UPPSC LT Assistant Teacher Syllabus

SYLLABUS
SUBJECT : SCIENCE

(A) PHYSICS

General Physics & Mechanics

Units and dimensions, vector and scalar quantities, products (scalar and vector), gradient, divergence & curl, Gauss and Stoke theorems and applications, Motion, force and Acceleration equations of motion, Kinetic and potential energy, Linear and angular momentum, conservation of energy and momentum, conservative and non-conservative forces, Rotatory motion, centrifugal and centripetal forces, gravitational force, central force, Kepler's laws of planetary motion, geo stationary, satellites, acceleration due to gravity, escape velocity, simple and compound pendulums.

Moment of inertia, Theorems of parallel and perpendicular axes, Moment of inertia of ring, circular disc, sphere and cylinder, Angular momentum and Torque, Viscosity, Streamline and Turbulent motion, critical velocity, Stoke's and Poissullis formula. Bernoulli theorem and uses. Surface tension: Excess pressure inside curved surfaces, surface

(B) CHEMISTRY

General Organic Chemistry- Hyper conjugation, Inductive effect, Resonance, and Aromaticity and their applications. Electrophiles and nucleophiles. and reaction intermediates (carbocation, carbanion, free radical, carbine and benzyne)

Reaction mechanism- SN_1, SN_2, E_1, and E_2 reaction, electrophilic addition of alkenes, alkynes and free radical addition of alkenes. Nucleophilic addition of carbonyl compounds. Electophilic aromatic substitution, ortho/para/meta directing groups and activating and deactivating groups in ArSE reaction.

Mechanism of name reaction: Aldol reaction, Perkin reaction, Cannizzaro reaction, Benzoincondensation, Witting reaction, Reimer-Tiemann reaction, Hoffmann Bromamide reaction, Knoevenagel reaction, Michael addition.

Carbohydrates: (only glucose and fructose) mutarotation formation of ozazone, oxidation and reduction.

Polymer: Natural (starch, cellulose, rubber and silk) and synthetic polymers, Nylon, Terylene, Polyethylene, PVC, and Teflon).

Isomerism: Structural and stereoisomerism (enantiomerism, diastereomerism R/S and E/Z nomenclature).

Absorption Spectroscopy UV: Chromophore, auxochrome, bathochromic and hypsochromic shift, effect of conjugation and stability on l_{max} Woodward- Fieser rule for calculation of l_{max} of polyenes. IR: Absorption frequency of Various functional groups and Factors on which V_{max} depend.

Structure of Atom - Bohr's model, quantum numbers and Modern Atomic Theory.

Periodic properties : Atomic and ionic radii, ionization potential, electron affinity, electronegativity Lattice energy, hydration energy and their relation to solubility of ionic compounds.
Chemical bonding : Ionic, covalent, coordinate and hydrogen bonding. Shape of molecules.

Coordination Chemistry : 3d block elements, nomenclature of complexes, ligands (monodentate, bidentate, polydentate), Werner theory and valence bond theory, Biologically active coordination compounds (haemoglobin, myoglobin, vitamin B_{12}, chlorophyll)

Oxidation and Reduction : Oxidation number, redox reaction and standard electrode potential of half cell and its application in inorganic chemistry.

Radioactivity : Natural radioactivity, radioactive decay, properties of a, bEand gJRays, half-life period, nuclear fission and nuclear fusion.

Chemical kinetics and catalysis- Molecularity, order of reaction, examples of zero, first and second order reaction, examples of catalytic and enzymatic reactions.

Thermodynamics : First and second law of thermodynamics, enthalpy of a system and capacity at constant volume and pressure, relation between C_p and C_V Extensive and intensive property.

Chemical equilibrium : Law of mass action, Le-Chatelier principle and its application, degree of dissociation, relation between K_p and K_c, activity and activity coeficient.

Ionic equilibrium : Dissociation of weak acid (K_a) and weak base. (K_b), hydrolysis of salts of weak acid and Weak base, strong acid-weak base and weak acid- strong base.

Solubility and solubility product. Dissociation constant of water(K_w), buffer solution and p of the buffer solution.