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

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

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.

42-224-I-(Essay Type) – 57000

Sl 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 – II Maximum Marks : 17

PAPER CODE = 6484

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	The gases show more deviation from ideal behaviour at : (A) Low temperature and high pressure ● (B) High temperature and low pressure (C) High temperature and high pressure (D) Low temperature and low pressure
2	The wave number of the light emitted by a certain source is $2\times10^{6}m^{-1}$. The wavelength of this light will be : (A) 200 nm (B) 500 m (C) 500 nm ● (D) $5\times10^{7}m$
3	The equilibrium constant for the reaction $2O_3 \rightleftharpoons 3O_2$ is 10^{55} at 25 °C. It tells us that at room temperature : (A) ● O_3 is unstable and decomposes rapidly (B) O_3 is highly stable and decomposes slowly (C) O_3 is unstable and decomposes slowly (D) O_3 is highly stable and decomposes rapidly
4	The main function of a catalyst in a chemical reaction is to : (A) Increase Ea (B) Decrease temperature (C) ● Decrease Ea (D) Decrease pressure
5	49 g of aqueous solution of H_2SO_4 contains moles of H^+ ions : (A) 1.0 ● (B) 0.2 (C) 0.4 (D) 0.01
6	Which of the following molecule has zero dipole moment : (A) H_2S (B) SO_2 (C) CO (D) CS_2 ●
7	Solvent extraction is an equilibrium process and it is controlled by : (A) Law of mass action (B) Distribution law ● (C) The amount of solute (D) The amount of solvent used
8	The geometry of PH_3 is : (A) Bent (B) Trigonal planar (C) Tetrahedral (D) ● Trigonal pyramidal
9	Stronger the oxidizing agent, greater is the : (A) Oxidation potential (B) Reduction potential ● (C) Redox potential (D) emf of cell
10	Which type of intermolecular forces are present in chloroform : (A) Hydrogen bonding (B) Dipole-dipole forces ● (C) London forces (D) Dipole-induced forces
11	One mole of CO_2 contains : (A) 6.02×10^{23} atoms of oxygen (B) 18.1×10^{23} molecules of CO_2 (C) 6.02×10^{23} atoms of carbon ● (D) 22 gram atoms of CO_2
12	The solid iodine is the best example of : (A) Ionic solids (B) Covalent solids (C) Metallic solids (D) Molecular solids ●
13	The order of the rate of diffusion of gases NH_3 , SO_2 , $C\ell_2$ and CO_2 is : (A) $NH_3 > SO_2 > C\ell_2 > CO_2$ (B) $NH_3 > CO_2 > SO_2 > C\ell_2$ ● (C) $C\ell_2 > SO_2 > CO_2 > NH_3$ (D) $NH_3 > CO_2 > C\ell_2 > SO_2$
14	Quantum number values for 2p orbitals are : (A) $n=2, \ell=1$ ● (B) $n=1, \ell=2$ (C) $n=1, \ell=0$ (D) $n=2, \ell=0$
15	Which of the following substance is used as drying agent in desiccator : (A) NaCℓ (B) Animal Charcoal (C) $NH_4C\ell$ (D) ● Anhydrous $CaC\ell_2$
16	At constant volume, q_v is equal to : (A) ΔH (B) ΔE ● (C) ΔP (D) ΔV
17	18 g glucose is dissolved in 90 g of water. The relative lowering of vapour pressure is equal to : (A) 1/5 (B) 5.1 (C) 1/51 ● (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 – II Maximum Marks : 68

SECTION – I

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

(i) What are molecular ions, give two examples?

(ii) Define stoichiometry.

(iii) What is importance of limiting reactant?

(iv) Why is sintered glass crucible superior than Gooch Crucible?

(v) What is solvent extraction?

(vi) Write quantitative statement of Charles's law.

(vii) Differentiate between quantitative and qualitative analysis.

(viii) What is compressibility factor, write its value for an ideal gas?

(ix) Write two characteristics of plasma.

(x) Differentiate between equilibrium constant " K_c " and chemical equilibrium.

(xi) Derive expression of K_c for $NH_3(g)$ synthesis by Hyber process.

(xii) Define pH and pOH.

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

(i) Ionic crystals are highly brittle. Explain with reason.

(ii) HF is the weakest acid among all halogen acids. Why?

(iii) Differentiate between crystalline and amorphous solids.

(iv) Evaporation takes place at all temperatures. Explain with reason.

(v) How neutron decays? Give reaction.

(vi) What is atomic emission spectrum? Explain.

(vii) Give importance of Moseley's law. (Any two)

(viii) State ($n + \ell$) rule. Give its importance.

(ix) What do you mean by the term activation of a catalyst? Give example.

(x) Define order of reaction by giving example.

(xi) What do you mean by water of crystallization? Give two examples.

(xii) Define mole fraction in solutions by giving one example.

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

(i) Bond distance is a compromised distance between two atoms. Justify the statement.

(ii) Sketch the hybrid orbitals of : (i) PCl_3 (ii) NH_4^+

4. (iii) Define bond energy. What are factors influencing bond energy?

(iv) Why is sigma (σ) bond stronger than pi (π) bond?

(v) Define lattice energy. Give one example.

(vi) How do you determine ΔH for food and fuel in laboratory?

(vii) Define Hess's law of constant heat summation.

(viii) Na & K can displace hydrogen from acids but Pt, Pd and Cu can not. Why?

(ix) Give the reactions taking place in silver oxide battery.

SECTION – II

Note : Attempt any THREE questions.

5. (a) Explain evidence of atom in detail. 4

(b) Define metallic solids. Discuss metallic solids in terms of electron gas theory and molecular orbital theory. 1,3

6. (a) What pressure is exerted by a mixture of 2.00 g of H_2 and 8.00 g of N_2 at 273 K in a $10\,dm^3$ vessel? 4

(b) Explain J.J Thomson's experiment for determination e/m value of electron. 4

7. (a) Define hybridization. Explain sp hybridization by taking example of ethyne. 1,3

(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 CH_3COOH is 1.85×10^{-5}. 4

8. (a) Define the following with suitable example : 2,2
(i) Enthalpy of neutralization. (ii) Enthalpy of formation.

(b) Define oxidation number. Also write rules for assigning oxidation number. 1,3

9. (a) How boiling point elevation is measured by Landsberger's method? 4

(b) Differentiate between homogeneous catalysis and heterogeneous catalysis with one example of each. 2,2

Roll No _____ (To be filled in by the candidate) **(Academic Sessions 2019 – 2021 to 2022 – 2024)**

