CHEMISTRY (GENERAL)

Paper II

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

Twelve questions to be set. Six to be answered (at least Two from Group A, Two from Group B and Two from Group C)

Group A

Physical Chemistry

1. **Chemical Kinetics** - Rate of reaction, order and molecularity of reaction, first and second order, derivation of rate constant, methods of determining order reaction, half life and its unit.
2. **Cell** : Reversible electrodes and cells, electrode potential oxidation-reduction potential, criteria of chemical reaction with reference to electrode potential and e.m.f simple idea about concentration cell (without transference) and their e.m.f.
3. **Phase Equilibria**-Phase, component and degree of freedom, one component system, water and sulphur system, Triple point, heating and cooling curves.
4. **ElectroChemistry** - Conductivity and its measurements specific conductance, Equivalent conductance and molar conductance, Kohslrauch's law, Variation of conductivity with dilution, ionic conductance transport number and its measurements, application of conductance measurements.
5. **Ionic equilibria** : Ostwald's dilution law, ionic product of water. Modern concepts of acids and base. Solubility products, applications of solubility products principles, hydrolysis constants, pH, buffer solutions, acid-base indicators.

Group B

Organic Chemistry

1. A brief idea of substitution, addition and elimination reaction including mechanism of nitration, sulphonation and halogenation.
2. **Stereo isomerism** : Optical activity, optical isomerism of lactic and tartaric and racemic and meso form, resolution, Geometrical isomerism of maleic acid and fumeric acid.

3. **Hydoxy acid** : Praparation and properties of lactic, tartaric and citric acid.
4. **Carbohydrate**:Definition and classification, conversion of glucose into fructose and reverse. Ascending and descending the series of monosaccharide openchain structure of glucose and fructos & Mutarotation.
5. **Benzene** : Aromaticity, Orientation, Idea of ortho and para orienting groups.

   Preparation and properties of

   (a) Nitrobenzene (b) Aniline (c) Benezene diazonium chloride, phenol, benzaldehyde and benzoic acid

A brief idea of

i. Friedel Craft's reaction
ii. Sandmayer's reaction
iii. Cannizzaro's reaction
iv. Perkin's reaction
v. Kolbe's reaction

6. Active methyle compounds

   Active methyle groups, keto enol tautomerism, preparation and properties of ethylaceto acetate and malonic ester.

Group C

Inorganic Chemistry

1. **Chemical bonding** : Directional character of covalent bond, resonance, hybridisation and bonds structure and shape of molecules of the type AB_2, AB_3, AB_4, AB_5, AB_6, and AB_7, M.O. diagram for diatomic systems, bond order, bond length and bond energy, dipolemoment and percentage ionic character, hydrogen bond.
2. **Radioactivity** : α, β & γ rays, group displacement law, isotope, isobars and isotones, induced radioactivity, balancing of nuclear equation, natural radiocative series.
3. **Group studies** : Boron: Boronhalides, Boronhydrides, Boric acid and Borates, Borazole, chemistry of Borax bead test.

Nitrogen family : Hydrazine, Hydrazoic acid, Oxides and Oxyacids of phosphorus, analytical tests for nitrate and phoshate, nitrogenous and phosphatic fertilizers.

Sulphur family : Halides and Oxyacids of sulphur, selenium and tellurium, Peracids of Sulphur, Sodium thiosulphate.

4. General characteristics of transition and nontransition elements : Stability of different oxidation states, variation of atomic and ionic radii, acid, base behaviour of oxides, hydrolysis and amphoterism of compound, magnetic properties and complex formation.
5. **Co-ordination compounds** : Double salts and complex compounds, Werner's theory, co-ordination number, ligands and their classification, isomerism in complexes, Sidgwick EAN rule, valance bond model and inner and outer orbital complexes, inner complexes, application of complex compounds in qualitative analysis.

Books Recommended

1. Physical Chemistry *by* **P. C. Rakshit**
2. Advance Physical Chemistry *by* **Bahl and Bahl**
3. Physical Chemistry through Problems *by* **S. K. Dogra & S. Dogra**
4. Inorganic Chemistry *by* **Puri, Sharma and Jauhar**
5. Inorganic Chemistry *by* **T. Sharma**
6. Inorganic Chemistry *by* **Huhee**
7. Organic Chemistry *by* **M. K. Jain**
8. Modern Organic Chemistry *by* **I. L. Finar**
9. Advance Organic Chemistry *by* **B. S. Bahl & Arun Bahl**

CHEMISTRY (GENERAL)

Practical

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

1. Volumetric analysis — 10 marks
   Use of $KMnO_4$, $K_2Cr_2O_7$, Oxalic and sodiumthiosulphate
2. Organic group detection — 10 marks
3. Viva -voce and Note-Book — 5 marks