# CHEMISTRY (Subsidiary)
## 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 $K_p$, $K_c$ & $K_x$, Le-Chatelier'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 solution.

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 ($C_p$, $C_v$). Relation between $C_p$ & $C_v$, 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. Aldehydes and Ketones - General methods of preparation and properties.

5. Carboxylic acids - General methods of preparation and properties of monocarboxylic acid and their derivatives.
6. Isomerism-Elementary idea of geometrical and optical isomerism.

## Group C
## Inorganic Chemistry

1. **Atomic structure**- The components of atom, results of Rutherford's 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's 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. **A.** General properties of Ag, Be, B, Si, Pb, Cr, Mn, Co, Ni and inert gases.

   **B.** Principle of extraction of Ag, Sn, Pb, Cr, Mn, Co and Ni.

4. Preparation, Properties and uses of the following compounds - $AgNo_3$, AgX(Silver halides), Borax, Boric acid, Silicon, $SiO_2$, Silicagel, $Sncl_2$, White lead, Chrome-Yellow, Red lead, Hydrazine, Hydroxyl amine, Hydrazoic acid, $KMnO_4$, $Ni(CO)_4$, $Na_2S_2O_3$.

## CHEMISTRY (SUBSIDIARY)
### Practical

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

1. Qualitative inorganic analysis of mixtures containing four radicals.

          12 marks

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

   Acid Radicals - $CO_3^{-2}$, $S^{-2}$, $SO_4^{-2}$, $NO_3^{-1}$, $NO_2^{-1}$, halides

2. Organic preparation - Preparations of organic compounds by using following reactions        8 marks

   A. Nitration of Nitrobenzene

   B. Oxidation of benzaldehyde

   C. Acetylaton of p-toluidine and anilne

   D. Hydrolysis of Ester, Ethyl Benzonate and Methyl Salicylate

3. Viva and Note-Book        5 marks