

Unique Paper Code: 42173923

Name of the paper: Basic Analytical Chemistry

Name of the Course: B.Sc. (Prog.) Chemistry

Semester: III/V

Duration: 2 Hours

Maximum Marks: 38

Instructions for Candidate:

1. Each sheet is to be numbered and signed at the end of each answer.
2. The questions should be numbered in accordance to the number in the question paper.
3. Attempt any two questions.
4. All questions carry equal marks.

Q1

- a. Name the indicators used and parameters of water which can be identified by following volumetric methods:
 - i. Complexometric titration
 - ii. Iodometric titration
 - iii. Neutralization titrations
- b. Why random errors are also known as indeterminate or accidental errors? Why random errors cannot be minimised?
- c. Why TLC is superior to the paper and column chromatography?
- d. Define ion exchange capacity of resin and give its unit for dry and wet resin?
- e. What is meant by the term 'sampling'? With suitable examples, explain the difference between homogenous and heterogeneous samples.
- f. Give reasons for selecting EDTA in complexometric titration? Why disodium salt of EDTA is used for complexometric titrations?

(3, 3, 3, 3, 3, 4)

Q2

- a. When zero can be a significant figure. Round off the following numbers to three significant figures:
 - i. 63.35
 - ii. 76.752
 - iii. 89.673
- b. What are the different ways of expressing precision? Justify that good precision does not assume good accuracy.
- c. How pH of soil indicates presence or absence of certain elements? What happens if the pH of the soil is too low or too high?
- d. What is the role of adsorbents and adsorbate in TLC? Name some of the

adsorbents which can be used to prepare chromatoplates?

- e. In liquid chromatography, what are the conditions required for suitable stationary and mobile phases?

(5, 4, 4, 4, 2)

Q3

- a. What does Q-test and F-test represent? How are they helpful in presenting the experimental data and results?
- b. Differentiate between (any two):
- Standard deviation of mean and relative standard deviation
 - Confidence interval and confidence limit
 - Planar and column chromatography
- c. Explain why water containing $\text{Ca}^{2+}(\text{aq})$ and $\text{HCO}_3^{-}(\text{aq})$ ions is said to be hard? Calculate temporary hardness and total hardness of a sample of water containing:
- $\text{Mg}(\text{HCO}_3)_2 = 7.3 \text{ mg/L}$;
 $\text{Ca}(\text{HCO}_3)_2 = 16.2 \text{ mg/L}$;
 $\text{MgCl}_2 = 9.5 \text{ mg/L}$;
 $\text{CaSO}_4 = 13.6 \text{ mg/L}$
- d. What are the two forces involved in paper chromatography? Name different types of paper chromatography based on the flow of mobile phase?

(4, 8, 4, 3)