CHEMISTRY 223-1st Annual-(INTER PART – I) Time Allowed : 20 Minutes

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

PAPER CODE = 6485 Lahore Board-2023

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	The study of heat changes accompanying a chemical reactions is known as : (A) Electrochemistry (B) Physical chemistry (C) Analytical chemistry (D) Thermochemistry
2	Which of the following has hydrogen bonding : (A) CH_4 (B) $CC\ell_4$ (C) NH_3 (D) NaCℓ
3	An excess of aqueous silver nitrate is added to aqueous barium chloride and precipitate is removed by filtration. What are the main ions in the filtrate : (A) Ag^+ and Ba^{2+} and NO_3^- (B) Ag^+ and NO_3^- only (C) Ba^{2+} and NO_3^- only (D) Ba^{2+} and NO_3^- and $C\ell^-$
4	Mass in grams of 2.74 moles of $KMnO_4$: (A) 0.715 g (B) 1416.2 g (C) 432.92 g (D) 294 g
5	The unit of the rate constant is the same as that of the rate of reaction in : (A) Zero Order Reaction (B) First Order Reaction (C) Second Order Reaction (D) Third Order Reaction
6	Splitting of spectral lines when atoms are subjected to strong electric field is called : (A) Stark effect (B) Zeeman effect (C) Photoelectric effect (D) Compton effect
7	The partial pressure of oxygen in air is : (A) 116 torr (B) 159 torr (C) 110 torr (D) 160 torr
8	Isotopes differ in : (A) Arrangement of electrons in orbitals (B) Properties which depend upon mass (C) Chemical properties (D) The extent to which they may be affected in electromagnetic field
9	Calorie is equivalent to : (A) 0.4184 J (B) 4.184 J (C) 41.84 J (D) 418.4 J
10	Stronger the oxidizing agent, greater is the : (A) Oxidation potential (B) Reduction potential (C) Redox potential (D) E.M.F of cell
11	Which of the following hydrogen halides has the highest percentage of ionic character : (A) HF (B) HCℓ (C) HBr (D) HI
12	Pressure remaining constant, at which temperature the volume of a gas will become twice of what it is at 0 °C : (A) 546 °C (B) 200 °C (C) 546 K (D) 273 K
13	Cathode in Nickel Cadmium cell is : (A) Zn (B) NiO_2 (C) Cd (D) Ag_2O
14	Ionic solids are characterized by : (A) Low melting points (B) High vapour pressures (C) Good conductivity in solid state (D) Solubility in polar solvents
15	Solvent extraction is an equilibrium process and is controlled by : (A) Law of mass action (B) Distribution law (C) The amount of solvent used (D) The amount of solute
16	The optimum pressure in ammonia synthesis by Haber's process is : (A) 100 – 400 atm (B) 250 – 400 atm (C) 200 – 300 atm (D) 150 – 450 atm
17	A solution of glucose is 10% w/v. The volume in which 1 g mole of it is dissolved will be : (A) $1\,dm^3$ (B) $200\,cm^3$ (C) $900\,cm^3$ (D) $1.8\,dm^3$

Roll No _____ (To be filled in by the candidate) **(Academic Sessions 2019 – 2021 to 2022 – 2024)**

CHEMISTRY 223-1st Annual-(INTER PART – I) Time Allowed : 2.40 hours

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

SECTION – I

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

(i) Define percentage yield give example.

(ii) How many moles of CO_2 can be produced from burning one mole of octane mass of octane is 114?

(iii) Calculate mass in grams of 2.74 mole of $KMnO_4$.

(iv) How do you differentiate between diffusion and effusion?

(v) Gases show non ideal behaviour at low temperature and high pressure, give reason.

(vi) What is Avogadro's law of gases? Give example.

(vii) Write electronic configuration of Cu_{29} and K_{19}

(viii) Why positive rays are also called as canal rays?

(ix) Why oxygen molecule is paramagnetic in nature?

(x) Define state function, give example.

(xi) Justify that heat of formation of a compound is the sum of all the other enthalpies.

(xii) What is a spontaneous process? Give two examples.

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

(i) What is difference between qualitative and quantitative analysis?

(ii) Define sublimation. Write name of two compounds which can be sublimed.

(iii) Write two uses of chromatography.

(iv) What are intermolecular forces of attraction? Give two examples.

(v) Evaporation causes cooling. Give reason.

(vi) Diamond is hard and an electrical insulator. Give reason.

(vii) Differentiate between hydration and hydrolysis.

(viii) The concentration in terms of molality is independent of temperature but molarity depends upon temperature. Give reason.

(ix) Justify that the boiling point of one molal urea solution is 100.52 °C but the boiling point of two molal urea solution is less than 101.04 °C.

(x) Define homogeneous catalysis. Give one example.

(xi) Justify that the radioactive decay is always a first order reaction.

(xii) Differentiate between rate and rate constant of a reaction.

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

(i) Define bond order. Give one example.

(ii) Differentiate between bonding molecular orbital and antibonding molecular orbital.

4. (iii) The radius of an onion is always larger than parent atom. Why?

(iv) How does the equilibrium constant of a reaction tell us the direction of a chemical reaction?

(v) How can NaCℓ be purified by common ion effect?

(vi) What are pK_a and pK_b? How do they show the acidic and basic strength?

(vii) What is the function of salt bridge in galvanic cell?

(viii) What is anodized aluminium?

(ix) Calculate the oxidation state of Mn in $KMnO_4$ and K_2MnO_4

SECTION – II

Note : Attempt any THREE questions.

5. (a) Define the following terms with examples :
(i) Relative atomic mass (ii) Molecular ion (iii) Isotope (iv) Molar volume. 1,1,1,1

(b) 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 the gas at 27 °C. 4

6. (a) Describe four properties of the crystalline solids. 4

(b) What is bomb calorimeter and describe it with the help of diagram? 4

7. (a) Derive the equation to calculate radius of electron in nth orbit hydrogen atom by using Bohr's model. 4

(b) The solubility of PbF_2 at 25 °C is 0.64 $g\,dm^{-3}$. Calculate K_{sp} of PbF_2. 4
At. Mass of Pb = 207
At. Mass of F = 19

8. (a) Define atomic orbital hybridization. How can we describe the geometry of NH_3 on its basis? 4

(b) What is lead accumulator battery? Discuss its discharging process. 4

9. (a) Discuss Raoult's law when one component is volatile other is non-volatile. 4

(b) Describe half life method and method of large excess for finding the order of reaction. 2,2

Roll No _____ (To be filled in by the candidate) **(Academic Sessions 2019 – 2021 to 2022 – 2024)**

CHEMISTRY 223-1st Annual-(INTER PART – I) Time Allowed : 20 Minutes

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

PAPER CODE = 6484

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	Which of the following is a pseudo solid : (A) CaF_2 (B) Glass (C) NaCℓ (D) KCℓ
2	The number of bonds in nitrogen molecule is : (A) One σ and two π (B) One σ and one π (C) Three sigma only (D) Two sigma and one π
3	Molarity of pure water is : (A) 1 (B) 18 (C) 55.5 (D) 6
4	Photochemical reactions are : (A) Zero Order Reaction (B) First Order Reaction (C) Second Order Reaction (D) Third Order Reaction
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	The pH of 10^{-3} mol dm^{-3} of an aqueous solution of H_2SO_4 is : (A) 3.0 (B) 2.7 (C) 2.0 (D) 1.5
7	The comparative rates at which the solutes move in paper chromatography depend on : (A) The size of the paper (B) R_f values of solutes (C) Temperature of the experiment (D) Size of the chromatographic tank used
8	The quantity of heat required to change the temperature of a body by 1 Kelvin is known as : (A) Heat energy (B) Enthalpy (C) Heat capacity (D) Heat of a reaction
9	Electroplating is done by one of the following methods : (A) Hydration (B) Hydrolysis (C) Electrolytic conduction (D) Electrolysis
10	All gases can be liquefied by the Lind's method, except : (A) N_2 (B) O_2 (C) F_2 (D) He
11	The number of moles of CO_2 which contain 8 g of oxygen : (A) 0.25 (B) 0.50 (C) 1.0 (D) 1.50
12	When 6d orbital is complete, the entering electron goes into : (A) 7f (B) 7s (C) 7p (D) 7d
13	The existence of an element in more than one crystalline forms is known as : (A) Polymorphism (B) Allotropy (C) Symmetry (D) Anisotropy
14	For a given process, the heat changes at constant pressure q_p and q_v at constant volume are related to each other as : (A) $q_p = q_v$ (B) $q_p < q_v$ (C) $q_p > q_v$ (D) $q_p = \frac{q_v}{2}$
15	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.
16	Purification of NaCℓ by passing HCℓ gas is the example of : (A) Filtration (B) Sublimation (C) Ionic product (D) Common ion effect
17	If the salt bridge is not used between two half cells, then the voltage : (A) Decreases rapidly (B) Decreases slowly (C) Does not change (D) Drops to zero

Roll No _____ (To be filled in by the candidate) **(Academic Sessions 2019 – 2021 to 2022 – 2024)**

CHEMISTRY 223-1st Annual-(INTER PART – I) Time Allowed : 2.40 hours

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

SECTION – I

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

(i) Why isotopes have same chemical properties but different physical properties?

(ii) Define gram atom and gram molecule.

(iii) Define stoichiometry, give its assumptions.

(iv) Derive mathematical relationship for density of an ideal gas.

(v) Why pilots feel uncomfortable in breathing at higher altitude?

