GAYATRI VIDYA PARISHAD
COLLEGE FOR DEGREE AND PG COURSES (AUTONOMOUS)
Affiliated to Andhra University | | Accredited by NAAC and NBA
VISAKHAPATNAM

DEPARTMENT OF ORGANIC CHEMISTRY

M.Sc. (PREVIOUS) CHEMISTRY SYLLABUS
SEMESTER-II
PAPER-III: ORGANIC CHEMISTRY-II
(Effective from the admitted batch of 2022-2023)

Credits: 4		**Theory: 4 Hours**
Max Marks: 100	**External: 80**	**Internal: 20**

Course Outcomes (COs)/Course Specific Outcomes (CSOs):

CO 1: Acquire the knowledge of addition to carbon-carbon multiple bonds by electrophiles, nucleophiles and free radicals
CO 2: Acquire the knowledge of addition to carbon-Hetero atom multiple bonds through reductions of carbonyl group.
CO 3: Acquire the knowledge of molecular rearrangement to electron deficient carbon, to electron deficient Nitrogen and on electron deficient oxygen
CO 4: Acquire the Knowledge of different kinds of spectroscopic techniques like NMR, IR, UV and mass.
CO 5: Develop interest chemistry of Natural products the synthesis of terpenes, alkaloids and flavonoids.

Course learning outcome (LOs):

Upon completion of the course the students should be able to:

LO 1: Analyze and solve to add nucleophiles, electrophiles and free radicals to carbon-carbon multiple bonds
LO 2: Analyze and solve to add nucleophiles, electrophiles and free radicals to carbon-hetero atom multiple bonds
LO 3: Know different molecular rearrangements on electron deficient carbon, nitrogen and oxygens
LO 4: Have a basic knowledge on different spectroscopic techniques
LO 5: Structure, synthesis, and reactivity of various natural products like terpenes, alkaloids and flavonoids.
LO 6: Explain addition reactions, molecular rearrangements, spectroscopic techniques and natural products

UNIT-I: Addition Reactions: **[12 Hours]**

(a) **Addition to carbon-carbon multiple bonds-** Addition reactions involving electrophiles, nucleophiles and free radicals, cyclic mechanisms. Stereochemistry and reactivity. Hydrogenation of double and triple bonds, Michael reaction, Prins reaction.

(b) **Addition to carbon-hetero atom multiple bonds**: Addition of Grignard reagents, Mannich reaction, Reformatsky reaction, Tollen's reaction.

UNIT-II: Elimination Reactions: **[12 Hours]**

Mechanisms of E2, El, and E1CB, factors-effects of substrate, attacking base, leaving group and medium. Stereochemistry of eliminations in acyclic and cyclic systems. Saytzeff elimination, Hoffman elimination and pyrolytic elimination.

UNIT-III: Molecular Rearrangements **[12 Hours]**

Molecular Rearrangements:

Types of molecular rearrangements, migratory aptitude.

Rearrangements to electron deficient carbon: Pinacol-pinacolone, Wagner-Meerwein and Benzil-Benzilic acid,
Rearrangements to electron deficient nitrogen: Beckmann, Hofmann, Curtius, Schmidt and Lossen rearrangements.
Rearrangements to electron deficient oxygen: Baeyer-Villiger, Dakin rearrangements.
Other rearrangements: Neber rearrangement and Favorskii rearrangements.

UNIT - IV: Spectroscopy **[12 Hours]**

A) **UV Spectroscopy**: Various electronic transitions, selection rules, effect of solvent on electronic transitions, the absorption laws, chromophores, auxochromes, bathochromic and hypso chromic shifts, hyperchromic and hypochromic effects,
B) **Infrared Spectroscopy**: Basic principles: types of molecular vibrations, fingerprint region and identification of functional groups.
C)**Nuclear Magnetic Resonance Spectroscopy (^{1}H-NMR)**: nuclear spin, nuclear resonance, saturation, shielding of magnetic nuclei, chemical shifts, factors affecting the chemical shift.
D) **Mass Spectroscopy**: Basic Principles, instrumentation, isotope abundance, the molecular ion, metastable ions, base peak, fragment ions, even-electron rule and nitrogen rule. simple cleavage – retro Diels Alder reaction and Mclafferty rearrangement -

UNIT-V

Chemistry of Natural Products: **[12 Hours]**

study of the following compounds involving their isolation - structure elucidation - synthesis and biogenesis
A) Terpenoids: - Occurrence, Isolation, isoprene rule, structure elucidation and synthesis ofα- Terpineol and α- pinene
B) ALKALOIDS: Occurrence, Isolation, classification based on nitrogen heterocyclic ring and synthesis of quinine and nicotine
C) Natural plant pigments; anthocyanins, Flavonoids and isoflavonoids: Cyanidin, Quercetin, and Genistein.

Text books:

1. Organic Chemistry Vol. I (Sixth Edn.) and Vol. II (Fifth Ed.,) by IL finar ELBS.
2. Organic Chemistry (fifth Edn.,) by Morrison and Boyd, PHI, India.
3. Organic Chemistry (fifth edition) by Francis A. Carey Tata McGraw Hill publishing Company Limited, New Delhi.
4. Reaction Mechanism in Organic Chemistry by Mukherjee Sirigh, N Terniitarr, Indiar
5. A guidebook to mechanism in Organic Chemistry by Peter Sykes, ELBS.
6. Advanced organic chemistry by Jerry March (4th Edition) Wiley Eastern. .
7. Stereochemistry of carbon compounds by E. Eliel, John Wiley & Sons, Inc.
8. Stereochemistry of Organic compounds by D. Nasipuri.
9. Chemistry of Natural products by R.S. Kalsi Kalyani Publ.

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