



ISTANBUL COMMERCE UNIVERSITY

DEPARTMENT OF ELECTRICAL-ELECTRONICS ENGINEERING

EEE202 ELECTRO-TECHNICAL LABORATORY

**PART 6
EXPERIMENTS**

EXPERIMENT 6.1

EXAMINATION OF RL SERIES AC CIRCUIT

REQUIRED MATERIAL:

- 1- Function Generator
- 2- Oscilloscope (**two channeled**)
- 3- AC voltmeter
- 4- AC ampermeter
- 5- Y-0016/01AC module
- 6- Enough connection cable

THE EXPERIMENT:

Adjust the terminal of the function generator to sine, peak to peak value to **E_{pp}**=10Volt and frequency to **F**=1KHz. Connect the Y-0016/01AC module to its place. Short-circuit the **J3**. Make the circuit connections as in the figure 6.1. Apply the power to the circuit.

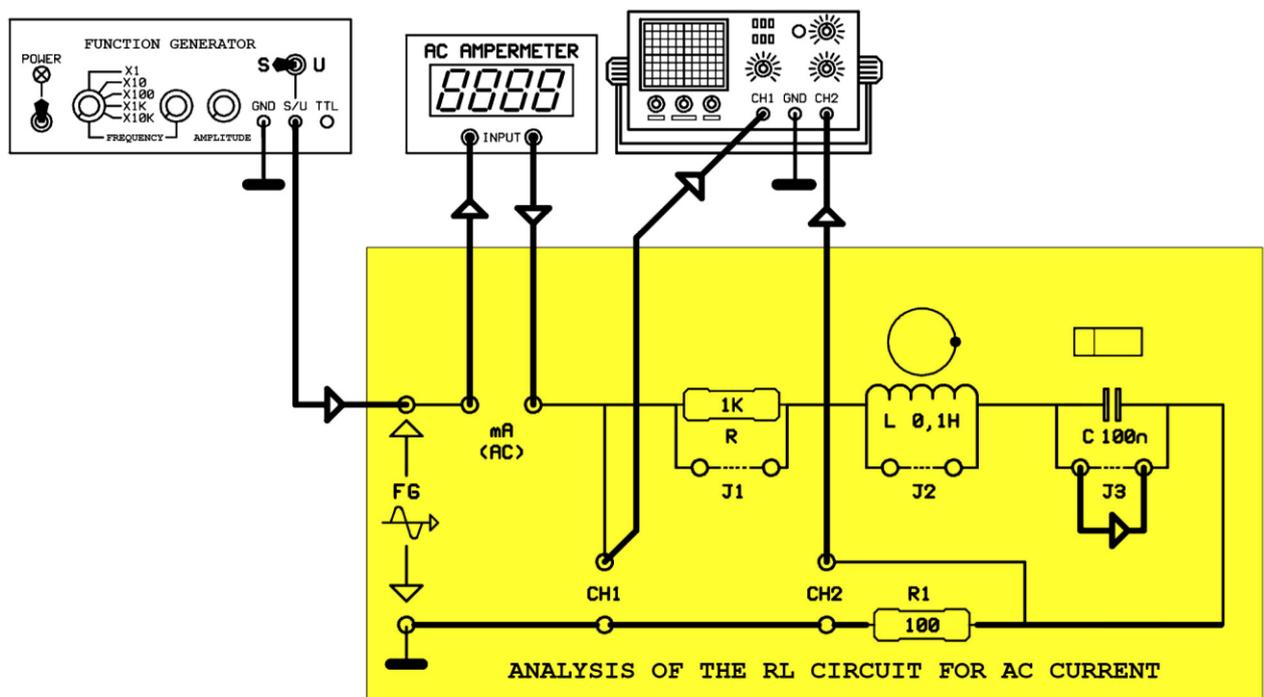


Figure 6.1

- 1- What is the effect of short-circuiting the **J3** points?

2- What can be said about the circuit looking at the vector diagram on the oscilloscope?

3- Calculate the inductive reactance of the inductor.

$$XL = 2\pi FL$$

4- Short circuit the CH2 points so that the "**R1**" resistor will not affect the circuit. Calculate the total resistance of the circuit.

5- Calculate the circuit impedance

$$Z^2 = RT^2 + XL^2$$

6- Calculate the circuit current.

7- Compare the current value in Ampermeter with the calculated current value.

8- Calculate the voltages on resistor and inductor using the current value (**2,6mA**).

$$ER = I.R =$$
$$EL = I.XL$$

9- Read the voltage values of resistor and inductor with the AC Voltmeter. Compare these values with the ones we calculated.

10- Calculate the circuit voltage using the calculated voltage values (ER and EL). Compare the result with the voltage (**E=3,5V**) that you applied to the circuit.

$$E^2 = ER^2 + EL^2$$

11- Draw the phasor diagram of the circuit and the impedance triangle.



