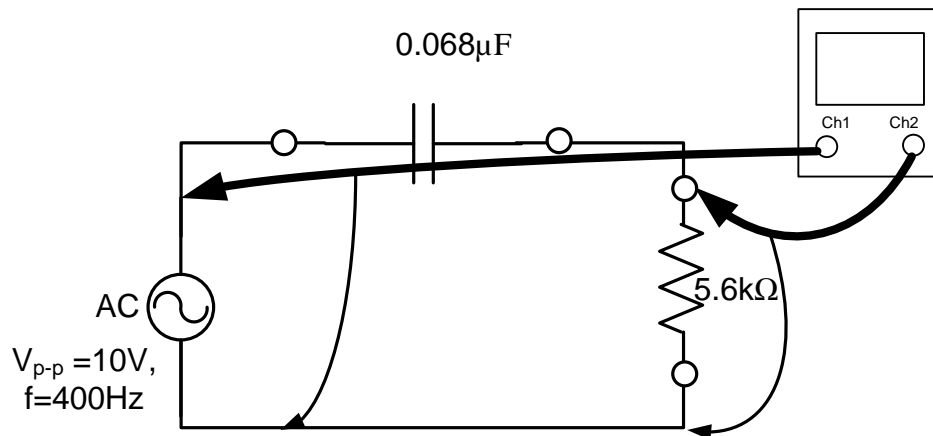
- i. Oscilloscope.
- ii. Function Generator
- iii. 2 Probe
- iv. Decade Inductor Box
- v. Capacitor (2 unit  $0.086\mu\text{F}$ )
- vi. Resistor (1 unit  $5.6\text{k}\Omega$ )
- vii. Proto Board

#### 4. Procedure:

***Precaution:*** Ensure that the 'earth' connection of the oscilloscope probes are at the same earth point. Failure to observe this will damage the oscilloscope.

#### Series RC Circuit Test

1. Construct the RC circuit as referred to figure 1.0 with capacitor value of  $0.086\mu\text{F}$

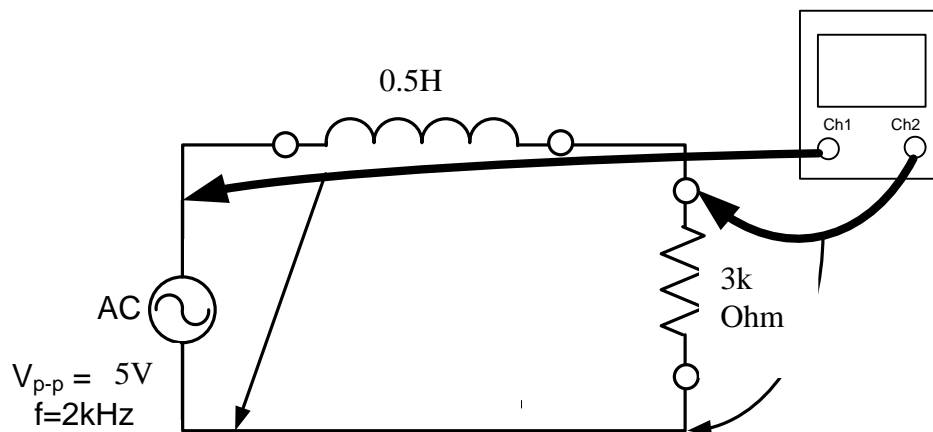


**Figure 1.0**

2. Turn ON the oscilloscope and calibrate it.
3. Set channel 1 to measure voltage supply ( $V_S$ ), while channel 2 for load voltage ( $V_R$ ).
4. Set the oscilloscope scale for both channels to 2V/div and time division scale to 0.5ms.
5. Set the frequency of function generator to 400Hz. Adjust the amplitude of function generator until sinusoidal waveform 10V<sub>p-p</sub>. Connect the function generator to the series RC circuit as figure 1.0.
6. Draw and label the waveform displayed by the oscilloscope and record the  $V_{S\text{-p-p}}$ ,  $V_{R\text{-p-p}}$  and the phase shift ( $\Theta$ ) value in table 1.
7. Off the supply and switch position on R and C only. Now channel 2 will measure  $V_{C\text{-p-p}}$ , then repeat steps 4 and 5
8. Record the  $V_{C\text{-p-p}}$  in table 1.
9. Repeat all the procedures (1 to 8) with capacitor value of 0.034  $\mu\text{F}$ .

### Series RL Circuit Test

1. Construct the RL circuit as referred to figure 2.0 with inductor value (decade inductor box) 0.4H.



**Figure 2.0**

2. Turn ON the oscilloscope and calibrate it.
3. Set channel 1 to measure voltage supply ( $V_S$ ), while channel 2 for load voltage ( $V_R$ ).
4. Set the oscilloscope scale for both channels to 2V/div and time division scale to 0.1ms.

5. Set the frequency of function generator to 2kHz. Adjust the amplitude of function generator until sinusoidal waveform  $5V_{p-p}$ . Connect the function generator to the series RL circuit as figure 2.0.
6. Draw and label the waveform displayed by the oscilloscope and record the  $V_{Sp-p}$ ,  $V_{Rp-p}$  and the phase shift ( $\Theta$ ) value in table 2.
7. Off the supply and switch position on R and L only. Now channel 2 will measure  $V_{Lp-p}$ , then repeat steps 4 and 5
8. Record the  $V_{Lp-p}$  in table 2.
9. Repeat all the procedures (1 to 8) with inductor value of 0.1H.