Total No. of printed pages = 5

Sc-103/Ch-I/1st Sem/2016/N

CHEMISTRY – I

Full Marks – 70

Pass Marks – 21

Time – Three hours

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

Answer question No.1 and any *six* from the rest.

1. Fill in the blanks : 1×10=10

   (i) E.C.E of Ag is ———— .

   (ii) Conjugate acid of SO_4" is ———— .

   (iii) Isotones are atoms of different atomic number but same number of ———— .

   (iv) The oxidation number of Fe in Fe_3O_4 is ————.

   (v) The energy of first Bohr's orbit is ———— erg / atom.

[Turn over

(vi) 0.5 mole of oxygen occupies ———— ml volume at NTP.

(vii) The vapour density of SO_2 gas is ————.

(viii) Number of protons present in O^{-2} is ————.

(ix) ———— is an example of acidic oxide.

(x) The equivalent weight of $CaCO_3$ is ———— .

2. (a) Balance the following equation by ion-exchange method : 3

$$MnO_4^- + C_2O_4^{-2} + H^+ \rightarrow Mn^{+2} + CO_2 + H_2O$$

Or

Balance the following equation by partial method :

$$KMnO_4 + HCl \rightarrow KCl + MnCl_2 + H_2O + Cl_2$$

(b) What do you mean by Lewis acid ? Give example. 2

(c) State Le Chatellier's principle and describe the effect of pressure, temperature and concentration in the manufacture of H_2SO_4 acid by contact process. 2+3=5

3. (a) State and explain Faraday's first law of electrolysis. 1+2=3

(b) What do you mean by basicity of an acid and acidity of a base ? 2

(c) What do you mean by decinormal solution ? What volume of 0.5(N) NaOH is required to neutralize 50 ml of 1.5(N) HCl solution ? 1+3=4

(d) What is indicator ? 1

4. (a) What are postulates of Bohr's atomic model ? 3

(b) Prove that M = 2D 3

(c) Prove that $\frac{r_1}{r_2} = \sqrt{\frac{M_2}{M_1}}$ 3

(d) What is Pauli's exclusion principle ? 1

5. (a) What is modern periodic law ? 1

(b) Derive De-Broglier's equation. 3

(c) Write down the characteristics of transition elements. 3

(d) Calculate the pH of 0.0001(M) NaOH solution. 3

Or

Calculate the E.C.E of Zn (Atomic wt of Zn = 65).

6. (a) Calculate the number of moles and molecules present in 100 ml of CO_2 gas at NTP. 4

(b) Write down three industrial applications of catalyst. 3

(c) Write down the estimation of hardness of water by EDTA method. 3

7. (a) What do you mean by hydrolysis ? Why an aqueous solution of Na_2CO_3 is alkaline ? 2+2=4

(b) Write down the electron dot structure of N_2 molecule. 2

(c) How does ionisation energy vary in a period and in a group ? 2

(d) Identify the hardness causing salts among the following : 2

$NaHCO_3$, $Ca(HCO_3)_2$, $Al_2(SO_4)_3$, $MgSO_4$, NH_4Cl, Na_2CO_3.

8. Write short notes on any *four* : $2\frac{1}{2} \times 4 = 10$

(i) Common ion effect

(ii) Quantum numbers

(iii) Heissenburg's uncertainty principle

(iv) Solubility product

(v) Electrovalency.