B38EB Circuits and Analysis
Series and Parallel a.c. Circuits Laboratory

Name	Signed	Date

You must hand in the completed laboratory experiment at the end of this session.

Part B: Parallel a.c. circuits

"For series circuits Kirchhoff's voltage law applies / all voltages are drawn as *phasors*"

Circuit B1: Parallel CR

Experimental results

a) Connect the circuit as shown in Figure B1.

b) Using the bridge measure the actual values of the 1 kΩ resistor and the 0.22 μF capacitor. Insert your measurements into Table B3(b).

c) Set the function generator to give a 5 volt rms sinewave at a frequency of **500 Hz**.

d) Measure and record the rms voltage across the resistor and the capacitor. Measure the total current in the circuit, and the current in both the resistor and the capacitor.

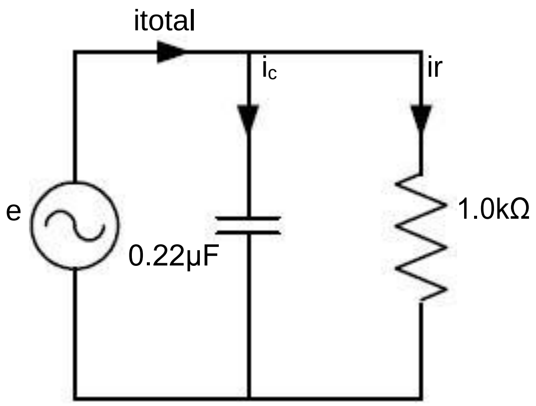


Figure B1 Parallel CR circuit

Log the results in Table B1(a).

resistor voltage (Volts rms.)	capacitor voltage (Volts rms.)	Total current (mA)	Resistor current (mA)	Capacitor current (mA)

Table B1(a)

Theoretical Calculations

Determine the conductance, capacitive reactance, capacitive susceptance and hence the total admittance of the circuit of Figure B1. Insert your calculations into Table B1(b).

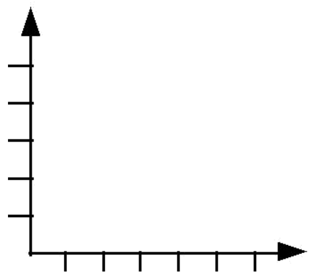
resistor value (Ω)	**conductance G (mS)**	**capacitor value (μF)**	**capacitive reactance (Ω)**	**capacitive susceptance, B (mS)**	**Total Admittance (mS)**

Table B1(b)

Calculate:

a) The theoretical total current using ***i = e* Y**.
The theoretical phasor current in each branch of Figure B1. Compare the magnitude of these currents with their measured values.

b) Using the applied voltage, e, as the reference phasor, draw a phasor diagram for the measured circuit currents and show the resultant current.

a) Total current (*i* total) = *e* (G + j B)
b) Capacitor current (*i*c) = *e* (jB)
c) Resistor current (*i*r) = *e* G
d) 
Phasor diagram

Circuit B2: Parallel connected LC circuit

Experimental Results

a) Connect the circuit as shown in Figure B2.

b) Using the bridge measure the actual values of the three components.

R = ______________ **Ω**
C = ______________ **F**
L = _ ______________ **mH**

c) Set the function generator to give a 5 volt rms sinewave at a frequency of **1 kHz**.

d) Measure and record the total rms current. Now measure the rms current flowing in the inductor.

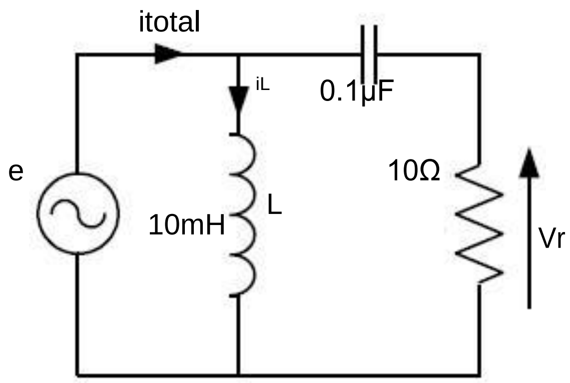


Figure B2 Parallel LC circuit with ac capacitor current determined by a voltage measurement.

Log the results in Table 4.

e) Measure and record the values of the voltage e and the voltage V_r . Measure the phase angle between e and V_r.

Log the results in Table B2.

total current (mA)	**inductor current (mA)**	**generator voltage, e (Volts rms.)**	**resistor voltage (mVolts rms.)**	**phase shift between e and V_r (degrees)**

Table B2

Theoretical Calculations

Calculate:

a) The value of $| X_L |$ and hence the inductance, L.

b) The theoretical phasor current in the capacitor of Figure B2. Use the current divider rule. Neglect the 10Ω resistor and use *e* as the reference for the phase angle.

c) Determine the measured phasor current in the capacitor.
Compare the results obtained for theoretical and measured capacitor current values.

d) Using admittance calculations confirm that the measured total current in the circuit agrees with theory.

a) The value of $\mid X_L \mid$ and hence the inductance, L.
b) The theoretical phasor current in the capacitor
c) Determine the measured phasor current in the capacitor.
d) Using admittance calculations confirm that the measured total current in the circuit agrees with theory.

Comments: