☆	Roll No _____	HSSC-(P-I)-A/2024 (For All Sessions)	Paper Code	6	4	8	1

Chemistry (Objective)

(Group-I)

Time: 2υ Minutes **Marks : 17**

Note: Write Answers to the Questions on the objective answer sheet provided. Four possible answers A, B, C and D to each question are given. Which answer you consider correct, fill the corresponding circle A, B, C or D given in front of each question with Marker or Pen ink on the answer sheet provided.

1.1 The mass of one mole of electron is:

(A) 1.008 mg (B) ● 0.55 mg (C) 0.184 mg (D) 1.673 mg

2. In organic phase color of Iodine is:

(A) Brown (B) ● Purple (C) Colorless (D) Green

3. Pressure remaining constant at which temp. The volume of a gas will become twice of it is at 0°C:

(A) 546°C (B) 200°C (C) ● 546 k (D) 273 k

4. Ionic crystals are characterized by:

(A) ● Solubility in polar solvents (B) Low melting point (C) High vapour pressure (D) Conductivity in solid state

5. Number of crystal systems are:

(A) ● 7 (B) 6 (C) 5 (D) 4

6. When 6 d orbital is complete, the entering electron goes to.

(A) 7f (B) 7s (C) ● 7p (D) 7d

7. Dipole moment of CS_2 is:

(A) 3.2D (B) 2.2D (C) 1.3D (D) ● Zero Debye

8. The net heat change in a chemical reaction is same whether it is brought about in two or more different ways in one or more than one steps, it's known as:

(A) Henry's law (B) Joul's principle (C) ● Hess's law (D) Law of conservation of energy

9. Which of the following solution have P_H less than 7?

(A) $NaOH$ (B) $NaCl$ (C) $Ca(OH)_2$ (D) ● HCl

10. The boiling point constant is the ratio of the elevation in boiling point to:

(A) Molarity (B) Mole fraction of solvent (C) ● Molality (D) Mole fraction of solute

11. Cathode reaction in the electrolysis of dil H_2SO_4 with Pt electrodes is:

(A) Oxidation (B) ● Reduction (C) Both oxidation & reduction (D) Neither oxidation nor reduction

12. The unit of rate constant is the same as that of the rate of reaction in:

(A) First order reaction (B) Second order reaction (C) Third order reaction (D) ● Zero order reaction

13. Number of isotopes of tin are:

(A) 8 (B) 10 (C) 6 (D) ● 11

14. Which of the following is sublime?

(A) ● Iodine (B) Calcium (C) $NaCl$ (D) Benzene

15. S.I unit of pressure is:

(A) ● $N.m^{-1}$ (B) Torr (C) mm of Hg (D) Psi

16. Positive rays are also called as:

(A) Cathode rays (B) ● Canal rays (C) X-rays (D) Magnetic rays

17. Octet rule is not obeyed by the molecule:

(A) NF_3 (B) CF_4 (C) ● PF_5 (D) CO_2

Roll No _____

HSSC-(P-I)-A-2024
(For All Sessions)

Marks : 68

Chemistry (Subjective)

(GROUP-I)

Time: 2:40 hours

SECTION-I

2. Write short answers of any eight parts from the following: (8x2=16)

i. Define gram ion. Give two examples.
ii. One mole of H_2SO_4 should completely react with two moles of $NaOH$. How does Avogadro's number help to explain it?
iii. Give any four methods for the separation of isotopes.
iv. What is sintered glass crucible? Give its significance.
v. What is crystallization? Give its basic principle.
vi. What is chromatogram? Give an example.
vii. Derive Avogadro's law from kinetic molecular theory of gases.
viii. Give two characteristics of plasma.
ix. What is the effect of pressure and temperature on the density of an ideal gas?
x. Why is HCl added before passing H_2S gas for the detection of second group basic radicals during salt analysis?
xi. What is the effect of rise in temperature on the solubility of KI in water?
xii. What are buffer solutions? Give their two applications.

3. Write short answers of any eight parts from the following: (8x2=16)

i. Why HF is weaker acid than other hydrogen halids?
ii. Define dipole-diploe forces of attraction with example.
iii. Why lower alcohols are soluble in water?
iv. Define crystal lattice and unit cell.
v. Why it is necessary to decrease pressure in discharge tube to get cathode rays?
vi. What is origin of line spectrum?
vii. Define stark effect.
viii. Discuss Pauli exclusion principle.
ix. Why aqueous solution of NH_4Cl is acidic in nature?
x. Define solubility with two examples.
xi. Radioactive decay is always first order reaction. Justify.
xii. Rate of reaction decreases with passage of time. Explain.

4. Write short answers of any six parts from the following: (6x2=12)

i. Potassium can displace hydrogen from acids but copper cannot. Explain by giving reason.
ii. Calculate the oxidation number of underlined elements : $H\underline{P}O_3$, $\underline{Cr}O_3$
iii. Differentiate between system and surrounding by giving example.
iv. Define enthalpy of combustion by giving suitable example.
v. What do you mean by internal energy? Briefly explain.
vi. The bond angle of H_2O is not 109.5° like that of CH_4. Although 'O' and 'C' are both sp^3 hybridized. Explain with reason.
vii. π-bonds are more diffused than σ-bonds. Explain with reason.
viii. The heat of vapourization of electrovalent compounds are higher than covalent compounds. Explain with reason.
ix. Write down basic assumption of VSEPR-theory.

SECTION-II

Note **Attempt any three questions. Each question carries equal marks:** (8x3=24)

5. (a) Define following terms: (i) Atom (ii) Isotope (iii) Empirical formula (iv) Molecular formula. (4)
(b) Give four (04) applications of liquid crystals. (4)
6. (a) Calculate the density of CH_4 gas at $0°C$ and 1 atm. What will happen to the density if temperature is increased to 27°C (2+2)
(b) Explain azimuthal quantum number in detail. (4)
7. (a) Define ionization energy. How does it vary in the periodic table? What factors are responsible for their variations? (4)
(b) The solubility product of Ag_2CrO_4 is 2.6×10^{-2} at 25°C. Calculate the solubility of the compound. (4)
8. (a) Explain how enthalpy of a reaction can be measured by Bomb Calorimeter? Draw diagram also. (3+1)
(b) How electrode potential of Zn can be measured? Draw diagram also. (3+1)
9. (a) Define elevation of boiling point and describe Landsberger's method for measurement of boiling point elevation. (4)
(b) Define catalysis. Explain its types with suitable examples. (1+3)

☆☆ Roll No _____	HSSC-(P-I)-A/2024 (For All Sessions)	Paper Code	6	4	8	4

Chemistry (Objective)

(Group-II) **Time: 20 Minutes** **Marks : 17**

Note: Write Answers to the Questions on the objective answer sheet provided. Four possible answers A, B, C and D to each question are given. Which answer you consider correct, fill the corresponding circle A, B, C or D given in front of each question with Marker or Pen ink on the answer sheet provided.

