DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/ COMMERCIAL PRACTICE, NOVEMBER - 2022

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. Define nanochemistry. Give two examples for nanomaterials.
2. Define buffer solution with example.
3. Distinguish between temporary hardness and permanent hardness of water.
4. What is powder metallurgy?
5. What are the composition of Brass and Bronze?   (5 x 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.   (3)

    (b) Explain homogeneous and heterogeneous catalysis with one example for each.   (3)

2. (a) Write any three applications of carbon nanotubes.   (3)

    (b) Calculate the no.of electrons, protons and neutrons of the following.

    (i) $_6C^{13}$ (ii) $_{11}Na^{23}$ (3)

3. (a) Define equivalent weight of an acid and equivalent weight of a base.   (2)

    (b) Write any four applications of p^H.   (4)

4. (a) Write a note on selection of indicators in acid – base titrations.   (4)

    (b) Calculate the p^H of 0.02M NaOH.   (2)

5. (a) Explain ion exchange method for the removal of permanent hardness of water.   (3)

    (b) What is reverse osmosis? Give any two advantages.   (3)

6. (a) Write any three characteristics of potable water.   (3)

    (b) Explain the limitations of hard water in industrial use.   (3)

1

7. (a)Write any three limitations of powder metallurgy. (3)

   (b)Write any three physical properties of metals. (3)

PART – C
Maximum marks : 60
(Answer one full question from each unit.. Each full question carries 15 marks)

UNIT –I

III. (a) Explain any two methods for the synthesis of carbon nanotubes. (6)

  (b) Explain catalytic promoter and catalytic poison with one example each. (5)

  (c) Write any four applications of nano particles. (4)

OR

IV.(a) Write any six properties of carbon nanotubes. (6)

  (b) What are the three important fundamental particles present in atom. Write their

     charge and mass. (5)

  (c) What are carbon nano tubes? Mention different types of carbon nano tubes. (4)

UNIT-II

V.(a) Explain the theories of acids and bases with two examples for each. (6)

  (b) Calculate the p^H of the following. (i) 0.002M H_2SO_4 (ii) 0.002N H_2SO_4 (5)

  (c) Define ionic product of water. Explain the concept of self ionization of water. (4)

OR

VI. (a) Explain acidic and basic buffer with examples. (6)

  (b) Explain the neutralization reaction according to Arrhenius concept and

    Lewis concept. (5)

  (c) Calculate the normality of the following solutions.

    (i) A solution of 96g of NaOH in 600ml.

    (ii) 3.15g of crystalline oxalic acid is dissolved in 100ml. (4)

UNIT-III

VII. (a) Explain the various steps involved in the production of potable water with the

    help of block diagram. (6)

  (b) What is temporary hardness? Explain two methods to remove temporary hardness. (5)

  (c) Distinguish between hard water and soft water. (4)

OR

VIII.(a) What is desalination of sea water? Explain any one method for desalination

    of sea water. (6)

(b) What is sterilization? Explain any four sterilization methods for making

   potable water. (5)

(c) Hard water is harmful to steam boilers used in industry. Justify your answer. (4)

UNIT-IV

IX. (a) Explain the following methods of heat treatment of steel.

   (i) Annealing (ii) Quenching (iii) Tempering (iv) Nitriding. (6)

(b) Write any five advantages of powder metallurgy. (5)

(c) Briefly explain the effects of any two impurities in steel. (4)

OR

X. (a) Explain the steps involved in powder metallurgy. (6)

(b) What is an alloy? Explain the preparation of alloys by fusion method with the

   help of a diagram. (5)

(c) Give any four purposes of making alloys. (4)

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