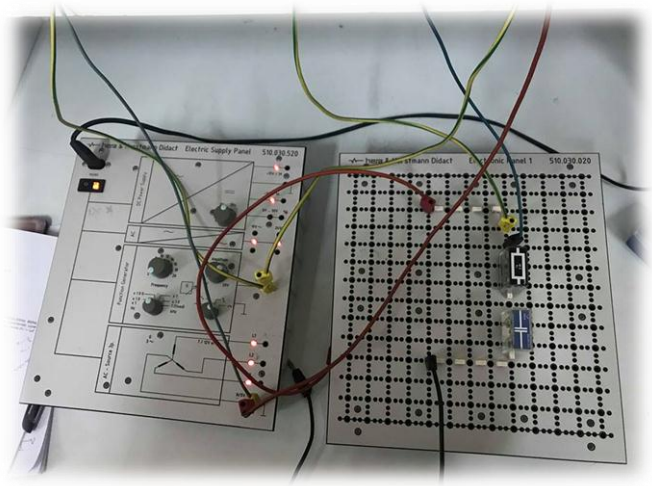
Introduction

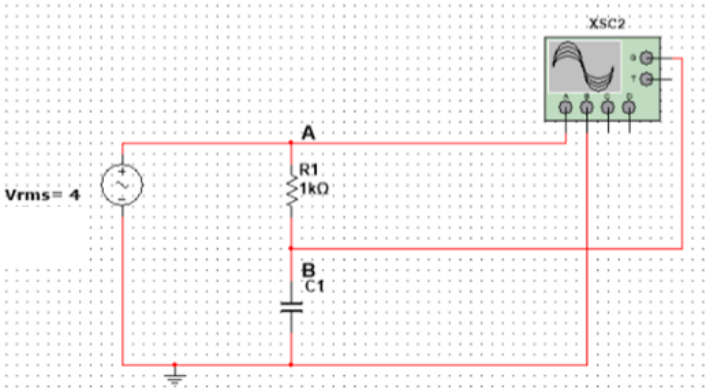
In this experiment we are going to study the relationship between the frequency and the capacitive reactance and to study the series and parallel combination of capacitors.

✓ Part one Capacitive Reactance Xc

Procedures:

1. **Build the circuit as shown in Fig.**

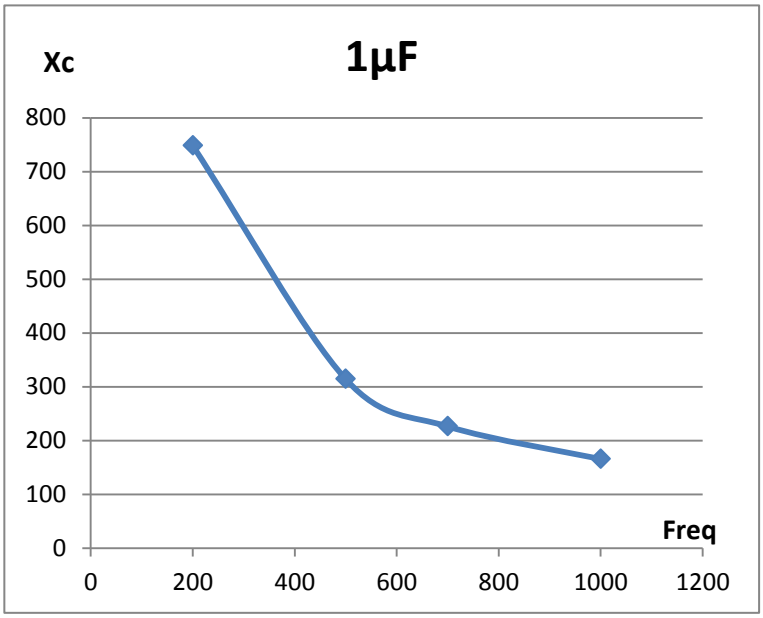


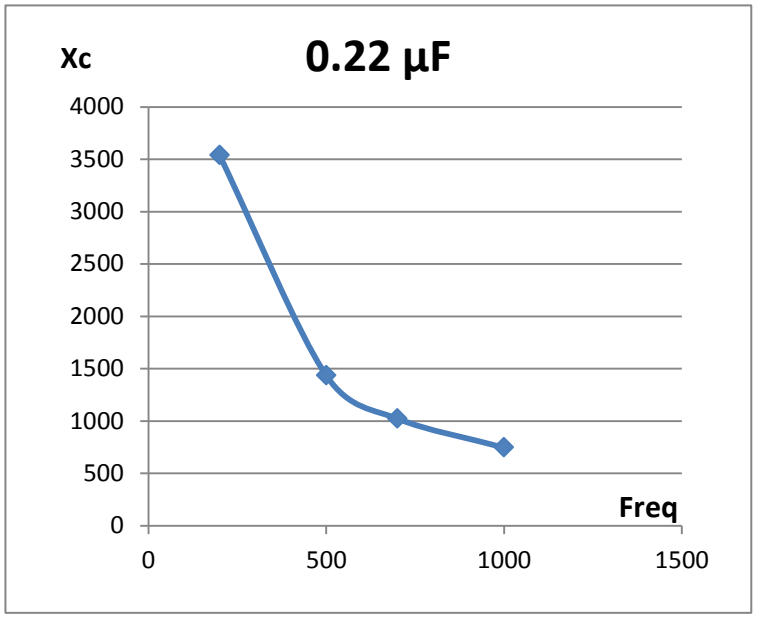


2. **Set the function generator at (200 Hz , 500 Hz , 700Hz , 1000 Hz) then complete the Table.**

