RAJARSHI SHAHU MAHAVIDYALAYA, (AUTONOMOUS)

LATUR – 413512

DEPARTMENT OF CHEMISTRY

Syllabus

M.Sc. (Second Year) Organic Chemistry

(III & IV Semester)

CBCS Pattern

With Effect from 2022-2023

Rajarshi Shahu Mahavidyalaya (Autonomous), Latur
Syllabus
Faculty of Science
M.Sc. (Second Year) Organic Chemistry
Semester – III

Paper	Code No.	Title of the course	Hours/ Week	Marks(100)		Credits
				In Sem	End Sem	
IX	P-ASM-343	Advanced Spectroscopic Methods	04	40	60	04
X	P-OTF-344	Organic Transformation	04	40	60	04
XI	P-CNP-345	Chemistry of Natural Products	04	40	60	04
XII	P-MDC-346(A) P-POC-346(B)	Elective: A.Medicinal Chemistry B.Polymer Chemistry	04	40	60	04
IX	P-LAC-347	Lab Course-IX	04	20	30	02
X	P-LAC-348	Lab Course –X	04	20	30	02
XI	P-LAC-349	Lab Course XI	04	20	30	02
		Seminar			25	01
	Total			**575**		**23**

Theory Papers 100 Marks: (Internal 40*+External 60*)
*External S.E.E. 60 Marks Theory
* Internal 40 Marks (Two unit test -30 marks+ Attendance 10Marks)
Unit Test I MCQ patterns 60 MCQ questions
Unit Test II Activity Based 60 Marks

Unit test (I+ II) = 120 converted to 30 Marks

M.Sc. (Second Year) Organic Chemistry

Semester - IV

Paper	Code No.	Title of the course	Hours/ Week	Marks(100)		Credits
				In Sem	End Sem	
XIII	P-ASM-439	Advanced Synthetic Methods	04	40	60	04
XIV	P-STE-440	Stereochemistry	04	40	60	04
XV	P-AHC-441	Advanced Heterocyclic Chemistry	04	40	60	04
XVI	P-AOC-442(A) P-DAI-442(B)	Elective: A.Applied Organic Chemistry B. Dyes andIntermediates	04	40	60	04
XII	P-LAC-443	Lab Course-XII	04	20	30	02
XIII	P-LAC-444	Lab Course –XIII	04	20	30	02
XIV	P-LAC-445	Lab Course XIV	04	20	30	02
XV	P-LAC-446	Lab Course XV (Project) Annual	04	40	60	04
		Seminar			25	01
	Total				**725**	**27**

Theory Papers 100 Marks: (Internal 40*+External 60*)

*External S.E.E. 60 Marks Theory

* Internal 40 Marks (Two unit test -30 marks+ Attendance 10Marks)

Unit Test I MCQ patterns 60 MCQ questions

Unit Test II Activity Based 60 Marks

Unit test (I+ II) = 120 converted to 30 Marks

Rajarshi Shahu Mahavidyalaya (Autonomous), Latur
Syllabus
M.Sc. II (Organic Chemistry) (Semester – III)
(w.e.f. – 2020-21)
Paper IX
Core Course Title - Advanced Spectroscopic Methods
Course Code: P-ASM-343

Marks:100 **Periods:60**
Credit:04 **04 Per Week**

Learning Objective:

1. 1. To study principles of different advanced spectroscopic methods such as UV,IR, ^{1}H-NMR and Mass-spectrometry methods for the analysis of organiccompounds.

2. Tostudyapplicationsofallspectroscopicmethodsfortheelucidationofstructuresofan organiccompounds.

Course Outcome:

1. After studying UV, IR, ^{1}H-NMR and Mass-spectrometry methods, students will be able to detect the nature as well as structure of organiccompounds

2. Studentswillbeskilledinproblemsolving,criticalthinkingandanalyticalreasoningas applied to scientificproblems.

3. By gaining knowledge of spectroscopic techniques students will be able to explorenew areas of research in both chemistry and allied fields of science andtechnology

Unit-I UV and IRSpectroscopy: **15Periods**

A) UltravioletSpectroscopy

Introduction: spectroscopy, electromagnetic spectrum, Various Electronic transitions, Chromophores, Auxochromes, Bathochromic and Hypsochromic shifts, Hyperchromic and, Hypochromic shift, Effect of solvent on electronic transitions, Woodward-Fieser rules for dienes, polyenes, enones and aromatic compounds, Application of U.V. Spectroscopy.

B) IRSpectroscopy

Introduction, molecular vibration, fundamental modes of vibration, Hookes law, presentation of IR spectra, functional group region, finger print region, overtones; combination bands and Fermi resonance. Characteristic vibrational frequencies of alkanes;

alkenes; alkynes; aromatic compounds; alcohols; ethers; phenols and amines. Detailed study of vibrational frequencies of carbonyl compounds [ketones; aldehydes; esters; amides; acids; anhydrides; lactones; lactams and conjugated carbonyl compounds] Effect of hydrogen bonding and solvent on vibrational frequencies.

Unit-II NMRSpectroscopy : 15 Periods

General introduction and definition; Principle of NMR spectroscopy.

PMR spectroscopy: spinning nuclei, magnetic moment and magnetic field, precessional motion, orientation and nuclear resonance, Equivalent and naoequivalent proton, Chemical shift; spin –spin interaction; shielding and deshielding mechanism of measurement; chemical shift values and correlation for protons bonded to carbons [aliphatic; olefinic; aldehydic and aromatic] and other nuclei [alcohols; phenols; enols; acids; ammines; amides and mercapto]; solvent effect. Fourier transform technique; nuclear overhauser effect [NOE]

Unit-III MassSpectrometry : 15Periods

Introduction- ion production- EI, CI, FD and FAB, factors affecting fragmentation, ion analysis, ion abundance. Mass spectral fragmentation of organic compounds, common functional groups, molecular ion peak, metastable peak, McLafferty rearrangement, nitrogen rule. Examples of mass spectral fragmentation of organic compounds with respect to their structuredetermination.

Unit –IV C^{13}NMRSpectroscopy: 15Periods

A) Carbon-13 NMR Spectroscopy

Resolution and multiplicity of ^{13}C NMR, ^{1}H-decoupling, noise decoupling, broad band decoupling; NOE signal enhancement, off- resonance, proton decoupling, Structural applications of CMR. DEPT. Calculations of chemical shift [Saturated, Unsaturated (Olefinic&Acetylenic) and substituted aromatic Carbon atom]

B)Structural problems based on combined spectroscopictechniques.

References :

1. V.M. Parikh, Application spectroscopy of organic molecules.(Mehata)
2. D.W. Williams and Flemming, Spectroscopic methods of organiccompound.
3. Silverstein and Basallar, Spectroscopic identification of organic compoundsV.M.Parikh
4. OrptionSpectroscipy of Organic Molecules (J. Wiley)
5. P.S. Kalsi Spectroscope of organic compounds (New age publisher)
6. J.R. Dyer. Application of absorption spectroscopy of organiccompounds.
7. Jackman and Sterneil , Application of NMRspectroscopy
8. J.D. Roberts, Nuclear magnetic resonance (J.Wiley)
9. Jafee and Orchin, Theory and application ofU.V,
10. K. Benjamin. Massspectroscopy
11. Beynon J H et.al , The mass spectra of organicmolecules.
12. Wehli F.W, Marchand A. P. Interpretation of carbon 13 NMR (J. Wiley)
13. W. Kemp, Organic spectroscopyELBS
14. Willard Merritt and Dean. Instrumental methods of analysisCBS
15. Das and Jame , MassSpectroscopy..
16. Organic spectroscopy Y. R .Sharma
17. Organic spectroscopyPavia

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Paper X
Core Course Title - Organic Transformation
Course Course Code: P- OTF-344

Marks:100 **Periods:60**
Credit:04 **04 Per Week**

Learning Objective:

1.To understand the general mechanistic consideration, nature of migration, migratory aptitude
of various rearrangements
2.To learn mechanism, sterochemistry and synthetic applications of selective organic reactions.
3.Understand about different oxidativeprocesses.
4.To know about different reductiveprocesses.

Course Outcome:
After successful completion of the course the students will :

1.Understand the general mechanistic consideration, nature of migration, migratory aptitude
of Baeyer-Villiger, Benzillic acid, Fovorskii, : Fries, Claisen rearrangements
2. Learn mechanism, stereochemistry and synthetic applications of Stork Enamine, Chichibabin, Diels-Alderetc.reactions
3. Understand about Oxidative cleavage of 1,2-diols, oxidation of allylic and benzylic C-H bonds
4. Know about different Catalytic hydrogenation, Wolff-Kishner and diimidereductions.

Unit – IRearrangements: **15Periods**

General Mechanistic Consideration, Nature of migration, migratory aptitude
Memory Effects of following rearrangements:

b) Rearrangement to Electron Deficient Carbon: Pinacol-pinacolone, Wagner-Meerwein, Benzillic acid, Wolf (Arndt–Eisterts Synthesis) Rupe and Demjanovrearrangements.
c) Rearrangement to Electron Deficient Nitrogen: Hofman, Curtius, Schimdt, Lossen and Beckmannrearrangements

d) Rearrangement to Electron Deficient Oxygen: Baeyer-Villigerrearrangement.

e) RearrangementtoElectronRichCarbon:Fovorskii,Wittig,NeberandSteven's rearrangements.

f) Aromatic Rearrangement: Fries, Claisen and Benzidinerearrangement, Smiles rearrangement.

Unit – II Selective OrganicReactions: 15Periods

Mechanism, Sterochemistry and Synthetic Applications of following reactions

a) Stork Enamine, Chichibabin, Diels-Alder, Bucherer, Ullmann, Chugaev, Biginelli, Prins, Hunsdiecker Reactions, Arbuzov reaction, Bamfordstevens reaction, Baylis – Hillman reaction, Dakin reaction, Darzene reaction.

b) Negishi, Suzuki, Stille, Kumada,Heck couplingreactions.

Unit-III: OxidationReaction:15 Periods

Introduction, different oxidative processes.

a) Alcohols to carbonyl compounds: Chromium (VI) oxidants, Dimethyl sulfoxide andits modifications (Swern Oxidation), Mangnese (IV) oxide, Silver carbonate, Oppenauer oxidation.

b) Alkenes to epoxides: Peroxide induced epoxidation-epoxidation by H_2O_2,hydroperoxides andperoxyacids.

c) Alkenestodiols:oxidationbypotassiumpermanganate,Osmiumtetraoxide,Prevost oxidation and Woodwardmodifications.

d) Oxidative cleavge of 1,2-diols: Periodic acid, LeadTetraacetate.

e) Oxidation of allylic and benzylic C-H bonds: NBS, DDQ, Chloranil,SeO_2.

Unit- IV ReductionReaction: 15Periods

Introduction, different reductive processes.

a) Catalytic hydrogenation: Homogenious and heterogeneous catalyticreductions.

Dissolving metal reductions including Birchreduction, Lindlar reduction, Luche reduction

b) Metal hydride reductions: Nucleophilic metal hydrides, LiAlH4, andNaBH4.

c) Non-metallic reductions: Wolff-Kishner and diimidereductions.

d) Electrophilic metal hydrides: BH_3 andDIBAL-H

References:

1. Designing Organic Synthesis – S. Warren,Willey
2. Some Modern Methods of Organic Synthesis, W. Carrathers, Cambridege Univ.Press
3. Modern syntetic reactions, H.O. House, W.A.Benjamin
4. Advanced Organic Reactions, Reactions, Mechanisms and Structure, J. March,Wiley
5. Principles of Organic Synthesis, R.O.C. Norman and J.M. Coxon, Blackie Academic and Professional
6. Advanced Organic Chemistry Part - B,F.A.Carey and R.J. Sundberg, PlenumP.
7. Organic Reaction and Their mechanisms, P.S. Kalsi, New Age InternationalPublishers.
8. Protective Groups in Organic Synthesis, T.W. Greene and P.G.M. Wuts. IIndEdition, John Wiley and Sons1991.
9. Organic synthesis: The Disconnection Approach, sturant Warren, John Wiley andsons.

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Paper XI
Core Course Title - Chemistry of Natural Products
Course Code: P-CNP-345

Marks:100 **Periods:60**
Credit: 04 **04 Per Week**

Learning Objective:

1.To learn general methods of structure determination, isoprene rule and synthesis of Terpenoids & Carotenoids.

2.To understand nomenclature, occurrence, isolation, classification and synthesis of alkaloids

3.To know isolation, structure determination and synthesis of steroids.

4.To learn nomenclature and general methods of structure determination, and synthesis of Anthocyanins and Flavones.

Course Outcome:

After successful completion of the course the students will:

1.Learn general methods of structure determination, isoprene rule and synthesis of Citral, Menthol, Camphor, Phytol etc.

2.Understand nomenclature, occurrence, isolation, classification and synthesis of Ephedrine, atropine, Quinine and Morphine.

3. Know isolation, structure determination and synthesis of cholesterol , Androsterone.

4.Learn nomenclature and general methods of structure determination, and synthesis of cyanin, Hirsutidin chloride, Flavones and Flavonols.

Unit - I Terpenoids&Carotenoids: **15 Periods**

Classification, Nomenclature, occurrence, isolation, general methods of structure determination, isoprene rule Structure determination, stereochemistry, and synthesis of the following representative molecules: Citral, Menthol, Camphor, Phytol, Abietic acid and β-Carotene.

Unit - IIAlkaloids : **15Periods**

Definition, nomenclature and, occurrence, isolation, classification based on nitrogen heterocyclic ring. Structure, stereochemistry and synthesis of the following: Ephedrine, atropine, Quinine and Morphine.

Unit -IIISteroids: **15Periods**

Occurrence, nomenclature, basic skeleton, Diel's hydrocarbon and stereochemistry. Isolation, structure determination and synthesis of cholesterol, Androsterone, Testosterone, Estrone, Progestrone, Aldosterone.

Unit - VI Anthocyanins andFlavones: **15 Periods**

Occurrence, nomenclature and general methods of structure determination. Synthesis of cyanidin chloride, cyanin, Hirsutidin chloride, Flavones (Kostanecki and Baker-Venkataraman approaches), Flavonols.

References :

1. The Organic chemistry of Drug Design and Drug Action, R.B.Silverman,Academicpress.
2. Natural Products: Chemistry and Biological Significance, J.Mann,R.S.Davidson,
3. J.B. Hobbs, D.V.Banthrope and J.B.Harborne, Longman,Essex.
4. Organic chemistry, Vol 2, I.L.Finar,ELBS.
5. Introduction to Flavonoids, B.A.Bohm, Harwood Academicpublishers
6. New Trends in natural product chemistry, Atta-ur-Rahman and M.I.Choudhary,Harwood Academicpublishers.

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Elective
Paper XII
Course Title – Medicinal Chemistry
Course Code: P-MDC-346 (A)

Marks:100 **Periods:60**
Credit: 04 **04 Per Week**

Learning Objective:

1. Introduction of Medicinal chemistry and itsterminology.

2. Drug designing, SAR and study of pro and softdrugs.

3. Synthesis, properties and uses of differentdrugs

4. Study of different antibiotics, their synthesis and mode ofaction.

Course Outcome:

After successful completion of the course the students will :

1. Understand about Medicinal chemistry and its terminology like pharmacodynamic agents, pharmacophore, pharmacodynamicsetc.

2. Know about Drug designing methods, SAR and study of Pro and Softdrugs.

3.Understand about Synthesis, properties and uses of analgesic, antipyretic, antiaids,antimalerialetc.drugs.

4. Learn about different antibiotics, their synthesis and mode ofaction.

Unit - I Concepts of MedicinalChemistry: **15Periods**

A) Concepts of Medicinal chemistry: Important terminology in medicinal chemistry:Drugs, Pharmacy, Pharmaceutics, Toxicology; Pharmacodynamic agents, Pharmacophore, Pharmacodynamics, metabolite and antimetabolites, chemotherapy. Mechanism of chemotherapeutic actions: 1) Biological defences2) Chemicaldefences.

a) Surface active agent, b) Metabolic antagonism. Assay of Drugs: Chemical assay, Biological assay, Immunological assay, LD-50 andED-50

Unit-II **15 Periods**

A] Drug Discovery.

i) Introduction

ii) Procedure followed in drugdesign.

iii) Lead modification: Drug design anddevelopment

a) Identification of the active part: The pharamcophore, b) Functional group modification,

c) Structure-activity relationship, d) Structure modification to increase potency and the therapeutic index; 1) Homologation, 2) Chain branching, 3) Ring-chain transformation. 4) Bioisosterism.

B] Concept of prodrugs and soft drugs.

a) Prodrugs: i) Prodrugs designing, types of prodrugs, ii) Prodrug formation of compounds containing various chemical groups.

b) Soft drugs: i) Soft drug concept ii) Properties of softdrug.

Unit III: Study of the following drugs: **15Periods**

a) Analgesic and antipyretic-Paracetamol, meperidine, aminopyrene

b) Antiinflammatory- Ibuprofen, oxyphenbutazone, indomethacin, arachidonicacid

c) Anasthatic- Lidocaine, thiopental, mechanism ofaction

d) Antihistamine- Phenobarbiton, diphenylhydramine, mechanism ofaction

e) Antiaids drugs- Cause and antiaidsdrugs

f) Antimaleria-Trimethupim, role of folic acid and its inhibition.

Unit IV:Antimicobacterialdrugs **15 Periods**

A] Antitubercular drugs:

Introduction.

a) First-line agents (Primary tubercular drugs): Structure and activity of streptomycin and dihydro-streptomycin, Synthesis and SAR of 4-amino salicylic acid andisoniazid.

b) Second line agents (Secondary antitubercular agents): Structure and activity of Rifampicin, Cycloserine, Enthionamide, Ethambutol,. (Synthesis of Cycloserine and Ethambutolexpected)

B] Antileprotic drugs.

Chaulmoogra and hydrocarpus oil, Multidrug therapy, SAR of sulphones, Dapsone (DDS), Acedapsone, (Synthesis of Acedapsone expected)

C] Antibiotics. drugs

a) Cell wall synthesis inhibitors (β-Lactam antibiotics): Synthesis of Penicillin-V, Penicillin-G, amoxicillin, ampicilin from 6-APA, Structure and activity of benzyl penicillin, semi-synthetic penicillin, cephalosporin, Mode of action of penicillin and cephalosporin.

b) Protein synthesis inhibitors: Structure activity of tetracycline Synthesis and SAR of chloramphenicol, Mode of action of chloroamphenicol.

References :

1.Medicinal chemistry-William O.Foye

2. T. B. of Organic medicinal and pharmaceutical chemistry-Wilson and Gisvold's (Ed.Robert F.Dorge)

3. An introduction to medicinal chemistry-Graham L.Patrick

4. Principles of medicinal chemistry (Vol. I and II)-S. S. Kadam, K. R. Mahadik and K.G. Bothara (Niraliprakashan)

5. Medicinal chemistry (Vol. I andII)-Burger

6. An introduction to drug design-S. S. Pandeya and J. R. Dimmock (New ageinternational)

7.The organic chemistry of drug design and drug action-R. B. Silverman(Academic Press)

8.Strategies for organic drug synthesis and design-D. LednicerWiley

Elective Paper

Paper XII

P-POC-342(B)

Core Course Title – Polymer Chemistry

Marks:100 **Periods:60**
Credit: 04 **04 Per Week**

Learning Objective:

1.To understand the concepts of Petroleum based raw materials, types and source ofcrude oils

acetylene and derivatives, propylene and derivatives

2. To know about Chain/step growth polymers, Nomenclature of polymers, names based onsource

3.To familiarize with , H-T and H-H polymerization, ATRP, RAFT and nitroxidemediated polymerization.

4. Tounderstand aboutbasicconceptsofcationicandanionicmethodsofpolymerization, Ring openingpolymerization.

Course Outcome:

After completion of course students will know about:

1.The concepts of Petroleum based raw materials, types and source of crude oilsacetylene and derivatives, propylene andderivatives

2. Types of polymers. linear, branched, hyperbranched, star brancheddendrimers.

3. Experimentaldeterminationofrateofpolymerization.Initiationbyfreeradical,redox, photochemical, ionizing radiation and thermalmethods.

Unit 1 : RAW MATERIALS AND INTERMEDIATESFORPOLYMERS 10Periods

Petroleum based raw materials: Crude oil, natural gas, petroleum hydrocarbons, types and source of crude oil, refining various petroleum fractions, cracking (thermal and catalytic), knock and octane rating, petrochemical as building blocks, Acetylene and derivatives, propylene and derivatives, butane/butene, butadiene fractions, BTX and their derivatives: Polymer feed stocks (monomers, solvents), petroleum industry Carbon monoxide, Carbon dioxide as building block for monomers and polymers

Unit 2: CLASSIFICATIONOFPOLYMERS **10Periods**

Addition- condensation, (Chain/step growth polymers) organic-inorganic, natural-synthetic, polarnonpolar with suitable examples, types of polymers. linear, branched, hyperbranched, star branched dendrimers, semiladder, ladder, crosslinked, and layer-latties- polymers. Nomenclature of polymers, names based on source, based on structure (IUPAC and Non IUPAC) Trade names.

Unit 3: RADICALCHAINPOLYMERIZATION **16Periods**

Structural arrangement of monomer units, propagation modes, H-T and H-H polymerization, mechanism and kinetics: energetics, experimental determination of rate of polymerization. Initiation by free radical, redox, photochemical, ionizing radiation and thermal methods, efficiency of initiator in transfer reactions, retardation, autoacceleration. Controlled radical polymerization. ATRP, RAFT and nitroxide mediated polymerization.

Unit 3 :CHAINPOLYMERIZATION **12 Periods**

Basic concepts of cationic and anionic methods of polymerization, distinguishing between radical and ionic polymerization. Group transfer polymerization. Ring opening polymerization, mechanism of ROP of cyclic ethers, cyclic amides and cyclosiloxanes; Ring opening metathesis polymerization.

Unit 4: STEPGROWTHPOLYMERIZATION **12Periods**

Polymerization which proceed with C-C, C-O and C-N bond formation Suzuki, Heck, ADMET, Chain-growth polycondensation [examples-polyamides, polyether-ketones], enzyme/metal catalyzed step growth polymerization; Reactivity of functional groups, basis for analysis of step growth polymerization kinetics. Kinetic equation for polyesterification, Carothers equation for DP, control of molecular weights in linear step-growth polymers.

References :

1. P. Rempp and E.W. Merill Polymer Synthesis Huethig and WepfVerlag,Basel

2. Polymer Synthesis Theory and Practice D. Braun, H. Cherdrown and H.Ritter Springer,Heidelberg (2001) ISBN 3-540–41697-8

3. Principles of Polymer Chemistry, 2Nd Ed. A Ravve Kluwer Academic Publisher (2000) ISBN 0-306-48368-7

4. OrganicChemistryofSyntheticHighPolymersR.W.LenzIntersciencePublishers,New York(1967)

5. Principles of Polymer Chemistry, P. J.Flory.

6. Principles of Polymerization, G. Odian, John Wiley & Sons(1981).

7. Polymer Chemistry, B.Vollmert, Springer Verlag (1973) 22. StructureProperty Relationship in Polymers, R. B. Seymour and C. E. CarraherJr.

8. Fundamental Principles of Polymeric Materials, S. L.Rosen.

9. Principles of Polymer Engineering, N. G. Mecrum, C. P. Buckley, C. B.Bucknall.

10. Introduction to Physical Polymer Science, L. H.Sperling.

11. Polymer Processing Fundamentals, T. A.Osswald.

12. Commercial Polymer Blends, L. A.Utracki.

13. Polymer Chemistry, M. G. Arora & M. Singh, (AmolPublPvt.Ltd. New Delhi- 110002)

M. Sc. III Semester
Laboratory Course-IX
Mixture Analysis
Course Code: P-LAC-347

Marks:50 **Periods:60**
Credit:02 **06 Periods PerWeek**

Learning Objective:

1. Tounderstandanalysisofternarymixturesoforganiccompoundbyseparationwith physical methods.
2. Learn about chromatographic Separation (TLC)techniques.

Course Outcome:

1. Students will able to separate ternary mixture and can analyse each component ofthe mixture.
2. They can know about chromatographic Separation (TLC)techniques.

Qualitative Analysis (At least 05 Organic Mixtures)

Semi-micro Qualitative Analysis of Ternary Mixtures (Two Solids and One Liquid) containing single/poly functional compounds by Chemical and Physical Method with Chromatographic Separation (TLC) for purity of all three components and its Expected Theoretical Spectral Data (IR, ^{1}H NMR &^{13}C NMR).

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M. Sc. Semester III
Laboratory Course-X
Synthesis of Organic Molecules
Course Code: P-LAC-348

Marks:50 **Periods:60**
Credit:02 **06 Periods PerWeek**

Learning Objective:

1. To synthesize different multicomponentreactions.
2. To learn the use of ultrasound in synthesis f organiccompounds.

Course Outcome:

1. They obtained the skill in synthesis of different multicomponentreactions.
2. They can use of ultrasound in synthesis f organiccompounds.

1. Multistage Synthesis (At least four):

a) Benzophenone → benzopinacol →benzopinacolone

b) Benzoin → benzil → benzilicacid

c) Benzaldehyde → chalcone → chalconeepoxide,

d) Acetanalide → 4-bromoacetanalide → 4-bromo-2-chloroacetanalide → 2-chloro-4-bromoaniline.

e) Cyclohexanone → cyclohexanoneoxime →caprolactone

f) Anthranilic acid → o-chlorobenzoic acid → N-phenyl Anthranilic acid →acridone

2. Use of ultrasound in organic synthesis. (OneEach)

a) Ultrasound-assisted one-pot synthesis of 2,4,5-triarylimidazole catalyzed by ceric (IV) ammonium nitrate in aqueous media from benzaldehyde, benzil/benzoin and ammonium acetate .

b) Synthesis of Benzotriazoles by Ultrasound Irradiation fromo-phenylenediamine.

Note:

1. Synthesis is carried out in molar quantities (Less than 5gm).
2. Reaction with possiblemechanism.
3. Calculate Theoritical and practical %yield.
4. Product conformation by Physical constant andTLC.
5. Give expected spectral data (IR and NMR) of starting material, intermediateand final product.
6. All the prepared organic compounds should be stored as a sample and present at the time of Universityexamination.

M. Sc. Semester III
Laboratory Course-XI
Physico-Organic Estimations
Course Code: P-LAC-349

Marks:50 **Periods:60**
Credit:02 **06 Periods PerWeek**

Learning Objective:

1.To understand the Physico organic estimations of drugs by titrimetric methods.

2.To learn the skill in estimation of drugs by instrumental methods.

Course Outcome:

1.They perform the Physico organic estimations of drugs by titrimetricmethods.

2.They got the skill in estimation of drugs by instrumentalmethods.

A] Estimation of Drugs by Titrimetry: (At least three)

a) Assay ofAspirin.

b) Assay ofIbuprofen.

c) Assay ofAnalgin.

d) Determination of Chloride in Ringer Lactate solution forInjection.

e) Determination of Calcium ions in Calcium GluconateInjection.

B] Estimation of Drugs by Instrumental Methods: (At least Two)

a) Assay of sulfanilamide byPotentiometry.

b) Assay of Riboflavin byColorimetry.

c) Assay of ascorbic acid byColorimetry.

d) Assay of Diazepam by UV-VisSpectrophotometer.

Note:

1. All required solutions must be prepared by thestudents.
2. In examination one experiment is on Instrumental and one should beon noninstrumental.

References :

1. Modern Experimental organic chemistry by Royston M. Robert, John C. Gilbert,Lyuu B. Rodewald& Alan S. Wingrove, Saunder InternationalEdition
2. Advanced practical organic chemistry by N.K.Vishnoi
3. Experimental organic chemistry by L. M. Harwood & C. I. Moody, Blackwell Scientific Publications.
4. The systematic identification os organic compounds by R.L. Shriner & D.Y.Curtin
5. Semi-microqualitative organic analysis by N.D. Cheronis, J.B. Entrikin& E.M.Wodnett
6. Small scale organic preparation by P.J.Hill
7. Vogel's textbook of practical organic chemistry by ELBS,Longmann.

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Rajarshi Shahu Mahavidyalaya (Autonomous),Latur
M Sc IIYear
Semester-IV
Paper -XIII
Core Course Title : Advanced Synthetic methods
Course Code: P-ASM-439

Marks:100 **Periods:60**
Credit: 04 **04 Per Week**

Learning Objective:

1. To learn how to design a new route for synthesis of variousreactions.

2. To understand Retro- synthesis of aromatic heterocyclic 5 and 6 memberedrings.

3. To familiarize with protection and deprotection of functionalgroups.

4.Know about the role of various reagents in synthetic methods.