1.1 Mixture of NH_4OH and NH_4Cl is one of the best example of:
(A) Acidic buffer (B) ● Basic buffer (C) Common Ion effect (D) Solubility product

2. Molarity of pure water is:
(A) 1 (B) 18 (C) ● 55.5 (D) 6

3. Stronger the oxidizing agent, greater is the:
(A) Oxidation potential (B) ● Reduction potential (C) Redox potential (D) E.M.F. of cell

4. The process in which catalyst and reactant are in different phases is called:
(A) Homogeneous catalysis (B) ● Heterogeneous catalysis (C) Autocatalysis (D) Negative catalysis

5. The efficiency of a reaction can be checked by calculating its:
(A) Theoretical yield (B) Actual yield (C) ● Percentage yield (D) Mass

6. The mass of one mole of electrons is:
(A) 1.008 mg (B) ● 0.55 mg (C) 0.184 mg (D) 1.673 mg

7. A safe and reliable method for drying the crystals is by using:
(A) ● Vacuum desiccators (B) Oven (C) Filter paper (D) Spreading the crystals in open air

8. Chromatography in which stationary phase is liquid is classified as:
(A) Thin layer chromatography (B) Gas chromatography (C) Adsorption chromatography (D) ● Partition chromatography

9. The partial pressure of oxygen in lungs is:
(A) 159 torr (B) ● 116 torr (C) 1160 torr (D) 1590 torr

10. Smell of the cooking gas during leakage from a gas cylinder is due to the process of:
(A) Osmosis (B) Diffusion ● (C) Effusion (D) Evaporation

11. When water freezes at 0°C, its density decreases due to:
(A) Cubic structure of ice (B) ● Empty spaces present in the structure of ice
(C) Change of bond lengths (D) Change of bond angles

12. Ice and sugar are the best examples of:
(A) Ionic solids (B) Covalent solids (C) ● Molecular solids (D) Metallic solids

13. The name of proton was suggested by:
(A) Bohr (B) J.J Thomson (C) ● Rutherford (D) Stoney

14. When 6d orbital is complete, the entering electron goes into:
(A) 7f (B) 7s (C) ● 7p (D) 7d

15. The covalent radius of hydrogen is:
(A) 176.7 pm (B) ● 37.7 pm (C) 75.4 pm (D) 77.3 pm

16. Which of the following molecule has zero dipole moment?
(A) NH_3 (B) $CHCl_3$ (C) H_2O (D) ● BF_3

17. The product of mass and specific heat of water is called:
(A) ● Heat capacity (B) Enthalpy of reaction (C) Heat of a reaction (D) Buffer capacity

839-11-A

Roll No _____

HSSC-(P-I)-A-2024
(For All Sessions)

pakcity.org

Marks : 68

Chemistry (Subjective)

(GROUP-II)

Time: 2:40 hours

SECTION-I

2. Write short answers of any eight parts from the following: (8x2=16)

i. Molecular formula is multiple of empirical formula. Give an example.
ii. Define gram formula. Give an example.
iii. Many chemical reactions taking place in our surrounding involve the limiting reactants. Give the reason.
iv. Give two methods for drying of the crystallized substance.
v. What is ether extraction? Give its importance.
vi. How does a Gouch crucible increase the rate of filtration?
vii. What is plasma? How is it formed?
viii. Calculate the value of R in SI units.
ix. Derive Boyle's law from kinetic molecular theory of gases.
x. How can we prepare basic buffers? Give an example.
xi. Define solubility product. Give an example.
xii. How does the equilibrium constant of a reaction tell us about the direction of a chemical reaction?

3. Write short answers of any eight parts from the following: (8x2=16)

i. Why ionic crystals do no conduct electricity in solid state but their aqueous solutions are good conductors?
ii. Why one feels sense of cooling under the fan after bath?
iii. Why ethane (C_2H_6) has lower boiling point than hexane (C_6H_{14})?
iv. Why lower alcohols are water soluble but hydrocarbons are water insoluble?
v. Calculate wave number for first spectral line of Lyman series.
vi. Define Hund's rule, give an example.
vii. Write electronic configuration of Cu_{29} and I_{53}.
viii. Differentiate between orbit and orbitals.
ix. Justify that sum of all mole fractions is equal to unity for any solution.
x. Freezing points of solvents are depressed due to presence of solutes in solutions.
xi. Justify that radioactive decay is always a first order reaction.
xii. A catalyst is specific in its function, prove it by chemical reactions.

4. Write short answers of any six parts from the following: (6x2=12)

i. Na metal can displace hydrogen from acids but 'Pt' and 'Pd' cannot. Explain by giving reason.
ii. Calculate the oxidation number of underlined elements: $H\underline{N}O_3$; $\underline{Cr}O_3$
iii. Define enthalpy of neutralization by giving one such example.
iv. A reaction may be endothermic and spontaneous. Explain by giving example.
v. Prove that $\Delta E = q_v$
vi. The distinction between coordinate covalent bond and a covalent bond vanishes after the bond formation in $CH_3\overset{+}{N}H_3$. Explain by giving reason.
vii. The abnormality of bond length and bond strength in HI is less prominent than that of HCl. Explain with reason.
viii. Calculate the bond energy of H-Br. The bond energy of H-H is 436 KJ mol^{-1} and that of Br-Br is 193 KJ mol^{-1}
ix. Give any two limitations of Lewis concept of chemical bonding.

SECTION-II

Note **Attempt any three questions. Each question carries equal marks:** (8x3=24)

5. (a) What are limiting reactants and how is limiting reactant identified. (4)
(b) Discuss manometric method for measurement of vapour pressure. (4)

6. (a) Calculate the mass of 1 dm^3 of NH_3 gas at 30°C and 1000 torr pressure, considering that NH_3 is behaving ideally. (4)
(b) Describe eight (08) characteristics of cathode rays. (4)

7. (a) Define sp^3 hybridization . Explain the shape of methane molecule. (1+3)
(b) Calculate the P_H of buffer solution in which 0.11 molar CH_3COONa and 0.09 molar CH_3COOH solution are present. Ka for CH_3COOH is 1.85×10^{-5} (4)

8. (a) Explain how enthalpy of a reaction is determined by glass calorimeter. Also draw diagram. (3+1)
(b) Explain construction and working of standard hydrogen electrode. (4)

9. (a) Define the following terms: (i) Molarity (ii) Molality (iii) Mole Fraction (iv) Parts per million (ppm) (1x4)
(b) Define activation energy. How does the Arrhenius equation help us to calculate energy of activation of reaction. (4)

840-11-A

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Roll No _____ to be filled in by the candidate

(For All Sessions)
(Group-I)

Time: 20 Minutes Marks : 17

Chemistry (Objective)

Note: Write Answers to the Questions on the objective answer sheet provided. Four possible answers A, B, C and D to each question are given. Which answer you consider correct, fill the corresponding circle A, B, C or D given in front of each question with Marker or Pen ink on the answer sheet provided.

