Theoretical questions

for the Theory of Measurement exam

1. Measurement and measurement procedures.

2. Unit systems, the SI unit system.

3. Measurement uncertainty and its types.

4. Measurement result as a random variable. Probability distributions and their characteristics.

5. The normal or Gaussian distribution and its characteristics. Central limit distribution - theorem.

6. Poisson - distribution and its characteristics.

7. Continuous uniform distribution and its characteristics.

8. Measurement as a statistical sample. Estimating the expected value and standard deviation.

9. The arithmetic mean as an estimate of the expected value, and the estimated standard deviation of the arithmetic mean.

10. Uncertainty of indirect measurements, laws of error propagation.

11. Method of least squares.

12. Linear regression. The importance of possible linearization.

13. Analysis of time signals in the time domain. Correlation functions. Velocity measurement based on the time-of-flight method.

14. Time signal trends, smoothing procedures. Savitzky - Golay smoothing.

15. Analysis of time signals in the frequency domain. Sampling theorem. Fourier - analysis.

16. Auto spectrum and cross spectrum. Nyquist - frequency and frequency - resolution.