Course Objective:

After successful completion of the course the students:

1. Can understand how to design a new route for synthesis of variousreactions.

2. Can use Retro- synthetic methods in synthesis of aromatic 5 and 6 membered heterocyclic compounds.

3. Familiarize with protection and deprotection of functionalgroups.

4.Can know the role of LDA, DCC, DDQ, trimethylsilyl iodide etc. reagents inorganic synthesis.

Unit - I Disconnectionapproach: **15 Periods**

An introduction to Synthons and synthetic equivalents, disconnection approach, functional group interconversions. One group C-X and two group disconnections in 1,2,1,3 -,1,4-& 1,5-difunctional compounds , Retro- synthesis of Alkene ,acetylenes and aliphatic nitro Alcohols and carbonyl compounds, amines , the importance of the order of events in organic synthesis, chemoselectivity, regioselectivity. Diels Alder reaction, Michael addition and Robinson annulation. Retro- synthesis of aromatic Heterocycles and 5 and 6 membered carbocyclic and heterocyclic rings. Reversal of polarity(Umpolung).

Unit-II Protection and Deprotection ofGroups:

15 Periods

(A) Protecting Groups: Principle of protection of alcohol, amine, carbonyl and carboxyl

(B) Application of the following in synthesis Merrifield resin, polymeric reagents. Solid phase synthesis of polypeptide &oligonucleotides, electro organic synthesis, enzyme catalyzed reaction in synthesis & resolution of racemicmixtures.

Unit - III: Reagents & ReactionsinSynthesis. **15 Periods**

Complex metal hydrides, lithium dialkylcuprate, lithium diisopropylamide(LDA) Dicyclohexylcarbodiimide(DCC), Trimethylsilyl iodide, tributyltin hydride, peracids, lead tetra acetate, PPA, Diazomethane , ozone phase transfer catalyst, Barton andShapiroHoffmann – Loffler- Freytag , Peterson synthesis , selenium dioxide, crown ethers, DDQ,Dess-Martin periodic acid, Iodoisobenzyldiacetate,Fetizonsreagent, Lambardoreagent, Tebbe reagent, AIBN, 9-BBN.

Unit - IV Transition Metal Complexes inOrganicSynthesis: **15 Periods**

A) Fe,Mn,Co**,** Ni, Cr, Zn, Ti. (**07**)

B) Application of following metal in organic synthesis Pd, Hg, and Rh, Tland *Si,* (**08**)

References :

1. S.Warren: Designing of Organic Synthesis
2. J. Fuhrhop& G. Penzlin. : Organic synthesis (2nded.)
3. Carruthres: Some modern methods of organicsynthesis.
4. H.O.House: Modern syntheticreaction.
5. Fieser&Fieser : Reagent in organicsynthesis
6. R.O.C.Norman: Principle of organicsynthesis
7. Carey &Sundharg: Advanced organicChemistry
8. P.E. Realand: Organicsynthesis
9. Bartan and Ollis : Comprehensive organicChemistry
10. R. Admas: Organicreactions

11.Stone & West: Advances in OrganometallicChemistry
12.C.W. Bird: Transition metal intermediate in organic synthesis
13.Swan & black: Organometallic in organic synthesis.
14.A. Mitra: Synthesis of prostaglandins
15. John Apsimon: Total synthesis of naturalproducts
16. M. K. Mathur, C. K. Narang& R.E. Williams: Polymers as aid in organic synthesis
17.P. Hodge & D.C. Sherrington: Polymer supported reaction in organic synthesis.
18.C.J.Gray: Enzyme Catalysed reactions
19.T.W. Green & P.G.M. Wats : Protecting groups in organic Chemistry
20.T.Shona: Electroorganic Chemistry
21.Weber&Gokel : phase transfer catalyst in organic synthesis.

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Chemistry Paper – XIV
Core Course Title – Stereochemistry
Course Code: P-STE-440

Marks:100 **Periods:60**
Credit: 04 **04 Per Week**

Learning Objective:

1.To understand the basic concept of stereochemistry, sterio chemical principles.

2.To familiarize with newer methods of sterioselective synthesis.

3.To know about conformational analysis and stereochemistry of ring systems.

4.To learn about stereochemistry of fused and bridged rings.

Course Outcome:

After successful completion of the course the students will :

1.Understand the basic concept of stereochemistry like chirality, sterio chemicalprinciples like enantiometric and distereomeric relationship, D & L, R & S and E & Znomenclature.

2. Familiarize with newer methods of sterioselective synthesis like Regioselectiveand Chemoselective reactions, Stereospecific and stereoselective reactionsetc.

3. Knowaboutconformationalanalysisofcyclohexane,monosubstitutedanddisubstitutedcyclohexanes and stereochemistry of ringsystems.

4. Learn about stereochemistry of fused and bridged rings, O.R.D. andC.D

Unit - I Basic concepts inStereochemistry: **15Periods**

Introduction: definition-Stereoisomerism

1) Molecular symmetry and concept of Chirality. Simple or proper axis of symmetry, plane of symmetry, centre of symmetry, improper or alternating or rotation reflection axis ofsymmetry
2) Stereo chemical principles: enantiometric relationship, distereomeric relationship. D & L, R & S and E & Z nomenclature. Threose and Erythosenomenclature.
   Recemic Modification and Resolution. Prochiral relationship.

