

FIRST SEMESTER DIPLOMA EXAMINATION IN ENGINEERING/  
TECHNOLOGY — MARCH, 2016

**ENGINEERING CHEMISTRY - I**

(Common to all Branches except CABM and DCP)

[Time : 3 hours]

(Maximum marks : 100)

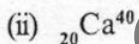
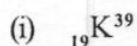
PART — A

(Maximum marks : 4)

Marks

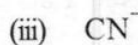
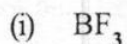
I Answer all the questions in one or two sentences. Each question carries 2 marks.

1. Calculate the number of neutrons and electrons in the following elements.



2. Define the terms catalyst and catalysis.

3. Classify the following species into Lewis acids and Lewis bases



4. Rain water is the purest form of natural waters. Give reason.

5. Define alloys. Give one example.

(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 differences between atoms and molecules.  | 3 |
| (b) Define atomic number and mass number. Which is the only atom having same value for atomic number and mass number. | 3 |
| 2. (a) What are nano sized materials ? Give any two examples.   | 2 |
| (b) Mention any four applications of nano materials.  | 4 |
| 3. (a) Define buffer solution and buffer capacity.  | 3 |
| (b) Explain acidic buffer and basic buffer with one example each.   | 3 |

4. (a) What is an acid-base indicator? Name the indicators used in the following set of titrations?
- $\text{H}_2\text{SO}_4 \times \text{K}_2\text{CO}_3$
  - $\text{HNO}_3 \times \text{KOH}$
  - acetic acid  $\times \text{NaOH}$
- (b) Calculate the pH of a solution prepared by dissolving 0.365 g of HCl in 1L water.
5. (a) Mention any four physical properties of water.  
(b) Why hard water is not suitable for washing purposes?
6. (a) How can temporary hardness be removed by Clarke's process?  
(b) List any three characteristics of potable water.
7. (a) Give any three physical properties of metals.  
(b) Give the composition of cast iron, wrought iron and steel.

## PART — C

(Maximum marks : 60)

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

## UNIT—I

- III (a) List any four properties of carbon nano tubes.  
(b) Distinguish between positive catalyst and negative catalyst giving one example for each.  
(c) Explain two important features of a solid catalyst with one example for each.  
(d) What is meant by carbon nano tubes? Explain different varieties of carbon nano tubes?

OR

- IV (a) Explain laser ablation method for the production of carbon nano tubes.  
(b) Distinguish between homogeneous and heterogeneous catalyst. Give one example for each.  
(c) Mention any four applications of carbon nano tubes.  
(d) Name three fundamental particles of matter. What is the charge carried by each of them?

## UNIT—II

- V (a) Define neutralization reaction using Arrhenius and Lewis concepts.  
(b) 24mL of a solution of  $\text{H}_2\text{SO}_4$  neutralizes 20 mL of decinormal solution of KOH. Calculate the weight of  $\text{H}_2\text{SO}_4$  in 40 mL of the acid.  
(c) Write any four applications of pH.  
(d) Define ionic product of water. Give its mathematical statement. What is its value at 25° C?

OR

- VI (a) Define equivalent weight of acid and bases. Write down the mathematical relation to calculate each of them. 4
- (b) A solution is prepared by dissolving 0.4g of NaOH in 100mL of water. What is the pH of the solution? 4
- (c) Define the terms normality and molarity. What is the relation between the two in the case of a tribasic acid? 4
- (d) What is meant by pH range of an indicator? Give the pH range of two indicators. 3

## UNIT—III

- VII (a) Explain the steps involved in the production of potable water? 4
- (b) Explain desalination of sea water using reverse osmosis. 4
- (c) Define hard water and soft water. Give reasons for temporary and permanent hardness of water. 4
- (d) Explain the chemical changes taking place when water with temporary hardness is boiled. 3

OR

- VIII (a) Explain ion-exchange method for removing permanent hardness of water. 4
- (b) Explain any two disadvantages of using hard water. 4
- (c) Explain any two important sterilization techniques employed in the production of potable water. 4
- (d) Define reverse osmosis. List any two of its advantages. 3

## UNIT—IV

- IX (a) Define heat treatment of iron. Write briefly on any three heat treatment processes. 4
- (b) Name any two impurities present in steel and give their effects on the properties of steel. 4
- (c) Give any four purposes of making alloys. 4
- (d) Explain preparation of alloys by fusion method. 3

OR

- X (a) Define powder metallurgy. Mention the steps involved in powder metallurgy. 4
- (b) List any two advantages and disadvantages of powder metallurgy. 4
- (c) Mention any four uses of powder metallurgy. 4
- (d) Give a comparison of cast iron, wrought iron and steel with respect to any of their three physical properties. 3