

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/  
COMMERCIAL PRACTICE – NOVEMBER -2020.

**ENGINEERING CHEMISTRY-I**

(Maximum Marks: 75)

[Time: 2.15 hours]

**PART-A**

Marks

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

1. Define pH value. Give its mathematical expression.
2. Define Catalytic promoter and poison.
3. Define hardness of water. Give the reason for hardness.
4. Give any two uses of Duralumin.
5. Define atomic number and mass number.

(3x2=6)

**PART - B**

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

1. Describe any two methods for the synthesis of Carbon Nano Tube.
2. Define the concepts of Arrhenius, Bronsted-Lowry and Lewis for acids and bases.
3. What do you mean by permanent hardness of water? How will you remove permanent hardness by Ion exchange method? Explain.
4. Briefly explain the effects of the following impurities on steel.  
(a)Silicon (b) Sulphur (c)Oxygen
5. Calculate the number of fundamental particles in the following atoms.  
(a)  $_{15}\text{P}^{31}$  (b)  $_{11}\text{Na}^{23}$  (c)  $_{19}\text{K}^{39}$
6. Give any six applications of pH value.
7. Define potable water. Give any four characteristics.

[4x6 =24]

**PART - C**

(Answer **any of the three units** from the following. Each full question carries 15 marks)

**UNIT I**

- III** (a) Distinguish between Homogeneous and Heterogeneous catalysis. Give one example each.

(5)

(b) Give any five applications of nanomaterials. (5)

(c) Distinguish between atom and molecule. (5)

**OR**

**IV** (a) Define Carbon Nano Tube. Give any four characteristics of CNT. (5)

(b) Define a catalyst. Briefly explain the important properties of a solid catalyst. (5)

(c) What are the important applications of CNT? (5)

### **UNIT- II**

**V** (a) Define conjugate acid-base pair. Give the conjugate pair of HCl, NH<sub>3</sub> and HNO<sub>3</sub>. (5)

(b) A solution is prepared by dissolving 0.2 g of NaOH in 500ml water. What is the pH of the solution?(Molecular weight of NaOH is 40). (5)

(c) Give the principle of volumetric analysis. Define the terms;  
(i)Standard solution (ii)Titration (iii)End point (5)

**OR**

**VI** (a) What are acid-base indicators? Explain the choice of indicator in the following titration.  
(i)Strong acid X Weak base (ii) Strong base X Weak acid. (5)

(b) Define Buffer solution. Classify them. Give one example each. (5)

(c) 20ml of decinormal solution of potassium hydroxide is titrated against sulphuric acid solution. The volume of acid required is 25ml. Calculate the normality and strength of the acid solution. (Molecular weight of H<sub>2</sub>SO<sub>4</sub> is 98). (5)

### **UNIT- III**

**VII** (a) Distinguish between soft and hard water. (5)

(b) Define reverse osmosis. Briefly explain the method of desalination of sea water using reverse osmosis. (5)

(c) Give any five physical properties of water. (5)

**OR**

- VIII** (a) Briefly explain the stages of production of potable water in municipal water supply. (5)
- (b) Give the reason or temporary hardness of water. How will you remove temporary hardness? Explain any one method. (5)
- (c) What are the disadvantages of hard water when used in steam generating boilers? (5)

**UNIT – IV**

- IX** (a) Define alloy. Give any four purposes of making alloys. (5)
- (b) Write any three advantages and two disadvantages of powder metallurgy. (5)
- (c) Give the composition of Brass. Briefly explain the fusion method for making alloy by taking brass as an example. (5)

**OR**

- X** (a) What are the important physical properties of metals? (5)
- (b) Briefly explain the different steps involved in the process of powder metallurgy. (5)
- (c) What do you mean by Heat treatment of steel? Distinguish between Annealing and Quenching of steel. (5)

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