1.1 The bond order of N_2 is (A) 2 (B) 1 (C) 0 (D) 3

2. In endothermic reaction, heat content of:
   (A) Product is more than that of reactant (B) Reactant is more than that of product
   (C) Surrounding increases (D) Reactants and products are equal

3. Which of the following is not a state function:
   (A) Enthalpy (B) Temperature (C) Work (D) Internal energy

4. Dilution increases the degree of dissociation, is the statement of which of the following law or principle.
   (A) Le-Chatelier principle (B) Law of mass action (C) Ostwald dilution law (D) Hess's law

5. PH of the soft drink is: (A) 2.0 (B) 3.0 (C) 5.8 (D) 4.6

6. Molarity of pure water is: (A) 1 (B) 18 (C) 55.6 (D) 6

7. Stronger the oxidizing agent, greater is the :
   (A) Oxidation potential (B) Reduction potential (C) Redox potential (D) E.m.f of the cell

8. Which of the following gas is bubbled through standard hydrogen electrode at one atmospheric pressure?
   (A) HCl gas (B) Pure H_2 gas (C) Chlorine gas (D) O_2 gas

9. The unit of rate constant is same as that of rate of reaction in:
   (A) 1st Order Reaction (B) 2nd Order Reaction (C) Zero Order Reaction (D) 3rd Order Reaction

10. The mass of 10 moles of electrons is:
    (A) 10.08 mg (B) 5.5 mg (C) 1.84 mg (D) 16.73 mg

11. The number of moles of CO_2 which contains 16 g of oxygen:
    (A) 1.0 moles (B) 0.50 moles (C) 2.0 moles (D) 3.0 moles

12. A complete quantitative determination generally consists of how many steps?
    (A) 4 steps (B) 5 steps (C) 2 steps (D) 6 steps

13. Pressure remaining constant, at which temperature the volume of a gas will become twice of what it is at 0^0C
    (A) 546^0C (B) 200^0C (C) $546\ k$ (D) 273 k

14. The scientist who identified plasma is:
    (A) William Crookes (B) Vander Waal (C) Rutherford (D) Boyle

15. When water freezes at 0^0C, its density decreases due to:
    (A) Cubic structure of ice (B) Empty spaces present in the structure of ice
    (C) Change of bond lengths (D) Change of bond angles

16. Total number of Bravias lattices are: (A) 7 (B) 10 (C) 12 (D) 14

17. The nature of positive rays depends upon:
    (A) The nature of electrode (B) The nature of residual gas
    (C) The nature of discharge tube (D) The length of discharge tube

Roll No _____ to be filled in by the candidate

HSSC-(P-I)-A/2023

Marks : 68

Chemistry (Subjective)

(GROUP-I) (For All Sessions)

Time: 2:40 hours

SECTION-I

2. Write short answers of any eight parts from the following: (8x2=16)

i. Why Isotopes of same element show similar chemical properties?

ii. Prove N_2 and CO have the same number of electrons, protons and neutron.

iii. Define molecular ion with examples.

iv. What is $\Delta H°f$? Give one example.

v. Why gases behave non ideally at high pressure and low temperature?

vi. What are the two faulty points of KMT?

vii. What is plasma? How it is formed?

viii. What is Zeeman effect?

ix. Why positive rays are also called as canal rays?

x. The e/m value of positive rays for different gases is different? Justify it.

xii. Define Lattice Energy? Give example.

xii. What is state function? Give any two examples.

3. Write short answers of any eight parts from the following: (8x2=16)

i. Define ppm and give its mathematical formula?

ii. State Raoult's law.

iii. Elevation of boiling point is a colligative property. Justify it.

iv. Give two characteristics of enzyme catalyst.

v. Define half life period. Give one example.

vi. Define homogeneous catalysis with an example.

vii. Evaporation causes cooling. Explain with reason.

viii. Define Allotropy with an example.

ix. What do you mean by lattice energy? Give an example.

x. Write down two uses of chromatography.

xi. What is fluted filter paper?

xii. Write any two methods for drying of crystals.

4. Write short answers of any six parts from the following: (6x2=12)

i. Justify that π bond are more diffused than sigma bond.

ii. Write the Lewis structures for the following compound: i) N_2O_5 ii) H_3PO_4

iii. What is bond order? Calculate bond order for H_2 molecule.

iv. Why change of temperature disturbs both the equilibrium position and the equilibrium constant of a reaction.

v. What is common ion effect? Give one example.

vi. What is PH and POH?

vii. SHE acts as anode when connected with Cu electrode but as cathode with Zn electrode. Give reason.

viii. Calculate the oxidation numbers of the elements underlined. i) $Na_3\underline{P}O_4$) ii) $H\underline{N}O_3$

ix. Define electrode potential.

SECTION-II

Note Attempt any three questions. Each question carries equal marks: (8x3=24)

5. (a) Define stoichiometry. Give its assumption and mention laws obeyed during stoichiometric calculation. 4

(b) Calculate the number of atoms in $20cm^3$ of CH_4 at 0°C and pressure of 700 mm of Hg. 4

6. (a) Define boiling point. What is the effect of external pressure on boiling point? Give two examples. 4

(b) Explain the Born-Haber cycle to calculate the lattice energy of sodium chloride. 4

7. (a) How neutron was discovered? Explain with the help of an experiment also write four properties of neutron. 4

(b) The equilibrium constant for the reaction between acetic acid and ethyl alcohol is 4.0. A mixture of 3 moles of acetic acid and one mole C_2H_5OH is allowed to come to equilibrium. Calculate the amount of ethyl acetate at equilibrium state in no of moles and grams. Also calculate mass of reactants left behind. 4

8. (a) Define ionization energy, name the factors influencing the ionization energies of elements. What is a trend of ionization energy in the periodic table. 4

(b) What is meant by Lead Accumulator explain it in detail, Give chemical equations of discharging and recharging. 4

9. (a) Differentiate between ideal and Non ideal solutions. 1x4=4

(b) Discusss how surface area and nature of reactants affect rate of a chemical reaction. 2+2=4

Rawalpindi Board-2023

Chemistry (Objective)

Group-II | Time: 20 Minutes | Marks : 17

Note: Write Answers to the Questions on the objective answer sheet provided. Four possible answers A, B, C and D to each question are given. Which answer you consider correct, fill the corresponding circle A, B, C or D given in front of each question with Marker or Pen ink on the answer sheet provided.

1.1 The PH of tomato is: (A) 12 (B) 4.2 (C) 7.2 (D) 9.2

2. For which system does the equilibrium constant Kc has unit 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) $2HF \rightleftharpoons H_2 + F_2$

3. 18 g glucose is dissolved in 90g of water. The relative lowering of vapor pressure is equal to:

(A) $^1/_5$ (B) 5.1 (C) $^1/_{51}$ (D) 6

4. The oxidation number of chromium in $K_2Cr_2O_7$ is:

(A) 4 (B) 2 (C) 6 (D) 3

5. Stronger is the oxadizing agent greater is the:

(A) Oxidation potential (B) Reduction potential (C) Redox potential (D) E.M.F of cell

6. The unit of 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

7. 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) $5.8\ g\ of\ N_2O_5$

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 grams atoms of SO_2

9. The rate of filtration can be increased by using:

(A) Desicator (B) Suction flask (C) Cold finger (D) Chromatographic tank

10. Which of the following will have the same no of molecules at STP:

(A) $11.2\ dm^3$ and $32\ g\ of\ O_2$ (B) $280\ cm^3$ of CO_2 and $280 cm^3\ of\ N_2O$ (C) $44\ g\ of\ CO_2$ and $11.2\ dm^3$ of oxygen (D) $280\ g\ of\ N_2$ and $5.6\ dm^3$ of oxygen

11. Normal human body temperature is:

(A) 37^0C (B) 98.6^0C (C) 37^0F (D) 273 K

12. Which of the following is a pseudo solid: (A) CaF_2 (B) Glass (C) NaCl (D) NaOH

13. Hydrogen bonding is maximum in: (A) HI (B) HBr (C) HCl (D) HF

14. The velocity of photon is:

(A) Independent of its wave length (B) Depends on its wave length (C) Equal to square of its amplitude (D) Depends on its source.

