ELT-63106  Measurements of Physiological Systems

Exam 16.2.2016 (Juha Nousiainen)

Use of calculators is NOT allowed.

Answer all questions. To pass the exam, you must get at least 40% of the maximum points (= 8 points) in ALL problems AND at least 40 points in total. Use clear handwriting. Aim at analytical and well structured answers. Compact answers are preferred instead of long non-stop text answers. Use graphics to illustrate your answers if possible.

1. Bioimpedance measurements.
   a) Explain how the electric impedance of tissues (bioimpedance) is formed and describe how it can be modelled.
   b) Describe and evaluate bioimpedance measurement systems, in general
   c) Describe and evaluate impedance cardiography method, in particular.

2. ECG and EEG are basic physiological measurement. Explain the following concepts and how they differ in ECG and EEG. The answer can be list-type, ECG and EEG topic side-by-side.
   a) The standard lead systems used in ECG and EEG.
   b) Noise coupling and elimination in ECG and EEG recordings.

3. To measure and assess physiological systems there are usually several alternative measurement methods available.
   a) Compare the static and dynamic pulmonary function tests.
   b) Compare alternative methods for continuous arterial blood pressure recording and monitoring methods

4. Explain briefly in few sentences the following measurement devices (what and how is measured).
   a) Thermodilution method.
   b) Evoked response measurement.
   c) Pulse oximeter.
   d) Cardiac event monitoring.
   e) Monitoring the depth of anesthesia.