DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE — APRIL, 2018

ENGINEERING CHEMISTRY - I

[*Time* : 3 hours

(Maximum marks : 100)

PART — A
(Maximum marks : 10)

Marks

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

1. What is Nanochemistry ? Give any two examples of nanomaterials.

2. Name the catalysts used in the manufacture of ammonia (Haber's process) and sulphuric acid (Lead Chamber process).

3. Write any two examples for dibasic acids and diacidic bases.

4. Give any four characteristics of potable water.

5. Give the elemental composition of Brass and Bronze.   (5×2 = 10)

PART — B
(Maximum marks : 30)

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

1. (a) Write any three differences between atom and molecule.

    (b) Give any three applications of nanomaterials.   (3+3= 6)

2. Explain :   (a) Arrhenius Concept   (b) Bronsted - Lowry Concept

              (c) Lewis Concept of acids and bases.   (2+2+2= 6)

3. (a) Define ionic product of water. Give its mathematical expression.

    (b) Explain the terms : (i) basicity of an acid (ii) acidity of a base.

    (c) 400mL of 0.2N HCl and 100mL water are mixed together. Calculate the normality of the resulting solution.   (2+2+2= 6)

4. (a) Define hard and soft water.

    (b) Explain the methods used to remove the temporary hardness of water.   (2+4=6)

5. (a) What are the chemical changes involved in the sterilization of water by the action of bleaching powder ?

    (b) Explain conjugate acid-base pairs with one example.   (3+3=6)

6. (a) Give any three purposes of making alloys.

    (b) Explain the preparation of brass by fusion method with the help of a diagram.   (3+3=6)

7. (a) Explain with one example of the terms : (i) poison (ii) promoter

    (b) Find the equivalent weight of NaOH and H_2SO_4.

      (Atomic weight of Na = 23, O = 16, S = 32, H = 1).   (3+3=6)

[509]   **[P.T.O.**

Marks

PART — C
(Maximum marks : 60)

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

UNIT — I

III (a) Explain briefly about the three fundamental particles of matter.   6

    (b) List any five applications of carbon nanotubes.   5

    (c) Explain homogeneous and heterogeneous catalysis with one example.   4

OR

IV (a) Distinguish between atomic number and mass number. Find out the number neutrons of the following elements.

$$\overset{14}{\underset{7}{}}N \qquad \overset{32}{\underset{16}{}}S \qquad \overset{40}{\underset{20}{}}Ca$$

          6

    (b) What are carbon nanotubes ? Explain any two methods used for synthesis of carbon nanotubes.   5

    (c) Discuss about the two important features of solid catalyst.   4

UNIT — II

V (a) Define pH and pOH scales. Calculate pH and pOH of the having
$[H^+] = 2 \times 10^{-5}$ moles/litre.   5

    (b) Discuss about buffer solutions and their classification with one example for each.   6

    (c) Explain any two methods used to express the concentration of a solution.   4

OR

VI (a) List any five applications of pH.   5

    (b) Calculate molarity and normality of KOH solution containing 2.5g in 400mL.   3

    (c) What is volumetric analysis ? Explain different types of acid-base titrations.   7

UNIT — III

VII (a) Write any two advantages and disadvantages of hard water.   4

     (b) How can remove the permanent hardness of water by ion exchange method ? Give any two advantages of this method.   6

     (c) Explain break point chlorination with diagram and give its three advantages.   5

OR

VIII (a) What is potable water ? Using the block diagram, explain the various steps involved in the production of potable water in municipal supply for drinking purpose.   10

     (b) Explain reverse osmosis and its three advantages.   5

UNIT — IV

IX (a) Write any six physical properties of a metal.   6

    (b) Explain any two properties each of cast iron, wrought iron and steel.   6

    (c) Give any three limitations of powder metallurgy.   3

OR

X (a) Explain any three heat treatment methods of steel.   6

   (b) Define the term powder metallurgy. Explain the different steps involved in powder metallurgy.   9