15. Which of the following molecule have zero dipole moment:

(A) NH_3 (B) $CHCl_3$ (C) H_2O (D) BF_3

16. Calories is equal to: (A) 0.4184 J (B) 41.84 J (C) 4.184 J (D) 418.4 J

17. Spontaneous reactions are:

(A) Reversible (B) Irreversible (C) No irreversible (D) None of these

*Roll No _____ to be filled in by the candidate

HSSC-(P-I)-A/2023 (For All Sessions) Marks : 68

Chemistry (Subjective)

GROUP-II

Time: 2:40 hours

SECTION-I

2. **Write short answers of any eight parts from the following:** (8x2=16)

i. Enlist different methods for separation of Isotopes.
ii. What is meant by internal energy?
iii. Give the contribution of J.Berzelius towards chemistry.
iv. Distinguish between diffusion and effusion of gases.
v. State Chale's law also write its mathematical formula.
vi. Enlist two characteristics of plasma.
vii. State Heisenberg's uncertainty principle and give its formula.
viii. Define system with an example.
ix. Define Pauli's exclusion principle. Give an example.
x. What is thermo chemistry?
xi. Calculate the mass of electrons from the value of charge and e/m.
xii. How molecular ions one generated? Name methods of generation.

3. **Write short answers of any eight parts from the following:** (8x2=16)

i. Define solution give an example.
ii. What is ppm? Give its mathematical formula.
iii. Define colligative properties of solutions.
iv. What is meant by auto catalysis?
v. What are enzymes? Give an example.
vi. Radioactive decay is always a first order reaction. Why?
vii. State partition law.
viii. Define partition chromatography.
ix. How crystals can be decolorized?
x. HF is weaker acid than HCl. Why?
xi. Define polymorphism. Give an example.
xii. Ionic crystals are highly brittle. Why?

4. **Write short answers of any six parts from the following:** (6x2=12)

i. Write two points of Valence Shell Electron Pair Repulsion Theory (VSEPR).
ii. Why the lone pairs of electrons on an atom occupy more space?
iii. Define bond order. Give one example.
iv. Give statement of Lechatlier's principle.
v. Define pH with mathematical expression.
vi. What is common ion effect? Give two examples.
vii. Impare "Cu" can be purified by electrolytic process.
viii. A porous plate on a salt bridge is not required in load storage cell.
ix. SHE acts as anode when connected with the "Cu" electrode but as cathode with "Zn" electode.

SECTION-II

Note **Attempt any three questions. Each question carries equal marks:** (8x3=24)

5. (a) Write down the steps involved for the determination of emphirical formula. 4

(b) $250\ cm^3$ of sample of hydrogen effuses four times as rapidly as an unknown gas. Calculate molar mass of unknown gas. 4

6. (a) Explain following types of Inter Molecular forces at least with one example each:

(ii) Dipole-Dipole forces (ii) Dipole –Induced Dipole forces 2+2

(b) Explain Born-Haber cycle in detail: 4

7. (a) Give four defects of Bohr's atomic model 1x4=4

(b) The solubility of P_bF_2 at 25^0C is $0.64\ gdm^{-3}$. Calculate Ksp of P_bF_2 $(At\ mass\ of\ P_b = 207,\ F = 19)$ 4

8. (a) Explain atomic orbital hybridization with reference to the structure of C_2H_2 and C_2H_4 2+2

(b) Write comprehensive note on lead accumulator with its discharging and recharging process. 2+2

9. (a) Give three statements of Roult's law with equations. 4

(b) How order of reaction is measured using half-life method and method of large excess? 4

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Inter - (Part-I)-A-2022

Roll No._____ to be filled in by the candidate

(For All Sessions)

Group - I

Paper Code	6	4	8	3

Chemistry (Objective Type)

Time:20 Minutes **Marks:17**

NOTE: Write answers to the questions on objective answer sheet provided. Four possible answers A, B, C & D to each question are given. Which answer you consider correct, fill the corresponding circle A, B, C or D given in front of each question with marker or pen ink on the answer sheet provided.

1.1. Amorphous solids:
(A) Have shape melting point
(B) Under go clean cleavage when cut with knife
(C) Have perfect arrangement of atoms
(D) Have small region of orderly arrangement of atom

2. The value of charge on electron is:
(A) 2.602×10^{-19} Coulombs (B) 1.602×10^{19} Coulombs (C) 1.6023×10^{-19} Coulombs (D) 1.602×10^{-19} Kg

3. Quantum number value for 2S orbitals are:
(A) $n=2,\ l=1$ (B) $n=1,\ l=2$ (C) $n=1,\ l=o$ (D) $n=2,\ l=o$

4. Which of the following species has unpaired electrons in the antibonding bonding molecular orbitals?
(A) O_2^{-2} (B) N_2^{2-} (C) B_2 (D) F_2

5. Geometry of H_2O on the basis of VSEPR theory.
(A) Linear (B) Trigonal planer (C) Tetrahedral (D) Bent

6. The net heat change in a chemical reaction is same, whether it is brought about in two or different ways in one or several steps. It is known as.
(A) Henry law
(B) Joul's law
(C) Hess's law
(D) Law of conservation of energy

7. For which system, does the equilibrium constant Ice has no units.
(A) $N_2+3H_2 \rightleftharpoons 2NH_3$ (B) $H_2+I_2 \rightleftharpoons 2HI$ (C) $2No_2 \rightleftharpoons N_2O_4$ (D) None of these

8. Colligative properties are the properties of:
(A) Dil solution which behave as nearly ideal solutions
(B) Concentrated solution which behave as nearly non-ideal solution
(C) Both (A) and (B)
(D) None of there

9. ~~If the salt bridge is not used between half cells, then the voltage.~~
(A) Decrease rapidly (B) Decrease slowly (C) Does not change (D) Drops to Zero

10. If the equation at reaction $2A+B \rightarrow Product$, $rate = K[A]^2[B]$ A is present in large excess, then order of reaction is.
(A) 1 (B) 2 (C) 3 (D) 4

11. One mole of So_2 contain:
(A) 6.02×10^{23} atoms of oxygen
(B) 1.81×10^{23} molecule of So_2
(C) 6.02×10^{23} atoms of Sulphur
(D) 4 gram atoms of So_2

12. A limiting reactant is one which is:
(A) Taken is small amount in gram as compared to other reactant
(B) Taken in lesser amount in volume as compared to other reactant.
(C) Give the maximum amount of product
(D) Give minimum amount of product

13. A filtration process could be very time consuming if it were not aided by suction which is developed:
(A) If the paper covers the funnel up to the circumference
(B) If the paper has got small sized pores in it
(C) If the stem at the funnel in large so that it dips into the filtrate
(D) If the paper fits tightly

14. Solvent extraction is an equilibrium process and is controlled by.
(A) Law of Mass action
(B) Amount of solvent used
(C) Partition law
(D) Amount of solute

15. Pressure remain constant, at which temperature the volume of gas will become twice of what it is at 0°C.
(A) 546°C (B) 200°C (C) 546 K (D) 273 K

16. The order of rate of diffusion of gases NH_3, So_2, Cl_2 and Co_2 is:
(A) $NH_3 > So_2 > Cl_2 > Co_2$
(B) $NH_3 > Co_2 > So_2 > Cl_2$
(C) $Cl_2 > So_2 > Co_2 > NH_3$
(D) $NH_3 > Co_2 > Cl_2 > So_2$

17. In order to raise the building point at H_2O up to 110°C, the external pressure should be.
(A) Between 760 torr and 1200 torr
(B) Between 200 torr and 760 torr
(C) 576 torr
(D) At any pressure

Inter - (Part-I)-A-2022

Roll No._____ to be filled in by the candidate

(For All Sessions)

Group - I

Chemistry (Essay Type)

Time: 2:40 Hours

Marks:68

Section - I

2- Write short answers of any eight parts from the following. 2 x 8 = 16

i. How molecular ions are formed? Give example.

ii. Define Mole and Avogadro's Number.

iii. What is percentage yield? Write its formula.

iv. Write down two phases of chromatography.

v. Define solvent extraction.

vi. Why fluted filter paper in more useful than ordinary filter paper for filtration?

vii. Convert 30° centigrade into Fahrenheit scale.

viii. What is Joule Thomson effect?

ix. Write down any two applications of plasma.

x. Calculate PH of 10^{-4} mole dm^{-3} of Hcl solution.

xi. What are the optimum conditions of temperature and pressure to get maximum yield of ammonia? $N_2 + 3H_2 \rightleftharpoons 2NH_3 + 92.46Kj$

xii. State Le-chatelier's principle.

