V - SEMESTER

Course 14A: Synthetic Organic Chemistry.

Credits: 03

I. Learning Outcomes:

Students after successful completion of the course will be able to:

1) Identify the importance of reagents used in the synthesis of organic compounds.
2) Acquire knowledge on basic concepts in different types of pericyclic reactions.
3) Understand the importance of retro synthesis inorganic chemistry.
4) Comprehend the applications of different reactions in synthetic organic chemistry.

II. Syllabus:

Unit-1:Pericyclic reactions 9 hours

Definition and classification of pericyclic reactions: Phases, nodes and symmetry properties of molecular orbital's in ethylene,1,3-butadiene,1,3,5-hexatriene,alkylationandallylradical. Thermal and photochemical reactions. Electro cyclic reactions: Definition and examples, definitions of con and disrotation,Woodward-Hoffmann selection rules.(Correlation diagrams excluded) Cyclo addition reactions: Definition and examples, definitions of supra facial and antar facial addition, Woodward- Hoffmann selection rules. (Correlation diagrams excluded)

Unit-2 : Organic photochemistry 9hours

Jablonski diagram-singlet and triplet States Photochemistry of Carbonyl compounds $n{-}\pi^*$ and $\pi{-}\pi^*$transitions, Norrish type-1and type-2reactions Paterno–Buchi reaction.

Unit-3 : Retrosynthesis 9 hours

Important terms in Retro synthesis with examples-Disconnection, Target molecule, FGI, Synthon, Retrosynthetic analysis, chemo selectivity, region selectivity. Importance of Order of events in organic synthesis. Retrosynthetic analysis of the compounds: a) cyclohexene b)4-Nitro toluene c) Paracetamol.

Unit-4 : Synthetic Reactions 9 hours

Shapiro reaction, Stork - enamine reaction(only alkylation),Wittig reaction, Robinson annulation, Bailys-Hillman reaction, Heck reaction, Suzuki coupling. Synthesis of aldehydes and ketones using1, 3-Dithiane.

Unit-5 : Reagents in Organic Chemistry 9 hours

Oxidizing agents:PCC,PDC,SeO_2 (Riley oxidation), NBS.

Reducing agents : $LiAlH_4$(with mechanism), LTBA, Metal-solvent reduction (Birch reduction), Catalytic reduction.

III. Suggested Co-Curricular Activities:

1) Training of students by related industrial experts.
2) Assignments, Seminars and Quiz (on related topics), collection of relevant videos and material.
3) Visits to laboratories, firms, research organizations etc.
4) Invited lectures and presentations on related topics by field / industrial experts.

IV. List of Reference books:

1) Pericyclic reactions by Ian Fleming, Second edition,Oxford University press.
2) Pericyclic Reactions- A Text book: Reactions, Applications and Theory by S.Sankararaman, WILEY-VCH.
3) Reaction Mechanism in Organic Chemistry by S.M. Mukherji and S.P.Singh, Revised edition, Trinity Press.
4) Pericyclic reactions – A Mechanistic study by S.M.Mukherji, Macmillan India.
5) Organic synthesis :The disconnection approach by Stuart Warren, John Wiley&Sons.
6) Organic chemistry by Jonathan Clayden, Nick Greeves and Stuart Warren, Second edition, Oxford university press.
7) Reactions, Reagents and Rearrangements by S.N. Sanyal, Bharati Bhawan Publishers &Distributors

V - SEMESTER

Course - 14-A Synthetic Organic Chemistry

Credits: 01

V. Learning Outcomes:

On successful completion of this practical course, student shall be able to:

1) Perform the organic qualitative analysis for the detection of N, S and halogens using the green procedure.
2) Learn the procedure for the separation of mixture famine acids using paper Chromatography.
3) Prepare the TLC plates for TL chromatography.
4) Acquire skills in conducting column chromatography for the separation of dyes in the given mixture.

VI. Laboratory course syllabus:

1) Green procedure for organic qualitative analysis: Detection of N,S and halogens
2) Separation of given mixture of amino acids (glycine and phenyl alanine) using ascending paper chromatography.
3) Separation of a given dye mixture (methyl orange and methylene blue) using TLC (using alumina as adsorbent).
4) Separation of mixture of methyl orange and methylene blue by column chromatography
5) Separation of food dyes using Column Chromatography
6) Separation of triglycerides using TLC

VII. Suggested Co-Curricular Activities

1) Mandatory:*(Lab/field training of students by teacher:(lab:10+field:05*):
2) For Teacher: Training of students by the teacher in laboratory and field for not lessthan15 hours on the field techniques/skills of detection of N, Sand halogens using thegreen procedure, preparation of TLC plates, detection of organic compounds using Rf values in TLC / paper chromatography, loading of column, selection of solvent

system for column chromatography, separation of amino acids and dye mixture using chromatographic techniques.

3) For Students : Student shall visit a related industry/chemistry laboratory in universities/research organizations/private sector facility and observes the synthetic reactions. Write their observations and submit a hand written fieldwork/project workreportnotexceeding10 pages in the given format to the teacher.

4) Max marks for Fieldwork/project work Report:05.

5) Suggested Format for Fieldwork/project work: *Title page, student details, index page, details of place visited, observations, findings, and acknowledgements.*

6) Unit tests(IE).

VIII. List of Reference books :

1) VogelA.I.Practical Organic Chemistry, Longman Group Ltd.

2) Bansal R.K. Laboratory Manual of Organic Chemistry, Wiley-Eastern.

3) Ahluwalia V. K. and Aggarwal R. Comprehensive Practical Organic Chemistry, University press.

4) MannF.G and Saunders B.C, Practical Organic Chemistry, Pearson Education.