M. Sc. Chemistry Examination, 2022

(4th Semester)

Analytical Chemistry Special

Paper – XIII-A

Time : Two hours Full Marks : 50

(25 marks for each unit)

Use a separate answer script for each Unit.

UNIT: A-4131

Unit: A-4131a

1. Answer the following questions :

   a) Differentiate between constant error and proportional error with examples. 2

   b) Discuss accuracy and precision. Correlate them with errors. 2+1

   c) The following results were obtained in the replicate determination of the lead content of a blood sample: 0.752, 0.756, 0.752, 0.751 and 0.760 ppm Pb. Calculate (i) the variance, (ii) the relative standard deviation in parts per thousand, (iii) the coefficient of variation and (iv) the spread. 3

   d) The solubility product, K_{sp}, for the silver salt, AgX, is 4.0 (±0.4) × 10^{-8}. What is the uncertainty in the calculated molar solubility of AgX? 1

e) Calculate a pooled estimate of σ from the following spectrophotometric analysis for NTA (nitrilotriacetic acid) in water from the Ohio River: 2

Sample	NTA, ppb
1	13, 19, 12, 7
2	42, 40, 39
3	29, 25, 26, 23, 30

f) What are the rules to round-off a number? Illustrate with examples. $1\frac{1}{2}$

Unit: A-4131b

2. Answer the following questions :

a) Mention the basic principle of A.C. polarography. What are its significance? What do you mean by 'Tensammetric Waves'? 2+2+1

b) Citing at least one example for each case, discuss the role of 'Cathodic depolariser' and 'Anodic depolariser' in electrogravimetry. 2+2

c) Enumerate the working principle of High Frequency Titration with example. 2

d) What do you mean by 'Ellipsometry'? $1\frac{1}{2}$

UNIT: A-4132

3. a) Write a short note on the role of silica and alumina in TLC. $3\frac{1}{2}$

b) Write a method of spearing nickel(II) and copper(II) by paper chromatography. 3

c) Write a short note on paper chromatography. 3

d) "Lanthanides come out in the reverse order of their atomic weight when separated with the help of ion exchange chromatography." Explain the statement. 3

4. a) What is continuous counter current extraction? How is it efficient than continuous extraction? Describe the general method of the continuous counter current extraction. $1+2+2\frac{1}{2}$

b) What do you mean by solid-liquid extraction? How can calcium, strontium and barium be separated using the solvent extraction technique? 2+1

c) How is a synergic agent related to the solvent extraction? How is the efficiency of the synergic extraction dependent on pH of the medium? What do you mean by anti-synergic effect? 1+2+1