3- Write short answers of any eight parts from the following. 2 x 8 = 16

i. What do you mean by Habit of a crystal? Give an example.

ii. Define molar heat of vaporization and Molar heat of sublimation.

iii. Boiling points of halogens increase down the group. Give the reason.

iv. Ice floats on water. Give the reason.

v. What do you mean by Line Spectrum?

vi. What is $n+l$ rule? Give an example.

vii. Why is the e/m value for positive rays obtained from hydrogen gas 1836 times less than that of cathode rays?

viii. State Heisen berg's Uncertainty Principle. Also write its mathematical form.

ix. What are conjugate solutions? Give an example.

x. What are hydrates? How are they formed?

xi. What is auto-catalysis? Give an example.

xii. A catalyst is specific in its action. Give one example to prove it.

4- Write short answers of any six parts from the following. 2 x 6 = 12

i. Bond distance is the compromised distance between two atoms.

ii. π bonds are more diffused than sigma bonds. Justify it.

iii. What are bonding and antibonding molecular orbitals? Give examples.

iv. Define non polar covalent bond. Give examples.

v. Define a spontaneous reaction.

vi. Why the temperature of the system changes during exothermic and endothermic reactions.

vii. Burning of Candle is a spontaneous process. Justify it.

viii. A salt bridge maintains the electrical neutrality in the cell. Give reasons.

ix. Write anodic reaction in alkaline battery.

Section - II

8 x 3 = 24

NOTE: Answer any three questions from the following.

5.(a) What is the difference between actual yield and theoretical yield? Why actual yield is less than the theoretical yield.

(b) What is spectrum? Explain Atomic Emission and Atomic absorption spectrum. 04+04

6.(a) 250 Cm^3 of hydrogen is cooled from 127°C to -27° by maintaining the pressure constant. Calculate the new volume of the gas at this low temperature.

(b) Define electrochemical series. Discuss calculation of the voltage of cell, giving one example. 04+04

7.(a) Explain structure of water and boron trifluoride by hybridization.

(b) Explain measurement of enthalpy of a reaction by glass calorilmeter. 04+04

8.(a) How is the vapour pressure of a liquid measured using Manometric method?

(b) The solubility of PbF_2 at 25°C is $0.64 gdm^{-3}$. Calculate Ksp of PbF_2. 04+04

9.(a) Explain Beckmann method to determine depression of Freezing point.

(b) How order of reaction can be measured by half life method. 04+04

Rawalpindi Board-2022

Inter - (Part-I)-A-2022

Roll No._____ to be filled in by the candidate

(For All Sessions)

Group - II

Paper Code	6	4	8	4

Chemistry (Objective Type)

Time:20 Minutes **Marks:17**

NOTE: Write answers to the questions on objective answer sheet provided. Four possible answers A, B, C & D to each question are given. Which answer you consider correct, fill the corresponding circle A, B, C or D given in front of each question with marker or pen ink on the answer sheet provided.

1.1. The volume occupied by 16g of O_2 at S.T.P is:
(A) 22.4 dm^3 (B) 2.24 dm^3
(C) 11.2 dm^3 (D) 1.12 dm^3

2. According to VSEPR theory, the shape of SO_3 molecule is.
(A) Trigonal pyramidal (B) Bent or angular (C) Triangular planer (D) Tetrahedral

3. A filtration process could be very time consuming if were not aided by a gentle suctioff which is developed.
(A) If the paper covers the funnel up to its circumference (B) If the paper has got small sized pores in it
(C) If the stem of the funnel is large so that it dips into the filtrate (D) If the paper fits tightly

4. When 6d orbital is complete, the entering electron goes into.
(A) 7s (B) 7p (C) 7f (D) 7d

5. Which one of the following hydrocarbons has shortest C – C bond length?
(A) Ethyne (B) Ethene (C) Ethane (D) Benzene

6. NH_3 shows a maximum boiling point among the hydrides of Vth group elements due to:
(A) Enhanced electronegative character of nitrogen (B) Pyramidal structure of NH_3
(C) Lone – pairs of electrons present on nitrogen (D) Very small size of nitrogen

7. If the absolute temperature of a gas is doubled and the pressure is reduced to one half, the volume of the gas will.
(A) Remains unchanged (B) Reduced to $\frac{1}{4}$
(C) Increases four times (D) Be doubled

8. Splitting of spectral lines when atoms are subjected to strong magnetic field is called:
(A) Zeeman effect (B) Stark effect
(C) Photoelectric effect (D) Compton effect

9. Gases deviate from ideal behaviour at high pressure. Which of the following is correct for non-ideality?
(A) At high pressure, the gas molecules move in one direction only (B) At high pressure, the intermolecular attractions becomes significant
(C) At high pressure, the collisions between the gas molecules are much increased (D) At high pressure, the volume of the gas becomes insignificant

10. Dipole – dipole forces are present among the.
(A) Atoms of helium gas (B) Molecules of CCl_4
(C) Molecules of solid I_2 (D) Molecules of HCl

11. Which of the following statements is not correct about galvanic cell?
(A) Reduction occurs at cathode (B) Anode is negatively charged
(C) Cathode is positively charged (D) Reduction occurs at anode

12. Oxidation of nitric oxide with ozone has been shown to be:
(A) First order reaction (B) Pseudo first order reaction
(C) Second order reaction (D) Third order reaction

13. A solution of glucose is 10% W/v. The volume in which 1g mole of it is dissolved will be:
(A) 900Cm^3 (B) 200Cm^3
(C) 1.8dm^3 (D) 1dm^3

14. The aqueous solution of $BiCl_3$ is cloudy. The cloudness of $BiCl_3$ solution can be vanished by:
(A) Addition of $BiCl_3$ (B) Addition of H_2O
(C) Addition of HCl (D) Addition of both $BiCl_3$ and H_2O

15. 22g of CO_2 sample has:
(A) $\frac{1}{2}$ mole of O atoms (B) 1 mole of O atoms
(C) 1.5 moles of O atoms (D) 6.02×10^{23} molecules of CO_2

16. Which one of the following maybe employed as drying agent in a desiccator?
(A) P_2O_5 (B) Animal charcoal
(C) $KMnO_4$ (D) NH_4Cl

17. In endothermic reactions, the heat contents of:
(A) Products is more than that of reactants (B) Reactants is more than that of products
(C) Both (A) and (B) (D) Reactants and products are equal

Inter - (Part-I)-A-2022

Roll No._____ to be filled in by the candidate

(For All Sessions)

Group - II

Chemistry (Essay Type)

Time: 2:40 Hours

Section - I

Marks:68

2- Write short answers of any eight parts from the following. **2 x 8 = 16**

i. Write the formulas to determine the percentage of carbon and hydrogen in combustion analysis.

ii. How the molecular and empirical formulas are related to each other?

iii. Define gram molecule by giving two examples.

iv. Define sublimation and give examples.

v. Differentiate between adsorption and partition chromatography.

vi. Define qualitative and quantitative analysis.

vii. Define Avogadro's Law and give two examples.

viii. One dm^3 of H_2 and O_2 have different masses but occupy same volumes. Give reason

ix. Why the sum of mole fractions is always equal to unity?

x. Define law of mass action and give the equilibrium constant expression.

xi. Write the formula to calculate the percentage ionization of weak acids.

xii. Define Lowry Bronsted acid base concept.

