

No. of Printed Pages : 4

**MCH-001**

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

**Term-End Examination**

**December, 2021**

**MCH-001 : BASIC ANALYTICAL CHEMISTRY**

*Time : 3 Hours*

*Maximum Marks : 75*

**Note :** (i) Answer any **five** questions.

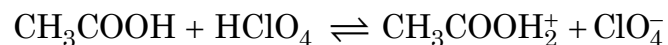
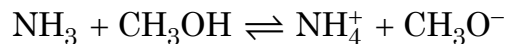
(ii) All questions carry equal marks.

1. (a) Classify optical methods of analysis and explain any **one** of these methods briefly. 5
- (b) Explain significant figures and discuss rules for rounding off addition/subtraction and multiplication/division by considering suitable examples. 5
- (c) Explain the criteria for rejection of data in terms of  $4d$  rule. In replicate analysis of Cu in an ore, % of Cu recorded were; 5.24, 5.25, 5.28, 5.19 and 5.27. Should any of the results be rejected ? Given that rejection

- quotient for 5 determinations at 90% confidence level is 0.64. 5
2. (a) Explain frequency distribution curve and normal error curve. 5
- (b) Describe various physico-chemical determinants required for preservation of samples from nutrient groups. 5
- (c) Discuss safety aspects of a functional chemical laboratory. 5
3. (a) What are the emergency procedures to be followed in a chemical laboratory in case of chemical and thermal burns ? 5
- (b) Discuss various precautions followed for safe handling of glassware. 5
- (c) Write briefly about handling of chemicals with emphasis on information on the label and explain how bulk chemicals should be transported. 5
4. (a) Discuss different applications of kinetic methods of analysis. 5
- (b) Differentiate between order of reaction and molecularity with an example. Define pseudo first order reaction. 5
- (c) Explain enzyme catalyzed reaction with a suitable example. How can it be used for the determination of an enzyme ? 5

**P. T. O.**

5. (a) Define acid and base in terms of Bronsted-Lowry's theory. Identify the base on the left and its conjugate acid on the right in the following reactions : 5



- (b) Derive an expression for ionization equilibria for a weak monoprotic acid. 5
- (c) Define buffer solution. Derive an expression for calculating pH of a buffer solution. Calculate pH of a solution containing 0.01 M  $\text{CH}_3\text{COOH}$  and 0.01 M  $\text{CH}_3\text{COONa}$ . Given  $K_a = 1.76 \times 10^{-5}$  at  $25^\circ\text{C}$  for acetic acid. 5
6. (a) Discuss all the requirements of a primary standard with suitable examples. Draw the nature of neutralisation plot for  $10\text{ cm}^3$  of 0.1 M  $\text{HCl}$  with 0.1 M  $\text{NaOH}$ . 5
- (b) Explain quinonoid theory of acid-base indicators. How colour changes in cases of phenolphthalein on the basis of quinonoid structures ? (Draw the structures). 5
- (c) Classify non-aqueous solvents and explain each of these 3 groups with *two* examples. 5

5

P. T. O.

7. (a) What do you understand by redox indicators ? Write an example and show how it is used for studying redox reactions. 5
- (b) Derive an expression for redox equilibrium constant. 5
- (c) Explain the nature of metal-EDTA titration curves with a schematic diagram. Name any *one* indicator used in such titration. 5
8. (a) Discuss Volhard's method of precipitation titration between  $\text{Ag}^+$  and  $\text{SCN}^-$ . Name the indicator used and write all chemical equations. 5
- (b) Explain the process of precipitation from homogeneous solution. Describe how anions could be generated by hydrolysis considering precipitation of oxalates or sulphates. Write complete chemical equation. 5
- (c) What is the difference between colorimeter and spectrophotometer with respect to range of wavelength, accuracy of the instrument and limitations ? 5

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