Total No. of printed pages = 7

END SEMESTER EXAMINATION – 2022

Semester : 1st

Subject Code : Sc-103

CHEMISTRY - I

Full Marks – 70

Time – Three hours

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

Instructions :

1. *All* questions of PART–A are compulsory.

2. Answer any *five* questions from PART–B.

PART – A

Marks – 25

1. Fill in the blanks :   1×5=5

   (a)   32 grams of methane contains _____ molecules.

   (b)   Conjugate acid of OH^- is _____.

   (c)   Oxidation number of Cr in $K_2Cr_2O_7$ is _____.

(d) f-sub-shell has _____ orbitals.

(e) The basis of modern periodic table is _____ .

2. Write true or false : 1×5=5

(a) Pi bond is formed by head on overlapping of atomic orbitals.

(b) pH + pOH = 7.

(c) Electrolysis of acidulated water liberates oxygen at the cathode.

(d) Temporary hardness of water can be removed by boiling.

(e) Molar volume of a gas at STP is 22.4 litres.

3. Choose the correct answers : 1×5=5

(a) Equivalent mass of sulphuric acid is

(i) same as molecular mass

(ii) twice the molecular mass

(iii) half of the molecular mass

(iv) one-tenth of molecular mass

(b) Group 18 elements in the periodic table is known as

(i) Halogen

(ii) Noble gases

(iii) Representative elements

(iv) Transition elements

(c) The relation between K_p and K_c is

(i) $K_C = K_P(RT)^{\Delta n}$

(ii) $K_P = K_C$

(iii) $K_C = K_P \times RT$

(iv) $K_P = K_C(RT)^{\Delta n}$

(d) Caustic embrittlement in boiler is due to

(i) KOH

(ii) $Mg(OH)_2$

(iii) $NaOH$

(iv) Na_2O

(e) The numerical value of Universal Gas Constant (R) depends upon

(i) nature of the gas

(ii) temperature of the gas

(iii) pressure of the gas

(iv) units of measurement.

4. Match the following :   1×5=5

(a) Heisenberg	(i) Softening of water
(b) Normality	(ii) Uncertainity principle
(c) Enzyme	(iii) Concentration of solution
(d) pH	(iv) Biological catalyst
(e) Permutit process	(v) Hydrogenion concentration

5. Answer the following questions in brief :

$1 \times 5 = 5$

(a) Who proposed Modern Periodic law ?

(b) Who introduced pH scale ?

(c) What is the relation between molarity and grams per litre ?

(d) What is the SI unit for pressure of a gas ?

(e) What is the shape of p-orbital ?

PART – B

Marks – 45

6. (a) State Avogadro's hypothesis. Calculate the volume occupied by 6 grams of hydrogen at 1.5 atmosphere and 27°C. $\quad 1+3=4$

(b) State the difference between oxidation number and valency. $\quad 2$

(c) Balance by ion electron method :

$$MnO_4^- + Fe^{2+} + H^+ \rightarrow Mn^{2+} + Fe^{3+} + H_2O.$$

3
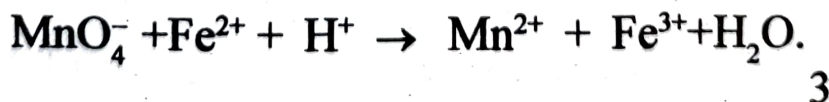
7. (a) Discuss Lewis concept of acids and bases with examples. 3

(b) 5.3 grams of sodium carbonate is dissolved in 5000 ml of water. Express the concentration of solution in terms of normality. 3

(c) State and explain de-Broglie's hypothesis. 3

8. (a) Write electronic configuration of Copper and Potassium. 2

(b) What do you mean by ionization enthalpy? What are the factors affecting ionization enthalpy? Arrange C,N,O and F in decreasing order of ionization enthalpy. 1+2+1=4

(c) Write the differences between ionic compound and covalent compound. 3

9. (a) State and explain Law of Mass action. 4

(b) Calculate the pH of 0.001 M solution of $Ca(OH)_2$ assuming it to be completely ionized. 3

(c) Write electron dot structure of NH_3. 2

10. (a) Discuss homogeneous and heterogeneous catalysis with examples. 4

(b) What do you mean by primary cell and secondary cell ? Give one example of each. 2+2=4

(c) What do you mean by Galvanization ? 1

11. Write short notes on any *three* : 3×3=9

(a) Hund's Rule of maximum multiplicity.

(b) Dalton's Law of Partial pressure.

(c) Common ion effect.

(d) Soft water and hard water.