

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.