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. (Final) CHEMISTRY
SEMESTER-IV SYLLABUS
PAPER – III: DESIGNING ORGANIC SYNTHESIS AND SYNTHETIC APPLICATIONS OF ORGANO- BORANES AND SILANES
(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 principles of disconnection approach.
CO 2: Understands various synthetic strategies for one group disconnection.
CO 3: Understands various synthetic strategies for Two group disconnection.
CO 4: Develop knowledge on various organoboranes.
CO 5: Develop knowledge on various organosilanes.

Course learning outcome (LOs):

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

LO 1: Explain and apply principles of disconnection approach.
LO 2: Apply in analyzing molecules using various synthetic strategies for one group disconnection.
LO 3: Analyze molecules using various synthetic strategies for one group disconnection.
LO 4: Apply different organoborane reagents in organic synthesis.
LO 5: Apply different organosilanes reagents in organic synthesis.
LO 6: Compare and apply the knowledge of disconnection approach, synthetic strategies for one group and two group disconnection, organoboranes and organosilanes.

UNIT-I: Disconnection Approach – Principles **[12 Hours]**

Introduction, Terminology: Retrosynthesis, Target Molecule (TM), synthon, synthetic equivalent, functional group interconversion (FGI). Linear and convergent synthesis. Criteria for selection of target. Order of events in retrosynthesis with reference to Salbutamol, Proparcaine and Dopamine. Chemoselectivity, Regioselectivity, reversal of polarity and cyclizations. Protecting groups- Principles of protection of alcohols, amine, carbonyl and carboxyl groups

UNIT-II: Synthetic Strategies - One group Disconnections **[12 Hours]**

Introduction to one group disconnections: C-C disconnection-alcohols and carbonyl compounds; C-X disconnections- alcohols and carbonyl compounds and sulphides two group C-C and C-X Disconnections.

UNIT-III: Synthetic Strategies - Two group Disconnections **[12Hours]**

Introduction to Two group C-C disconnections; Diels-Alder reaction, 1,5-difunctionalized compounds, Michael addition and Robinson annulation. Two group C-X disconnections; 1, 1-difunctionalised, 1, 2-difunctionalised and 1, 3-difunctionalised compounds. Control in carbonyl condensations, explanation with examples oxanamide and mevalonic acid.

UNIT –IV: Organoboranes **[12 Hours]**

Hydroboration- Preparation of Organoboranes. Reagents – dicylohexyl borane, disiamyl borane, thexyl borane, 9-BBN and mono-, di-isopinocamphenyl borane. Functional group transformations of Organoboranes-Oxidation, protonolysis and rearrangements. Formation of carbon-carbon-bonds viz organoboranes-carbonylation, cyanoboration.

UNIT –V: Organosilanes **[12 Hours]**

Preparation and synthetic applications of trimethylsilyl chloride, dimethyl-t-butylsilylchloride, trimethylsilylcyanide, trimethylsilyliodide and trimethylsilyltriflate. Protection of functional groups - Trimethylsilylethers, Silylenolethers. Synthetic applications of α-silylcarbanions, β-silylcarbonium ions. Peterson's olefination.

Text Books:

1. Organic syntheses via boranes / Herbert C. Brown; with techniques by Gary W. Kramer,
2. Alan B. Levy, M. Mark Midland. New York: Wiley, 1975
3. Some Modern Methods of Organic Synthesis W. Carothers, Third Edition, Cambridge University Press, Cambridge, 1988.
4. Organic Synthesis: The disconnection approach, S. Warrant John Wiley & sons, New York, 1984.
5. Modern Synthetic Reactions, Herbert O. House, Second Edition, W.A. Benzamine Inc. Menio Park, California, 1972.
6. Principle of Organic Synthesis- R.O.C. Norman and J. M. Coxon.(ELBS)
7. Organic Synthesis: Special techniques. V.K. Ahulwalia and Renu Aggarwal.
8. Organic Synthesis by C Willis and M Willis
9. Problems on organic synthesis by Stuart Warren

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