3- Write short answers of any eight parts from the following. **2 x 8 = 16**

i. In a very cold winter fish in the garden ponds owe their lives due to H-bonding. Justify.

ii. Water and ethanol can mix easily and in all proportions. Justify.

iii. Cleavage of the crystals is itself anisotropic behaviour. Justify.

iv. London dispersion forces are weaker than dipole – dipole forces. Why?

v. Differentiate between frequency and wave number.

vi. Write two importance of Mosely's law.

vii. What is Zeeman effect?

viii. Write down any two postulates of plank's quantum theory.

ix. Differentiate between Molarity and Molality.

x. What is fractional crystalization?

xi. The radio active decay is always first order reaction. Give reason.

xii. Differentiate between homogeneous and Heterogeneous catalysis.

4- Write short answers of any six parts from the following. **2 x 6 = 12**

i. Name the factors influencing the electron affinity.

ii. Define orbital hybridization and name its types.

iii. Explain bond order for Helium and why it does not exist as He_2 molecule?

iv. Ionization energy decreases down the group. Why?

v. Define internal energy and point out; is it a state function or not?

vi. What do you mean by heat of solution; give a suitable example.

vii. Define state function, write names of two such functions.

viii. What do you mean by Standard Hydrogen Electrode (SHE).

ix. Impure Cu can be purified by electrolytic process, justify?

Section – II

8 x 3 = 24

NOTE: Answer any three questions from the following.

5.(a) What is limiting reactant, give examples and how it is identified.

(b) Explain measurement of e/m value of electron. **04+04**

6.(a) Describe the charging and discharging of Lead Accumulator.

(b) Calculate the mass of 1 dm^3 of NH_3 gas at 30°C and 1000mm Hg pressure, considering that NH_3 is behaving ideally. **04+04**

7.(a) Discuss Geometry of ethene $\left(C_2H_4\right)$ according to Sp^2 hybridization.

(b) How can you measure enthalpy of reaction by glass calorimeter. **04+04**

8.(a) What is hydrogen bonding. Give its three applications.

(b) The solubility of CaF_2 in water at 25°C is found to be 2.05×10^{-4} mol dm^{-3}. What is value of Ksp at this temperature? **04+04**

9.(a) Explain graphically depression of freezing point of a solvent by solute. Also write down its mathematical form.

(b) Clearly differentiate between Homogeneous and Heterogeneous catalysis. Give two examples of each. **04+04**

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Roll No._____to be filled in by the candidate.

(For all sessions)

Paper Code	6	4	8	3

Chemistry (Objective Type)

Time: 20 Minutes

Marks: 17

NOTE: Write answers to the questions on objective answer sheet provided. Four possible answers A,B,C & D to each question are given.Which answer you consider correct, fill the corresponding circle A,B,C or D given in front of each question with Marker or pen ink on the answer sheet provided.

1.1. For which system does the equilibrium constant,Kc has 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. 18g of glucose is dissolved in 90g of water.The relative lowering of vapour pressure is equal to:
(A) 1/5 (B) 5.1 (C) 1/51 (D) 6.0

3. Stronger the oxidizing agent,greater is the:
(A) Odixation potential (B) Reduction potential (C) Redox potential (D) E.M.F of cell

4. If the rate equation of a reaction: 2A+B ⟶ Products is, rate=K[A]^2[B], and A is present in large excess,then order of reaction is:
(A) 1 (B) 2 (C) 3 (D) 4

5. Isotopes differ in:
(A) properties which depend upon mass (B) arrangement of electrons in orbitals
(C) chemical properties (D) their behaviour in electromagnetic field.

6. Number of isotopes of Tin is/are:
(A) one (B) eleven (C) fifteen (D) eighteen

7. Solvent extraction method is a 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

8. 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

9. The partial pressure of oxygen in the lungs is:
(A) 100 torr (B) 116 torr (C) 150 torr (D) 159 torr

10. When water Freezes at 0°C, its density decreases due to:
(A) Cubic structure of ice (B) Empty spaces present in the structure of ice
(C) Change of bond lengths (D) Change of bond angle

11. Which one of the following is an example of cubic system?
(A) Diamond (B) Borax (C) Iodine (D) Graphite

12. Brackett series lie in the region:
(A) U.V (B) I.R (C) Visible (D) X-Ray

13. Bohr model of atom is contradicted by:
(A) Plank's quantum theory (B) dual nature of matter
(C) Heisenberg's uncertainity principle (D) Newton theory

14. The number of bonds in nitrogen molecule is:
(A) one σ and one π (B) one σ and two π (C) three σ (sigma) only (D) two σ and one π

15. The covalent radius of Cl-atom is:
(A) 99.4 pm (B) 80 pm (C) 70 pm (D) 66.4 pm

16. One calorie is equivalent to:
(A) 0.4184J (B) 4.184J (C) 41.84J (D) 418.4J

17. pH value of vinegar is:
(A) 1.1 (B) 2.0 (C) 2.8 (D) 3.5

Inter (Part-I)-A-2021

Roll No._____ *to be filled in by the candidate.*

(For all sessions)

Chemistry (Essay Type)

Time: 2:40 Hours **Section - I** **Marks: 68**

2- Write short answers of any eight parts from the following. **2 x 8 =16**

i. Why is actual yield less than theoratical yield?
ii. Define Fractional crystallization with example.
iii. Magnesium atom is twice heavier than that of carbon.
iv. Define (i) Stationary phase (ii) Distribution co-efficient
v. Give uses of Chromatography.
vi. Why absolute zero is unattainable?
vii. What is (i) Isotherm (ii) Partial Pressure
viii. What are the Faulty points of Kinetic theory of Gas?
ix. Give quantitatively statement of Charles law.
x. Give any two differences between Ideal and Non Ideal solution.
xi. Colligative properties are obeyed when solute is non-volatile and solution is dilute. Justify it.
xii. 23 gram sodium and 238 gram Uranium have equal number of atoms.

3- Write short answers of any eight parts from the following. **2 x 8 =16**

i. Distinguish between Isomorphism and polymorphism.
ii. Differentiate between continuous and line spectrum.
iii. How does polarizibility effect the strength of London Forces?
iv. What are the favourable conditions for ammonia synthesis on Industrial scale?
v. Why is it necessary to decrease the pressure in a discharge tube?
vi. Justify with examples that some reactions occur at higher rate and some may occur at moderate rate.
vii. Why positive rays are called canal rays?
viii. Why do crystals change their habit?
ix. How does the buffer solution act?
x. Radioactive decay is always a First order reaction.
xi. Define the terms (i) helix (ii) Deby Forces
xii. What is electromagnetic spectrum?

