

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/
COMMERCIAL PRACTICE, APRIL - 2025**

ENGINEERING CHEMISTRY I

[Maximum marks: 100]

[Time: 3 Hours]

PART – A

Maximum marks: 10

I. (Answer *all* the questions in one or two sentences. Each question carries **2** marks)

1. Why atoms are electrically neutral?
2. Give reason for the hardness of water.
3. What is a conjugate acid-base pair? Give an example.
4. Write the composition of Brass and Bronze.
5. Name the catalysts used in Contact process and Lead chamber process for the manufacture of sulphuric acid.

(5 x 2 = 10)

PART – B

Maximum marks: 30

II. (Answer any *five* of the following questions. Each question carries **6** marks)

1. Explain homogeneous and heterogeneous catalysis with two examples for each.
2. Differentiate between soft water and hard water.
3. Explain the preparation of alloy by fusion method with the help of a diagram.
4. What is potable water? Give any five characteristics of potable water.
5. Write the physical properties of metal.
6. (a) Write any three differences between atom and molecule.
(b) List any three applications of pH.
7. Calculate the normality and molarity of
(a) Na_2CO_3 solution containing 10.6 g in 250ml.
(b) H_2SO_4 solution containing 19.6 g in 500ml.
(Atomic weights: Na-23, C-12, O-16, H-1, S-32).

(5 x 6 = 30)

PART – C

Maximum marks: 60

(Answer *one full* question from each unit. Each full question carries 15 marks)

UNIT – I

- III. (a) List any six applications of nanotechnology. (6)
(b) What are the properties of CNTs? (5)
(c) Distinguish between promoter and poison with one example for each. (4)

OR

- IV. (a) What are CNTs? How are they classified? Give any two applications of CNTs. (6)
(b) Explain any two methods for the synthesis of carbon nano tubes. (5)
(c) Define atomic number and mass number. Calculate the number of electrons and neutrons in the following elements.
(a) $^{23}_{11}\text{Na}$ (b) $^{16}_8\text{O}$ (4)

UNIT - II

- V. (a) Define pH and pOH. Calculate the pH of (i) 0.01M HCl and (ii) 0.01M NaOH solution. (6)
(b) What are indicators? Suggest suitable indicators for the following titrations. Justify your answer. (i) NaOH X CH₃COOH (ii) Na₂CO₃ X HCl (5)
(c) Define ionic product of water. Give its mathematical statement. (4)

OR

- VI. (a) What are buffer solutions? Explain their classification with examples. (6)
(b) Explain Arrhenius and Lewis concepts of acid and bases with examples. (5)
(c) A solution of NaOH is prepared by dissolving 4 g in 500ml. 20mL of this solution is required to neutralize 19.5 mL of HCl solution. Calculate the normality of HCl
(Atomic weights : Na-23, O-16, H-1) (4)

UNIT - III

- VII. (a) Explain the steps involved in the production of potable water with the help of a flow chart. (6)
(b) What are the physical properties of water? (5)

- (c) List the disadvantages of hard water. (4)

OR

- VIII.** (a) What is desalination? Explain the desalination of sea water by reverse osmosis with necessary diagrams. (6)
- (b) Explain any two methods for the removal of temporary hardness of water. (5)
- (c) What is bleaching powder? How it sterilizes water? (4)

UNIT – IV

- IX.** (a) Define powder metallurgy. Explain the different steps involved in powder metallurgy. (6)
- (b) Write any three advantages and two disadvantages of powder metallurgy. (5)
- (c) Give a comparison of cast iron, wrought iron and steel with respect to any of their four physical properties. (4)

OR

- X.** (a) Explain the terms (i) Tempering (ii) Quenching (iii) Nitriding. (6)
- (b) What are the purposes of making an alloy? (5)
- (c) Write any four uses of powder metallurgy. (4)