(vi) What are causes of deviation from ideality?

(vii) What happens when a free neutron decay?

(viii) Define Hund's rule and Aufbau principle.

(ix) Define Mosley law. Give its importance.

(x) Define enthalpy of solution. Give one example.

(xi) Define internal energy and enthalpy.

(xii) Why enthalpy of combustion of some compounds can not be measured directly?

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

(i) How crystals are dried by reliable method?

(ii) Define sublimation. Give the importance of sublimation.

(iii) Differentiate between adsorption and partition chromatography.

(iv) The boiling point of water is different at Murree hills and at Mount Everst. Give reason.

(v) Describe crystallographic elements.

(vi) The electrical conductivity of the metals decreases by increasing temperature.

(vii) $Na_2SO_4.10H_2O$ shows discontinuous solubility curve. Give reason.

(viii) Define molarity. Give one example.

(ix) Freezing points are depressed due to the presence of solutes.

(x) Define energy of activation. What is the affect of temperature on the activation energy of a reaction?

(xi) What is half life period? How it is used for the determination of order of a reaction?

(xii) The rate of a chemical reaction is an ever changing parameter under the given conditions.

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

(i) On what factors bond energy depends?

(ii) Draw molecular orbital diagram of oxygen molecule.

(Turn Over)

4. (iii) Why ionic bonds are non-directional?

(iv) Define buffer capacity.

(v) State law of mass action.

(vi) What is meant by percentage ionization of acids?

(vii) A salt bridge maintains electrical neutrality in the cell. How?

(viii) What is meant by electrolytic conduction?

(ix) Calculate oxidation number of " P " in Na_2PO_4.

SECTION – II

Note : Attempt any THREE questions.

5. (a) Define types of yield. How do we calculate the percentage yield of a chemical reaction? 4

(b) Calculate the mass of 1 dm^3 of NH_3 gas at 30 °C and 1000 mm Hg pressure, considering ammonia is behaving ideally. 4

6. (a) What are metallic solids? Describe their properties. 4

(b) Explain spontaneous and non spontaneous reactions describe four points which differentiate them. 4

7. (a) Derive the formula to calculate the energy of an electron in nth orbit using Bohr's model. 4

(b) The solubility of CaF_2 in water at 25 °C is found to be $2.05\times10^{-4}\ mol\ dm^{-3}$. What is the value of K_{sp} at this temperature? 4

8. (a) Explain SP^2-hybridization with suitable example. 4

(b) Give four applications of electro-chemical series. 4

9. (a) Describe Beckmann's method for the measurement of freezing point depression with the help of diagram. 4

(b) What is enzyme catalysis? Give one example. Also give any four characteristics of enzyme catalysis. 4

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.

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

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.

(Turn Over)

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

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 – II Maximum Marks : 17

PAPER CODE = 6484

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	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
2	Quantum number values for 2p orbitals are : (A) $n = 2, \ell = 1$ (B) $n = 1, \ell = 2$ (C) $n = 1, \ell = 0$ (D) $n = 2, \ell = 0$
3	For which system does the equilibrium constant, K_c has units of (concentration)$^{-1}$: (A) $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$ (B) $H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$ (C) $2NO_{2(g)} \rightleftharpoons N_2O_{4(g)}$ (D) $2HF_{(g)} \rightleftharpoons H_{2(g)} + F_{2(g)}$
4	The unit of the rate constant is the same as that of the rate of reaction in : (A) First order reaction (B) Second order reaction (C) Zero order reaction (D) Third order reaction
5	Isotopes differ in : (A) Properties which depend upon mass (B) Arrangement of electrons in orbitals (C) Chemical properties (D) The extent to which they may be affected in electromagnetic field
6	The bond angle in NH_3 molecule is : (A) 109.5° (B) 107.5° (C) 104.5° (D) 108°
7	The comparative rates at which the solutes move in paper chromatography depends on : (A) The size of the paper (B) R_f values of solutes (C) Temperature of the experiment (D) Size of the chromatographic tank used
8	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
9	If a strip of Cu metal is placed in a solution of $FeSO_4$: (A) Cu will be deposited (B) Fe is precipitated out (C) Cu and Fe both dissolve (D) No reaction takes place
10	London dispersion forces are the only forces present among the : (A) Molecules of water in liquid state (B) Atoms of helium in gaseous state at high temperature (C) Molecules of solid iodine (D) Molecules of hydrogen chloride gas

(Turn Over)

11	The mass of one mole of electron is : (A) 1.008 mg (B) 0.55 mg (C) 0.184 mg (D) 1.673 mg
12	Diamond is a bad conductor because : (A) It has a tight structure (B) It has a high density (C) There are no free electron present in the crystal of diamond to conduct electricity (D) Is transparent to light
13	How should the conditions be changed to prevent the volume of a given gas from expanding when its mass is increased : (A) Temperature is lowered and pressure is increased (B) Temperature is increased and pressure is lowered (C) Temperature and pressure both are lowered (D) Temperature and pressure both are increased
14	Bohr's model of atom is contradicted by : (A) Plank's quantum theory (B) Dual nature of matter (C) Heisenberg's uncertainty principle (D) All of these
15	Chromatography in which the stationary phase is a solid classified as : (A) Partition chromatography (B) Gas chromatography (C) Adsorption chromatography (D) Thin layer chromatography
16	The net heat change in a chemical reaction is same, whether it is brought about in two or more different ways in one or several steps. It is known as : (A) Henry's law (B) Joule's principle (C) Hess's law (D) Law of conservation of energy
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 2018 – 2020 to 2021 – 2023)**

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

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

SECTION – I

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

(i) N_2 and CO have the same number of electrons, protons and neutrons, justify.

(ii) Law of conservation of mass have to be obeyed during stoichiometric calculations, explain.

(iii) Why actual yield is always less than theoretical yield?

(iv) Write down any two uses of chromatography.

(v) In solvent extraction technique, why repeated extractions using small portions of solvent are more efficient than using a single extraction but larger volume of solvent?

(vi) How undesirable colours in crystallization process can be removed?

(vii) Write formulas to interconvert various scales of temperature.

(viii) How density of an ideal gas can be calculated from ideal gas equation?

(ix) Derive Charles's law by kinetic equation of gases.

(x) What is Henderson equation and for which purpose it is used?

(xi) What are applications of buffer in daily life?

(xii) Derive ionic product of water and what is its value at 25 °C?

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

(i) Define anisotropy, with example.

(ii) What is symmetry of a crystal?

(iii) Define isomorphism with example.

(iv) Define unit cell, give its crystallographic elements.

(v) What is Moseley's law?

(vi) Define Hund's rule.

(vii) Discuss briefly principal quantum number.

(viii) What is Aufbau's principle?

(ix) What are discontinuous solubility curves?

(x) Define colligative properties , give two examples.

(xi) What is meant by homogeneous catalysis, give one example.

(xii) How surface area of reactants affect rate of reaction?

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

(i) π bonds are more diffused than σ bonds. Why?

(ii) What is bond order? Give an example.

4. (iii) Define covalent bond. Draw the Lewis structure of water.

(iv) The radius of an atom can not be determined precisely. Why?

(v) What is enthalpy of combustion? Give an example.

(vi) Define system and surrounding.

(vii) What are exothermic reactions? Give an example with equation.

(viii) Calculate the oxidation number (O.N) of "Mn" in $KMnO_4$.

(ix) Write two functions of salt bridge.

SECTION – II

Note : Attempt any THREE questions.

