BME-2106 Measurement and analysis of physiological systems

Exam 12.3.2012

No calculators allowed.

Answer all questions. To pass the exam, you must get at least 40% of the maximum points in ALL problems AND at least 25 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. Measurement system. (max. 5 points)

List as many purposes (not only clinical) as possible for which any physiological quantity can be measured.

Give also the measured quantity at issue.

2. Recording of the ECG with the standard 12-lead ECG system. (20 p.)

Consider

a) ECG signal and its information content,

b) recording methodology,

c) instrumentation,

d) noise problem and noise rejection methods, and

e) ECG signal processing and analysis.

3. Consider the patient monitoring during anaesthesia. (20 p.)

Explain the clinical condition of the patient during the anaesthesia and the purpose if monitoring.

Describe as many clinically important physiological quantities as possible to be monitored, why monitored and how (briefly the measurement method) monitored during the anaesthesia.

4. In few sentences, **describe** the principles and techniques of the following measurements and their applications in studies of cardiovascular and respiratory systems: (max. 5 p.)

a) impedance plethysmography and

b) flow velocity measurements by ultrasound