

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. (3+3=6)
- (b) Mention any three uses of powder metallurgy.
- 6. (a) Explain fusion method for the preparation of alloys. (3+3=6)
- (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. (3+3=6)
- (i) Sodium Hydroxide x Nitric Acid.
- (ii) Potassium Carbonate x 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. 5
- (b) What are fundamental particles ? Write their charge and mass. 4
- (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. 6
- (ii) Find the equivalent weight of H_2SO_4 and KOH. 6
- (b) Explain the following. (i) Neutralisation reaction. 5
- (ii) Lewis acid and bases. 4
- (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)
- (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