Ex/M.Sc/CHEM/AC/4/XIII/4131A/106/2018

M. Sc. Chemistry Examination, 2018

(4th Semester)

Analytical Chemistry Special

Paper - XIII-A

Time : Two hours Full Marks : 50

(25 marks for each unit)

Use a separate answerscript for each unit.

UNIT - A - 4131

1. Answer any ***four*** questions 4×3

   a) Define proportional error and constant error. Discuss about their relationship with absolute error and relative error.

   b) How can you detect systematic error ?

   c) Calculate spread, standard deviation and coeffcient of variation of the following set of replicate measurements :

   70·65, 70·63, 70·64, 70·21

   d) Estimate the absolute standard deviations of the following calculations :

   (i) $y=5.75(\pm 0.03)+0.833(\pm 0.001)-8.021(\pm 0.001)$

   (ii) $y = \log\left[2.00(\pm 0.03)\times 10^{-4}\right]$

[Turn over

e) What do you mean by null hypothesis and alternative hypothesis ? Discuss with suitable example.

2. a) Write down the basic principle of A.C. Polarography with necessary diagrams. Mention its significance. What is meant by 'Tensammetric Waves' ? 2+2+1

b) Mention the requisite criteria of Coulometric Titration. Write down the advantages of Coulometric Titrimetry. Provide two specific examples of Coulometric Titration. 1+2+1

c) Write a concise note one 'High-Frequency Titration'. 4

3. a) What is an ion suppressor column used in anion-exchange chromatography ? Explain the construction and function of hollow-fiber ion suppressor column. 3

b) What is super-critical fluid chromatography (SFC)? What are the advantages of it over HPLC and GC ? What is the detector used in SFC ? 3

c) What are the different type of detectors used in gas chromatography? What do you understand by concentration dependent and mass flow dependent detectors? Describe the construction of FID detector. 3

d) Answer ***any one*** of the following questions :

i) What is high performance size-exclusion chromatography? How would you explain the separation of fullerenes C_{60} and C_{70} by size exclusion chromatography ?

ii) What are plate height and plate numbers ? How are chromatographic efficiencies related to them? Describe a method of determination of plate number in the laboratory. $3\frac{1}{2}$

4. a) What is continuous extraction? Describe the general methods of the continuous extraction. 1+3

b) What do you mean by solid-liquid extraction ? Give one example, where the solid liquid extractions are used that leads to its application. 2+1

c) What is synergic agent with respect to solvent extraction? How the efficiency of the synergic extraction is dependent on the concentration of the synergic agent of the medium? What is anti-synergic effect ? Explain with example. $1+2\frac{1}{2}+2$