ELECTROTECHNICH LAB.

PART 4 EXPERIMENTS

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Contents

EXPERIMENT 17.1

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 **Epp=**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 16.5. Apply the power to the circuit.

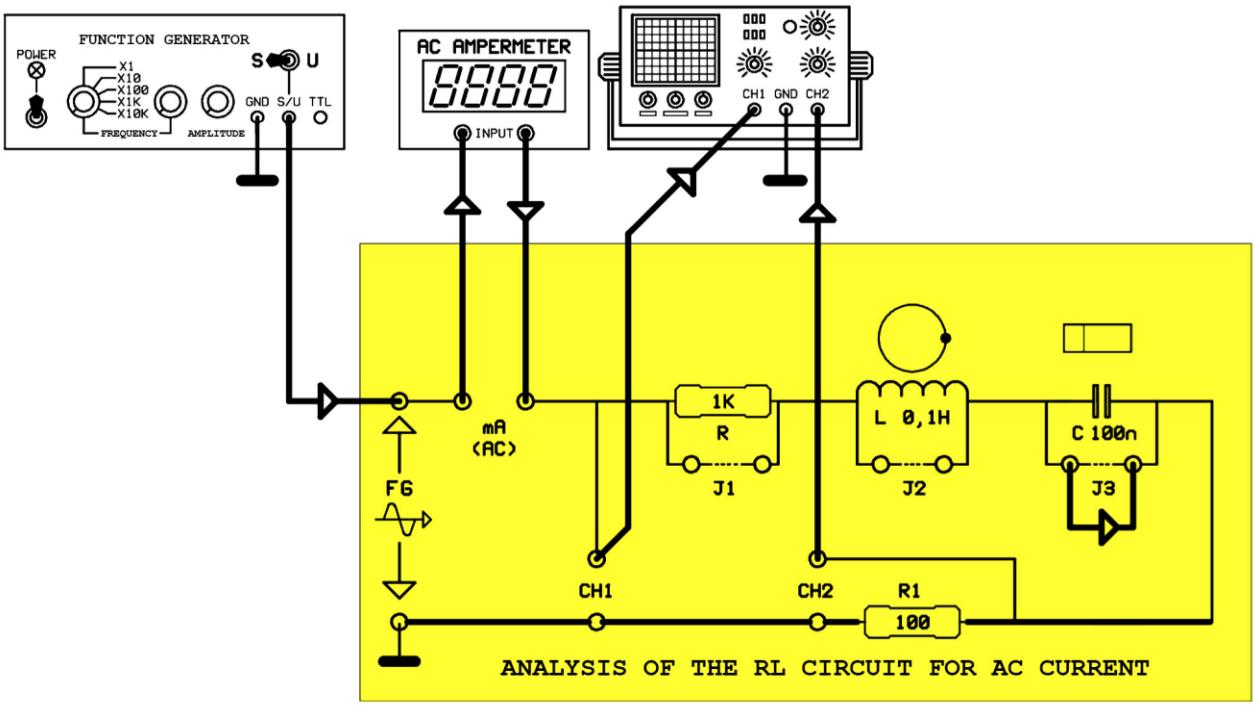

Figure 16.5

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 16.6

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 17.2

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 **Epp=**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 16.11. Apply the power to the circuit.

