Lecture Plan

Name of the college: Government College of Arts, Science and Commerce, Sanquelim- Goa

Name of Faculty: Dr. Rajesh R.Parvatkar	**Subject:** Chemistry	
Paper code: CHC-107	**Program:** T Y BSc	**Division:** A
Academic year: 2024 - 2025	**Semester:** V	**Total Lectures: 30**

1. **Course Objectives: :** To explain the concept of aromaticity.
2. To discuss mechanistic aspects of electrophilic and nucleophilic aromatic substitution.
3. To explain related to reactivity and orientation of activating and deactivating groups.
4. To elaborate upon classical methods for structure elucidation of Nicotine, Papaverine and Hygrine.

.

Expected Course Outcome:

Student Learning Outcome: Students will be able to

1. Explain the mechanisms, reactivity and orientation in aromatic electrophilic and nucleophilic substitution reactions
2. Discuss the methods of structure elucidation and synthesis of some alkaloids
3. Explain and apply the spectroscopic methods in IR, NMR and MS in structure elucidation.

Month	Lecture From	Lecture To	No. of lectures allotted	Topic, Subtopic to be covered	Exercise/ Assignment	ICT Tools	Reference books
June	28/06/2024	29/06/2024	2	**1. Aromaticity, Aromatic hydrocarbons and Reactivity**		Smart Board/PPT	Morrison and Boyd, Organic Chemistry; 6th Edn.

				Electrophilic Aromatic substitution (w.r.t Benzene): Mechanism of Nitration,			
July	01/07/2024	06/07/2024	2	**1. Aromatic hydrocarbons and Reactivity** Sulphonation, Halogenation, Friedel – Crafts alkylation and acylation. Reactivity and orientation of activating, deactivating groups (ortho, para and meta effects).		Smart Board/PPT	Morrison and Boyd, Organic Chemistry; 6th Edn.
July	08/07/2024	13/07/2024	2	**1. Aromaticity, Aromatic hydrocarbons and Reactivity** Nucleophilic aromatic substitution of Aryl halides (SNAr mechanism).		Smart Board/PPT	Morrison and Boyd, Organic Chemistry; 6th Edn.
July	15/07/2024	20/07/2024	2	**2. Alkaloids** Ziesel's Method, Herzig-Meyer's method, Hoffman's exhaustive methylation method. Structure elucidation of Nicotine, Synthesis of Nicotine from Succinimide.		Smart Board/PPT	I.L.Finar, Organic Chemistry Vols I and II, Orient Longman

July	22/07/2024	27/07/2024	2	**2. Alkaloids** Structure elucidation of Papaverine Synthesis of Papaverine using Bischler-Napieralski reaction.		Smart Board/PPT	I.L.Finar, Organic Chemistry Vols I and II, Orient Longman
July/ August	29/07/2024	03/08/2024	2	**2. Alkaloids** Structure elucidation of Hygrine Synthesis of Hygrine from Pyrrole.		Smart Board/PPT	I.L.Finar, Organic Chemistry Vols I and II, Orient Longman
August	05/08/2024	10/08/2024	2	**3. Spectroscopic methods in Organic Chemistry** Infra Red Spectroscopy: Principle of I.R Spectroscopy (Hooke's law), types of molecular vibrations (Stretching and bending). Source, instrumentation and working of I.R spectrophotometer. Functional group region and Fingerprint region. Applications of I. R. Spectroscopy:		Smart Board/PPT	P.S. Kalsi, Spectroscopy of Organic compounds
August	12/08/2024	17/08/2024	2	**3. Spectroscopic methods in Organic Chemistry** Functional group analysis, detection of purity of sample, establishing the identity of an unknown		Smart Board/PPT	P.S. Kalsi, Spectroscopy of Organic compounds

