

Paper – I CHN-701(P) Physical Chemistry

Unit :- 1

☛ Photo Chemistry – 2

- Nature and importance of singlet and Triplet oxygen.
- Quenching of fluorescence by $3 O_2$, Kinetics of photoperoxidation reaction.
- Mechanism of ene reaction., Cycloaddition reactions., Photosubstitution reduction.
- Transition metal complex., Metal complex sensitizers, water photolysis, nitrogen fixation and CO_2 reduction.
- Solar energy conversion and storage.,
- Chemiluminescence.

Unit :- 2

☛ Nuclear Chemistry :-

- Decay Kinetics, Half life and average life, nuclear deexcitations, Parent-daughter decay growth relationship, Theory of α -decay, and β -decay.
- Nuclear Models: Shell model, liquid drop model and Semi-empirical equation, Fermi gas model, Collective model.
- Types of Nuclear Reaction : Photo and thermal reaction, Nuclear fusion and Nuclear fission.
- Artificial radioactivity, Synthesis of radio isotopes of Na and C., Accelerators, Synchrocyclotron, Betatron.
- Application of radioisotopes in chemical investigations, Age determination medicinal applications, Analytical application Industrial applications.

Unit :-3

☛ Chemical Kinematics

- Mechanism of mono molecular reaction, Lindemann, Hinshelwood, RRK, RRRM and Slater, Conventional transition state theory.
- Branched chain reactions, Explosion limits, A Kinetic isotope effect (Primary and Secondary).
- Theory of absolute reaction rate, Applicable to reaction in solution (ideal and real solution), Linear free energy relationship and Hammett equation, Deviation from Hammett equation.
- Kinetics of organic decomposition of CH_3CHO and butane.

Unit :-4

☛ Spectroscopy :-

- UV- visible : Principle, Instrumentation, determination of pK value of Indicator, and Instability constant, Qualitative and quantitative Analysis.
- Raman spectroscopy : Raman effect, Difference from IR and fluorescence, Nature of spectra, Selection rule, Basic Instrumentation and applications.
- Atomic absorption spectroscopy : Basic principle, Advantages over flame emission spectroscopy, Basic instrumentation and applications.
- Emission spectroscopy : Basic principle, Radiative and non radiative decay, Internal conversion, Basic Instrumentation and applications.