

DERPARTMENT OF ELECTRICAL-ELECTRONICS ENGINEERING

EEE202 ELECTRO-TECHNICH LABORATORY

PART 8 EXPERIMENTS

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EXPERIMENT 8.1 ANALYSIS OF THE RLC CIRCUIT FOR THE AC CURRENT

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 8.1 Apply the power to the circuit.



Figure 8.1

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.

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

4- Calculate the circuit impedance.

XC > XLXF = 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 > ELEF = EC - EL $E^2 = ER^2 + EF^2$

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





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

$$Cos\phi = \frac{R}{Z}$$
 =
 $P = E.I.Cos\phi$

EXPERIMENT 8.2 EXAMINATION OF RLC PARALLEL AC CIRCUIT

REQUIRED MATERIAL:

- 1- Function Generator
- **2-** Four AC ampermeters
- 3- Y-0016/01AC module
- 4- 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 8.3. Apply the power to the circuit.



Figure 8.3

1- Short-circuit the CH2 points so that ``R1'' resistor will not affect the circuit.

2- Calculate the inductive reactance of the inductor

$XL = 2\pi FL$			
XL =			

3- Calculate the capacitive reactance of the capacitor

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

4- Calculate the circuit current and currents passing through the legs of circuit.

$IR = \frac{E}{R} =$
$IL = \frac{E}{XL} =$
$IC = \frac{E}{XC} =$
IF = IL - IC =
$I = \sqrt{IR^2 + IF^2}$
I =

5- Read the current values shown by Ampermeters. Compare the current values in Ampermeters with the calculated current values.

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





7- Find the circuit impedance using the values in measurement devices.

$$Z = \frac{E}{I} =$$

8- Calculate the power coefficient and the phase angle.

$$Cos \varphi = rac{IR}{I} = \varphi =$$

9- Find the power coefficient and phase angle of the circuit.

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