				molecule, Effect of H-bonding, conjugation, resonance and ring size on IR absorptions. To study the progress of a reaction. Problems based on I.R. spectroscopy (ketone, aldehyde, ester, acid & alcohol).			
August	19/08/2024	24/08/2024	2	**3. Spectroscopic methods in Organic Chemistry** Nuclear Magnetic Resonance Spectroscopy: Basic Principles of 1H NMR spectroscopy, Number of signals (Homotopic, Enantiotopic, diastereotopic protons).		Smart Board/PPT	P.S. Kalsi, Spectroscopy of Organic compounds
August	26/08/2024	31/08/2024	2	**3. Spectroscopic methods in Organic Chemistry** Position of signals, Chemical shift: Reference standard, Solvent effect, Shielding and deshielding effect, anisotropic effects in alkenes, alkynes, aldehydes, aromatic compounds, factors affecting chemical shift.		Smart Board/PPT	P.S. Kalsi, Spectroscopy of Organic compounds
September	02/09/2024	07/09/2024	2	**3. Spectroscopic methods in Organic Chemistry** Intensity of signals: Peak area and proton counting.		Smart Board/PPT	P.S. Kalsi, Spectroscopy of Organic compounds

				Spin-Spin coupling: Coupling constant (J). Interpretation of NMR spectra of simple compounds. (acetone, acetaldehyde, toluene, ethyl bromide, anisole, acetic acid, t-butylbenzene, 2-butanone, propene).			
September	09/09/2024	14/09/2024	**GANESH CHATURTHI BREAK**				
September	16/09/2024	21/09/2024	2	**3. Spectroscopic methods in Organic Chemistry** Simple problems based on NMR spectral data for identification of molecule.		Smart Board/PPT	P.S. Kalsi, Spectroscopy of Organic compounds
September	23/09/2024	28/09/2024	2	**3. Spectroscopic methods in Organic Chemistry** Problems based on ^{13}C spectroscopy. Principle, theory, instrumentation of Mass spectrometry.		Smart Board/PPT	P.S. Kalsi, Spectroscopy of Organic compounds
September/ October	30/09/2024	05/10/2024	2	**3. Spectroscopic methods in Organic Chemistry** Base Peak, Molecular ion, Metastable ion.		Smart Board/PPT	P.S. Kalsi, Spectroscopy of Organic compounds
October	07/10/2024	12/10/2024	2	**3. Spectroscopic methods in Organic Chemistry** Fragmentation pattern for alkanes. Fragmentation pattern of ketones: α-cleavage and McLafferty			P.S. Kalsi, Spectroscopy of Organic compounds

				rearrangement. Isotopic effect of alkyl halides.			
October	14/10/2024	19/10/2024	2	**3. Spectroscopic methods in Organic Chemistry** Problem-solving spectroscopy		Smart Board/PPT	P.S. Kalsi, Spectroscopy of Organic compounds
October	21/10/2024	21/10/2024	1	**3. Spectroscopic methods in Organic Chemistry** Problem-solving spectroscopy			

Practical Plan

Name of the college: Government college of Arts Science and commerce Sanquelim Goa.

Name of Faculty: Dr. Rajesh R. Parvatkar	**Subject:** Chemistry	
Paper code: CHC-107	**Program: T.Y.B.Sc**	**Division: Batch III and IV**
Academic year: 2024 - 2025	**Semester: V**	**Total Practicals/Labs: 30 (120 hours)**

Credits: 2

Course Objectives:

- To explain theoretical concepts required for experiments and develop hands on experience with reference to basic laboratory techniques required for organic preparations, estimations and identification and separation of organic binary mixtures.
- • To discuss the interpretation of Infra-Red and proton NMR spectra by applying the concepts studied in theory.

Expected Course Outcome:

Student Learning Outcome:

1.Students will able to perform titrimetric analysis for organic estimation.
2.They will be able to perform multistep organic preparations.
3.They will able to analyse IR and NMR Spectra

Month	Practicals/Labs Scheduled Date	No. of Practical's/Labs planned	List of Experiments	Reference books
June	28/06/2024-29/06/2024		Practical's not started	-
July	01/07/2024-06/07/2024	2	**Organic Estimations**	Practical Organic Chemistry, Vishnoi

