

Seat No. : \_\_\_\_\_

# MH-105

March-2022

M.Sc., Sem.- I

404 : Chemistry

(Analytical Chemistry)

Time : 2 Hours]

[Max. Marks : 50

- Instructions :**
- (1) Section – I : Answer any **three (3)** questions out of **eight (8)**.
  - (2) Section – II : **All** questions are compulsory.
  - (3) Illustrate your answers with neat diagrams/figures wherever necessary.

## SECTION – I

Answer any **three (3)** questions :

- (A) Discuss about the classical and instrumental methods of analysis. 7

(B) Write a brief note on non-aqueous titrations. 7
- (A) In a gravimetric analysis, how many tablets should be analyzed to provide 0.25 g of  $\text{Fe}_2\text{O}_3$  product. [Mol. wt. of  $\text{Fe}_2\text{O}_3$ : 159.69 g/mol and At. wt. of Fe : 55.845 g/mol] 7

(B) Calculate the mole fraction, molarity, and molality of  $\text{NH}_3$  (Mol. wt. 17 g/mol) if it is in a solution that is composed of 30.6 g  $\text{NH}_3$  in 81.3 g of  $\text{H}_2\text{O}$  (Mol. wt. 18 g/mol). The density of the solution is 0.982 g/mL and the density of water is 1.00 g/mL. 7
- (A) Discuss different causes of systematic errors and ways to minimize their effect. 7

(B) Give a brief account of control charts and confidence limit/interval. 7
- (A) Describe in brief standard addition technique and the importance of internal standards for qualitative and quantitative analysis. 7

(B) Discuss various parameters of analytical method validation. 7

5. (A) Discuss the components of glass electrode with a neat diagram and explain the operational definition of pH measurement using glass electrode. 7
- (B) Discuss various factors on which conductance of solution depends. And explain the complexometric and precipitation titrations based on conductance measurement. 7
6. (A) Discuss various errors encountered while working with glass electrode and state the corrections. 7
- (B) Explain the principle of conductometric titration and nature of curve for conductometric acid-base titrations. 7
7. (A) Outline the detail classification of electrodes from metals to membranes with examples. 7
- (B) Explain the working mechanism and application of fluoride ion selective electrode. 7
8. (A) Elaborate the principle and properties of ion selective electrodes. 7
- (B) Explain the working mechanism of CO<sub>2</sub> gas sensing probe. Give their applications in the analysis of environmental samples. 7

## SECTION – II

9. Answer the following questions : (1 mark each) 8
- (A) What do you understand by “matrix” for any real sample ?
- (B) Define significant figures.
- (C) What is Gaussian distribution ?
- (D) Mention the role and functions of Quality Control department.
- (E) What is specific conductivity ?
- (F) Define boundary potential.
- (G) State two applications of potentiometry.
- (H) Give two characteristics of reference electrodes.
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