Roll No _____ (To be filled in by the candidate) **(Academic Sessions 2018 – 2020 to 2021 – 2023)**

CHEMISTRY 222-(INTER PART – I) Time Allowed : 20 Minutes

Q.PAPER – I (Objective Type) GROUP – I Maximum Marks : 17

PAPER CODE = 6487

Note : Four possible answers A, B, C and D to each question are given. The choice which you think is correct, fill that circle in front of that question with Marker or Pen ink in the answer-book. Cutting or filling two or more circles will result in zero mark in that question. LHR-41-22

1-1	For which system does the equilibrium constant, K_c has the units of (concentration)$^{-1}$: (A) $N_2 + 3H_2 \rightleftharpoons 2NH_3$ (B) $H_2 + I_2 \rightleftharpoons 2HI$ (C) $2NO_2 \rightleftharpoons N_2O_4$ (D) $2HF \rightleftharpoons H_2 + F_2$
2	NH_3 shows maximum boiling point among the hydrides of group V-A elements due to : (A) Very small size of nitrogen (B) Lone pair of electrons present on nitrogen (C) Enhanced electronegative character of nitrogen (D) Pyramidal structure of NH_3
3	The molar volume of CO_2 is maximum at : (A) S.T.P (B) 127 °C and 1 atm. (C) O °C and 2 atm. (D) 273 °C and 2 atm.
4	Which one has a regular tetrahedral shape : (A) $SnCl_2$ (B) CH_4 (C) SO_3 (D) BF_3
5	Splitting of spectral lines when atoms are subjected to strong electric field is called : (A) Zeeman effect (B) Stark effect (C) Photoelectric effect (D) Compton effect
6	One mole of SO_2 contains : (A) 6.02×10^{23} *atoms of oxygen* (B) 18.1×10^{23} *molecules of* SO_2 (C) 6.02×10^{23} *atoms of sulphur* (D) 4 *gram atoms of* SO_2
7	With increase of 10 °C temperature , the rate of reaction doubles, this increase in rate of reaction is due to : (A) Decrease in activation energy of reaction (B) Decrease in the number of collisions between reactant molecules (C) Increase in activation energy of reactants (D) Increase in number of effective collisions
8	Which of the following will have the same number of molecules at S.T.P : (A) 280 cm^3 of CO_2 and 280 cm^3 of N_2O (B) 11.2 dm^3 of O_2 and 32 g of O_2 (C) 44 g of CO_2 and 11.2 dm^3 of CO (D) 28 g of N_2 and 5.6 dm^3 of oxygen
9	The change in heat energy of a chemical reaction at constant temperature and pressure is called : (A) Enthalpy change (B) Bond energy (C) Heat of sublimation (D) Internal energy change
10	The mass of one mole of electrons is : (A) 1.008 mg (B) 0.55 mg (C) 0.184 mg (D) 1.673 mg
11	The wave number of the light emitted by a certain source is 2×10^6 m^{-1}. The wavelength of this light will be : (A) 500 nm (B) 500 m (C) 200 nm (D) 5×10^7 m
12	Solvent extraction method is particularly useful technique for separation, when the product to be separated is : (A) Non-volatile or thermally unstable (B) Volatile or thermally stable (C) Non-volatile or thermally stable (D) Volatile or thermally unstable

(Turn Over)

13	Molarity of pure water is : (A) 1 (B) 18 (C) 55.5 (D) 6
14	The number of bonds in nitrogen molecule is : (A) One σ and one π (B) One σ and two π (C) Three sigma only (D) Two σ and one π
15	Which of the following statements is not correct about galvanic cell : (A) Anode is negatively charged (B) Reduction occurs at anode (C) Cathode is positively charged (D) Reduction occurs at cathode
16	Which of the following is a pseudosolid : (A) CaF_2 (B) Glass (C) NaCl (D) All
17	Which one does not undergo sublimation : (A) Ammonium chloride (B) Naphthalene (C) Iodine (D) Mercury

Roll No _____ (To be filled in by the candidate) **(Academic Sessions 2018 – 2020 to 2021 – 2023)**

CHEMISTRY 222-(INTER PART – I) Time Allowed : 2.40 hours

PAPER – I (Essay Type) GROUP – I Maximum Marks : 68

SECTION – I

LHR-Gr-22

2. Write short answers to any EIGHT (8) questions : **16**

(i) Why we use the term relative atomic mass?

(ii) Many chemical reactions take place in our surroundings involve limiting reactant. Give reason.

(iii) How can you justify with example that molecular formula = n × empirical formula

(iv) In solvent extraction why repeated extraction using small portion of solvent is more efficient than single extraction using large volume of solvent.

(v) How the decolorization of crude crystal can takes place?

(vi) What is the purpose of Gooch Crucible?

(vii) Give characteristics of plasma.

(viii) What are the faulty points of kinetic molecular theory of gas?

(ix) Water vapours do not behave ideally at 273 K. Give reason.

(x) Give applications of common ion effect (any two).

(xi) How do the buffer acts?

(xii) Solubility of glucose in water is increased by increasing temperature. Give reason.

3. Write short answers to any EIGHT (8) questions : **16**

(i) What is polarizability? Give its relation with London dispersion forces.

(ii) Why H_2O is liquid but NH_3 is gas at room temperature?

(iii) Why graphite conduct electricity in one direction only not in other?

(iv) What is habit of crystal? How it is changed?

(v) Why positive rays are called canal rays?

(vi) How neutrons were discovered?

(vii) Give difference between continuous spectrum and line spectrum.

(viii) What are slow and fast neutrons?

(ix) What is continuous solubility curve? Which solution give this type of curve?

(x) Why 1 molal solution of NaOH is dilute as compared to its 1 molar solution?

(xi) What is order of reaction? Give examples.

(xii) What do you mean by rate determining step? Give example.

4. Write short answers to any SIX (6) questions : **12**

(i) Why the size of a cation is smaller as compared to its parent atom?

(ii) What is octet rule? Give one example.

4. (iii) Define co-ordinate covalent bond, give one example.

(iv) Dipole moment of CO_2 is zero but SO_2 is 1.61 D. Why?

(v) Define thermochemistry.

(vi) Define enthalpy of formation. Give example.

(vii) Describe enthalpy of neutralization by taking example of HCl and NaOH.

(viii) Describe Nickle Cadmium Cell.

(ix) Define anode and cathode.

SECTION – II

Note : Attempt any THREE questions.

5. (a) How can the percentage of carbon, hydrogen and oxygen in the given organic compound be estimated by combustion analysis? 4

(b) Derive an expression to calculate the radius of revolving electron in the nth orbit of hydrogen atom. 4

6. (a) A sample of nitrogen gas is enclosed in a vessel of volume 380 cm^3 at 120 °C and pressure of 101325 Nm^{-2}. This gas is transferred to a 10 dm^3 flask and cooled to 27 °C. Calculate the pressure in Nm^{-2} exerted by a gas at 27 °C. 1,1,1,1

(b) Explain the structure and function of voltaic or galvanic cell. 1,3

7. (a) Explain type of hybridization in H_2O and NH_3. 2,2

(b) State first law of thermodynamics. Also prove that $\Delta E = q_2$. 1,3

8. (a) Write four properties of covalent solids. 1,1,1,1

(b) The solubility of CaF_2 in water at 25 °C is found to be $2.05 \times 10^{-4}\ mol\ dm^{-3}$. What is the value of K_{sp} at this temperature? 4

9. (a) Describe a method to determine the boiling point elevation of a solution. 3,1

(b) Define order of reaction. Describe it with three examples. 1,3