

**M. Sc. CHEMISTRY EXAMINATION, 2019**

( 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) What do you mean by proportional error and constant error? Discuss about their relationship with absolute error and relative error.
  - b) Define (i) type I error, (ii) coefficient of variation and (iii) significant figures.
  - c) The solubility product  $K_{sp}$  for silver salt, AgX, is  $4.0(\pm 0.4) \times 10^{-8}$ . Determine the molar solubility of AgX in water. What is the uncertainty in the calculated solubility of AgX in water?
  - d) A chemist obtained the following data for the alcohol content of a sample of blood : %C<sub>2</sub>H<sub>5</sub>OH : 0.084, 0.089 and 0.079. Calculate the 95% confidence interval for the mean assuming

[ Turn over

(i) the three results obtained are only indicative of the precision of the method and (ii) from previous experience on hundreds of samples, we know that the standard deviation of the method,  $s=0.005\% C_2H_5OH$  and is a good estimate of  $\sigma$ . (Given:  $t=4.30$  for 2 numbers of degrees of freedom and 95% confidence interval).

e) What is confidence interval? Describe in your own words why the confidence interval for the mean of five measurements is smaller than that for a single result.

2. a) Write a concise note on 'Ellipsometry'. 3

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

c) Mention the basic principle of A.C.Polargraphy. What are the significant aspects of this technique? 2+2

d) Enumerate the working principle of High Frequency Titration. 2

**UNIT -A-4132**

3. a) Explain  $t_R$ ,  $t_M$  and  $t_S$  in a chromatographic separation. Symbols have their usual meanings. 3

b) Prove that : Selectivity factor  $(\alpha) = (t_R)_B - t_M / (t_R)_A - t_M$

where, A and B are two analytes to be separated by chromatography. 4

c) Explain the principle of gas liquid chromatography. 3

d) Explain elutopic series with example. 2  
1

4. a) What stands for the "equilibrium" in solvent extraction process? What is ion pair and what is ion pair extraction? Give one example of ion pair extraction with the number of equilibrium involved. 1+1+3

b) What is continuous counter current extraction? How it is efficient from continuous extraction? Describe the general method of the continuous counter current extraction. 1+2+2

c) What is synergic agent with respect to solvent extraction? What is anti-synergic effect? Explain with example. 2