5. (a) Explain construction and working of mass spectrometer. 4

(b) Give properties of neutron in detail (any four). 4

6. (a) Calculate the mass of 1 dm^3 of NH_3 gas at 30 °C and 1000 mm Hg. 1,2,1

(b) How electrochemical series is helpful in the prediction of feasibility of chemical reaction and relative chemical reactivity of metals? 2,2

7. (a) Explain sp^3 hybridization by taking example of methane (CH_4). 4

(b) Explain bomb calorimetric method for the measurement of enthalpy of reaction. Also draw diagram. 3,1

8. (a) What are molecular solids? Give their important characteristics. 4

(b) The solubility product of Ag_2CrO_4 is 2.6×10^{-2} at 25 °C. Calculate the solubility of the compound. 4

9. (a) State solubility curves and explain continuous and discontinuous solubility curves. 1, 1½ , 1½

(b) What are the characteristics of a catalyst (Any four)? 1,1,1,1

Roll No _____ (To be filled in by the candidate) **(Academic Sessions 2017 – 2019 to 2020 – 2022)**

CHEMISTRY 221-(INTER PART – I) Time Allowed : 20 Minutes

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

PAPER CODE = 6487 Lahore Board-2021

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	The pH of mixture of CH_3COONa and CH_3COOH is : (A) 7 (B) >7 (C) <7 (D) 1
2	Balmer series in hydrogen spectrum lies in the region : (A) Ultraviolet (B) Visible (C) Infrared (D) Microwave
3	Density of an ideal gas can be calculated by the formula : (A) $d = nRT$ (B) $d = \frac{PM}{RT}$ (C) $d = \frac{m}{M}RT$ (D) $d = \frac{PV}{M}$
4	In endothermic reactions, the heat content of the : (A) Products is more than that of reactants (B) Reactants is more than that of products (C) Surrounding increases (D) Reactants and products are equal
5	Which of the following species has unpaired electrons in antibonding molecular orbitals : (A) O_2^{2+} (B) N_2^{2-} (C) B_2 (D) F_2
6	1 gram formula of $NaC\ell$ is equal to : (A) 58.5 g (B) 23 g (C) 35.5 g (D) 12 g
7	The unit of rate constant is the same as that of rate of reaction in : (A) First order reaction (B) Second order reaction (C) Zero order reaction (D) Third order reaction
8	When water freezes at 0 °C, its density decreases due to (A) Cubic structure of ice (B) Empty spaces present in structure of ice (C) Change of bond lengths (D) Change of bond angles
9	An excess of silver nitrate in aqueous form is added to aqueous barium chloride and precipitate is removed by filtration. What are main ions in the filtrate : (A) Ag^+ and NO_3^- only (B) Ag^+ and Ba^{2+} and NO_3^- (C) Ba^{2+} and NO_3^- only (D) Ba^{2+} and NO_3^- and $C\ell^-$
10	Many elements have fractional atomic masses, this is because : (A) The mass of an atom is itself fractional (B) Atomic masses are average masses of isobars (C) Atomic masses are average masses of isotopes (D) Atomic masses are average masses of isotopes proportional to their relative abundance
11	According to VSEPR theory, the shape of PH_3 molecule is : (A) Trigonal pyramidal (B) Tetragonal (C) Linear (D) Trigonal planer
12	Which of the following compounds do not show process of sublimation : (A) Ammonium chloride (B) Iodine (C) Naphthalene (D) Carbon tetra chloride
13	A thermometer used in Landsberger's method can read upto : (A) 0.1 K (B) 0.01 F (C) 0.01 K (D) 0.01 °C
14	In the monoclinic crystal system, bond axes are : (A) $a = b = c$ (B) $a = b \neq c$ (C) $a \neq b = c$ (D) $a \neq b \neq c$
15	If a salt bridge is not used between two half cells, then the voltage : (A) Decreases rapidly (B) Decreases slowly (C) Does not change (D) Drops to zero
16	Orbitals having same energy are called : (A) Hybrid orbitals (B) Valence orbitals (C) Degenerate orbitals (D) d-orbitals
17	If absolute temperature of a gas is doubled and the pressure is reduced to one half, the volume of the gas will : (A) Remain unchanged (B) Increase four times (C) Reduce to $\frac{1}{4}$ (D) Be doubled

No _____ (To be filled in by the candidate) **(Academic Sessions 2017 – 2019 to 2020 – 2022)**

HEMISTRY 221-(INTER PART – I) Time Allowed : 2.40 hours

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

SECTION – I

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

(i) How is the law of conservation of mass obeyed during stoichiometeric calculations?

(ii) Why N_2 and CO have same number of electrons, protons and neutrons? Justify.

(iii) Define mole. Calculate the gram atoms (moles) in 0.1 g of sodium.

(iv) Draw the beautiful diagram of sublimation process.

(v) Write down the uses of chromatography.

(vi) What is the physical meaning of R?

(vii) Prove Boyle's law in the light of K.M.T.

(viii) What are the two characteristics of plasma?

(ix) Write down the quantitative statement of Charles's law.

(x) Define heat of solution.

(xi) How will you justify that the lowering of vapour pressure is a colligative property?

(xii) Differentiate between ideal and non-ideal solutions.

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

(i) Ethyl alcohol is soluble in water. Why?

(ii) Explain H-bonding in deoxyribonucleic acid (DNA).

(iii) What do you know about anisotropy, explain with example?

(iv) What is allotropy, give one example?

(v) Write two nuclear reactions for production of gamma (γ) radiations and β-particle.

(vi) Write defect of Rutherford Atomic Model.

(vii) Define Heisenberg's uncertainty principle and write its mathematical equation.

(viii) Write name of different quantum numbers.

(ix) Write Henderson's equation for acidic and basic buffer.

(x) Why do we need buffer solution?

(xi) Explain specific rate constant briefly.

(xii) What is zero order reaction, give one example?

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

(i) Define bond order and give one example.

(ii) Draw diagram for formation of bonding and antibonding molecular orbitals for H_2 molecule.

(iii) Define sigma bond and pi-bond.

(iv) Define atomic orbital hybridization.

(v) What is first law of thermodynamics, give its mathematical equation?

(vi) Define enthalpy of combustion ΔH_c^o.

(vii) How anodized aluminium is prepared in an electrolytic cell?

(viii) Draw a diagram of standard hydrogen electrode (SHE)

(ix) Define electrochemical series.

(Turn Over)

SECTION – II

Note : Attempt any THREE questions.

5. (a) NH_3 gas can be produced by heating together $NH_4C\ell$ and $Ca(OH)_2$. If a mixture containing 100g of each solid is heated then calculate the number of grams of NH_3 produced.
$$2NH_4C\ell + Ca(OH)_2 \rightarrow CaC\ell_2 + 2NH_3 + 2H_2O$$ 4

(b) Explain isomorphism with examples. 4

6. (a) Give postulates of kinetic molecular theory. 4

(b) Derive an expression to determine radius of an orbit using Bohr's model. 4

7. (a) What is sp^2 hybridization, how it explains structure of ethene? 4

(b) What is Hess's law? Explain by giving two examples. 4

8. (a) Calculate the pH of a buffer solution in which 0.11 molar CH_3COONa and 0.09 molar acetic acid solutions are present. K_a for the CH_3COOH is 1.85×10^5. 4

(b) Define half life period. How order of reaction can be determined by knowing half life of a reaction? 4

9. (a) What are colligative properties of solutions? Explain elevation of boiling points. 4

(b) Describe the construction and working of standard hydrogen electrode. 4

ıo _____ (To be filled in by the candidate) **(Academic Sessions 2017 – 2019 to 2020 – 2022)**

