Reg. No...

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