

**FIRST SEMESTER DIPLOMA EXAMINATION IN ENGINEERING/  
TECHNOLOGY— OCTOBER, 2015**

**ENGINEERING CHEMISTRY – I**  
(Common to all Branches except CABM and DCP)

[Time : 3 hours]

(Maximum marks : 100)

## PART— A

(Maximum marks : 10)

Marks

I Answer the following questions in one or two sentences. Each question carries 2 marks.

1. Define nanomaterial. Give any two examples of nanosized materials.
2. Hard water does not produce readily lather with soap. Why ?
3. Give the composition of Cast iron and Wrought iron.
4. Define catalyst. Name the catalyst used in the contact process for the synthesis of sulphuric acid.
5. Define buffer capacity. (5×2=10)

## PART — B

(Maximum marks : 30)

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

1. (a) Give any three properties of carbon nanotube. 3
- (b) Explain conjugate acid base pair with an example. 3
2. (a) Define ionic product of water. Give it's mathematical statement. 3
- (b) Give any three physical properties of water. 3
3. (a) Distinguish between an atom and a molecule. 3
- (b) Calculate the pH of 0.002M H<sub>2</sub>SO<sub>4</sub>. 3
4. (a) Mention two important features of solid catalyst with one example each. 3
- (b) What are the indicators used in the following titration ? Why ?
- (i) HCl × Na<sub>2</sub>CO<sub>3</sub>      (ii) CH<sub>3</sub>COOH × NaOH (1½×2=3)

- |  | Marks    |
|--|----------|
| 5. (a) Define atomic number and mass number.   | 2        |
| (b) How can permanent hardness of water can be removed using ion exchange chromatography ? | 4        |
| 6. (a) Explain the terms with one example for each.  |          |
| (i) Positive catalyst      (ii) Negative catalyst.   | (1½×2=3) |
| (b) Name any three impurities of steel and give their effects on its properties.           | 3        |
| 7. (a) Explain the preparation of alloy by Fusion method with the help of a diagram.       | 4        |
| (b) Give the causes of temporary hardness and permanent hardness of water.                 | 2        |

## PART—C

(Maximum marks : 60)

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

## UNIT—I

- |   |   |
|---|---|
| III (a) What is a carbon nanotube and what are the different varieties of carbon nanotube ? | 4 |
| (b) Give any four applications of carbon nanotube.  | 4 |
| (c) Explain the term catalytic promoter and catalytic poison with examples.                 | 4 |
| (d) Calculate the number of protons, electrons and neutrons of the following elements.      | 3 |
| ${}_{12}\text{Mg}^{24}$ ${}_{6}\text{C}^{12}$ ${}_{8}\text{O}^{16}$                         |   |

OR

- |   |   |
|---|---|
| IV (a) Explain the homogeneous and heterogeneous catalysis with one example for each. | 4 |
| (b) Give any four applications of nanomaterials.                                      | 4 |
| (c) Explain any two methods of synthesis of carbon nanotube.                          | 4 |
| (d) Name the three important fundamental particles of matter. Give their masses.      | 3 |

## UNIT—II

- |   |   |
|---|---|
| V (a) Explain acidic and basic buffer with one example for each.  | 4 |
| (b) Calculate the normality of hydrochloric acid which contains 2.281g of the acid in 200ml. Find out the volume of this solution required to neutralize exactly 50ml of 0.12N sodium hydroxide solution. | 4 |
| (c) Explain Arrhenius theory and Lewis theory of acids and bases with one example of each.  | 4 |
| (d) Define pH and pOH scales. Write down the relation between pH and pOH.   | 3 |

OR

- |  | Marks |
|--|-------|
| VI (a) Define equivalent weight of acid and base and give their mathematical relations.                          | 4     |
| (b) Give any four applications of pH.  | 4     |
| (c) A solution is prepared by dissolving 0.4g of NaOH in 500ml of the solution. What is the pH of the solution ? | 4     |
| (d) What is the basic principle of Volumetric analysis ? Give the normality equation.                            | 3     |
| UNIT—III   |       |
| VII (a) Distinguish between soft water and hard water.   | 4     |
| (b) Give the block diagram for the production of potable water in Municipal supply.                              | 4     |
| (c) Explain desalination using reverse osmosis.  | 4     |
| (d) Explain the disadvantages of hard water.   | 3     |
| OR   |       |
| VIII (a) Give two methods for removing temporary hardness of water.  | 4     |
| (b) Give any four characteristics of potable water.  | 4     |
| (c) Give any two advantages of reverse osmosis method for desalination of sea water.                             | 3     |
| (d) What is sterilization ? Explain any two sterilization methods.   | 4     |
| UNIT—IV  |       |
| IX (a) Explain powder Metallurgy with different steps involved.  | 6     |
| (b) Give the composition of the following alloys :   |       |
| (i) Brass      (ii) Bronze      (iii) Solder.  | 6     |
| (c) Give any three physical properties of metals.  | 3     |
| OR   |       |
| X (a) Explain the following methods of heat treatment of steel.  |       |
| (i) Tempering      (ii) Quenching      (iii) Nitriding.  | 6     |
| (b) What are the alloys ? Mention any three purposes of making alloys.   | 5     |
| (c) Give any two uses and advantages of Powder Metallurgy.   | 4     |