Figure 6.2

12- Calculate the power factor of the circuit, active power dissipated by the circuit and the phase angle.

$$\cos\phi = \frac{R}{Z} =$$

$$P = E.I.\cos\phi$$

EXPERIMENT 6.2

EXAMINATION OF RC SERIES AC CIRCUIT

REQUIRED MATERIAL:

- 1- Function Generator
- 2- Oscilloscope (**two channeled**)
- 3- AC voltmeter
- 4- AC ampermeter
- 5- Y-0016/01AC module
- 6- Enough connection cable

THE EXPERIMENT

Adjust the terminal of the function generator to sine, peak to peak value to **E_{pp}**=10Volt and frequency to **F**=1KHz. Connect the Y-0016/01AC module to its place. Short-circuit the **J2**. Make the circuit connections as in the figure 6.3. Apply the power to the circuit.

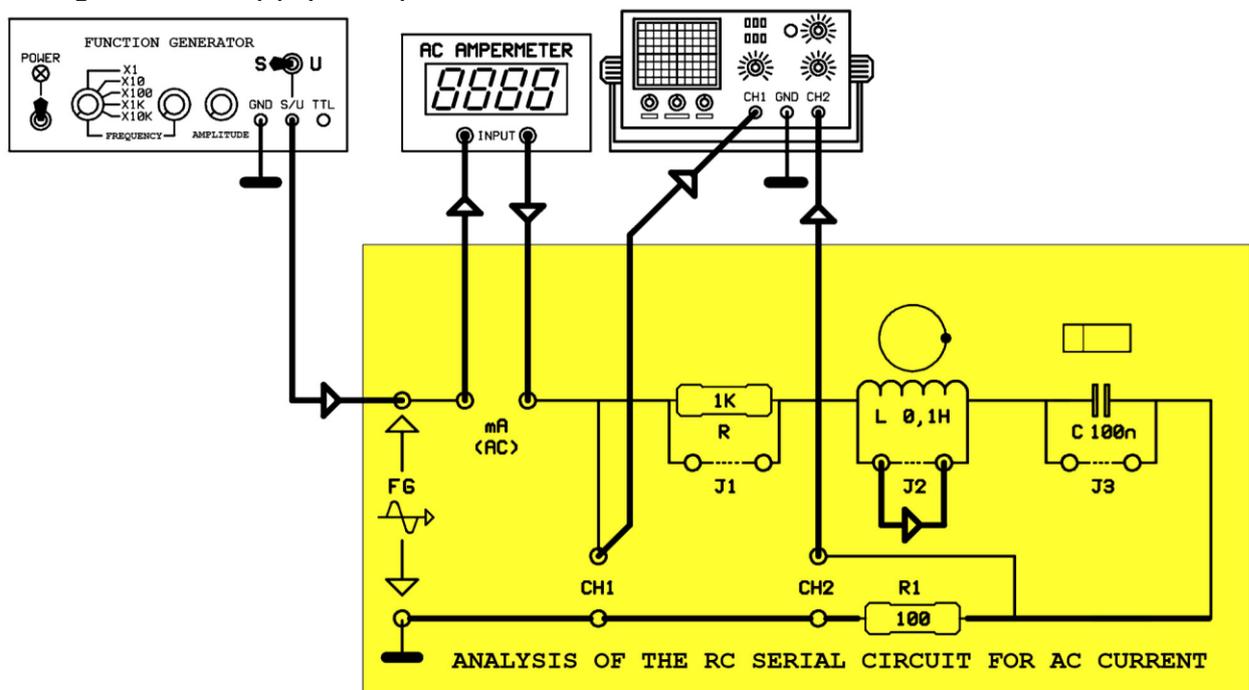


Figure 6.3

1- Why is the **J2** points short-circuited?

2- What can be said about the circuit looking at the vector diagram on the oscilloscope?

3- Short circuit the CH2 points so that the "R1" resistor will not affect the circuit. Calculate the total resistance of the circuit.

4- Calculate the capacitive reactance of the capacitor.

5- Calculate the circuit impedance.

$$Z^2 = RT^2 + XC^2$$

6- Calculate the circuit current.

7- Compare the current value in Ampermeter with the calculated current value.

8- Calculate the voltages on resistor and capacitor using the current value (**1,86mA**)

9- Read the voltage values of resistor and capacitor with the AC Voltmeter. Compare these values with the ones we calculated.

10- Calculate the circuit voltage using the calculated voltage values (ER and EL). Compare the result with the voltage (**E=3,5V**) that you applied to the circuit.

$$E^2 = ER^2 + EC^2$$

11- Draw the phasor diagram of the circuit and the impedance triangle.



Figure 6.4

12- Calculate the power factor of the circuit, active power dissipated by the circuit and the phase angle.

$$\cos\phi = \frac{R}{Z} =$$

$$P = E.I.\cos\phi$$