4- Write short answers of any six parts from the following. **2 x 6 =12**

i. Why atomic radii cannot be determined precisely?
ii. Define electrode potential.
iii. Name factors affecting ionization energy.
iv. Calculate Bond order of Helium molecule(He_2).
v. Define enthalpy of atomization and give an example.
vi. Define heat and give its units.
vii. Differentiate between galvanic and electrolytic cell.
viii. How is copper purified by electrolysis?
ix. Why cationic radii are smaller than its parent atom?

Section - II

NOTE: Answer any three questions from the following. **8x3=24**

5. (a) NH_3 gas can be prepared by heating two solids NH_4Cl and $Ca(OH)_2$.the mixture containing 100g of each.Calculate no. of grams of NH_3 produced. 4
   (b) Define and explain Hydrogen bondings by giving any two suitable examples. 4
6. (a) Define plasma and explain its four applications. 4
   (b) Explain the concept of orientation of orbitals by using magnetic quantum number. 4
7. (a) How ionization energy varies in periodic table? 4
   (b) What is internal energy?Discuss first law of thermodynamics. 4
8. (a) $N_2(g)$ and $H_2(g)$ combine to give $NH_3(g)$.The value of K_c in this reaction at 500°C is 6.0×10^{-2}.Calculate the value of Kp for this reaction. 4
   (b) Explain half life method for measurement of the order of a reaction can help us to measure the order of even those reactions which have fractional order. 4
9. (a) Explain elevation of boiling point with a graph. 4
   (b) Explain electrolysis of aqueous solution of salts. 4

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Roll No. _____ to be filled in by the candidate.

(For all Sessions)

Paper Code	6	4	8	3

Chemistry (Objective Type)

Time: 20 Minutes **Marks: 17**

NOTE: Write answers to the questions on objective answer sheet provided Four possible answers A,B,C & D to each question are given.Which answer you consider correct, fill the corresponding circle A,B,C or D given in front of each question with Marker or pen ink on the answer sheet provided

1.1. An aqueous solution of ethanol in water have vapour pressure:
(A) equal to that of water (B) equal to that of ethanol
(C) more than that of water (D) less than that of water

2. The sum of mole fraction of gas in a mixture of gases is.
(A) always more than one (B) always less than one
(C) always one (D) may be less or more than one

3. Stronger the oxidizing agent greater is the.
(A) Oxidation potential (B) Reduction potential (C) Redox potential (D) E.M.F of cell

4. The rate of reaction:
(A) Increases as the reaction proceeds (B) decreases as the reaction proceeds
(C) remains the same as the reaction proceeds (D) may decrease or increase as the reaction proceeds

5. 27g of 'Al' will react completely with how much mass of O_2 to produce Al_2O_3.
(A) 8g of oxygen (B) 16g of oxygen (C) 32g of oxygen (D) 24g of oxygen

6. The number of moles of CO_2 which contain 8.0g of oxygen is.
(A) 0.25 (B) 0.50 (C) 1.0 (D) 1.50

7. Solvent extraction method is a particularly useful technique for separation when product to be separated:
(A) non volatile or thermally unstable (B) volatile or thermally unstable
(C) non volatile or thermally stable (D) volatile or thermally stable

8. 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

9. Amorphous solids:
(A) have sharp melting point (B) Undergo clean cleavage when cut with knife
(C) have perfect arrangement of atoms (D) can possess small regions of orderly arrangement of atoms

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

11. The nature of the positive rays depends on:
(A) the nature of the electrode (B) the nature of the discharge tube
(C) the nature of the residual gas (D) all these

12. 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) 500 nm (B) 500 m (C) 200 nm (D) 5×10^{7} m

13. Which of the following molecules have zero dibole moment?
(A) NH_3 (B) $CHCl_3$ (C) H_2O (D) BF_3

14. Which of the hydrogen halides has the highest percentage of ionic character?
(A) HCl (B) HBr (C) HF (D) HI

15. In endothermic reaction, the heat content of the:
(A) Product is more than that of reactants (B) Reactant is more than that of products
(C) Both A and B (D) Reactant and product are equal

16. The solubility product of AgCl is 2×10^{-10} mole dm^3. The maximum concentration of Ag^+ ion in the solution is.
(A) 2×10^{-10} mole dm^{-3} (B) 1.41×10^{-5} mole dm^{-3} (C) 1.0×10^{-10} mole dm^{-3} (D) 4.0×10^{-20} mole dm^{-3}

17. The relationship between Kp and Kc is given by:
(A) $Kc = Kp(P)^{\Delta n}$ (B) $Kc = Kp(\frac{P}{N})^{\Delta n}$ (C) $Kp = Kc(RT)^{\Delta n}$ (D) $Kp = Kc(RT)^{-\Delta n}$

Roll No._____ to be filled in by the candidate. **(For all Sessions)**

Chemistry (Essay Type)

Time: 2:40 Hours **Marks: 68**

Section - I

2- Write short answers of any eight parts from the following. **2 x 8 =16**

i. Discuss purification of sodium chloride by common ion effect.
ii. Write down the role of magentic separator in mass spectrometer
iii. Define molecular formula and empirical formula. Give relationship between them.
iv. Write down K_c for the following reaction. Suppose the volume of reaction mixture is "V" dm^3 at equilibrium stage.

$$PCl_5 \rightleftharpoons PCl_3 + Cl_2$$

v. How do you justify that the greater quantity of CH_3COONa in acetic acid decreases the dissociation power of acetic acid so the pH increases.
vi. Explain respiration process in the light of Dalton's Law of partial pressure
vii. Convert -40°C into Fahrenheit scale.
viii. Derive Charle's law from kinetic theory of gases.
ix. Define pH and pOH. What is the sum of pH and pOH?
x. What are molecular ions? How are they produced?
xi. How is undesirable colour removed from the crystals?
xii. Define sublimation with examples.

3- Write short answers of any eight parts from the following. **2 x 8 =16**

i. Justify that one molal solution of urea in water is more dilute than its molar solution.
ii. What is meant by symmetry? Give elements of symmetry.
iii. Define colligative properties. Name some important colligative properties.
iv. What is octet rule? Give two examples of compounds which deviate from it
v. A fresh cut metal has a shiny look. Justify it
vi. What factors influence the electron affinity?
vii. No bond in chemistry is 100% ionic. Justify it.
viii. Why the molecule of BF_3 is triangular palner?
ix. What is meant by state function? Give examples.
x. Differentiate between internal energy and enthalpy.
xi. Define crystal and crystallite.
xii. What is habit of a crystal? Give one example.

4- Write short answers of any six parts from the following. **2 x 6 =12**

i. State Moseley's law.
ii. What is Hund's rule?
iii. How atomic emission spectrum is obtained?
iv. Why the positive rays are also called as canal rays?
v. What is Electrochemistry?
vi. Give advantages of Fuel Cell.
vii. What is zero-order reaction? Give an example.
viii. Write two characteristics of a catalyst.
ix. Calculate oxidation state of Cr in (a) $Cr_2(SO_4)_3$ (b) $K_2Cr_2O_7$

Section - II

NOTE: Answer any three questions from the following. **8x3=24**

5. (a) The combustion analysis of an organic compound shows it to contain 65.44% carbon, 5.50% hydrogen and 29.6% of oxygen. What is the emperical formula of the compound if the molar mass of this compound is 110.15 g mol^{-1}? Calculate the molecular formula of the compound. 4
   (b) Discuss manometric method for the measurement of vapour pressure of a liquid. 4
6. (a) State and explain Graham's Law of diffusion. 4
   (b) State and explain Plank's quantum theory 4
7. (a) Describe the structure of NH_3 and H_2O with the help of atomic orbital hybridization 4
   (b) Describe Hess's law of constant heat summation with two examples. 4
8. (a) Derive Handerson's equation for acidic and basic buffer. 4
   (b) What is electrolysis? Discuss the electrolysis of fused salt $PbBr_2$ 4
9. (a) The vapour pressure of water at 30° C is 28.4 torr. Calculate the vapour pressure of solution containing 70.0g of cane sugar ($C_{12}H_{22}O_{11}$) in 1000.0 g of water at same temperature. Also calculate the lowering of vapour pressure. 4
   (b) How does Arrhenius equation help us to calculate the energy of activation of a reaction? 4

Roll No._____ to be filled in by the candidate.

