

B. Sc. Part I GENERAL

Five questions will have to be answered selecting at least one question and not more than two from each group. Four questions will be set from each group.

GROUP—A

PHYSICAL CHEMISTRY

1 The States :

(a) **Gaseous State :** Kinetic theory of gases, derivation of kinetic gas equation, deduction of gas laws, calculation of gas constants and kinetic energy.

(b) **Types of solid, crystal forces, law of constancy of angles, seven crystal systems, law of rational indices, Bragg's law. Lattice Energy, Born Haber Cycle.**

2 Thermochemistry :

Heat in chemical reactions, reaction enthalpy, standard enthalpy changes, Hess Law, Kirchoff Law, Bond energies and determination.

3 Ionic Equilibrium :

Ionic product of water, pH, pK_a , pK_b and pK_w , buffer solution. Idea of role of buffer solution in day-to-day life.

Solubility product and its applications in salt analysis : common ion effect. Conductance specific, equivalent and molar.

4 (a) Chemical Kinetics : Rate of reaction, order and molecularity, expression for specific rate constant of first order reaction, half life period, unit.

(b) Colligative Properties :

Colligative properties, osmosis, osmotic pressure and its determination. Vapour pressure, Raoult's law of lowering of vapour pressure. Relation between osmotic pressure and lowering of vapour pressure.

GROUP—B

INORGANIC CHEMISTRY

1 Atomic Structure and Bonding :

Features of H-spectra and Bohr's theory, shapes of orbitals and their labellings, idea of quantum numbers Pauli's exclusion Principle, Hund's rules, Aufbau principle. Electronic configuration of elements

Idea of ionic and covalent bonds, I. P., E. N., and E. A., Fajan's rule.

2 Chemistry of the following elements :

Li, Sn, Fluorine, Chlorine, Iodine.

- 3 Principles involved in the volumetric and gravimetric estimations of Cu^{++} and iron.
- 4 Isotopes : Brief idea of detection and separation, tracer techniques radiocarbon dating.

GROUP—C

ORGANIC CHEMISTRY

1 Structure and Mechanism :

Hybridization, bond angle bond length, idea of σ and π bonds, inductive effect, electromeric effect and mesomeric effect, bond fission and fission products, elementary idea of reagents and types of reactions.

2 Nomenclature :

Acquaintance with IUPAC nomenclature of aliphatic and aromatic compounds.

3 (a) Alcohols : monohydric,

(b) Grignard's reagent.

4 Idea of purification of compounds. criteria of purity, Chromatography.

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Chemistry Practical

Time—5 hours

Full Marks—25

GROUP—A (Inorganic Chemistry)

—12 Marks

1 Volumetric Analysis :

(40)

- (a) Acidimetry and alsealimetry
(b) Use of $KMnO_4$ and $K_2Cr_2O_7$, Iodometry.

GROUP — 3 (Organic Chemistry) — 8 marks

2. Organic Detection — Detection of N, S, halogens in organic compounds.

Detection of the following functional groups of organic compounds:

- (i) Phenolic $-OH$ (ii) $-CHO$ (iii) $>C=O$ (iv) $-COOH$ (v) NH_2 and (vi) NO_2 (aromatic)

3. Record of class work and viva-voce. — 5 marks