

ELT-63106 Measurements of Physiological Systems

Exam 10.2.2014 (Juha Nousiainen)

Use of calculators is **NOT** allowed.

To pass the exam, you must get at least 40% of the maximum points in ALL problems AND at least 40 points in total. Use **clear handwriting**. Aim at analytical and well structured answers.

1. Basic measurement principles. Answer only one of the following questions, a) or b) (max. 20 p.):
 - a) The electrode-skin interface and its importance for the bioelectrical measurements and measurement instrumentation.
 - or
 - b) The absorption of light into the tissue, absorption photo spectrometry, and its importance in clinical diagnostics.

2. **Compare** from several points of view the two different approaches and systems to record the electrocardiogram, ECG: the standard 12-lead ECG system and the Frank vectorcardiographic VCG system. Make the comparison in a chart, where you define the comparative features of the systems and their differences in ECG and VCG. (If you cannot precisely identify the how the methods differ, give and define still the feature that differs between ECG and VCG. Consider the differences from all possible relevant points of view) (max. 20 p.)

3. To measure physiological quantities there are usually several alternative measurement methods available. **Consider** the following physiological quantities and **describe** in all cases **two different alternative methods** to measure them. (max. 20 points)
 - a) Respiratory gas flow
 - b) Ventilation rate
 - c) Stroke volume
 - d) Arterial blood pressure

4. Patient monitoring during anaesthesia. (max. 20 p.)

Explain meaning of anaesthesia and **give a list** of important physiological quantities that are usually monitored during the anaesthesia and **briefly explain** their measurement principle applicable to monitoring purpose during anaesthesia.