

## **Laboratory work 2**

### **EXAMINING THE FILTERS**

#### **What will be done?**

In this work we will familiarize with the low, high, band pass and band stop filters with help of Matlab-programme. With help of the program the filters of the different filter families are designed and their amplitude and phase responses and group delays are examined. The results found are then compared to find the differences between the filter families.

#### **How?**

The parameters used when designing a filter are the ripple and the attenuation on the pass and stop and the cut off frequencies of the pass and the stop band. After setting the parameters the degree of the filter and the natural (real) cut off frequencies are known. From these values Matlab calculates the properties of the filter as a function of frequency. The file (or macro) ending .m is already done and the group should change the parameters to appropriates according to the task.

#### **What to take with?**

During the work you will need course book or hand-outs of the course and tools to make notes and calculations. Course book / hand-outs you will need for solving the questions.

#### **Documentation during the work**

Graphs and macros are printed for each group according to given instructions. Some or all of the results may be sent by e-mail to group members. Observations from listened sound files should be written down. Assistant gives parameters to some assignments. This laboratory work can be made with any of the computers reserved for this work (12).

#### **Reporting**

Before the laboratory work each group answers to the preliminary questions and returns the answers to the assistant in the beginning of the work. You can't begin without returned answers. After the laboratory work each group writes a report, which will be returned to a box under the notice board of the course.

#### **Grading of the work**

The maximum points for the preliminary questions are 35 and for the report 65. Therefore, the overall maximum for the laboratory work is 100 points as for every work.

#### **How to pass the work**

Both the preliminary questions and the report must be returned. The required minimum for the preliminary questions is 15 points and 25 points for the report. If this is not the case, one has to retake the work (or just the preliminary questions or the report).

#### **Hardware**

The hardware used in this work is the same as one in laboratory work 1 i.e. 800 MHz PC with additional equipment and accessories.