

**POST GRADUATE DIPLOMA IN
ANALYTICAL CHEMISTRY (PGDAC)**

Term-End Examination

December, 2025

MCH-001 : BASIC ANALYTICAL CHEMISTRY

Time : 3 Hours

Maximum Marks : 75

Note : Attempt any *five* questions. All questions carry equal marks.

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1. (a) What are the advantages of volumetry over gravimetry ? 5
 - (b) List the various optical methods of analysis. 5
 - (c) Give property measured and instrument used in the following : 5
 - (i) Thermogravimetric Analysis (TGA)
 - (ii) Differential Thermal Analysis (DTA)
 - (iii) Differential Scanning Calorimetry (DSC)

2. (a) What are indeterminate errors ? How can they be reduced ? 5
- (b) What are significant figures ? Analysis of sample of brass gave the following percentages :
- 2.47 Sn, 7.60 Pb, 62.08 Cu, 0.027 Fe and 27.86 Zn.
- Calculate the total percentage determined. Apply the rules for correct use of significant figures. 5
- (c) What is the coefficient of variation in analytical data evaluation ? How would you compute addition and subtraction of standard deviation ? 5
3. (a) What are the objectives of water quality monitoring system ? What are the possible sampling sites of a river passing through a city ? 5
- (b) Explain specific criteria for selection of location for air sampling. 5
- (c) Discuss random and representative sampling of food materials. 5
4. (a) What are the measures to be taken for effective running of a chemical laboratory ? 5

- (b) What are the acute and chronic effects of chemicals on human body ? How can it be minimised ? 5
- (c) Discuss relevant first aid procedures for the possible chemical burns in a chemistry laboratory. 5
5. (a) With the help of suitable examples, discuss levelling effect and differentiating solvent. 5
- (b) Discuss the properties of buffer solutions and the effect of adding small amounts of acids or bases on their pH. 5
- (c) Explain polyprotic acids. Write the general procedure to determine the $[H_3O^+]$ for solutions containing a diprotic acid. 5
6. (a) Draw and discuss titration curve for titration of a strong acid *vs.* strong base. 5

- (b) Discuss selection of indicator and indicator error. 5
- (c) Explain Modern Quinoid theory of indicators with the help of suitable examples. 5
7. (a) How will you obtain the equilibrium constant of a redox reaction ? 5
- (b) With the help of suitable chemical equations, show that iodine can be used for the determination of oxidising as well as reducing agents. 5
- (c) In complexometric titrations, what strategies are adopted to selectively determine a given metal ion in presence of another ion ? 5
8. (a) How do you calculate the end point equilibrium in Mohr's titration ? 5

- (b) Differentiate between co-precipitation and post-precipitation. PbSO_4 is soluble in ammonium acetate and co-precipitated with BaSO_4 but cannot be removed, why ? 5
- (c) What is the basic principle involved in the following electroanalytical techniques ? 5
- (i) Potentiometry
 - (ii) Electrogravimetry
 - (iii) Conductometry

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