

Electrostatic potential, capacitance, parallel plate and spherical capacitors capacitors in series and parallel, energy of a capacitor.

Electric current, Ohm's law, Kirchhoffs laws, resistances in series and parallel temperature dependence of resistance. Wheatstone bridge, potentiometer.

Measurement of voltages as currents.

Electric power, heating effects of currents, chemical effects and law of electrolysis thermoelectricity. Biot Savart law. Magnetic fields due to a straight wire circular loop and solenoid.

Force on a moving charge in a magnetic field (Lorentz force), magnetic moment of a current loop, effect of a uniform magnetic field of a current loop, forces between two currents, moving coil, galvanometer, ammeter and voltmeter.

Electromagnetic induction induced emf, Faradays law, Lenz's law, self and mutual inductance alternating currents, impedance and reactance, growth and decay of current in L-R circuit, elementary idea of dynamo and transformer.

(B) CHEMISTRY

GENERAL AND PHYSICAL CHEMISTRY

1. Structure of Atom: Constitution of nucleus: Bohr's atom model: quantum numbers Aufbau principle, electronic configuration of elements (upto-Kr): de-Broglie relation, shapes of orbitals.
2. Chemical Bond: Electrovalent, covalent and coordinate bonds, hybridisation (sp): hydrogen bond: shapes of molecules (VSEPR theory) : bond polarity, resonance, Elements of VBT and MOT.
3. Solutions: Modes of expressing concentrations of solutions: Types of solutions, Raoult's law of colligative properties, non-ideal solution, abnormal molecular weights.
4. Solid State: Crystal lattices, unit cells, Structure of ionic compounds: close packed structure Ionic radii, imperfections (Point defects): Properties of solids.
5. Nuclear chemistry Radio active radiations: half-life, radioactive decay, group displacement Law structure and properties of nucleus: Nuclear reaction, disintegration series artificial transmutation: isotopes and their uses: Radiocarbon dating.
6. Chemical Equilibrium: Chemical equilibrium, Law of mass action: K_p and K_c : Le Chatelier principle and its applications.
7. Ionic Equilibria in solutions, Solubility product, common ion effect, theories of acids and base hydrolysis of salts: pH : buffers.
8. Thermochemistry and Thermodynamics: Energy changes during a chemical reaction: intrinsic energy enthalpy, First Law of thermodynamics: Hess's law Heats of reactions: Second law of thermodynamics: entropy: free energy; spontaneity of a chemical reaction; free energy change and chemical equilibrium; free energy as energy available for useful work.
9. Chemical Kinetic: Rate of a reaction, factors affecting the rate, rate constant rate expression, order of reaction, first order rate constant expression and characteristics, Arrhenius equation.

10. Electrochemistry: Oxidation, Oxidation number and ion-electron methods. Electrolytic conduction. Faraday's laws; voltaic cell, electrode potentials, electromotive force, Gibb's energy and cell potentials. Nernst equation, commercial cells, fuel cell, electrochemical theory of corrosion.
11. Surface chemistry, Colloids and Catalysis; Adsorption, Colloids (types preparation and properties), Emulsions, Micelles, Catalysis: Types and characteristics.

INOGRANIC CHEMISTRY:

12. Principles of metallurgical operations: Furnaces, ore concentration, extraction, purification metallurgies of Na, Al, Fe, Cu, Ag, Zn and Pb and their properties.
13. Chemical periodicity: S.p.d. and f-block elements, periodic Table: periodicity : atomic and ionic radii valency. ionization energy, electron affinity electronegativity, metallic character.
14. Comparative study of elements: Comparative study of the following families of elements: (i) Alkali metals (ii) Alkaline earth metals (iii) Nitrogen family (iv) Oxygen family (v) halogens (vi) Noble gases.
15. Transition metals: Electronic configuration of 3d-metal ions, oxidation states, other general characteristic properties, Potassium permanganate, potassium dichromate.
16. Co-ordination compounds: Simple nomenclature, bonding and stability, classification and bonding in organometallics.
17. Chemical analysis: Chemistry involved is simple inorganic qualitative analysis: calculations based on acid-base titrimetry.

ORGANIC CHEMISTRY:

18. Calculation of empirical and molecular formula of organic compounds, Nomenclature of organic compounds, common functional groups isomerism Structure and shapes of alkanes, alkenes and benzene.
19. Preparation properties and uses of alkynes, alkenes, benzene petroleum, cracking octane number, gasoline additives.
20. Nomenclature, Physical chemical properties, correlation of physical properties with structure properties and uses of haloalkanes, haloalkenes, alcohols and phenols: General ideas of some polyhalogen compounds viz dichloroethanes, dichloroethers, chloroform, carbon tetrachloride D.D.T. benzene hexachloride.
21. Nomenclature, methods of preparation, Chemical properties correlations of physical properties with structures and uses of ethers aldehydes, ketones, carboxylic acids and their derivatives, Brief account of the chemistry of Cyanides isocyanides, amines and nitro compounds.
22. Polymers: Classification: Preparation and uses of common natural and synthetic polymers.
23. Biomolecules: Classification, Structures and biological importance of carbohydrates amino acids, peptides, proteins and enzymes, nucleic acids and lipids.

2. गणित (MATHEMATICS)

1. **ALGEBRA:** Algebra of complex numbers. Graphical representation of complex numbers modulus, and argument of complex numbers, conjugate of a complex number, Triangle inequality, cube roots of unity. Arithmetic, geometric and harmonic progression. Arithmetic,