1. Define or describe the following: (10%)
   a) digestion
   b) confidence interval
   c) masking reagent
   d) chemically modified electrode
   e) electrode of the 2nd kind

2. How are determinate method errors detected? (5%)

3. How to avoid peptization in a gravimetric analysis? (5%)

4. Describe a proper way for weighing hygroscopic solids. (10%)

5. Why are ESCA peaks changes with the change in source (such as Al and Mg tube) whereas Auger peaks are unaffected by the change in source? (10%)

6. To determine the concentration of Co^{2+} in a solution by measuring the voltammetric reduction current according the following reaction:
   $$Co^{2+} + 2e^- \longrightarrow Co(s)$$
   on a mercury electrode at an applied potential of -0.4 V *vs*. SHE. Please discuss the relative magnitude of the measured current if the experiments are carried out in solutions containing the Co^{2+} species and (a) 0.001 M KClO4, (b) 1.0 M KClO4. (10%)

7. In gas chromatographic method, the average linear mobile phase velocity is usually five to ten times greater than the optima velocity. Would you please discuss under this condition which are the most significant factors that influence the column efficiency.(10%)

8. The infrared spectroscopy is not a very sensitive instrument, since its light source and detector sensitivity both are low and can be interfered by surroundings. How can we enhance the signal-to-noise ratio in order to increase the sensitivity for an infrared spectroscopy.(5%)

9. Give the reasons for the derivatization of samples in chromatographic analysis.(10%)

10. What kind ionization source and why you choose for the determination of molecular weight in the below by mass spectrometry.(10%)
    (1) an alcohol   (2) a protein

11. What are the reasons for the spectral line broadening in a atomic spectroscopy.(15%)