Frequency		200	500	700	1000
Vc (rms) v	1µF	2.2	1.084	0.794	0.59
	0.22 µF	3.68	3.057	2.63	2.178
Ic(mA)	1µF	2.94	3.45	3.51	3.56
	0.22 µF	1.04	2.13	2.57	2.92
Xc(Ω)	1µF	748.29	314.2	226.2	165.7
	0.22 µF	3538.46	1435.2	1023.3	745.89
VR	1µF	2.94	3.45	3.51	3.56
	0.22 µF	1.04	2.13	2.57	2.92

3. **Plot the relationship between Xc and the Freq.**





- ✓ **from the curve Xc at 220 HZ = 3.3 k ohm**
- ✓ **calculated Xc=1/(2*pie*f*c) = 1/(2 *3.14 * 220* 0.22 micro) =3.28 k ohm.**

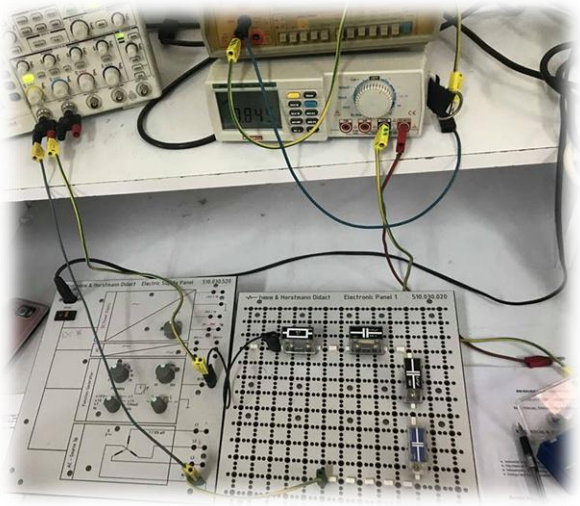
Questions :

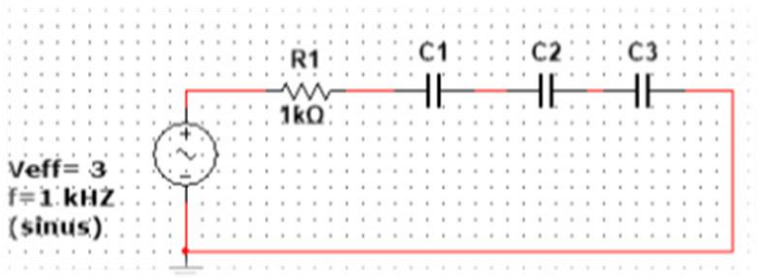
1. **Explain the shape of the curve**
   - ✓ **we see from the curves as we decrease the frequency the reactance increases that means the voltage also increases . the relationship is inversely proportional.**

Part Two capacitor in series and parallel

- ✓ we connected the circuits as shown below for series and parallel connection for the capacitors and we did some measurements for the current and voltage and reactance and the capacitance.

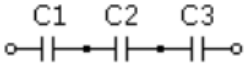
☒ In Series





Vc1(v)	1.4	Ic1 mA	1.74	Xc1	804.59Ω	C	0.1979µF
Vc2	0.67	Ic2	1.74	Xc2	385.05Ω	C	0.403 µF
Vc3	0.327	Ic3	1.74	Xc3	187.93Ω	C	0.84µ F
Vctot	2.343	Ictot	1.74	Xctot	1346.5	C	0.1182µF
VR=1.879 volt							

☒ The total capacitance is given by :

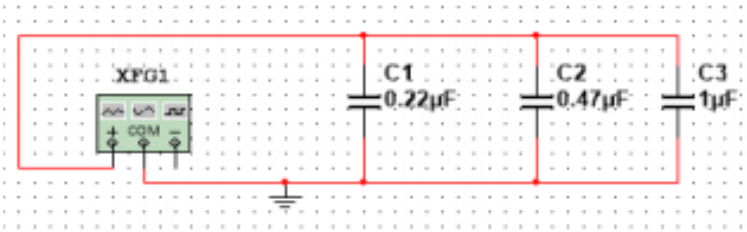


$$C_s = \frac{1}{\frac{1}{C1} + \frac{1}{C2} + \frac{1}{C3}}$$

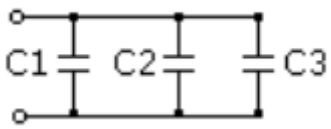
=0. 1303µF (calculated)

= 0.1146µF(measured)

☒ In Parallel



Vc1	2.77	Ic1	3.2mA	Xc1	865.62Ω	c	0.18395µF
Vc2	2.76	Ic2	7mA	Xc2	394.28Ω	c	0.4038µF
Vc3	2.76	Ic3	15.2mA	Xc3	181.57Ω	c	0.876µF
Vctot	2.76	Ictot	25.1mA	Xctot	109.96Ω	c	1.44µF



$C_p = C1 + C2 + C3$

C total=2.9037µF(measured)

=1.69µF (calc)

Conclusion

We learned how to calculated the capacitiveXc and we analyzed and demonstrated the series and parallel combinations of capacitors and there effect on the total capacitance.