No. of Printed Pages : 4

MCH–001

POST GRADUATE DIPLOMA IN ANALYTICAL CHEMISTRY (PGDAC)

Term-End Examination

June, 2025

MCH-001 : BASIC ANALYTICAL CHEMISTRY

Time : 3 Hours *Maximum Marks : 75*

Note : *Attempt* ***five*** *questions in all. Question No.* ***1*** *is compulsory. All questions carry equal marks.*

1. Answer any ***five*** of the following :

   (a) What is meant by gravimetric analysis ? 3

   (b) What are potentiometric titrations ? 3

   (c) Define amperometry. 3

(d) Differentiate between potentiostatic coulometry and amperostatic coulometry. 3

(e) Discuss in brief Turbidimetry and Nephelometry. 3

(f) Give differences between Differential Thermal Analysis (DTA) and Differential Scanning Calorimetry (DSC). 3

2. (a) What are the *five* sources of determinate errors ? 5

(b) Differentiate between accuracy and precision. 5

(c) Explain standard deviation. 5

3. (a) Write the various factors relevant to sampling. 5

(b) Discuss Suspended Particulate Matter (SPM) and Respirable Suspended Particulate Matter (RSPM). 5

(c) Give differences between physical adsorption and chemical adsorption. 5

4. (a) Explain safety aspects in the design of a chemical laboratory. 5

   (b) What are the do's and don'ts regarding the code of practice in a laboratory ? Write at least *five* points. 5

   (c) What are the considerations that are kept in mind while storing the chemicals ? 5

5. (a) What is leveling effect in acid-base equilibria ? 5

   (b) Write the expression for calculation of pH of buffer solutions. Calculate the pH of a solution containing 0.01 M CH_3COOH and 0.01 M CH_3COONa (K_a of acetic acid = 1.76×10^{-5} at 25°C). 5

   (c) Explain buffer capacity. Calculate the buffer capacity of a solution which is 0.10 M in acetic acid and 0.1 M in sodium acetate. The pKa of acetic acid is 4.75. 5

6. (a) What are primary and secondary standards ? Give suitable examples of each type. 5

   (b) Discuss titration of Sodium carbonate *vs.* HCl giving suitable equation and titration curve. 5

   (c) How do you select an indicator for a given titration ? Explain indicator error. 5

7. (a) Derive an expression of Nernst equation for cell potential of the Daniel cell. 5

   (b) Write the application of an oxidising reagent in redox titrations. 5

   (c) Describe metallochromic indicators giving suitable examples. 5

8. (a) How is the end point detected in the Volhard method of precipitation titration ? What is meant by Volhard titration equilibrium ? 5

   (b) Define nucleation. What are different variables that influence of particle size in gravimetry ? 5

   (c) Give the advantages and disadvantages of organic precipitants. 5

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