ʌEMISTRY 221-(INTER PART – I) Time Allowed : 20 Minutes

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

PAPER CODE = 6486

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	The pH of 10^{-3} mol dm^{-3} of an aqueous solution of H_2SO_4 is :			
	(A) 3	(B) 2.7	(C) 2.0	(D) 1.5
2	Bond angles $\alpha = \gamma = 90°$; $\beta \neq 90°$ and axes $a \neq b \neq c$ is for crystal system :			
	(A) Tetragonal	(B) Hexagonal	(C) Monoclinic	(D) Triclinic
3	If the rate equation of a reaction $2A + B \rightarrow$ Products is , rate $= K[A]^2[B]$ and A is present in large excess, then order is :			
	(A) 1	(B) 2	(C) 3	(D) Zero
4	Nickel has number of isotopes :			
	(A) 3	(B) 5	(C) 7	(D) 2
5	pH of human blood is :			
	(A) 7.35	(B) 6.35	(C) 5.35	(D) 4.35
6	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
7	Pressure remaining constant, at which temperature the volume of the gas will become twice of what it is at 0 °C :			
	(A) 546 °C	(B) 200 °C	(C) 546 K	(D) 273 K
8	1 gram formula of $NaC\ell$ is equal to :			
	(A) 58.5 g	(B) 23 g	(C) 35.5 g	(D) 12 g
9	18 g glucose is dissolved in 90 g of water, the relative lowering of vapour pressure is :			
	(A) $\frac{1}{5}$	(B) 5.1	(C) $\frac{1}{51}$	(D) 6
10	de-Broglie equation is represented as :			
	(A) $\lambda = \frac{h}{mv}$	(B) $m = \frac{h}{\lambda}$	(C) $m = \frac{h}{v}$	(D) $\lambda = \frac{2h}{mv}$
11	1-calorie is equivalent to :			
	(A) 0.4184 J	(B) 41.84 J	(C) 418.4 J	(D) 4.184 J
12	The temperature of a natural plasma is about :			
	(A) 20000 °C	(B) 1000 °C	(C) 5000 °C	(D) 10000 °C
13	Ionization energy for $Mg \rightarrow Mg^+ + 1e^-$ has $\Delta H = ---$:			
	(A) 738 $KJ\,mol^-$	(B) 238 $KJ\,mol^-$	(C) 448 $KJ\,mol^-$	(D) 138 $KJ\,mol^-$
14	The velocity of photon is :			
	(A) Independent of wavelength	(B) Depends on wavelength		
	(C) Equal to square of its amplitude	(D) Depends on its source		
15	Solvent extraction is an equilibrium process and it is controlled by :			
	(A) Law of mass action	(B) The amount of solvent used		
	(C) Distribution law	(D) The amount of solute		
16	Stronger the oxidizing agent, greater is the :			
	(A) Oxidation potential	(B) Reduction potential		
	(C) Redox potential	(D) E.M.F of cell		
17	Which of the following is a pseudo solid :			
	(A) CaF_2	(B) Glass	(C) NaCℓ	(D) All of these

(To be filled in by the candidate) (Academic Sessions 2017 – 2019 to 2020 – 2022)

CHEMISTRY 221-(INTER PART – I) Time Allowed : 2.40 hours
PAPER – I (Essay Type) GROUP – II Maximum Marks : 68

SECTION – I

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

(i) Define stoichiometry. Give two assumptions for stoichiometeric calculations. Justify it.

(ii) How percentage yield is calculated?

(iii) Define Avogadro's number. Give one example.

(iv) Differentiate between stationary phase and mobile phase in chromatographic technique?

(v) What is ether extraction?

(vi) Derive Avogadro's law from KMT.

(vii) Why the graph plotted between pressure and volume moves away from pressure axis at higher temperature?

(viii) Calculate SI unit of ' R ' gas constant.

(ix) Why does pilots feel uncomfortable breathing at high altitude?

(x) State Raoult's law. Give one mathematical expression.

(xi) Relative lowering of vapour pressure is independent of temperature. Justify this statement.

(xii) Give two applications of colligative properties.

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

(i) What are dipole dipole forces? Give one example.

(ii) Name the factors which affect the London forces.

(iii) Cleavage of the crystals is itself anisotropic behaviour, explain.

(iv) Define transition temperature with two examples.

(v) Why cathode rays are also called as electron?

(vi) Write down any four properties of positive rays.

(vii) Define spectrum and name any two types of spectrum.

(viii) For Azimuthal quantum number, $\ell = 2$ and $\ell = 3$, calculate the total values of magnetic quantum number (m).

(ix) How equilibrium constant (K_c) predicts direction of a reaction?

(x) Define pH and write how it is helpful to know nature of solutions.

(xi) What do you mean by order of reaction? Give two examples.

(xii) What is the effect of temperature on rate of chemical reaction? Also write Arrhenius equation.

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

(i) Bond distance is the compromise distance between two atoms. Justify.

(ii) Write down the two postulates of VSEPR theory.

(iii) Differentiate between covalent and co-ordinate covalent bond.

(iv) Draw the hypothetical orbital picture of He_2 molecule according to M.O.T.

(v) Define enthalpy of formation with an example.

(vi) Prove $q_v = \Delta E$.

(vii) Calculate the oxidation numbers of the elements underlined : (a) $Na_2\underline{P}O_4$ (b) $H\underline{N}O_3$

(viii) How salt bridge maintains the electrical neutrality in the cell? Justify.

(ix) What is standard hydrogen electrode (SHE)?

(Turn Over)

SECTION – II

Note : Attempt any THREE questions.

5. (a) Calculate the number of grams of K_2SO_4 and H_2O produced when 14 gram of KOH reacts with excess of H_2SO_4 under the following equation : 4

$$2KOH + H_2SO_4 \rightarrow K_2SO_4 + 2H_2O$$

(b) Explain the structure of ice on the basis of hydrogen bonding. 4

6. (a) State Charles's law. Explain its experimental verification. 4

(b) Write down experiment that how neutrons were discovered? 4

7. (a) Define ionization energy, write factors affecting ionization energy and explain its trend along group. 4

(b) Prove that $\Delta H = q_p$ 4

8. (a) A buffer solution is prepared by mixing 0.2 M CH_3COONa and 0.5 M CH_3COOH in $1 dm^3$ of solution. Calculate pH of solution. pK_a of acid is 4.74. 4

(b) Explain energy of activation. 4

9. (a) Define solubility curve. Explain different types of solubility curves with the help of graphs. 4

(b) Describe electrochemical series. Give its three applications. 4

Roll No _____ (To be filled in by the candidate) **(Academic Sessions 2015 – 2017 to 2018 – 2020)**

CHEMISTRY 219-(INTER PART – I) Time Allowed : 20 Minutes

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

PAPER CODE = 6481 Lahore Board-2019

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	The largest number of molecules is present in : (A) 5.4 g of N_2O_4 (B) 2.8 g of CO (C) 4.8 g of C_2H_6O (D) 3.6 g of H_2O
2	1.00 mole of SO_2 contains : (A) 6.02×10^{23} atoms of oxygen (B) 3.01×10^{23} molecules of SO_2 (C) 6.02×10^{23} molecules of SO_2 (D) 3.01×10^{23} atoms of sulphur
3	Solvent extraction is a separation technique used for the product, which is : (A) Non-volatile; thermally unstable (B) Volatile; thermally stable (C) Non-volatile; thermally stable (D) Volatile; thermally unstable
4	The deviation of a gas from ideal behaviour is maximum at : (A) – 10 °C and 5 atm (B) –10 °C and 2 atm (C) 100 °C and 2 atm (D) 0 °C and 2 atm
5	The order of effusion of NH_3, SO_2, $C\ell_2$ and CO_2 gases is : (A) $NH_3 > SO_2 > C\ell_2 > CO_2$ (B) $NH_3 > CO_2 > SO_2 > C\ell_2$ (C) $C\ell_2 > SO_2 > CO_2 > NH_3$ (D) $NH_3 > CO_2 > C\ell_2 > SO_2$
6	Density of ice is minimum at 4 °C due to : (A) Empty spaces in structure of ice (B) Tetrahedral shape of crystal of ice (C) Large bond lengths (D) Large bond angles
7	The solid which has no definite crystalline shape : (A) Sugar (B) Salt (C) Glass (D) Dry ice
8	Quantum numbers, which represents 2p orbitals are : (A) $n=2, \ell=1$ (B) $n=1, \ell=2$ (C) $n=1, \ell=0$ (D) $n=2, \ell=0$
9	The nature of positive rays in discharge tube depends upon nature of : (A) Anode (B) Cathode (C) Residual gas (D) Discharge tube
10	Nature of bonds in N_2 molecule is : (A) One sigma ; two pi bonds (B) Two sigma; two pi bonds (C) Two sigma; one pi bond (D) Three pi bonds
11	For HF molecule μ_{obs} is 1.90 D ; μ_{ionic} is 4.4 D. The percentage ionic character of HF molecule is : (A) 100 (B) 80 (C) 57 (D) 43
12	The amount of heat absorbed when one mole of gaseous atoms are formed from the element is called enthalpy of : (A) Formation (B) Reaction (C) Combustion (D) Atomization
13	For which of the following reaction, the unit of equilibrium constant (K_c) is reciprocal of molar concentration (M^{-1}) : (A) $3H_2(g)+N_2(g) \rightleftharpoons 2H_3N(g)$ (B) $2NO_2(g) \rightleftharpoons N_2O_4(g)$ (C) $H_2(g)+I_2(g) \rightleftharpoons 2HI(g)$ (D) $N_2(g)+O_2(g) \rightleftharpoons 2NO(g)$
14	18 g glucose dissolved in 90 g water has relative lowering of vapour pressure equal to : (A) $\frac{18}{90}$ (B) $\frac{1}{6}$ (C) $\frac{10}{51}$ (D) $\frac{1}{51}$
15	The salt dissolved in water forms a solution of pH greater than 7 : (A) $NaC\ell$ (B) Na_2CO_3 (C) $CuSO_4$ (D) $NH_4C\ell$
16	The oxidation state of oxygen in OF_2 is : (A) – 2 (B) – 1 (C) + 1 (D) + 2
17	The unit of rate constant is same as that of rate of the reaction having order : (A) Zero (B) One (C) Fractional (D) Two

