

**P. G. DIPLOMA IN ANALYTICAL  
CHEMISTRY (PGDAC)**

**Term-End Examination**

**December, 2020**

**MCH-004 : ELECTROANALYTICAL AND  
OTHER METHODS**

*Time : 3 Hours*

*Maximum Marks : 75*

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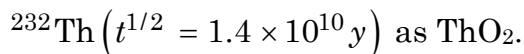
***Note :** Answer any **five** questions. All questions carry equal marks.*

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1. (a) Which complexing agents provide the best deposits in electrogravimetry ? How would you determine electrode potential in this methods ? 5
  
- (b) Calculate the pH during the titration of 75.00 cm<sup>3</sup> of 0.15 M HCl with 0.3 M NaOH at different stages of titration : 5
  - (i) initial point
  - (ii) after addition of 10 cm<sup>3</sup> of NaOH.

- (c) Explain the difference between concentration polarization and kinetic polarization with an suitable example. 5
2. (a) Explain ionic product of water. The conductivity of pure water is  $7.0 \times 10^{-6} \text{ S m}^{-1}$ . Calculate the ionic product of pure water if  $\wedge_{\text{H}^+}^{\alpha} = 0.035 \text{ S m}^2 \text{ mol}^{-1}$  and  $\wedge_{\text{OH}^-}^{\alpha} = 0.020 \text{ S m}^2 \text{ mol}^{-1}$ . 5
- (b) List pulse methods and describe any *one* of these briefly. 5
- (c) Draw the nature of polarogram and describe the information one can get from it. Define half wave potential. 5
3. (a) Discuss salient features of a thermogravimetric curve. How this can be used to find out if gravimetric precipitates should be dried or ignited ? 5
- (b) Discuss all the errors in Differential Scanning Calorimetry (DSC). 5
- (c) Calculate the mass of 5 m Ci the following radionuclide source of : 5



4. (a) Explain the basic principle of Isotope Dilution Analysis (IDA). Derive its equation. How substoichiometric isotope dilution analysis (SIDA) method is an improvement over IDA ? 5
- (b) Discuss the principle of radioimmunoassay and its application briefly. 5
- (c) Explain the role of furnace atmosphere and how it has an effect on the Thermogravimetric (TG) curve with a suitable example. 5
5. (a) How can equilibrium constants be determined from electrode potential measurements ? 5
- (b) Explain 'alkaline error' in pH measurement. 5
- (c) Define the term limiting molar conductivity. List all the factors affecting conductivity. 5
6. (a) Discuss classification of coulometric methods briefly. 5
- (b) What are capillary characteristics ? How does it affect diffusion current in polarography ? 5

- (c) Discuss applications of amperometric titrations. 5
7. (a) Explain the method of measurement of crystallinity using Differential Thermal Analysis (DTA). 5
- (b) Explain, how thermometric titrations are different from classical titrations. 5
- (c) Discuss advantages and limitations of thermometric titrations. Name all the mentioning their parent and end products in each case. How many  $\alpha$  and  $\beta$  particles are emitted in each case? 5
8. (a) Discuss all the factors that affect choice of radiotracers with the help of an illustration. 5
- (b) Draw a labelled diagram of a experimental setup used in potentiometric titration. 5
- (c) Draw a schematic diagram for the instrumentation setup in cyclic voltammetry. 5