Total No. of printed pages = 6

END SEMESTER (REGULAR/RETEST) EXAMINATION, DECEMBER –2023

Branch : Common

Semester : 1st (New)

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) Questions number 1 to 3 are compulsory and objective type.

(ii) Answer any *five* questions from questions number 4 to 9.

1. Fill in the blanks : 1×5=5

(a) In the titration between Sulphuric acid and Sodium carbonate ——— is used as an indicator.

(b) E.C.E value of copper is ———.

[Turn over

(c) The acidity of $Al(OH)_3$ is ———.

(d) Pi bond is ——— than sigma bond.

(e) $p^H + p^{OH}$ = ———.

2. Choose the correct answers : 1×5=5

(a) $MgCl_2$ contains

(i) Ionic bond (ii) covalent bond

(iii) Dative bond (iv) Hydrogen bond

(b) At N.T.P 32 grams of SO_2 occupies

(i) 11.2 litre (ii) 22.4 litre

(iii) 44.8 litre (iv) 1 litre

(c) The outermost electron of sodium atom has principal quantum number

(i) 1 (ii) 2

(iii) 3 (iv) 4

(d) Conjugate acid of HSO_4^- is

(i) SO_3^{2-} (ii) SO_4^{2-}

(iii) H_2SO_4 (iv) H_2SO_3

(e) The catalyst used in the manufacture of Ammonia by the Haber's process is

(i) Iron

(ii) Nitric oxide

(iii) Vanadium pentoxide

(iv) Molybdenum.

3. Match the following columns : 1×5=5

Column–I	Column–II
(a) S-orbitals	(i) Most electronegative element
(b) Sludge and Scale formation	(ii) Semi-conductor
(c) Fluorine	(iii) Spherically symmetrical
(d) $KMnO_4$	(iv) Boiler trouble
(e) Germanium	(v) Strong oxidizing agent

4. (a) State and explain Boyle's law and Charle's law. 2+2=4

(b) State Avogadro's hypothesis. At 25°C temperature and 500 mm pressure the volume of a definite mass of a gas is 1000 ml. Calculate the volume of the gas at N.T.P. 1+3=4

(c) Balance the following equation (any *one*) :

(i) $C_2O_4^{2-} + MnO_4^- + H^+ \rightarrow CO_2 + Mn^{2+} + H_2O$ (By ion electron method)

(ii) $HNO_3 + S \rightarrow NO_2 + H_2SO_4 + H_2O$ (By partial equation method). 3

5. (a) What are the limitations of a chemical equation ? 2

(b) What is a decinormal solution ? What volume of 0.1(N) NaOH is required to neutralize 30 ml of 0.25(N) HCl solution ? 4

(c) Discuss the Bronsted-Lowry concept of acids and bases with suitable examples. 3

(d) Differentiate between Orbit and Orbital. 2

6. (a) State and explain the Aufbau principle. Write the electronic configuaration of Cr and Mn. 4

(b) What is electron affinity? Discuss its variation in the periodic table. 3

(c) What is an ionic bond? Explain with example. Write at least two important characteristics of an ionic compound. 4

7. (a) What is a Catalyst? Write its important characteristics. 3

(b) What do you mean by p^H of a solution? Calculate the p^H of 0.001(M) NaOH solution. 4

(c) State and explain the Faraday's first and second law of electrolysis. 4

8. (a) How long will it take to deposit 5 grams of zinc if a current of 10 ampere is passed through a $ZnSO_4$ solution? 3

(b) What is sterilization of water? Explain how water is sterilized by using bleaching powder. 4

(c) What are the main causes of hardness in water? How hardness in water is removed by the Permutit method? 4

9. (a) What is a salt bridge ? What is its function in an electrochemical cell ? 2

(b) Write short notes on any *three* : 3×3=9

(i) Common ion effect

(ii) Application of electrolysis

(iii) Heisenberg's uncertainty principle

(iv) Co-ordinate covalent bond.