

Roll No \_\_\_\_\_ (To be filled in by the candidate) (Academic Sessions 2020 – 2022 to 2023 – 2025 )  
CHEMISTRY 224-1<sup>st</sup> Annual-(INTER PART – I) Time Allowed : 2.40 hours  
PAPER – I ( Essay Type ) GROUP – I Maximum Marks : 68

SECTION – I

LHR-1-24

2. Write short answers to any EIGHT (8) questions :

16

- (i) 23 g of sodium and 238 g of uranium have equal number of atoms in them. Justify.
- (ii) Why actual yield is always less than theoretical yield?
- (iii) Define the term atomicity. Give example.
- (iv) Describe Gooch Crucible.
- (v) How the fluted filter paper is prepared?
- (vi) How the crystals are dried in crystallization?
- (vii) Why pilots feel uncomfortable breathing in un-pressurized cabins?
- (viii) Derive Charles's law from kinetic molecular theory.
- (ix) Some of postulates of kinetic molecular theory are faulty. Justify.
- (x) Discuss effect of change in temperature on  $K_w$ .
- (xi) Justify that chemical equilibrium is dynamic in nature.
- (xii) Discuss effect of common ion on solubility.

3. Write short answers to any EIGHT (8) questions :

16

- (i) Though oxygen and sulphur belong to same group but water is liquid while  $H_2S$  is a gas at room temperature. Why?
- (ii) Write four uses of liquid crystals.
- (iii) Define crystal lattice with an example.
- (iv) Heat of sublimation of iodine is very high. Why?
- (v) Define Hund's rule and Pauli's exclusion principle.
- (vi) Calculate mass of electron using its  $c/m$  value.
- (vii) What is origin of X-rays?
- (viii) State  $(n + l)$  rule.
- (ix) Define the term molarity and molality.
- (x) What do you mean by water of crystallization? Give an example.
- (xi) Differentiate between average and instantaneous rates of reaction.
- (xii) Define zero order reaction. Give an example.

4. Write short answers to any SIX (6) questions :

12

- (i) Why  $\sigma 2p_x$  is higher in energy in  $B_2, C_2$  and  $N_2$  and lower in energy in  $O_2$  and  $F_2$  in energy level diagram?
- (ii) Draw shape and write bond angle in  $NH_3$  and  $BF_3$  molecules with respect to VSEPR theory.

(Turn Over)

(2)

4. (iii) Define electron affinity. Name two factors affecting electron affinity.  
(iv) Why lone pair of electron occupy more space than bond pair of electron?  
(v) Define state of system and state function.  
(vi) Define enthalpy of reaction. Give one example.  
(vii) Define spontaneous process. Give one example.  
(viii) How impure copper can be purified.  
(ix) What is standard hydrogen electrode?

SECTION – II

Note : Attempt any THREE questions.

5. (a) Write all the steps involved in determination of empirical formula. 4  
(b) Define evaporation. On what factors it depends? Discuss. 1,1,2
6. (a) 250 cm<sup>3</sup> of hydrogen is cooled from 127 °C to – 27 °C by maintaining the pressure constant. Calculate the new volume of the gas at this low temperature. 4  
(b) What is the concept of dual nature of matter? Also derive de-Broglie's equation. 4
7. (a) What is dipole moment? Give its various units. Find relationship between Debye and mc. 4  
(b) Calculate the pH of a buffer solution in which 0.11 molar CH<sub>3</sub>COONa and 0.09 molar acetic acid solution are present K<sub>a</sub> for acetic acid (CH<sub>3</sub>COOH) is 1.85 × 10<sup>-5</sup>. 4
8. (a) State and explain Hess's law of constant heat summation with an example. 4  
(b) Describe the construction and working of standard hydrogen electrode. 4
9. (a) Discuss two types of solutions of liquids in liquids. 4  
(b) Define the following with examples : 4  
(i) Autocatalysis. (ii) Negative catalysis. (iii) Homogeneous catalysis.  
(iv) Enzyme catalysis.

42-224-I-(Essay Type) – 57000