Roll No _____ (To be filled in by the candidate) (Academic Sessions 2015 – 2017 to 2018 – 2020

CHEMISTRY 219-(INTER PART – I) Time Allowed : 2.40 hours

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

SECTION – I

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

(i) Define relative atomic mass. Give two examples.

(ii) Calculate the percentage of nitrogen in NH_2CONH_2. (Atomic masses of C = 12 , N = 14 , O = 16 and H = 1)

(iii) Define gram formula giving one example.

(iv) Write two disadvantages of drying crystals in the folds of filter paper.

(v) Define distribution law about solvent extraction.

(vi) Derive Graham's law of diffusion from kinetic equation.

(vii) Give two reasons for deviation of real gases from ideal behaviour.

(viii) Write down two characteristics of plasma.

(ix) Derive the SI units of van der Waal's constant 'a'.

(x) Sea water has $5.65\times10^{-3}\,g$ of dissolved oxygen in one kg of water. Calculate the concentration of oxygen in sea water in parts per million (ppm).

(xi) Define molal boiling point constant. Give one example.

(xii) Define solubility curve. Name its two types.

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

(i) Why ice occupies 9% more volume than liquid water?

(ii) Why evaporation causes cooling?

(iii) Write two applications of liquid crystals.

(iv) Why heat of sublimation of I_2 is very high than other halogens?

(v) Write defects of Rutherford atomic model.

(vi) State Moseley law and also give its importance.

(vii) Why e/m value of cathode rays is equal to that of electron?

(viii) State Hund's rule.

(ix) How does buffer act?

(x) Give optimum conditions to get maximum yield of NH_3.

(xi) Justify that radioactive decay is always a first order reaction.

(xii) Describe auto catalysis with example.

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

(i) Why the radius of an atom can not be determined precisely?

(ii) Define ionization energy. Give its trend in periods and group of periodic table.

(iii) How electronegativity changes in a group?

(iv) Define coordinate covalent bond. Give one example.

(v) Explain that burning of candle is a spontaneous process. Justify.

(Turn Over)

4. (vi) Define state and state function.

(vii) Write reactions taking place at anode and cathode in silver oxide battery.

(viii) How is aluminum anodized in an electrolytic cell?

(ix) Calculate oxidation number of Cr in K_2CrO_4.

SECTION – II

Note : Attempt any THREE questions.

5. (a) Describe combustion analysis method for the determination of percentage composition of an organic compound. 4

(b) Define ionic solids. Give their three properties. 4

6. (a) One mole of methane gas is maintained at 300 K, its volume is $250\,cm^3$. Calculate the pressure exerted by the gas, when the gas is ideal. 4

(b) Write four defects of Bohr's atomic model. 4

7. (a) Draw the molecular orbital picture of O_2 molecule. 4

(b) State Hess's law of constant heat summation. Explain it giving two examples. 4

8. (a) $Ca(OH)_2$ is a sparingly soluble compound. Its solubility product is 6.5×10^{-6}. Calculate the solubility of $Ca(OH)_2$. 4

(b) How does the Arrhenius equation help us to calculate energy of activation of a reaction? 4

9. (a) Give the three statements of Raoult's law. 4

(b) Describe the electrolysis of concentrated solution of $NaNO_3$ in aqueous solution. 4

Roll No _____ (To be filled in by the candidate) **(Academic Sessions 2015 – 2017 to 2018 – 2020)**

CHEMISTRY 219-(INTER PART – I) Time Allowed : 20 Minutes

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

PAPER CODE = 6488 Lahore Board-2019

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	Liquids which are practically immiscible : (A) $H_2O+C_6H_6$ (B) $H_2O+C_2H_5-OH$ (C) $H_2O+HC\ell$ (D) $H_2O+CH_3-O-CH_3$
2	The velocity of photon is : (A) Independent of its wavelength (B) Depend on its wavelength (C) Depend on its source (D) Depend upon its amplitude
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	The type of hybridization in $BeC\ell_2$ is : (A) sp^3 (B) sp^2 (C) sp (D) dsp^2
5	Splitting of spectral lines when atoms are subjected to strong electrical field is called : (A) Zeeman effect (B) Stark effect (C) Photoelectric effect (D) Compton effect
6	The volume occupied by 16 g of CH_4 at STP is : (A) 2.24 dm^3 (B) 22.414 dm^3 (C) 1.3 dm^3 (D) 1.8 dm^3
7	In zero order reaction, the rate is independent of : (A) Temperature of reaction (B) Concentration of reactants (C) Concentration of products (D) Nature of reactants
8	Hydrogen bonding is maximum in : (A) HI (B) HBr (C) HCl (D) H_2O
9	The pH of 10^{-3} mole dm^{-3} of an aqueous solution of H_2SO_4 is : (A) 3.0 (B) 2.7 (C) 2.0 (D) 1.5
10	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
11	The dipole moment of CO_2 is : (A) 0.95 D (B) 1.85 D (C) 1.61 D (D) 0 D
12	Which one of the following compound is purified by sublimation : (A) Benzoic acid (B) SiO_2 (C) CS_2 (D) NaI
13	The molal boiling point constant is the ratio of the elevation in boiling point to : (A) Molarity (B) Molality (C) Mole fraction of solute (D) Mole fraction of solvent
14	The term that is not state function : (A) Enthalpy (B) Internal energy (C) Work (D) Volume
15	The oxidation state of Mn in $KMnO_4$ is : (A) +7 (B) +6 (C) +2 (D) +5
16	The molecules of CO_2 in dry ice form the : (A) Ionic crystals (B) Covalent crystals (C) Molecular crystals (D) Metallic crystals
17	The unit millibar is commonly used by : (A) Meteorologists (B) Astronauts (C) Engineers (D) Dalton

Roll No _____ (To be filled in by the candidate) **(Academic Sessions 2015 – 2017 to 2018 – 2020)**

CHEMISTRY 219-(INTER PART – I) Time Allowed : 2.40 hours

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

SECTION – I

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

(i) Define isotopes. Why they have same chemical properties?

(ii) What is mass spectrum?

(iii) Molecular formula is nth multiple of empirical formula. Explain with an example.

(iv) How can rate of filtration be increased by fluted filter paper?

(v) Define ether extraction.

(vi) Calculate the value of general gas constant (R) in SI units.

(vii) Why do we get straight line, when pressure is plotted against inverse of volume?

(viii) Why lighter gases diffuse more rapidly than heavier gases?

(ix) State Joule-Thomson effect.

(x) How will you prepare 10% w/v glucose solution in water?

(xi) One molal solution of urea is dilute as compared to one molar solution. Justify.

