

GOKUL GLOBAL UNIVERSITY, SIDDHPUR**Ph.D. COURSE WORK EXAM SYLLABUS****SUBJECT: CHEMISTRY****Organic Chemistry**

- ◆ Stereogenicity, stereoselectivity, enantioselectivity, diastereoselectivity and asymmetric induction.
- ◆ Generation, stability and reactivity of carbocations, carbanions, free radicals, carbenes, benzyne and nitrenes.
- ◆ Addition, elimination and substitution reactions, with Electrophilic, Nucleophilic or Radical species, Determination of reaction pathways.
- ◆ Common named reactions and rearrangements: applications in organic synthesis.
- ◆ Chiral auxiliaries, substrate, reagent and catalyst controlled reactions, resolution – optical and kinetic.
- ◆ Synthesis and reactivity of common heterocyclic compounds containing one or two hetero atoms (O, N, S).
- ◆ Carbohydrates.
- ◆ Basic principles and applications in organic/inorganic chemistry: IR, UV-Vis, NMR, ^1H & ^{13}C NMR, Raman, EPR, Mass spectroscopic and electron spectroscopy and microscopic techniques.

Inorganic Chemistry

- ◆ Concepts of acids and bases, Hard-Soft acid base concept, Non-aqueous solvents.
- ◆ Basic concepts of coordination chemistry, structure, bonding theories, spectral and magnetic properties.
- ◆ Organometallic Compounds.

Physical Chemistry

- ◆ Chemical thermodynamics: Laws, state and path functions and their applications, thermodynamic description of various types of processes; temperature and pressure dependence of thermodynamic quantities, Le-Chatelier's principle.
- ◆ Homogeneous catalysis, heterogeneous catalysis and photochemical reactions.
- ◆ Crystal structures; Bragg's law and applications; band structure of solids.
- ◆ Polymer Chemistry: Molar masses; kinetics of polymerization.
- ◆ Material characterization: Basic principles and applications of AES, SEM, TEM, XRD, DTA-TGA, DSC.

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