The Syllabus of Chemistry Sub Stream

Section 1: Physical Chemistry


**Section 2: Inorganic Chemistry**

**Main Group Elements:** Hydrides, halides, oxides, oxoacids, nitrides, sulfides – shapes and reactivity. Structure and bonding of boranes, carboranes, silicones, silicates, boron nitride, borazines and phosphazenes. Allotropes of carbon. Chemistry of noble gases, pseudohalogens, and interhalogen compounds. Acid-base concepts.


**Lanthanides and Actinides:** Recovery. Periodic properties, spectra and magnetic properties.


**Radioactivity:** Decay processes, half-life of radioactive elements, fission and fusion processes.

**Bioinorganic Chemistry:** Ion (Na+ and K+) transport, oxygen binding, transport and utilization, electron transfer reactions, nitrogen fixation, metalloenzymes containing magnesium, molybdenum, iron, cobalt, copper and zinc.

**Solids:** Crystal systems and lattices, Miller planes, crystal packing, crystal defects, Bragg’s law, ionic crystals, structures of AX, AX2, ABX3 type compounds, spinels, band theory, metals and semiconductors.

**Instrumental Methods of Analysis:** UV-visible spectrophotometry, NMR and ESR spectroscopy, mass spectrometry. Chromatography including GC and HPLC. Electroanalytical methods- polarography, cyclic voltammetry, ion-selective electrodes. Thermoanalytical methods.
Section 3: Organic Chemistry

Stereochemistry: Chirality of organic molecules with or without chiral centres and determination of their absolute configurations. Relative stereochemistry in compounds having more than one stereogenic centre. Homotopic, enantiotopic and diastereotopic atoms, groups and faces. Stereoselective and stereospecific synthesis. Conformational analysis of acyclic and cyclic compounds. Geometrical isomerism. Configurational and conformational effects, and neighbouring group participation on reactivity and selectivity/specificity.


**Heterocyclic Compounds**: Structure, preparation, properties and reactions of furan, pyrrole, thiophene, pyridine, indole, quinoline and isoquinoline.

**Biomolecules**: Structure, properties and reactions of mono- and di-saccharides, physicochemical properties of amino acids, chemical synthesis of peptides, structural features of proteins, nucleic acids, steroids, terpenoids, carotenoids, and alkaloids.

**Spectroscopy**: Applications of UV-visible, IR, NMR and Mass spectrometry in the structural determination of organic molecules.