Paper Code	2	4	8	7

Sessions: 2015-2017, 2016-2018 & 2017-2019

Chemistry (Objective Type)

Time: 20 Minutes **Marks: 17**

NOTE: Write answers to the questions on objective answer sheet provided. Four possible answers A,B,C & D to each question are given.Which answer you consider correct, fill the corresponding circle A,B,C or D given in front of each question with Marker or pen ink on the answer sheet provided.

1.1. In order to mention the boiling point of water at 110°C, the external pressure should be:
(A) between 760 torr and 1200 torr (B) between 200 torr and 760 torr
(C) 765 torr (D) 620 torr

2. The molecules of CO_2 in dry ice form the:
(A) Ionic crystals (B) Covalent crystals
(C) Molecular crystals (D) Metallic crystalls

3. The nature of the positive rays depends on:
(A) nature of the electrode (B) nature of the discharge tube
(C) nature of the residual gas (D) all these

4. When 6d orbital is complete, the entering electron goes into:
(A) 7 f (B) 7 s (C) 7 p (D) 7 d

5. 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

6. Which of the following has zero dipole moment?
(A) NH_3 (B) $CHCl_3$ (C) H_2O (D) BF_3

7. The change in heat energy of a chemical reaction at constant temperature and pressure is called:
(A) enthalpy change (B) heat of sublimation (C) bond energy (D) internal energy change

8. For which system does the equilibrium constant, Kc has 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) $2HF \rightleftharpoons H_2 + F_2$

9. 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

10. Molarity of pure water is:
(A) 1 (B) 18 (C) 55.5 (D) 6

11. Stronger is the oxidizing agent, greater is the:
(A) Oxidation potential (B) Reduction potential (C) Redox potential (D) E.M.F of the cell

12. 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

13. The mass of one mole of electrons is:
(A) 1.008 mg (B) 0.55 mg (C) 0.184 mg (D) 1.673 mg

14. The atomicity of $C_6H_{12}O_6$ is:
(A) 6 (B) 12 (C) 3 (D) 24

15. The comparative rate at which the solute moves in paper chromatography depends on:
(A) the size of paper (B) R_f value of solutes
(C) Temperature of the experiment (D) Size of chromatographic tank used

16. The order of the rate of diffusion of gases NH_3, SO_2, Cl_2 and CO_2 is:
(A) $NH_3 > SO_2 > Cl_2 > CO_2$ (B) $NH_3 > CO_2 > SO_2 > Cl_2$ (C) $SO_2 > NH_3 > CO_2 > Cl_2$ (D) $CO_2 > SO_2 > Cl_2 > NH_3$

17. The number of molecules in one dm^3 of water is close to:
(A) $\frac{6.02}{22.4} \times 10^{23}$ (B) $\frac{12.04}{22.4} \times 10^{23}$ (C) $\frac{18}{22.4} \times 10^{23}$ (D) $55.6 \times 6.02 \times 10^{23}$

Roll No._____to be filled in by the candidate.

Sessions: 2015-2017, 2016-2018 & 2017-2019

Chemistry (Essay Type)

Time: 2:40 Hours **Marks: 68**

Section - I

2- Write short answers of any eight parts from the following. **2 x 8 =16**

i. Write the names of any four methods employed for the separation of isotopes.
ii. Law of conservation of mass has to be obeyed during stoichiometric calculations. Justify it.
iii. What is the difference between adsorption and partition chromatography.
iv. Hydrogen and helium are ideal at room temperature, but SO_2 and Cl_2 are non ideal. How do you explain it?
v. Justify that the volume of given mass of a gas becomes theoretically zero at 273°C.
vi. What is buffer solution? Give types of buffer solution with their composition.
vii. What do you know about gram atom?
viii. Define solvent extraction and partition law.
ix. Write any two methods for drying the crystals.
x. Why pilots feel uncomfortable breathing at high altitude?
xi. How do buffers act? Give example of acidic buffer.
xii. Prove that $Pk_a + Pk_b = 14$. at 25°C.

3- Write short answers of any eight parts from the following. **2 x 8 =16**

i. How is dynamic equilibrium established during evaporation of a liquid in a closed vessel at constant temperature?
ii. Why is boiling point of water different in Murree and Mount Everest?
iii. Justify that one molal solution of urea in H_2O is dilute as compared to one molar solution of urea but the number of particles of solute is same?
iv. Why the concentration term of molality is independent of temperature but molarity depends upon temperature?
v. Differentiate between Continuous spectrum and Line spectrum?
vi. Calculate mass of electron by using its value of charge and e/m value.
vii. How was neutron discovered by James Chadwick? Prove it by a nuclear reaction.
viii. How is caustic soda obtained by electrolysis of aqueous solution of NaCl? Write only the chemical reactions occuring at different electrodes.
ix. Define oxidation number and calculate oxidation number of chromium in K_2CrO_4.
x. Why do earthenware vessels keep water cool?
xi. Define isomorphism and give one example.
xii. What is Bohr's atomic model? Give its two postulates.

4- Write short answers of any six parts from the following. **2 x 6 =12**

i. Why Cationic radius is smaller than atomic radius of atom?
ii. Differentiate between polar and non-polar covalent bond.
iii. Differentiate between endothermic and exothermic reactions.
iv. Why does O_2 show paramagnetic character?
v. Why is Pi-bond weaker than Sigma bond?
vi. Define Thermochemical equation.
vii. How can half life be used to determine order of reaction?
viii. Discuss a reaction to explain specification of Catalyst.
ix. Discuss two characteristics of enzyme.

Section - II

NOTE: Answer any three questions from the following. **8x3=24**

5. (a) Ascorbic acid (vitamin C) contains 40.92% carbon, 4.58% hydrogen and 54.5% of oxygen by mass. What is the empirical formula of ascorbic acid? 4
   (b) Write down any four properties of Ionic solids. 4
6. (a) Give the statement of Dalton's Law of partial pressure. How does this law help to find out the partial pressure in the mixture of gases? 4
   (b) Explain Millikan's oil drop experiment to determine the charge on electron. 4
7. (a) Describe measurement of enthalpy of a reaction with bomb calorimeter. 4
   (b) Explain paramegnetic behaviour of oxygen molecule on the basis of Molecular Orbital Theory. 4
8. (a) $N_{2\,(g)}$ and $H_{2\,(g)}$ combine to give $NH_{3\,(g)}$. The value of Kc in this reaction at 500°C is 6.0×10^{-2}. Calculate the value of Kp for this reaction. 4
   (b) Describe four uses of electrolysis process in industries. 4
9. (a) Discuss Raoult's law for the solution in which both components are volatile. 4
   (b) What is catalysis? Explain its types with one example of each. 4