SEMESTER-I
M 1 IC 02-CT 02

Organic Chemistry

Time: 3 Hrs. **M.M. 80 marks**
Credits: 4

Unit-I

Reaction mechanism: σ and π bond, kinetic and thermodynamic control of reaction, transition state and intermediates, methods of determining reaction mechanism, isotope effect, effect of reactivity, linear free energy relationship (Taft and hammett equation).

Unit-II

Introduction of following types mechanism: Type of reaction – Addition (nucleophilic, electrophilic, free radical), Substitution (nucleophilic, electrophilic, free radical), Elimmination and rearrangement reaction.

Unit-III

Name reactions: Hoffmann-loffler-fretag reaction, Chichibabin reaction, Sharpless asymmetric reaction, Barton reaction, Aldol, Perkin, Stobbe, Dieckman condensation, Michael addition, Mannich reaction.

Unit-IV

Disconnection approach: Elementary idea of disconnection, an introduction to synthesis, synthetic equivalents, functional group one and two group (C-X and C-C disconnection), Interconversions, chemoselectivity, Diels-alder reaction, 1,3 and 1,5 difunctionalised compounds, α,β unsaturated carbonyl compounds, Michal reaction, robinson annelation.

Unit-V

Pericyclic reaction: Selection rules and stereochemistry of electroyclic reaction, cycloaddition and sigmatropic shifts, Sommlet-hauser, cope and clasien rearrangements, structural elucidation of organic compounds.

SEMESTER-I
M 1 IC 03-CT 03

Physical Chemistry

Time: 3 Hrs. **M.M. 80 marks**
Credits : 4

Unit-I

Chemical kinetics: Different methods to determine rate of reaction, factors affecting rate, half life time, order of reaction, entropy and activation energy of reaction and determination, idea of chain conservation, parallel and opposite reactions, oscillation reaction, kinetic salt effect and solvent effect on rate.

Unit-II

Thermodynamics: thermodynamic systems, laws of thermodynamics and their applications, concept of work, entropy, internal energy, free energy, spontaneous energy, heat engine efficiency , gibb's-helmholtz equation, clausius-clapeyron equation and their uses, chemical potential and uses, heat capacity – Cp and Cv.

Unit-III

Electrochemistry: Standard electrode potential, EMF measurement, different types of electrodes, electrolysis, conductometric and potentiometric titration, pH concept, polarization, overvoltage, decomposition potential storage cells, fuel cells, electrochemical cells and notations.

Unit-IV

Thermochemistry: Thermochemical reactions, laws of thermochemistry, Kirchhoff's equation, standard heat of formation, combustion, heat of reaction and their related mathematical problems.

Unit-V

Surface chemistry: Chemical and physical adsorption, adsorption isotherms, Frendlich-langmuer adsorption isotherms, reactions on solid surface, industrial uses of adsorption.

SEMESTER-I
M 1 IC 04-CT 04
Spectroscopy in Analysis-I

Time: 3 Hrs. **M.M. 80 marks**
Credits: 4

Unit-I

Ultraviolet and visible spectroscopy: Electronic transition , instrumentation, shift of bands with solvents, the isolated double bond , conjugated dienes , effects of geometrical isomerism (steric effects, effects of alkyl substitution and ring residue), exocyclic double bonds, woodward-feiser rule, effect of strain around the diene, chromophore, polyenes, UV spectra of carbonyl compounds, unsaturated aldehyde and ketones, UV spectroscopy

Unit-II

Atomic absorption spectroscopy: Principle, instrumentation and application.

Unit-III

Flame Photometry: Principle, instrumentation and application

Photoelectron spectroscopy: Frank-codon principle, type of electron spectroscopy, ESCA-theory, instrumentation and application, Auger emission spectroscopy- theory , instrumentation and applications.

Unit-IV

IR spectroscopy: Molecular vibrations, calculation of vibrational frequencies, instrumentation, finger print region, IR of alkanes and effect of some functional groups, effects of hydrogen bonding, Fermi resonance, overtones, shifting of bands due to inductive and mesomeric effects, aromatic and heteroaromatic compounds, effects of ring strain , application of IR spectroscopy, brief idea of FT-IR.

Unit-V

Raman spectroscopy: Theory, stokes and anti stokes line, Raman depolarization ratio, instrumentation, intensity of Raman peaks, applications.

Microwave spectroscopy: Theory, selection rules, diatomic molecules as non-rigid rotator, symmetric top molecules, P-Q-R bands, instrumentation, limitations and applications.

SEMESTER-I

M 1 IC 05-CP 01

(Practical-A-I**)**

Credits 4; Time 8h **M.M. 100**

80 marks (External)
20 marks (Internal)

Organic synthesis (Yield, Crystallization, M.P. determination, IR characterization)

1. Preparation of m-dinitrobenzene from nitrobenzene
2. Preparation of m-nitroaniline from m-dinitrobrnzene
3. Preparation of methyl orange
4. Synthesis p-nitro acetanilide from acetanilide
5. Preparationof 2-iodobenzoic acid from anthranilic acid
6. Thiamine catalyzed Benzoin condensation
7. Synthesis of 2,4 diacetyl-pentanedioc acid diethyl ester
8. Synthesis of 3-methylpyrazol-5-one
9. Synthesis of Benzylidene acetophenone
10. Synthesis of p-bromoacetanilide
11. Synthesis of Urotropine (hexamethylenetetraamine)
12. Synthesis of picric acid
13. Synthesis of oil of winter green

Organic estimations

1. Glucose estimation
2. Phenol estimation
3. Aniline estimation

SEMESTER-I
M 1 IC 06-CP 02
(Practical-B-I**)**

Credits 4; Time 8h **M.M. 100**
80 marks (External)
20 marks (Internal)

Analysis of Minerals/Ores/Alloys

1. Determination of CaO & MgO, Al_2O_3 and Silica in supplied mixture - 2
2. Analysis of Brass (Cu & Zn contents)/ Solder(Sn & Pb contents) - 2
3. Analysis of Wood's Metals Bi/Cd/Pb – 2

Water analysis

1. Total hardness of water
2. Alkalinity-OH^- /CO_3^{2-}/OH^-+HCO_3^-
3. Chloride contents

Physical Experiments

1. Study of first order kinetics
2. Study of second order kinetics
3. Determination of Viscosity