

U.G. 6th Semester Examination - 2022**CHEMISTRY****Course Code : BCEMDSHC4 [DSE-4]****Course Title : Analytical Methods in Chemistry**

Full Marks : 30

Time : 2 Hours

*The figures in the right-hand margin indicate marks.**Candidates are required to give their answers in their own words as far as practicable.*

1. Answer any **ten** questions: 1×10=10
- Define random error with an example.
 - What do you mean by 'confidence interval' of the mean?
 - What do you mean by Accuracy?
 - Among N₂ and NO which one is IR active and why?
 - In atomic absorption spectroscopy, for higher flame temp (3200K) which fuel mixture is essential?

- What is the ion-exchange capacity of a cation-exchanger?
- What is the most common support materials for a packed G.C. column?
- In a sample you find out the amount of Ni²⁺ is 3.24 gm/L but the original value is 3.00 gm/L. Find out the absolute error.
- Find out the round off value:
1.2884+0.06+3.484.
- Write the relation between absorption and transmittance.
- Which type of stationary phase used in reverse phase chromatography?
- Mention two important parameter on which distribution coefficient of a particular column in column chromatography generally depend.
- Draw the conductometric titration graph (conductance vs volume added) for weak acid vs weak base and strong acid vs strong base.
- Write down the two sources of determinate error.
- What is distribution ratio?

2. Answer any **five** questions: $2 \times 5 = 10$

- a) What are the criteria for rejection of an observation?
- b) Write the basic principles of ion-exchange chromatography.
- c) 'Sample size' is playing a vital role in detecting the systemic error'. – Explain.
- d) What do you mean by isobestic point in spectrophotometry?
- e) Name two important applications of atomic absorption spectroscopy.
- f) Find out the equivalence point potential during the titration of 0.1(M) Mohr's salt solution with 0.1(M) $K_2Cr_2O_7$ solution.

$$\left[\text{Given : } E_{Fe^{3+}/Fe^{2+}}^0 = 0.77V \text{ and } E_{Cr_2O_7^{2-}/Cr^{+3}}^0 = 1.33V \right]$$

- g) What is the difference between adsorption and partition chromatography?
- h) Estimate the absolute standard deviation from the result of the following calculation:

$$Y = \frac{1.97(\pm 0.01)}{243(\pm 3)}$$

3. Answer any **two** questions: $5 \times 2 = 10$

- a) What is thin layer chromatography? How can you identify some amino acids in a mixture by TLC? $1+4=5$
- b)
 - i) The following results were obtained in the replicate determination of the lead content of a sample: 0.752, 0.756, 0.752,, 0.751 and 0.760 ppm. Calculate the mean, standard deviation and variance of this set of data.
 - ii) What is the basic difference between atomic absorption and atomic emission spectroscopy? $4+1=5$
- c)
 - i) What is Buffer solution? Write the Henderson equation?
 - ii) What reference is generally used in FTIR spectroscopy?
 - iii) What type of electronic transition is responsible for the purple color of $KMnO_4$? $(2+1)+1+1=5$