

Lab 3 - Results: Intro to AC Circuits

ECE202: *Electrical Circuits I*

Name	Student ID	CCID	Lab Section

Pre-lab Sign-off: _____ Results Sign-off: _____

AC Resistors – 100 Ω

		DMM	$R_1 (\Omega) =$	
Freq	100 Hz	1 kHz	10 kHz	
Oscilloscope – Method 1 – Counting Divisions				
Horizontal - # of divs				
SEC/DIV				
T_s – Period (s)				
Vertical - # of divs				
VOLTS/DIV				
$V_R^{\text{Pk-Pk}}$ – peak-to-peak (V)				
Oscilloscope – Method 2 - Cursors				
T_s – Period (s)				
F_s – Frequency (Hz)				
$V_R^{\text{Pk-Pk}}$ – peak-to-peak (V)				
Oscilloscope – Method 3 – Automatic Measurements				
f_s – 'Freq' (Hz)				
T_s – 'Period' (s)				
$V_R^{\text{Pk-Pk}}$ – 'Pk-Pk' (V)				
V_R^{RMS} – 'Cyc RMS' (V)				
DMM – Milliammeter – RMS current				
I_R^{RMS} – (mA)				
Calculate Resistance – ($R = V_{\text{RMS}}/I_{\text{RMS}}$)				
$R (\Omega)$				

AC Capacitors – 68 nF

		DMM	C_1 (nF) =		R_{C1} (Ω) =	
Freq	X_C	F_s	V_C^{RMS}	I_C^{RMS}	X_C	C
(Hz)	(Ω)	(Hz)	(V)	(mA)	(Ω)	(nF)
100 Hz						
1 kHz						
10 kHz						

