

ELEC-E5710 Sensors and Measurement Methods 22.5.2018

Exam, five (5) exercises.

*NB! If you have received credit for one (1) or two (2) exam questions by solving the homework exercises, choose and answer to **only four (4) or three (3) questions out of five. The additional answers will not be taken into account (the last ones on the sheet of answers).***

1. Explain *briefly* the following concepts
 - a. Liquid column manometer
 - b. Uncertainty
 - c. Sensitivity
 - d. Bourdon tube
 - e. Piezoelectric effect
 - f. Interferometer

2. Explain:
 - a. The difference between radiometry and photometry (also in terms of measurement equipment).
 - b. The operating principle of capacitive sensors. Give two examples for different measurement quantities.

3. Explain the traceability of measurands. What is the SI system of units? How are National metrology institutes related to the traceability chain? What is the *difference* between working and primary standards?

4. Which phenomenon is the optical temperature measurement based on? Define the term *emissivity* and describe how should it be taken into account when measuring the temperature of an object optically?

5. The velocity of air is measured using a pitot tube based on a mercury manometer (Figure 1). What is the velocity, if $h_m = 6$ cm? Densities of mercury and air are $13,6$ g/cm³ and $1,2$ kg/m³, respectively.

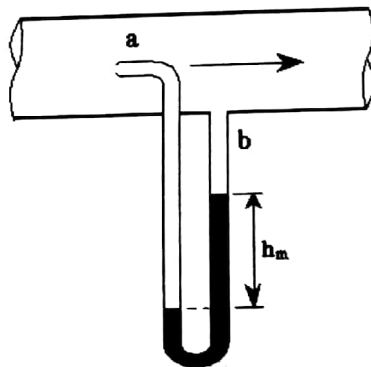


Figure 1.
Pitot tube
based on a
mercury
manometer