ASE-8016 Advanced Topics in Automation Science and Engineering
Special topic: “Instrumentation in Clinical Chemistry”

Examination 19.12.2013 at 17:00 - 20:00
No lecture material is allowed. All calculator types can be used.

Please, write your answers for the questions 1-3 on one writing paper and for the questions 4-6 on another paper.

1. Explain the principle of fluorescence and phosphorescence. What is the main difference between them.
2. Explain the difference between a conventional 2-electrode set-up and the 3-electrode potentiostatic set-up.
3. What are the three main markers for myocardial infarction, and explain how the determination of these three markers can be used to determine the starting time of the infarction. What kind of measurement instrument can be used?
4. Explain and describe typical optical components used in UV-VIS-spectrophotometers to a) produce light, b) filter and select wavelength, and c) detect light.
5. The absorbance of a 1.10-4M solution of dye A in 1 cm cell is 0.85 at 400 nm and 0.25 at 500 nm. The absorbance of a 2.10-4M solution of dye B is 0.45 at 400 nm and 0.95 at 500 nm. The absorbance of a mixture of the two dyes is 0.75 at 400 nm and 0.95 at the 500 nm. Determine the concentration of both components. (Hint: total absorbance is the sum of components).
6. The chromatogram of the three-component mixture is shown below.
   a) Calculate the partition ratio (capacity ratio) for peaks A, B and C.
   b) If the flow rate is 2.5 mL/min, what will be the volume of the mobile phase?
   c) Determine the resolution between peaks B and C.