(xii) Define molarity. How is molarity related to mass of solute?

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

(i) Boiling point of water is greater than boiling point of HF, although hydrogen bonding is stronger in HF than in H_2O. Why?

(ii) Evaporation is a cooling process. Justify.

(iii) Define isomorphism and polymorphism giving one example in each.

(iv) Write two applications of liquid crystals.

(v) Write nuclear reaction for the production of neutron.

(vi) Write any two points of Planck's quantum theory.

(vii) State Hund's rule, giving an example.

(viii) Write any two defects of Bohr's atomic model.

(ix) Differentiate between reversible and irreversible reactions.

(x) How are acidic buffer and basic buffer prepared? Give one example in each case.

(xi) Define catalysis. Give its different types with one example in each case.

(xii) Justify that rate of chemical reaction is an ever changing parameter under the given conditions.

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

(i) Explain geometry of H_2S molecule on the basis of VSEPR theory.

(ii) Define ionization potentials of elements. How the ionization potential vary across the periods?

(iii) Cationic radius is smaller than that of its parent atomic radius. Why?

(iv) Differentiate between bonding and antibonding molecular orbitals with reference to relative energies and symmetry of electronic clouds (no figure required).

(v) Define state function. Write name of two such functions.

(Turn Over)

4. (vi) Burning of natural gas is spontaneous reaction. Justify.

(vii) What are secondary cells? Write name of any two such cells.

(viii) Describe function of salt bridge in a voltaic cell.

(ix) Define electrode potential.

SECTION – II

Note : Attempt any THREE questions.

5. (a) Write detailed note on : (i) Avogadro's number (ii) Molar volume. 4

(b) Define vapour pressure. Write down manometric method for its determination with diagram. 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 $10\,dm^3$ flask and cooled to 27 °C, calculate the pressure in Nm^{-2} exerted by the gas at 27 °C. 4

(b) Write any four properties of cathode rays. 4

7. (a) Explain the structure of ethyne (C_2H_2) according to hybridization concept. 4

(b) Explain the following terms : (i) Standard heat of neutralization.
(ii) Standard enthalpy of solution. 4

8. (a) $Ca(OH)_2$ is a sparingly soluble compound. Its solubility product is 6.5×10^{-6}. Calculate the solubility of $Ca(OH)_2$. 4

(b) Explain the effect of temperature on the rate of reaction. 4

9. (a) Differentiate between ideal and non-ideal solutions. 4

(b) Define electrochemical series. Discuss calculation of the voltage of cell, giving one example. 4

Roll No _____ (To be filled in by the candidate) **(Academic Sessions 2015 – 2017 to 2017 – 2019)**

CHEMISTRY 218-(INTER PART – I) Time Allowed : 20 Minutes

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

PAPER CODE = 6485 Lahore Board-2018

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	Which of the following molecules has zero dipole moment : (A) NH_3 (B) $CHC\ell_3$ (C) H_2O (D) CO_2
2	NH_3 shows maximum boiling point among the hydrides of Vth group element due to : (A) Very small size of nitrogen (B) Lone pair of electrons on nitrogen (C) Enhanced electronegative character of nitrogen (D) Pyramidal structure of NH_3
3	Approximate PH of apple is : (A) 2.7 (B) 3.1 (C) 4.2 (D) 4.5
4	27 g of $A\ell$ will react completely with how much mass of O_2 to produce $A\ell_2O_3$: (A) 8 g of oxygen (B) 16 g of oxygen (C) 32 g of oxygen (D) 24 g of oxygen
5	The rate of reaction : (A) Increases as reaction proceeds (B) Decreases as reaction proceeds (C) Remains same as reaction proceeds (D) May decrease or increase as reaction proceeds
6	When 6d orbital is complete, the entering electron goes into : (A) 7s (B) 7p (C) 7d (D) 7f
7	Equal masses of methane and oxygen are mixed in an empty container at 25 °C. The fraction of total pressure exerted by oxygen is : (A) $\frac{1}{3}$ (B) $\frac{8}{9}$ (C) $\frac{1}{9}$ (D) $\frac{16}{17}$
8	The number of moles of CO_2 which contain 8.0 g of oxygen : (A) 0.25 (B) 0.50 (C) 1.0 (D) 1.50
9	If an endothermic reaction is allowed to take place very rapidly in an air, the temperature of surrounding air : (A) Remains same (B) Increases (C) Decreases (D) Remains unchanged
10	An aqueous solution of ethanol in water may have vapour pressure : (A) Equal to water (B) More than that of water (C) Equal to ethanol (D) Less than that of water
11	The number of bonds in nitrogen molecule is : (A) One σ and one π (B) One σ and two π (C) Three σ only (D) Two σ and one π
12	Geometry of diamond is : (A) Tetragonal (B) Cubic (C) Rhombohedral (D) None of these
13	Oxidation number of chromium in Cr_2O_3 is : (A) +1 (B) +2 (C) +3 (D) +4
14	In the ground state of an atom, the electrons are present : (A) In the nucleus (B) In second shell (C) Nearest to the nucleus (D) Farthest from the nucleus
15	The chromatography in which stationary phase is liquid is called : (A) Thin layer chromatography (B) Partition chromatography (C) Absorption chromatography (D) Gel chromatography
16	The PH of human blood is maintained at : (A) 7.35 (B) 7.53 (C) 7.63 (D) 7.73
17	Ideal solutions obey : (A) Henry's law (B) Avogadro's law (C) Raoult's law (D) Smith's law

Roll No _____ (To be filled in by the candidate) **(Academic Sessions 2015 – 2017 to 2017 – 2019)**

CHEMISTRY 218-(INTER PART – I) Time Allowed : 2.40 hours

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

SECTION – I

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

(i) How is the law of conservation of mass obeyed during stoichiometric calculations?

(ii) How do many chemical reactions take place in our surroundings involve the limiting reactant?

(iii) How do no individual Ne atom in the sample of the element has mass of 20.18 a.m.u.?

(iv) Define qualitative analysis and quantitative analysis of a compound.

(v) What is difference between Gooch's crucible and sintered glass crucible?

(vi) Why is SO_2 comparatively non-ideal at 273 K but behaves ideally at 327 °C?

(vii) Derive expression of molecular mass of a gas by using general gas equation.

(viii) Where do natural plasma and artificial plasma exist?

(ix) Calculate pH of 10^{-4} mole dm^{-3} solution of $HC\ell$.

(x) Why does catalyst affect the equilibrium constant?

(xi) Write the relationship of K_p and K_c.

(xii) Why can solid ice at 0 °C be melted by applying pressure without supply of heat from outside?

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

(i) Define isomorphism and polymorphism.

(ii) How are liquid crystals used to locate veins, arteries, infections and tumors?

(iii) Lower alcohols are soluble in water but hydrocarbons are insoluble. Give reason.

(iv) Why electrical conductivity of the metals decrease by increasing temperature?

(v) Why is dipole moment of CO_2 is zero but that of CO is 0.12 D?

(vi) Why do ionic compounds not exhibit the phenomenon of isomerism but covalent compounds do?

(vii) On what factors strength of bond depends upon?

(viii) Differentiate between co-ordinate covalent bond and covalent bond.

(ix) What are exothermic and endothermic reactions? Give examples.

(x) Define enthalpy of solution. Give examples.

(xi) What are zeotropic and azeotropic mixtures?

(xii) What is fractional crystallization?

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

(i) What particles are formed by the decay of free neutron, give equation?

(ii) Justify that the distance gaps between different orbits go on increasing from lower to the higher orbits.

(iii) What is Zeeman effect?

(iv) Distribute electrons in orbitals of : (a) $_{24}Cr$ (b) $_{35}Br$

(v) A salt bridge maintains the electrical neutrality in the cell, give reasons to support your answer.

(vi) Calculate the oxidation numbers of the elements underlined in the following compounds :
(i) $K_2\underline{Mn}O_4$ (ii) $Ca(\underline{Cl}O_3)_2$

(vii) SHE acts as anode when connected with Cu electrode but as cathode with Zn electrode, give reasons in support of your answer.

