Roll No _____ (To be filled in by the candidate) **(Academic Sessions 2020 – 2022 to 2023 – 2025)**

CHEMISTRY 224-1st Annual-(INTER PART – I) Time Allowed : 20 Minutes

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

PAPER CODE = 6483 LHR-1-24

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.

1-1	Equal masses of methane and oxygen gases are mixed in an empty container at 25 °C. The fraction of the total pressure exerted by oxygen is : (A) $\frac{1}{3}$ (B) $\frac{8}{9}$ (C) $\frac{1}{9}$ (D) $\frac{16}{17}$
2	Orbitals having same energy are called : (A) Hybrid orbitals (B) Valence orbitals (C) Degenerate orbitals (D) d-orbitals
3	For which system does the equilibrium constant K_c has units of (concentration)$^{-1}$: (A) $N_2 + 3H_2 \rightleftharpoons 2NH_3$ (B) $H_2 + I_2 \rightleftharpoons 2HI$ (C) $2NO \rightleftharpoons N_2O_4$ (D) $2HF \rightleftharpoons H_2 + F_2$
4	All the photochemical reactions are usually : (A) First order reactions (B) Second order reactions (C) Zero order reactions (D) Third order reactions
5	The largest number of molecules are present in : (A) 3.6 g of H_2O (B) 4.8 g of C_2H_5OH (C) 2.8 g of CO (D) 5.4 g of N_2O_5
6	Which of the following hydrogen halide has the highest percentage of ionic character : (A) HCℓ (B) HBr (C) HF (D) HI
7	The colour of iodine in organic layer is : (A) Brown (B) Colourless (C) Purple (D) Green
8	The bond order of N_2 molecule is : (A) Zero (B) Three (C) Two (D) One
9	The cathodic reaction in the electrolysis of dil. H_2SO_4 with pt electrode is : (A) Oxidation (B) Reduction (C) Both oxidation and reduction (D) Neither oxidation or reduction
10	ΔH_v value of C_6H_{14} should be ---- than that of C_2H_6 : (A) Greater (B) Lesser (C) Equal to (D) Always lesser
11	The phenomenon of isotopy was introduced by : (A) Soddy (B) Avogadro (C) Rutherford (D) Max plank
12	Diamond is bad conductor because : (A) It has a tight structure (B) It has high density (C) There are no free electrons present in the crystal of diamond to conduct electricity (D) Is transparent to light
13	During liquefaction of gases the intermolecular spaces : (A) Decreases (B) Increases (C) Remains constant (D) Cannot be predicted
14	Rutherford model of atom failed because : (A) The atom did not have a nucleus and electron (B) It did not account for attraction between proton and nucleus (C) It did not account for the stability of atom (D) There is actually no space between the nucleus and electron
15	Paper chromatography is known as : (A) Adsorption chromatography (B) Partition chromatography (C) Thin layer chromatography (D) Gas chromatography
16	Which one is not a state function : (A) Temperature (B) Internal energy (C) Work (D) Volume
17	Molarity of pure water is : (A) 1 (B) 18 (C) 55.5 (D) 6

Roll No _____ (To be filled in by the candidate) **(Academic Sessions 2020 – 2022 to 2023 – 2025)**

CHEMISTRY 224-1st Annual-(INTER PART – I) Time Allowed : 2.40 hours

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

LHR-1-24

SECTION – I

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 e/m value.

(vii) What is origin of X-rays?

(viii) State ($n + \ell$) 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.

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^3 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_3COONa and 0.09 molar acetic acid solution are present K_a for acetic acid (CH_3COOH) is 1.85×10^{-5}. 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.