

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

Term-End Examination

00082

June, 2017

MCH-001 : BASIC ANALYTICAL CHEMISTRY

Time : 3 hours

Maximum Marks : 75

Note : Answer any five questions. All questions carry equal marks. Log tables may be used.

1. (a) Distinguish between Turbidimetry and Nephelometry. 5
- (b) Round off the following numbers as indicated : 5
- (i) 1.2367 to 4 significant figures
- (ii) 2.0513 to 4 significant figures
- (iii) 0.2353 to 3 significant figures
- (iv) 2.0050 to 3 significant figures
- (v) 2.051 to 2 significant figures
- (c) What is meant by a pseudo first order reaction ? Explain with the help of a suitable example. Give its rate equation. 5
2. (a) Distinguish between the following : 5
- (i) Chemical burns and Thermal burns
- (ii) Poisonous substance and Infectious substance

- (b) What is a conjugate acid-base pair ? Give two examples. 5
- (c) Why are non-ionizable solvents weakly basic and not weakly acidic ? Explain. 5
3. (a) Calculate the electrode potential of the half cell containing aqueous solution 0.1 M KMnO_4 and 0.1 M MnCl_2 having a pH = 1.00. (E° for the reaction $\text{MnO}_4^- + 8\text{H}^+ + 5e = \text{Mn}^{2+} + \text{H}_2\text{O}$ is + 1.52 V) 5
- (b) What are enzyme catalysed reactions ? What is Michaelis Constant with reference to the rate law for such reactions ? 5
- (c) Describe the technique of polarography. Give a labelled diagram of a polarograph. 5
4. (a) Replicate K^+ concentration (mg/100 ml) in a sample of blood serum is found to be 15.30, 15.85, 15.55 and 16.30. Calculate the 90% confidence interval for the set, assume $C_n = 0.53$. 5
- (b) Describe the method of segregating and grinding of solid waste samples. 5
- (c) 8-Acetoxyquinoline is used for homogeneous precipitation. Name the cations/anions it is used to estimate. Give reactions involved in the process. 5

5. (a) Give the precautions to be observed while washing a precipitate for gravimetric determination. 5
- (b) What is a metallochromic indicator ? How does it differ from an acid-base or Redox indicator ? Explain citing suitable examples. 5
- (c) Calculate the pH of a solution which is prepared by dissolving 8.0 mmole of sodium acetate in 200 mL of 0.1 M acetic acid ($pK_a = 4.74$). 5
6. (a) Explain, what is meant by a 'buffer region' during acid-base titration. 5
- (b) Name any four types of atomizers used as sources for atomic emission. Give the advantages of a plasma source over other sources. 5
- (c) Describe the problems arising in the sampling of water for determination of BOD. 5
7. (a) Distinguish between acute and chronic effect of a chemical. Illustrate giving one example. 5

- (b) In the single step reaction $A + 2B \rightarrow C$, what is the
- (i) overall order of the reaction ?
 - (ii) order of the reaction w.r.t. A ?
 - (iii) order of the reaction w.r.t. B ?
 - (iv) order of the reaction if B is taken in large excess ? Give the rate equation. 5
- (c) Calculate the concentration of $[\text{SO}_4]^{2-}$ in a 0.1 M aqueous H_2SO_4 solution.
($K_2 = 1.2 \times 10^{-2}$) 5

8. Write short notes on any *three* of the following : 3×5=15

- (a) Adsorption Indicators
 - (b) Coprecipitation
 - (c) Sampling of Food Materials
 - (d) Accuracy and Precision
 - (e) Non-aqueous Titration
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