Experimental data processing
Exam, October 25, 2017

1. You have experimental data about a dynamical process. What do you start with to study the regularities of process?

2. What is the difference between optimal and quasi-optimal estimation methods?

3. Describe advantages and disadvantages of optimal and quasi-optimal estimation methods.

4. How do you analyze the reliability of obtained estimation results and potential success of processing?

5. Which conditions are more preferable to apply running mean than exponential mean?

6. What are results of running mean if the width of running window is the same or greater than period of variations?

7. Processing methods are based on finding a balance between the maximal noise reduction and the minimal distortion of true process. Which parameters determine this balance?
   A. In Kalman filter
   B. In running mean
   C. In exponential mean
   D. In smoothing algorithm based on complex minimization of deviation and variability indicator?

8. What is the main difference between classical least-square method and Kalman filter?

9. How a theoretical model of process can be adjusted on the basis of available experimental data? How errors of measurements can be estimated?

10. Is it possible to estimate directly unmeasured parameters using
    A. Classical least-square method?
    B. Kalman filter?
    C. Quasi-optimal estimation methods?

11. How to estimate the accuracy of forecast m steps ahead using Kalman filter?

12. Does Extended Kalman filter provide optimal estimation? Why?
    Under which conditions it comes to divergence even if all the parameters are known?

13. Which methods considered in the course can be widely applied in
    A. Navigation?
    B. Space weather?
    C. Biomedicine

14. What is the most important thing you learned in this course?