			Acid+ Amide	
July	08/07/2024-13/07/2024	2	**Organic Estimations** Acid + Ester	Practical Organic Chemistry, Vishnoi
July	15/07/2024-20/07/2024	2	**Organic Estimations** Estimation of the number of acetyl groups in an acetyl ester	Practical Organic Chemistry, Vishnoi
July	22/07/2024-27/07/2024	2	**Organic Preparations (Two steps):** Benzophenone to Benzanilide Step I	A.I. Vogel, A.R. Tatchell , B. S. Furniss, A.J. Hannaford, *Vogel's Textbook of Practical Organic Chemistry*, 5th Ed., Practical organic chemistry, F G Mann and B C Saunders,
July /August	29/07/2024-03/08/2024	2	**Organic Preparations (Two steps):** Benzophenone to Benzanilide Step II	A.I. Vogel, A.R. Tatchell , B. S. Furniss, A.J. Hannaford, *Vogel's Textbook of Practical Organic Chemistry*, 5th Ed., Practical organic chemistry, F G Mann and B C Saunders,
August	05/08/2024-10/08/2024	2	**Organic Preparations (Two steps):** Nitrobenzene to m-nitroaniline Step I	A.I. Vogel, A.R. Tatchell , B. S. Furniss, A.J. Hannaford, *Vogel's Textbook* *of Practical Organic Chemistry*, 5th Ed., Practical organic chemistry, F G Mann and B C Saunders,
August	12/08/2024-17/08/2024	2	**Organic Preparations (Two steps):** Nitrobenzene to m-nitroaniline Step II	A.I. Vogel, A.R. Tatchell , B. S. Furniss, A.J. Hannaford, *Vogel's Textbook* *of Practical Organic Chemistry*, 5th Ed., Practical organic chemistry, F G Mann and B C Saunders,
August	19/08/2024-24/08/2024	2	**Organic Preparations (Two steps):** Benzoin to benzilic acid Step I	A.I. Vogel, A.R. Tatchell , B. S. Furniss, A.J. Hannaford, *Vogel's Textbook* *of Practical Organic Chemistry*, 5th Ed., Practical organic chemistry, F G Mann and B C Saunders,
August	26/08/2024-31/08/2024	2	**Organic Preparations (Two steps):**	

			Benzoin to benzilic acid Step II	A.I. Vogel, A.R. Tatchell , B. S. Furniss, A.J. Hannaford, *Vogel's Textbook of Practical Organic Chemistry*, 5th Ed., Practical organic chemistry, F G Mann and B C Saunders,
September	02/09/2024-07/09/2024	**CHATURTHI BREAK**		
September	09/09/2024-14/09/2024	2	**Organic Preparations (Two steps):** Acetanilide to p-nitroaniline Step I	A.I. Vogel, A.R. Tatchell , B. S. Furniss, A.J. Hannaford, *Vogel's Textbook of Practical Organic Chemistry*, 5th Ed., Practical organic chemistry, F G Mann and B C Saunders,
September	16/09/2024-21/09/2024	2	**Organic Preparations (Two steps):** Acetanilide to p-nitroaniline Step II	A.I. Vogel, A.R. Tatchell , B. S. Furniss, A.J. Hannaford, *Vogel's Textbook of Practical Organic Chemistry*, 5th Ed., Practical organic chemistry, F G Mann and B C Saunders,
September	23/09/2024-28/09/2024	**2**	**Synthesis of dyes** Diazoaminobenzene	A.I. Vogel, A.R. Tatchell , B. S. Furniss, A.J. Hannaford, *Vogel's Textbook of Practical Organic Chemistry*, 5th Ed., Practical Organic Chemistry, Vishnoi
September/October	30/09/2024-05/10/2024	2	**Interpretation of Infra Red, and proton NMR spectra.** Proton NMR of simple organic compounds(6 compounds)	Silverstein, Bassler and Morill, Spectrometric Identification of Organic Compounds.
October	07/10/2024-12/10/2024	2	Repetition	
October	14/10/2024-19/10/2024	2	Revision	
October	21/10/2024-22/10/2024	1	Journal certification	

***Assessment Rubrics**

Component	Max Marks
ISA 1	10
ISA 2	
Practical	50
Project	-
Semester End Exam	40