Medical instrumentation DTEK8080

Exam 27.5.2019 (calculator allowed)

1. Design the inverting amplifier of Figure 1 for a nominal gain of 6 and an input impedance of at least 20 kΩ.

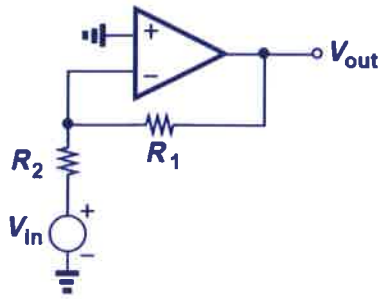

Figure 1. The inverting amplifier.

2. a) Explain the operation of the Flash AD-converter. Support explanation with circuit schematic.

b) What is minimum voltage difference that can be measured by a 1.8 volt, 12-bit ADC?

3. Explain shortly:

a) direct vs. indirect measurement, b) piezoelectric sensor, c) CMRR, d) Sample-and-hold (S/H) circuit, e) PPG and f) FDA

4. Explain

a) noise sources in ECG

b) oscillometric method

5. Explain

a) EEG and related four wave groups delta, theta, alpha, beta

b) Clinical applications of EEG