# CHEMISTRY (GENERAL)

## Paper I

**Time - 3 hours** **Full Marks - 75**

There shall be three groups, Group A (Physical), Group B (Organic), Group C (Inorganic) each carrying 25 Marks. Each group shall contain four questions out of which two are to be answered. **Six** questions are to be answered in all.

### Group A

### Physical Chemistry

1. **Gaseous state, Kinetic theory of gases** - Postulates, Kinetic gas equation, Value of R in different units, Deductions of gas laws from kinetic gas equation, R.M.S. velocity, Average velocity and Kinetic Energy of gas molecules, vander Waal's equation of state and law of corresponding state.
2. **Chemical equilibrium** - Law of mass action and its kinetic derivation, equilibrium constant, relation between Kp, Kc & Kx,Le-Chatellier's principle.
3. **Dilute solution** - Collgative properties, osmosis and osmotic pressure, Lowering in V.P., elevation of boiling point of solutions, depression of freezing point of solutions, abnormal colligative properties of solutions.
4. **Thermochemistry** - Hess's Law, Born Haber Cycle.
5. **Thermodynamics** - Thermodynamic terms, Work, heat and energy, Thermodynamic and non thermodynamic properties, The first law of Thermodynamics, Enthaply, Heat capacities (Cp,Cv), Relation between Cp & Cv, Isothermal reversible and irrversible processes, Work done in isothermal and adiabatic processes.

### Group B

### Organic Chemistry

1. Shape and structure of Organic compounds, tetravalency of Carbon and sp, $sp^2$, $sp^3$ hybridisation.
2. Nomenclature of simple functional organic compounds.
3. Elementry idea of electron displacement effect (inductive and electromeric effect).
4. **Alcohols** - Classification and distinction between different types of monohydric alcohols and general methods of preparation and properties of Trihydric alcohol-Glycerol.
5. **Aldehydes and Ketones** - General methods of preparation and

properties.

6. **Carboxylic acids** - General methods of preparation and properties of monocarboxylic acid and their derivatives.
7. **Amines** - Aliphatic amines, classification, distinction and separtion.

## Group C

## Inorganic Chemistry

1. **Atomic structure**- The components of atom, results of Rutherford's $\alpha$ scattering experiment, Mosley's finding on the relationship of X-rays with atomic numbers, Bohr's model and introduction to spectral lines of hydrogen atom, Bohr-Sommerfeld's model, Pauli exclusion Principle, Hund's Rule, Aufbau's Principle.
2. **Periodicity** - Electronic lay out of the periodic table, periodicity of properties e.g., ionic, covalent and vander Waal's radii, Ionisation potential, electron effinity and electronegativity.
3. **Group 1**- Silver and Gold - occurrence, metallurgy, properties and important compounds ($AgN0_3$, AgCl, $H[AuCl_4]$), comparative study of the coinage metals.
4. **Group II** - Beryllium - occurrence, isolation, properties, uses and important compounds ($BeCl_2$) Basic beryllium acetate.
5. **Group III** - Boron-occurrence, preparation, properties and uses of compounds of Boron ($B\chi_3$, $B_2H_6$, Boric Acid). Chemistry of Borax bead test.
6. **Group IV** - Preparation, properties and uses of $SiO_2$, Silicic acid and silicagel

   **Tin** - occurrence, metallurgy, properties and uses. Important Sn(II) & Sn(IV) compounds ($SnCl_2$, $SnCl_4$).

   **Lead** - occurrence, metalluragy, properties and uses, white lead chrome yellow and red lead.

## CHEMISTRY (GENERAL)

## Practical

**Time - 3 hours** **Full Marks - 25**

1. Qualitative inorganic analysis of mixtures containing four radicals. 12 marks

   Basic radicals - $Ag^{+1}$, $Pb^{+2}$, $Cu^{+2}$, $Sb^{+2}$, $AS^{+2}$, $Sn^{+4}$, $Fe^{+2}$, $Fe^{+3}$, $Al^{+3}$, $Cr^{+3}$, $Co^{+2}$, $Ni^{+2}$, $Zn^{+2}$, $Mn^{+2}$, $Ba^{+2}$, $Sr^{+2}$, $Mg^{+2}$, $NH^{+}_4$,

   Acid Radicals - $CO_3^{-2}$, $S^{-2}$, $SO_4^{-2}$, $NO_3^{-1}$, $NO_2^{-1}$, halides
2. Volumetric analysis 8 marks

   Acidimetry and Alkalimetry
3. Viva and Note-Book 5 marks