

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/  
MANAGEMENT/COMMERCIAL PRACTICE — OCTOBER, 2017

**ENGINEERING CHEMISTRY – I**

[Time : 3 hours

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

Marks

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

1. What are carbon nanotubes ?
2. Give any two applications of pH.
3. What is the basic principle of volumetric analysis ?
4. Why atoms are electrically neutral ?
5. Name the purest form and impurest form of iron. (5×2 = 10)

PART — B

(Maximum marks : 30)

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

1. (a) Explain catalytic promoter and poison with one example each.
- (b) Write any three applications of carbon nanotube. (3+3=6)
2. (a) Explain desalination of water and write one method used for desalination of sea water.
- (b) What is hard water ? Give the reason for temporary hardness of water. (3+3=6)
3. (a) Define ionic product of water. Give its value at 25°C.
- (b) A solution is prepared by dissolving 4.5g of Sodium Hydroxide in water to give 200ml of Solution. Calculate molarity of Sodium Hydroxide solution.  
[Atomic weight of Na = 23, O = 16, H = 1] (3+3=6)
4. (a) Write any three disadvantages of hard water.
- (b) Clarke's process is used to remove hardness of water. Explain Clarke's process with necessary equations. (3+3=6)

5. (a) Explain the term negative catalyst with an example.  
 (b) Mention any three uses of powder metallurgy. (3+3=6)
6. (a) Explain fusion method for the preparation of alloys.  
 (b) Certain impurities in steel change the physical properties of the steel.  
 What is the effect of presence of silicon and manganese in steel ? (3+3=6)
7. (a) What is pH range of an acid-base indicator ? Name the indicator used in the following titration.  
 (i) Sodium Hydroxide  $\times$  Nitric Acid.  
 (ii) Potassium Carbonate  $\times$  Hydrochloric Acid.  
 (b) Explain Lowry-Bronsted concept of acid and bases with one example. (3+3=6)

## PART -- C

(Maximum marks : 60)

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

## UNIT -- I

- III (a) Explain homogeneous and heterogeneous catalysis with two examples each. 6  
 (b) Write any five properties of carbon nanotubes. 5  
 (c) Distinguish atom and molecule. 4

OR

- IV (a) Explain the following methods for the synthesis of carbon nanotubes.  
 (i) High pressure CO deposition method. 6  
 (ii) Chemical vapour deposition method. 6  
 (b) What are fundamental particles ? Write their charge and mass. 5  
 (c) Give any four applications of nano materials in medical field. 4

## UNIT -- II

- V (a) (i) Define equivalent weight of acid and base and give their mathematical relation.  
 (ii) Find the equivalent weight of  $H_2SO_4$  and KOH. 6  
 (b) Explain the following.  
 (i) Neutralisation reaction.  
 (ii) Lewis acid and bases. 5  
 (c) Calculate the weight of sodium carbonate required to prepare 250 ml of 0.1N solution (Atomic weight of Na = 23, C = 12, O = 16) 4

OR

- VI (a) (i) Define pH of a solution.
- (ii) A solution is prepared by dissolving 2.45g of  $H_2SO_4$  in 500ml of solution. What is the pH of solution? (Atomic weight of H = 1, S = 32, O = 16) 6
- (b) What are Buffer solution? How are they classified and give one example for each type. 5
- (c) 200 ml of 0.5N  $HNO_3$  and 100ml of water are mixed together. Find out the normality of the resulting solution. 4

## UNIT — III

- VII (a) What are the cause of permanent hardness of water? Explain one method to remove permanent hardness. 6
- (b) Explain the various steps involved in the production of potable water. 5
- (c) Write any four physical properties of water. 4

OR

- VIII (a) What is sterilisation of water and explain two methods used for sterilisation of water. 6
- (b) What is potable water and write any three characteristics of it. 5
- (c) List two advantages and disadvantages of soft water. 4

## UNIT — IV

- IX (a) What is powder metallurgy? Explain different steps involved in powder metallurgy. 6
- (b) Write any five purpose of making alloys. 5
- (c) List any two advantages and limitations of powder metallurgy. 4

OR

- X (a) Heat treatment of steel develop certain required physical properties in steel. Explain any three methods of heat treatment of steel. 6
- (b) What is an alloy? Give the composition and uses of following alloys.
- (i) Bronze (ii) Brass 5
- (c) Write any four physical properties of metals. 4

