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 SYLLABUS
SEMESTER-III
PAPER-III-ORGANIC SYNTHESIS
(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 formation of C-C using various reagents.
CO 2: Acquire the knowledge of formation of C=C using various reagents.
CO 3: Develop the concept of click chemistry and Biorthogonal Chemistry
CO 4: Apply the knowledge and understanding the reactions of unactivated C-H bonds,
CO 5: Develop interest in the areas of Asymmetric Synthesis

Course learning outcome (LOs):
Upon completion of the course the students should be able to:
LO 1: Apply the concept of C-C bond formation using various reagents in organic synthesis.
LO 2: Apply the concept of C=C bond formation using various reagents in organic synthesis.
LO 3: Apply the new concept of click chemistry in organic synthesis and biological system
LO 4: Explain and apply the knowledge and understanding the reactions of unactivated C-H bonds,
LO 5: Explain and apply the knowledge of asymmetric synthesis in synthesizing pure enantiomers
LO 6: apply formation of C-C and C=C bonds, organic polymers, unactivated C-H bonds, Asymmetric Synthesis

UNIT-I: Formation of Carbon-Carbon (C-C) single bonds: [12 Hours]
Alkylations *via* enolate - the enamine and related reactions - umploung (dipole inversion) – the aldol reaction – applications of organopalladium (Heck-Suzuki coupling and Stille-Sonogishira cross coupling - Negishi-Kumada coupling reactions) and organocopper reagents (Gillman reagent) - applications of sulphur ylides - synthetic applications of carbenes and carbenoids.

UNIT-II: Formation of carbon-carbon double bonds: **[12 Hours]**
Elimination reactions – pyrolytic syn eliminations – sulphoxide -sulphonate rearrangement - Wittig reaction-alkenes from arylsulphonylhydrazones (Shapiro reaction) - Eschenmoser fragmentation - olefin metathesis (Grubb's reaction), Peterson's olefination.

UNIT-III: Click Chemistry: [12 Hours]
Introduction to click chemistry Copper(I)-catalyzed azide-alkyne cycloaddition (CuAAC), Strain-promoted azide-alkyne cycloaddition (SPAAC), Strain-promoted alkyne-nitrone cycloaddition (SPANC)
Reactions of strained alkenes: Alkene and azide [3+2] cycloaddition, Alkene and tetrazine inverse electron demand Diels-Alder, Biorthogonal Chemistry:

UNIT-IV: Reactions of unactivated carbon-hydrogen bonds: [12 Hours]

Unactivated carbon-hydrogen bonds: Definition, mechanism and synthetic applications- The Hoffmann-Loeffler-Freytag reaction (HLF reaction)-cyclisation reactions of Nitrenes-the Barton reaction-Photolysis of organic hypohalites, hypochlorites, hypobromites and hypoiodites,

UNIT-V: A) Asymmetric Synthesis [12 Hours]

Topocity – Prochirality – Substrate selectivity – Diastereoselectivity and enantioselectivity –Substrate controlled methods – use of chiral substrates – examples Auxiliary controlled methods – Use of chiral auxiliaries – Chiral enolates – alkylation of chiral imines-Reagent controlled methods – Use of chiral reagents – Asymmetric oxidation – Sharpless epoxidation – Asymmetric reduction – borate reagents.

Text Books:

1. Some Modem Methods of Organic Synthesis W. Carothers, Third Edition, Cambridge University Press, Cambridge, 1988.
2. Modern Synthetic Reactions, Herbert O. House, Second Edition, W.A. BenzamineInc. Menio Park, California, 1972.
3. Principle of Organic Synthesis- R.O.C. Norman and J. M. Coxon. (ELBS)
4. Advanced organic chemistry part A & B; Fourth edition; Francis A Cary and Richard J. Sundberg; Kluwer Academic/Plenum Publisher New York, 2000.
5. Organic chemistry Jonathan Clayden, Nick Geeves, Stuart Warren, 2nd Edition, 2012, Oxford University Press.
6. Stereochemistry of organic compounds — Principles & Applications by D Nasipuri.
7. Stereochemistry of Carbon compounds by Ernest L Eliel& Samuel H. wilen.
8. Stereochemistry: Conformation & Mechanism by P S Kalsi.
9. The third dimension in organic chemistry, by Alan Bassendale.
10. Stereo selectivity in organic synthesis by R S Ward.
11. Asymmetric synthesis by Nogradi.
12. Asymmetric organic reactions by J D Morrison and H S Moschcr.
13. Principles in Asymmetric synthesis by Robert E. Gawley & JEFFREY AUBE.

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