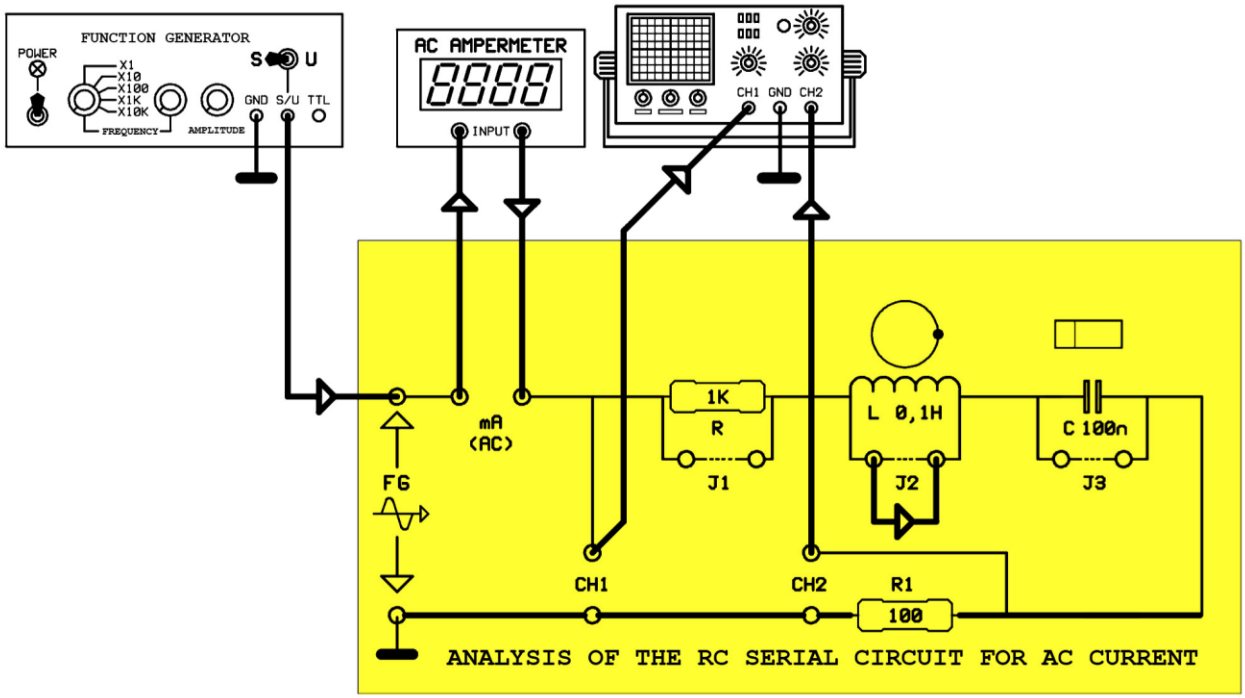

Figure 16.11

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 16.12

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 17.3

EXAMINATION OF RLC SERIES AC CIRCUIT

REQUIRED MATERIALS:

1- Function Generator
2- AC voltmeter
3- AC ampermeter
4- Y-0016/01AC module
5- Enough connection cable

THE EXPERIMENT:

Adjust the terminal of the function generator to sine, peak to peak value to **Epp=**10Volt and frequency to **F**=1KHz. Connect the Y-0016/01AC module to its place. Make the circuit connections as in the figure 16.17 Apply the power to the circuit.

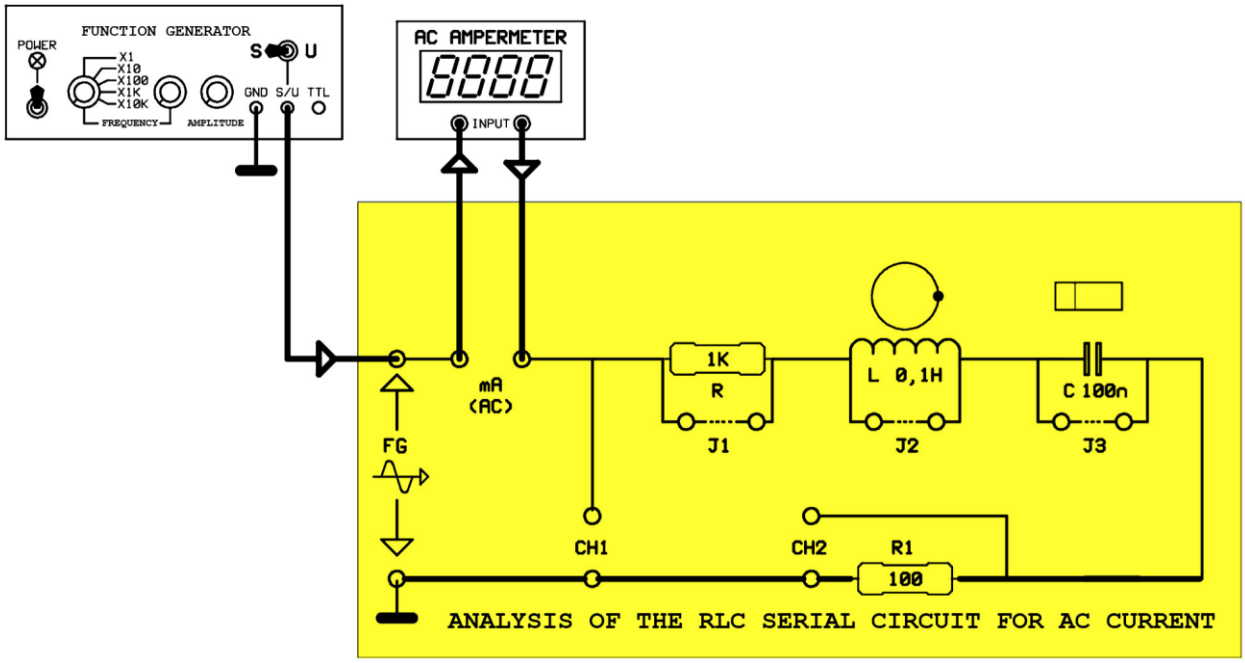

Figure 16.17

1- Short-circuit the CH2 points so that the "**R1**" resistor will not effect the circuit. Calculate the total resistance.

2- Calculate the inductive reactance of the inductor.

$$XL = 2\pi FL$$

3- Calculate the capacitive reactance of the capacitor.

$$XC = \frac{1}{2\pi FC} =$$

4- Calculate the circuit impedance.

$$XC > XL$$

$$XF = XC - XL =$$

$$Z^2 = RT^2 + XF^2$$

5- Calculate the circuit current.

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

7- Calculate the voltages on resistor, inductor and capacitor using the current value(**2,32mA**)

$$ER = I.R =$$

$$EL = I.XL =$$

$$EC = I.XC$$

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

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

$EC > EL$

$EF = EC - EL$

$E^2 = ER^2 + EF^2$

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

Figure 16.18

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

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

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