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.

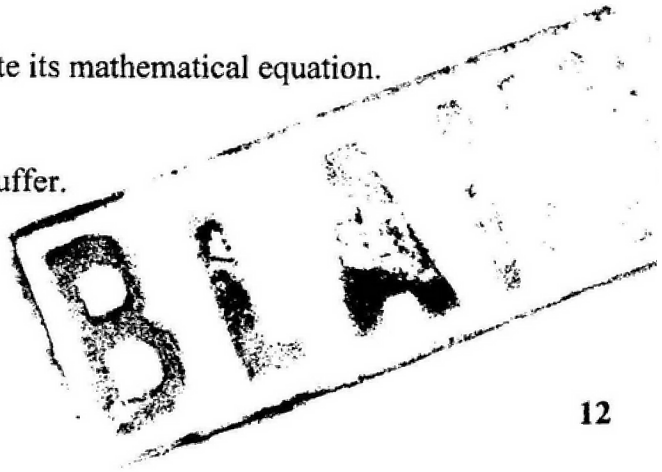
(viii) Write name of different quantum numbers.

(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.

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