

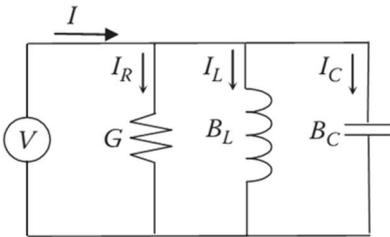
## ELEC-E8422 An Introduction to Electric Energy

### Exercises - Lecture 1 AC circuits

#### EX 1 Ac circuits

The 230 V voltage source in the figure is connected in parallel with a resistance, inductance and capacitance. The frequency of the source is 50 Hz, the resistance is  $5 \Omega$ , the reactance of the inductance is  $10 \Omega$ , and the reactance of the capacitance is  $2 \Omega$ .

1. Calculate the load total impedance
2. Calculate the frequency at which the load is seen as a resistance of  $5 \Omega$ .



#### EX 2 Phasors and Power

The voltage over a load and the current through are:

$$v = 150\sin(314.14t + 0.2) \text{ V}$$

$$i = 25\sin(314.14t - 0.5) \text{ A}$$

Calculate:

1. The frequency of the source
2. The source voltage phasor
3. The load current phasor
4. The active power drawn by the load
5. The reactive power drawn by the load

#### EX 3 Power and Energy

An electric load is connected to a 230 V voltage source. The load impedance changes during a 24 hours period according to the table below. Calculate the electric energy consumed by the load during the 24 hours period. You can use a spreadsheet calculation program.

Time period	Impedance $\Omega$	Power angle ( $^\circ$ )
8.00 – 10.30	10	30
11.00 – 13.00	20	0
15.00 – 17.00	15	60
17.00 – 20.00	5	45