科目：分析化學　　　　　　　　系所組：化學系碩士班甲組

1. To which kinds of analytes do the following gas chromatography detectors respond? (15 points)
   (a) thermal conductivity
   (b) flame ionization
   (c) electron capture
   (d) flame photometric
   (e) mass spectrometry

2. Find the absorbance and transmittance of a 0.00480 M solution of a substance with a molar absorptivity of 313 $M^{-1}cm^{-1}$ in a cell with a 1.00-cm pathlength. (10 points)

3. Comparsion of HPLC and GC in the (1) instrument system, (2) sample volatility, (3) polarity, (4) thermal lability, (5) molecular weight, (6) sample preparation, (7) sample size, (8) separation mechanism and (9) detectors (18 points)

4. What's the salt bridge, reference electrode, voltammograms and ion-selective electrode? (12 points)

5. Let's write the Nernst equation for the half-cell reaction in the below example. (15 points)
   (a) $2H^+(aq) + 2e^- \longrightarrow H_2(g)$
   (b) $2Ag^+ + Cu(s) \longrightarrow 2Ag(s) + Cu^{2+}$
   (c) $MnO_4^- + 5e^- + 8H^+ \longrightarrow Mn^{2+} + 4H_2O$
   (d) $Hg^{2+} + 2e^- \longrightarrow Hg(l)$
   (e) $\frac{1}{4}P_4(s, white) + 3H^+ + 3e^- \longrightarrow PH_3(g)$

6. (a) Find the pH of a solution prepared by dissolving 1.00g of glycine amide hydrochloride(FM 110.54) plus 1.00 g of glycine amide (FM 74.08) in 0.100 L. (pKa = 8.04) (5 points)
   (b) How many grams of glycine amide should be added to 1.00 g of glycine amide hychloride to give 100 mL of solution with pH 8.00? (5 points)

7. Explain what is meant by spectral, chemical, ionization, and isobaric interference. (12 points)

8. What is the Kjeldahl nitrogen method? (4 points) The Kjeldahl procedure was used to analyze 300 µL of a solution containing 32.34 mg protein/mL. The liberated NH_3 was collected in 5.00 mL of 0.033 6 M HCl, and the remaining acid required 6.34 mL of 0.010 M NaOH for complete titration. What is the weight percent of nitrogen in the protein? (N = 14) (4 points)

※ 注意：1.考生須在「彌封答案卷」上作答。
　　　　　2.本試題紙空白部分可當稿紙使用。
　　　　　3.考生於作答時可否使用計算機、法典、字典或其他資料或工具，以簡章之規定為準。