(viii) Define specific rate constant. Give equation to support your answer.

(ix) Define autocatalysis, give equation to support your answer.

SECTION – II

Note : Attempt any THREE questions.

(a) Serotenin (Molar mass = $176 g\, mol^{-1}$) is a compound that conduct nerve impulse in brain and muscle. It contains 68.2% C, 6.86% H, 15.09% N and 9.08% O. What is its molecular formula? 4

(b) Write down any four properties of molecular solids. 1,1,1,1

(a) Derive Boyle's law and Charles's law from kinetic equation. 4

(b) Describe J.J. Thomson's experiment for determining e/m value of electron. 4

(a) Define dipole-moment. Give its units. How is it used to determine the geometry of molecule by an example? 4

(b) State Hess's law. Explain it giving two examples. 4

(a) State Le-Chatelier's principle. How is this principle used to explain effect of change in concentration on a reaction at equilibrium state? 4

(b) Define electrochemical series and give any two applications of it. 4

(a) The freezing point of pure camphor is 178.4 °C. Find the freezing point of a solution containing 2.0 g of a non-volatile compound, having molecular mass 140, in 40g of camphor. The molal freezing point constant of camphor is 37.7 °C kg mol^{-1} 4

(b) What are enzymes? Mention the characteristics of enzyme catalysis. 4

Roll No _____ (To be filled in by the candidate) **(Academic Sessions 2015 – 2017 to 2017 – 2019)**

CHEMISTRY 218-(INTER PART – I) Time Allowed : 20 Minutes

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

PAPER CODE = 6486

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	Bond energy of hydrogen (H_2) molecule is : (A) $470\,KJ\,mol\ell^{-1}$ (B) $450\,KJ\,mol\ell^{-1}$ (C) $436\,KJ\,mol\ell^{-1}$ (D) $415\,KJ\,mol\ell^{-1}$
2	Boiling point of water at Mount Everest is : (A) 69 °C (B) 78 °C (C) 98 °C (D) 45 °C
3	An excess of aqueous silver nitrate is added to aqueous barium chloride and precipitate is removed by filtration, what are main ions in the filtrate : (A) Ag^+ and NO_3^- only (B) Ag^+, Ba^{2+} and NO_3^- (C) Ba^{2+} and NO_3^- only (D) Ba^{2+}, NO_3^- and $C\ell^-$
4	Number of isotopes of arsenic are : (A) 1 (B) 2 (C) 9 (D) 11
5	Photochemical reactions are usually : (A) Zero order (B) First order (C) Second order (D) Third order
6	Rutherford's model of atom failed because : (A) The atom did not have a nucleus and electrons (B) It did not account for attraction between protons and neutrons (C) It did not account for the stability of the atom (D) There is actually no space between nucleus and electrons
7	Partial pressure of oxygen in air is : (A) 110 torr (B) 112 torr (C) 114 torr (D) 159 torr
8	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 sulphur
9	For the given process the heat changes at constant pressure (q_p) and constant volume (q_v) are related to each other as : (A) $q_p = q_v$ (B) $q_p < q_v$ (C) $q_p > q_v$ (D) $q_p = q_v/2$
10	The molal boiling point constant is the ratio of the elevation of boiling point to : (A) Molality (B) Molarity (C) Mole fraction of solute (D) Mole fraction of solvent
11	Which one of the following molecules has zero dipole moment : (A) H_2S (B) SO_2 (C) H_2O (D) CH_4
12	An ionic solids are characterized by : (A) Low melting point (B) Good conductivity in solid state (C) High vapour pressure (D) Solubility in polar solvents
13	Stronger is the oxidizing agent, greater is the : (A) Oxidation potential (B) Reduction potential (C) Redox potential (D) EMF of cell
14	Quantum number values of 2P orbitals are : (A) $n=2, \ell=1$ (B) $n=1, \ell=2$ (C) $n=1, \ell=0$ (D) $n=2, \ell=0$
15	Solvent extraction is an equilibrium process and is controlled by : (A) Law of mass action (B) Distribution law (C) Amount of solute used (D) Amount of solvent used
16	Rain water is : (A) Slightly acidic (B) Slightly basic (C) Neutral (D) Highly basic
17	Molarity of pure water is : (A) 45.5 (B) 55.5 (C) 65.5 (D) 75.5

Roll No _____ (To be filled in by the candidate) **(Academic Sessions 2015 – 2017 to 2017 – 2019)**

CHEMISTRY 218-(INTER PART – I) Time Allowed : 2.40 hours

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

SECTION – I

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

(i) How have 4.9 g of H_2SO_4 when completely ionized in water produces equal number of positive and negative charges but the number of positively charged ions are twice than the number of negatively charged ions?

(ii) How has one mg of K_2CrO_4 thrice the number of ions than the number of formula units when ionized in water?

(iii) Why do 2g of H_2, 16g of CH_4, 44g of CO_2 occupy separately the volume of 22.414 dm^3 although the sizes and masses of molecules of three gases are very different from each other?

(iv) How does rate of filtration increase by using fluted filter paper?

(v) Name the various experimental techniques which are used for purification of substances?

(vi) Derive expression of density of gas with help of general gas equation.

(vii) Write two characteristics of plasma state.

(viii) Calculate value of the general gas constant (R) in unit of $dm^3\ atm\ K^{-1}\ mol^{-1}$.

(ix) Why do the rate of forward reaction slow down when a reversible reaction approaches the equilibrium stage?

(x) Prove by equations that what happens when Na_2CrO_4 is added to saturated solution of $PbCrO_4$?

(xi) Define Lowry Bronsted concept of acids and bases.

(xii) What is the formula to calculate the percentage ionization of weak acid?

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

(i) Why boiling point of H_2O is different at Murree hills and at Mount Everest?

(ii) Define transition temperature. Give two examples.

(iii) Why does ice float on water?

(iv) What are Debye forces?

(v) Define the term bond order with one example.

(vi) Ionization energy is an index to the metallic nature of element. Justify.

(vii) 75.4 pm is compromise distance between the bonded hydrogen atoms. Justify.

(viii) Why is no bond in chemistry 100% ionic?

(ix) Burning of candle is spontaneous process. Explain.

(x) Define enthalpy of solution and enthalpy of neutralization.

(xi) Define upper consulate temperature. Give two examples.

(xii) Give two statements of Raoult's law.

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

(i) State Pauli's exclusion principle and Hund's rule.

(ii) Calculate the number of electrons in s, p, d and f sub shells from the formula and write separately.

(iii) Write down any two postulate of Plank's quantum theory.

(iv) Why is e/m value of the cathode rays just equal to that of electron?

4. (v) What is electrochemistry?

(vi) Write down the function of salt bridge.

(vii) A porous plate or salt bridge is not required in lead storage cell. Why?

(viii) The radioactive decay is always the first order reaction, give reasons.

(ix) How are enthalpy changes of reaction and energy of activation of reaction distinguished?

SECTION – II

Note : Attempt any THREE questions.

5. (a) Ethylene glycol is used as automobile antifreeze. It has 38.7% C, 9.7% hydrogen and 51.6% oxygen. Determine its empirical formula. 4

(b) How vapour pressure can be measured by manometric method? Explain with diagram. 3,1

6. (a) Explain Linde's method of liquefaction of gases. 4

(b) Write down the four properties of neutron. 4

7. (a) How does molecular orbital theory explain the paramagnetic character of O_2 molecule? Also calculate the bond order. 4

(b) State first law of thermodynamics. How does it explain that $q_p = \Delta H$? 4

8. (a) What is common ion effect? How is this effect used in salt analysis, give two examples? 4

(b) Give explanation of discharging and recharging of lead accumulator, alongwith reactions occurring at electrode. 4

9. (a) The boiling point of water is 99.725 °C. To a sample of 600g of water are added 24.0 g of a solute having molecular mass of $58g\ mol^{-1}$, to form a solution. Calculate the boiling point of the solution. 4

(b) Define order of reaction and explain 2nd and zero order reaction. 4