TED (15) –1004 Reg. No.....

(REVISION — 2015) Signature .....

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.
   (i) $_{19}K^{39}$ (ii) $_{20}Ca^{40}$
2. Define the terms catalyst and catalysis.
3. Classify the following species into Lewis acids and Lewis bases
   (i) BF_3 (ii) Ag^+
   (iii) CN^- (iv) H_2O
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

Marks

4. (a) What is an acid-base indicator ? Name the indicators used in the following set of titrations ?
   (i) $H_2SO_4 \times K_2CO_3$
   (ii) $HNO_3 \times KOH$
   (iii) acetic acid $\times$ NaOH — 4
   (b) Calculate the pH of a solution prepared by dissolving 0.365 g of HCl in 1L water. — 2
5. (a) Mention any four physical properties of water. — 4
   (b) Why hard water is not suitable for washing purposes ? — 2
6. (a) How can temporary hardness be removed by Clarke's process ? — 3
   (b) List any three characteristics of potable water. — 3
7. (a) Give any three physical properties of metals. — 3
   (b) Give the composition of cast iron, wrought iron and steel. — 3

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. — 4
   (b) Distinguish between positive catalyst and negative catalyst giving one example for each. — 4
   (c) Explain two important features of a solid catalyst with one example for each. — 4
   (d) What is meant by carbon nano tubes ? Explain different varieties of carbon nano tubes ? — 3

OR

IV (a) Explain laser ablation method for the production of carbon nano tubes. — 4
   (b) Distinguish between homogeneous and heterogeneous catalyst. Give one example for each. — 4
   (c) Mention any four applications of carbon nano tubes. — 4
   (d) Name three fundamental particles of matter. What is the charge carried by each of them ? — 3

UNIT—II

V (a) Define neutralization reaction using Arrhenius and Lewis concepts. — 4
   (b) 24mL of a solution of H_2SO_4 neutralizes 20 mL of decinormal solution of KOH. Calculate the weight of H_2SO_4 in 40 mL of the acid. — 4
   (c) Write any four applications of pH. — 4
   (d) Define ionic product of water. Give its mathematical statement. What is its value at 25° C ? — 3

OR

Marks

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 empolyed 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