TED (15) – 1004

(REVISION — 2015)

Reg. No. .....

Signature .....

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE — OCTOBER, 2018

ENGINEERING CHEMISTRY - I

[*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. What are nanomaterials and give two examples ?
2. What do you mean by conjugate acid - base pair according to Lowry-Bronsted concept ?
3. Give any two advantages of Revese Osmosis.
4. What are the composition of cast iron and wrought iron ?
5. What are acid - base indicators ?

(5×2 = 10)

PART — B

(Maximum marks : 30)

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

1. (a) Bleaching powder is used for the sterilization of water. Give the chemical changes involved in sterilization of water by bleaching powder.

   (b) Write any three characteristics of potable water.

2. (a) Calculate the number of electrons, protons and neutrons of the following.

   (i) $^{14}_{7}N$ (ii) $^{35}_{17}Cl$

   (b) Write any three properties of carbon nanotubes.

3. (a) What is meant by equivalent weight of an acid and give its mathematical expression.

   (b) Calculate the molarity of HNO_3 which contains 1.57 gm per 100ml (atomic weight of H = 1, N = 14, O = 16).

Marks

4. (a) Why soap does not lather easily in hard water ?

   (b) Give the block diagram for the production of potable water with all necessary details.

5. (a) Write three limitations of powder metallurgy.

   (b) Which are the three varieties of Iron and Compare their magnetization property.

6. (a) Explain acidic and basic buffer with one example each.

   (b) Define ionic product of water. Give its mathematical expression.

7. (a) Write any three differences between atom and molecule.

   (b) Give the percentage composition and any two uses of Duralumin. (5×6 = 30)

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 of synthesis of carbon nanotubes. 6

(b) What are fundamental particles ? Write their charge and mass. 5

(c) Give any four applications of nanomaterials in medical field. 4

OR

IV (a) Explain homogeneous and heterogeneous catalysis with two examples each. 6

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

(c) What are carbon nanotubes and mention different varieties of carbon nanotubes. 4

UNIT — II

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

(i) Arrhenius concept

(ii) Lewis concept 6

(b) Which acid base indicators are used in the following titrations ? Justify your answer.

(i) Oxalic acid × Sodium hydroxide

(ii) Hydrochloric acid × Sodium carbonate 5

(c) Defne normality of a solution. Calculate the normality of sulphuric acid solution, if 1.96gm H_2SO_4 is present in 500ml of solution. (Atomic weight of H = 1, S = 32, O = 16). 4

OR

Marks

VI (a) (i) What is pH scale ?

(ii) A solution is prepared by dissolving 5.6gm of KOH in 500ml of solution. What is the pH of solution ? (K = 39, O = 16, H = 1) 6

(b) Write short notes on :

(i) Standard solution (ii) Buffer capacity 5

(c) Write any four applications of pH. 4

UNIT — III

VII (a) What is the cause of temporary hardness of water ? Explain two methods to remove temporary hardness. 6

(b) Explain the various steps involved in the production of potable water. 5

(c) Write any four physical properties of water. 4

OR

VIII (a) (i) Explain ion exchange method for the removal of permanent hardness of water.

(ii) What do you mean by regeneration of ion exchange resins ? 6

(b) What is desalination of sea water ? Explain any one method for desalination of sea water. 5

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

UNIT — IV

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

(i) Annealing

(ii) Hardening

(iii) Tempering 6

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

(c) Write any four physical properties of metals. 4

OR

X (a) What is powder metallurgy ? Explain different steps involved in powder metallurgy. 6

(b) What is an alloy ? Explain preparation of alloys by fusion method with the help of diagram. 5

(c) Name any two impurities of steel and give their effects on its properties. 4