

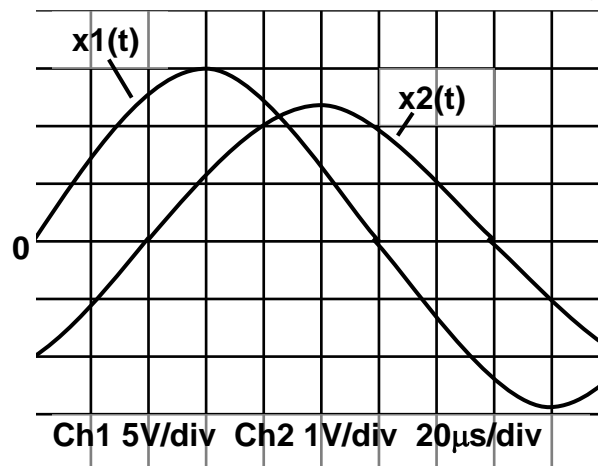
## Laboratory work 2

### EXAMINING THE FILTERS

#### Preliminary questions

Return answers to the preliminary questions to the supervisor of the work in the beginning of the laboratory work. **Take a copy of the answers and bring it with you to the laboratory works!**

- Answer briefly how the following types of filters can be used in signal processing by giving at least one example of real life applications for every type of filter. (Hint: Applications of sound and radio interference.)  
 Low pass filter                                      High pass filter  
 Band pass filter                                      Band stop filter
- A filter was examined with help of signal generator and oscilloscope. The input signal of filter  $x_1(t)$  was measured in the channel 1 (Ch1) of the oscilloscope and the output in the channel 2 (Ch2), respectively. The voltage divisions of channels and the time scale used are seen down in the picture. Result was the following presentation



- What is the frequency of the measured signal?
  - What is the attenuation of the filter at the measured frequency in decibels?
  - What is the phase distortion (phase difference) between output and input signals in degrees?
- Explain what means the selectivity of the filter. Show also a clarifying picture!
  - Butterworth low pass filter is of 10<sup>th</sup> degree. Cutoff frequency of the pass band (in which the attenuation is 3 dB comparing to the 0 Hz Frequency) is 1000 Hz. How big is the attenuation of the filter in decibels at the frequency of 2005 Hz
  - What is the advantage of a Bessel-filter comparing to the other filter types?
  - Explain what is the meaning of group delay?