

FIRST SEMESTER DIPLOMA EXAMINATION IN ENGINEERING/
TECHNOLOGY — OCTOBER/NOVEMBER, 2016

ENGINEERING CHEMISTRY - I

(Common for all programmes except DCP)

[Time : 3 hours]

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

Marks

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

1. Define nano chemistry. Give any two examples for nano sized materials.
2. Define homogeneous catalysis with one example.
3. What is sterilization ? Mention any two sterilization methods.
4. Explain the concept of conjugate acid base pair with example.
5. What is powder metallurgy ?

(5×2 = 10)

PART — B

(Maximum marks : 30)

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

- | | |
|---|---|
| 1. (a) Mention any four applications of nano materials. | 2 |
| (b) What are carbon nano tubes and what are the different varieties of CNTs ? | 4 |
| 2. (a) Name the catalysts and catalytic promoter used in Haber's process and contact process. | 4 |
| (b) Explain negative catalysis with two examples. | 2 |
| 3. (a) Define equivalent weight of acid and base. Calculate of equivalent weight $\text{Fe}(\text{OH})_3$ and H_3PO_4 . | 4 |
| (b) Define Buffer solutions with examples. | 2 |
| 4. (a) What are the treatment process used to make potable water ? | 4 |
| (b) Mention any two characteristics of potable water. | 2 |

5. Mention the composition and uses of the following alloys.
- | | | | |
|-----------|-------------|--------------|---|
| (i) Brass | (ii) Bronze | (iii) Solder | 6 |
|-----------|-------------|--------------|---|
6. (a) Give the causes for the temporary hardness and permanent hardness of water. 3
 (b) Explain the ion exchange method for the removal of permanent hardness of water. 3
7. What is the choice of indicator in the following titrations and why ?
- | | | | |
|--|--|---|---|
| (i) $\text{H}_2\text{C}_2\text{O}_4 \times \text{KOH}$ | (ii) $\text{HCl} \times \text{K}_2\text{CO}_3$ | (iii) $\text{HNO}_3 \times \text{NaOH}$ | 6 |
|--|--|---|---|

PART — C

(Maximum marks : 60)

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

UNIT — I

- III (a) Write a note on catalysis. 4
 (b) Explain the methods for the synthesis of carbon nano tubes. 4
 (c) Distinguish between atom and molecule. 4
 (d) Calculate the number of electrons, protons and neutrons of the following elements.
- | | | | |
|-------------------------|------------------------------|------------------------|---|
| (i) ${}_8\text{O}^{16}$ | (ii) ${}_{12}\text{Mg}^{24}$ | (iii) ${}_1\text{H}^1$ | 3 |
|-------------------------|------------------------------|------------------------|---|

OR

- IV (a) Write a note on application for carbon nanotubes in medical field. 4
 (b) Name any three fundamental particles of matter and their characteristics. 3
 (c) Write a note on carbon nano tubes. 4
 (d) Explain influence of promoter and poison in the rate of a reaction. 4

UNIT — II

- V (a) Write a note on buffer solutions. 4
 (b) Write a note on acid base theories. 3
 (c) Write a note on Industrial applications of P^{H} value. 4
 (d) A solution is prepared by dissolving 0.4g NaOH in 2 L of water. What is the P^{H} of the resulting solution ? 4

OR

- VI (a) Briefly explain the neutralization reaction according to Arrhenius concept and Lewis concept. 4
 (b) Calculate the P^{H} values of the following
- | | | |
|---------------------------------------|--------------------------|---|
| (i) 0.0002 M $\text{Ba}(\text{OH})_2$ | (ii) 0.002 M acetic acid | 4 |
|---------------------------------------|--------------------------|---|
- (c) Briefly explain the concept of self-ionization of water. 3
 (d) 25ml of potassium hydroxide solution was neutralized by 30 mL of hydrochloric acid of normality 0.01. Find the normality of potassium hydroxide solution . 4

UNIT — III

- VII (a) Distinguish between temporary hardness and permanent hardness. 3
- (b) Explain the process involved to make potable water in municipal supply of drinking water with the help of block diagram. 4
- (c) Briefly explain the disadvantages of hard water in industrial usage. 4
- (d) What is meant by reverse osmosis ? Mention any two advantageous. 4

OR

- VIII (a) Distinguish between soft water and hard water. 4
- (b) What are the chemical changes occur in the sterilization of water by bleaching powder ? 3
- (c) List the characteristics of potable water. 4
- (d) Limitations of hard water in using domestic use. 4

UNIT — IV

- IX (a) Mention any four physical properties of metals. 4
- (b) Briefly explain the methods for the preparation of alloys. 3
- (c) What are the advantageous of using powder metallurgy ? 4
- (d) Briefly explain the effects of impurities in steel. 4

OR

- X (a) What is alloy ? Explain the purposes of making alloys. 4
- (b) Explain the steps involved in powder metallurgy. 4
- (c) Explain the limitations of powder metallurgy. 3
- (d) Explain the terms :
- | | | |
|-----------------|----------------|---|
| (i) Annealing | (ii) Quenching | |
| (iii) Tempering | (iv) Nitriding | 4 |
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