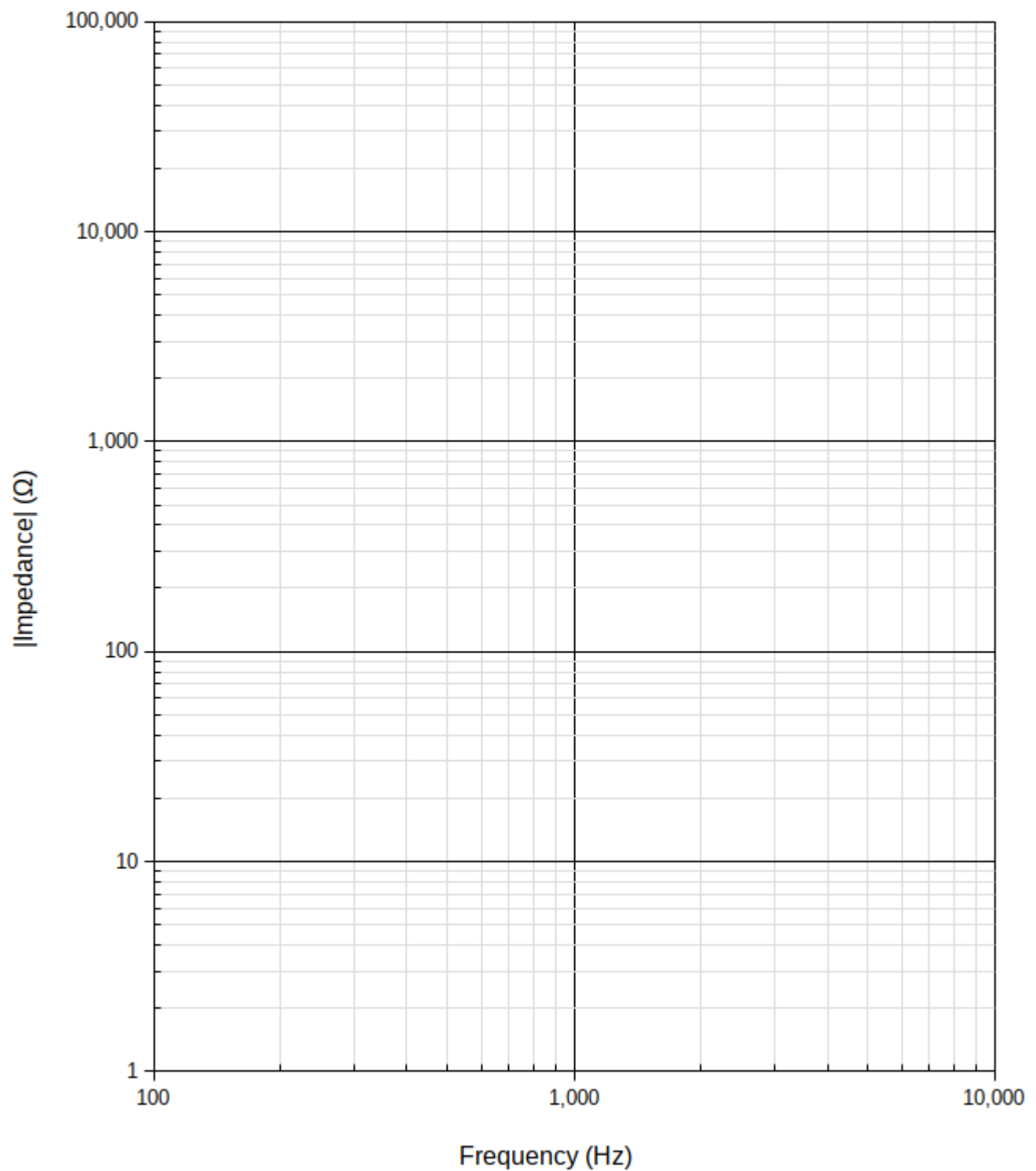
AC Capacitors – 1 μ F

		DMM	C_2 (nF) =		R_{C2} (Ω) =	
Freq	X_C	F_s	V_C^{RMS}	I_C^{RMS}	X_C	C
(Hz)	(Ω)	(Hz)	(V)	(mA)	(Ω)	(nF)
100 Hz						
1 kHz						
10 kHz						

AC Inductors – 2.5mH

					DMM	R_{L1} (Ω) =	
Freq	X_L	F_s	V_L^{RMS}	I_L^{RMS}	Z_L	X_L	L
(Hz)	(Ω)	(Hz)	(V)	(mA)	(Ω)	(Ω)	(mH)
100 Hz							
1 kHz							
10 kHz							

Impedance-Frequency of R, L and C



Series RC Circuit

Freq	(Hz)	100 Hz	1 kHz	10 kHz	f_s where $V_C = V_R$
Oscilloscope – Setup 1					
f_s - Freq	(Hz)				
T_s - Period	(s)				
V_s^{RMS}	(V)				
V_C^{RMS}	(V)				
t_{C-S} - phase diff	(s)				
V_C (leads/lags) V_s	(leads/lags)				
DMM – Milliammeter – RMS current					
I_s^{RMS}	(mA)				
Oscilloscope – Setup 2					
V_R^{RMS}	(V)				
t_{R-S} - phase diff	(s)				
V_R (leads/lags) V_s	(leads/lags)				
Calculations					
θ_{C-S}	(°)				
θ_{R-S}	(°)				
$\theta_{C-R} = (\theta_{C-S} + \theta_{R-S})$	(°)				
R – (ohms law)	(Ω)				
X_C – (ohms law)	(Ω)				
$Z = (R + X_C)$	(Ω)				
Z_{Calc}	(Ω)				
Z – (ohms law)	(Ω)				
C	(nF)				
R - (phase)	(Ω)				
X_C - (phase)	(Ω)				

Series RL Circuit

Freq	(Hz)	100 Hz	1 kHz	10 kHz	f_s where $V_L = V_R$
Oscilloscope – Setup 1					
f_s - Freq	(Hz)				
T_s - Period	(s)				
V_s^{RMS}	(V)				
V_L^{RMS}	(V)				
t_{L-S} - phase diff	(s)				
V_L (leads/lags) V_s	(leads/lags)				
DMM – Milliammeter – RMS current					
I_s	(mA)				
Oscilloscope – Setup 2					
V_R^{RMS}	(V)				
t_{R-S} - phase diff	(s)				
V_R (leads/lags) V_s	(leads/lags)				
Calculations					
θ_{L-S}	(°)				
θ_{R-S}	(°)				
$\theta_{L-R} = \theta_{L-S} + \theta_{R-S}$	(°)				
R – (ohms law)	(Ω)				
Z_L – (ohms law)	(Ω)				
$X_L = (Z_L - R_L)$	(Ω)				
Z_{Calc}	(Ω)				
Z – (ohms law)	(Ω)				
L	(mH)				