

Chemistry

DEGREE STANDARD

UNIT I

PHYSICAL CHEMISTRY:-

- a) Gas law and Kinetic Theory:- Ideal gas equation - Deviation from ideal behaviour - vander waals equation for real gases - Molecular velocities - the Maxwell's distribution of molecular velocities.
- b) Solid State:- Crystal systems - Bravaislattice - Unit Cell - Miller Indices - Symmetry elements in crystals - Bragg's equation - Radius ratio's and packing in crystals.
- c) Thermodynamics:- Intensive and extensive variables - First law of thermodynamics - CP and CV relation - Hess's law of constant heat summation - Kirchoff's equation - Second law of thermodynamics - Carnot theorem - entropy and probability - Free energy and Chemical equilibrium - third law - Gibb's and Helmholtz functions.

UNIT II

- d) Chemical Kinetics:- Rate laws - rate constant - order and molecularity of reactions - Arrhenius theory - collision theory and Transition state theory - catalysis.
- e) Electro-Chemistry:- Types of reversible electrodes - Nernst equation - reference electrode and standard hydrogen electrode - computation of cell e.m.f. calculations of thermodynamic quantities of cell reactions (DG, DH, DS and K) - Over potential and hydrogen over voltage - Arrhenius theory - Debye 'Huckel equation - Kohlraush's law - Ostwald's dilution law - Determination of PH and Pka of acids by potentio metric methods.

UNIT III

- f) Chemical spectroscopy:- Elementary ideas of microwave, infrared, Raman, uv, NMR, ESR and Mass spectroscopy.

UNIT IV

- g) Colloids and surface Chemistry:- Classification - preparation purification - properties - Tyndall effect - Gels - Emulsions Absorption - Langmur isotherms - Heterogeneous catalysis.
- h) Physical properties and Chemical constitution:- Surface tension - parachor and its application to structural problems - Dipolemoment - applications of dipolemoment measurements to structural studies of simple inorganic and organic molecules - magnetic properties of matter, diamagnetism, paramagnetism, ferromagnetism and anti-ferromagnetism - Applications to structural problems.

UNIT V

INORGANIC CHEMISTRY:-

- i) Periodic classification:- Classification based on electronic configuration - periodic properties - atomic and ionic radii, ionisation potential, electron affinity and electronegativity along periods and groups.
- j) Chemical bond:- Lattice energy - VSEPR Theory and its applications - partial ionic character from electronegativity - Fajan's Rules.
- k) Compounds of Boron:- Electron deficient nature of boron compounds - preparation and properties of halides and nitrates of boron - diborane - Borazine.

UNIT VI

I) LANTHANIDES AND ACTINIDES:-

Electronic configuration oxidation state, magnetic properties and complexation behaviour - comparison of lanthanides and actinides and their position in the periodic table.

m) Fertilisers:- Ammonium nitrate, ammonium phosphate, Superphosphate and Diammonium Phosphate, NPK fertilisers.

n) Nuclear Chemistry:- Nuclear stability, - n/p ratio - isotopes, isobars and isotones Nuclear reactions Spallation - Nuclear fission and fusion - uses of nuclear energy - applications of tracers in industry, medicine, agriculture.

UNIT VII

o) Co-ordination Chemistry:- Nomenclature - theories of co-ordination compounds - werner, valence bond, crystal field molecular orbital and ligand field theories - Effective atomic number - isomerism - Metal Carbonyls of iron and Nickel.

p) Analytical Chemistry:- i) Principles of volumetric analysis - gravimetric analysis - separation and purification techniques.

UNIT VIII

ORGANIC CHEMISTRY:-

q) Types of reactions:- Nucleophilic, electrophilic, free radicals, addition and elimination reactions.

r) Electron displacement effects:- Inductive, inductometric, electromeric, mesomeric, resonance, hyperconjugation and steric effects.

UNIT IX

s) Nature of Bonding:- Hybridisation (Sp , Sp^2 & Sp^3) and Geometry of molecule - cleavage of bonds - homolytic and heterolytic fission of carbon - carbon bonds - Reaction intermediates - free radicals, carbocations and carbonions - their stability.

t) Stereo Chemistry:- Optical isomerism and Geometrical isomerism - chirality - optical isomerism of lactic and tartaric acid - Racemisation - Resolution - Asymmetric synthesis - walden inversion - cis and trans isomerism of maleic and fumaric acids - R-S-Notations - conformational analysis of cyclohexane.

UNIT X

u) Dyes:- Classification and Properties of dyes - methyl orange, cangored, malachite green, fluorescein and indigo.

v) Carbon hydrates:- Classification and reactions - Glucose, Fructose, Sucrose and lactose - structure of glucose and fructose.

w) Aromatic Substitution:- Mechanism of nitration, Halogenation, sulphuration and Friedel Crafts reaction - Orientation effects - nucleophilic substitution - Benzyne mechanism.