Total No. of printed pages = 5

END SEMESTER (REGULAR/RETEST) EXAMINATION, JUNE – 2024

Semester : 1st (New)

Branch : Common

Subject Code : Sc-103

CHEMISTRY – I

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks for the questions.

Instructions :

(i) Question Nos. 1, 2 and 3 are compulsory.

(ii) Answer any *five* questions from the rest.

1. Fill in the blanks : 1×5=5

   (a) Absolute zero of temperature is _____. °C.

   (b) Oxidation number of Cr in $Cr_2O_7^{2-}$ is _____.

   (c) Grams per litre = Molarity × _____.

   (d) The mass of an electron is _____ kg.

   (e) Group 17 elements are known as _____.

[Turn over

2. Choose the most appropriate alternatives : 1×5=5

(a) Hydrogen bonding is not observed in

(i) H_2O (ii) NH_3

(iii) H_2S (iv) HF

(b) pH of 0.01M NaOH solution is

(i) 11 (ii) 12

(iii) 13 (iii) 2

(c) Catalyst used in the manufacture of ammonia by Haber's process is

(i) Fe (iii) Mo

(iii) V (iv) Pt

(d) Electrolysis of aqueous solution of sodium chloride produces

(i) Metallic sodium at cathode

(ii) Hydrogen gas at anode

(iii) Chlorine gas at cathode

(iv) Chlorine gas at anode

(e) Hardness of water is expressed in terms of equivalent amount of

(i) $MgCO_3$ (ii) $MgCl_2$

(iii) $CaCO_3$ (iv) $CaSO_4$

3 Match the following Columns : 1×5=5

Column–I	Column–II
(a) Graham	(i) Law of Electrolysis
(b) Methyl Orange	(ii) Complexometric Indicator
(c) Heisenberg	(iii) Law of Diffusion
(d) Faraday	(iv) Acid-Base Indicator
(e) Eriochrome Black T	(v) Uncertainty principle

4 (a) State and explain Charles' law.

(b) What will be volume of a gas at 27°C and 700 mm pressure if it occupies a volume of 22.4 litre at STP ?

(c) Calculate the volume of oxygen gas required at STP to burn completely 2.2 gram of propane.

(d) Balance the following redox equation by ion-electron method :

$Cr_2O_7^{2-} + Fe^{2+} \rightarrow Cr^{3+} + Fe^{3+} + H_2O$ (Acidic medium) 2+3+3+3=11

5 (a) Discuss Bronsted Lowry concept of acids and bases with example.

(b) Define standard solution, normal solution and molar solution.

(c) Calculate the dissociation constant of 0.1 M solution of acetic acid if it is dissociated to the extent of 1.43%.

(d) What do you mean by Avogadro's number ? What is its numerical value ? 3+3+3+2=11

6 (a) Calculate the number of proton, electron and neutron in $_{13}Al^{27}$.

(b) State and explain de-Broglie's hypothesis.

(c) Write electronic configuration of scandium (Atomic number 21).

(d) Discuss the periodic variation of atomic radius and ionization energy along a period and a group. 3+3+1+4=11

7 (a) What do you mean by a Covalent bond ? Explain bonding in NH_3 with Lewis electron dot structure.

(b) Explain why

(i) H_2O is a liquid but H_2S is a gas at room temperature ?

(ii) Metals are good conductors of electricity ?

(c) What do you mean by catalyst and catalysis ? Name the catalyst used in manufacture of sulphuric acid by Contact process and cracking of petroleum.

(d) Give the differences between electrochemical cell and electrolytic cell. 3+2+4+2=11

8 (a) Give one example each of primary cell and secondary cell.

(b) Calculate the mass of copper deposited when a current of 3A is passed through a solution of copper sulphate for 20 minutes.

(c) Explain the principle underlying estimation of hardness by EDTA method.

(d) What are the disadvantages of using hard water in boiler ? 1+3+4+3=11

9 (a) Write short notes on :

(i) Le-Chatelier's principle

(ii) Electroplating

(iii) Hund's rule of maximum multiplicity.

(b) Write down the relation between K_p and K_c for the reaction $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$. 3+3+3+2=11