Unit – II Newer methods of stereoselectivesynthesis: 15Periods

Regioselective and Chemoselective reactions, Stereospecificandstereoselectivereactions,Enantioselectivesynthesis(chiralapproach)reactionswithhydridedonors, Bromination,hydroboration, catalytic hydrogenation via chiral hydrazones andoxazolines.

Sharplessepoxidation. Diels Alder selective synthesis, use of calculations of optical purity and enantiomeric excess, Introduction of optical activity in absence of chiral carbon (biphenyls, spiranes and allenes) assignment of configuration, Configuration of distereomers based on physical and chemical methods. Dynamic Stereochemistry

Unit-III Conformationalanalysis: 15Periods

a) Conformational analysis of cyclohexane, mono substituted and disubstituted cyclohexane
b) Some aspects of the stereochemistry of ring systems: Stereoisomerism and determination of configuration Stability of rings and ease of ringsformation)
c) The shapes of the rings other than six membered: Shapes of five, and sevenmembered rings. Conformational effects in medium sized rings, Concept of Istrain.

Unit - IV Stereochemistry of Fused and BridgedRings: 15Periods

a) Fused and bridged rings: Fused bicyclic ring systems :Cis and trans decalins and perhydrophenanthrene. Bridged rings, Nomenclature stereoichemical restrictions, and The Bredt's rule,Reactivities.
b) O.R.D. and C.D.: Types of curves, the axial haloketone rule. The Octant rule. Determination of conformation andconfiguration.

References :

1. E.L. Eliel : Stereochemistry of carboncompounds
2. D. Nasipuri : Stereochemistry of organiccompounds
3. P.S. Kalsi: Stereochemistry: conformation andMechanism.
4. Eliel, Allinger, Angyal and Morrison : Conformationalanalysis
5. Hallas: Organicstereochemistry
6. Mislow and Benjamin: Introduction tostereochemistry.
7. H. Kagan : Organicstereochemistry.
8. Carl Djerassi ; Optical rotatorydispersion.
9. P. Crabbe : Optical rotatory dispersion andC.D.

Chemistry Paper - XV
Core Course Title - Advanced Heterocyclic Chemistry
Course Code: P-AHC-441

Marks:100 **Periods:60**
Credit: 04 **04 Per Week**

Learning Objective:

1.To outline the role of heterocycles,their spectral characteristics ,reactivity.

2. To understand the synthesis and aromatic character ofheterocycles.

3. To know the synthesis of IndoleQuinoline, Isoquinoline, Benzothiapeneetc.

Course Outcome:

1.Student can understand the role of heterocycles,their spectral characteristics , reactivity.

2.They can know how to synthesize Azirines, Oxaranes, Thiiranes, Diazirenes etc.

3.They can understand the synthesis and reactivity of IndoleQuinoline, Isoquinoline, Benzothiapeneetc.

Unit - I Introduction to Heterocycles and Small (3 and 4) membered Heterocycles :

15 Periods

Nomenclature (HantzschWidman System), spectral characteristics, reactivity and aromaticity of monocyclic, fused and bridged heterocycles, Different types of strains, interactions and conformational aspects on nonaromatic heterocycles. Synthesis, reactivity and importance of the following ring systems, Azirines, Oxaranes, Thiiranes, Diazirenes, Diaziridines, Azetidines.

Unit II : Five and six-membered heterocycles with two heteroatoms: 15 Periods

Synthesis, reactivity, aromatic character and importance of the following heterocycles: Pyrazole, Imidazole, Oxazole, Thiazole, Pyrimidine, Pyrazine, Oxazine, andThiazine.

Unit III: Heterocycles with more than twoheteroatoms: 15 Periods

Synthesis, reactivity, aromatic character and importance of the following heterocycles: Triazoles, Oxadiazoles, Thiadiazoles,Triazines, tetrazole, furazan.

Unit-IV:Larger ring andBenzofusedheterocycles: 15 Periods

Synthesis and reactivity of IndoleQuinoline, Isoquinoline, Benzothiapene, BenzofuranAzepines, Oxepines and Thiepines, Synthesis and rearrangement of Diazepines, Synthesis of Benzoazepines, Benzodiazepines,Benzooxepines, Benzothiepines, Azocines, and Azonines.

References :

1. Heterocyclic Chemistry, T. L.Gilchrist.
2. An Introduction to the Chemistry of Heterocyclic compounds, R. M.Acheson.
3. Heterocylic chemistry, J. A. Joule & K.Mills.
4. Principals of Modern Heterocyclic Chemistry, A.Paquette.
5. Heterocyclic Chemistry, J. A. Joule &Smith.
6. Handbook of Heterocyclic Chemistry, A. R.Katritzky.
7. HeterocyclicChemistry R.K.Bansal.

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Chemistry Paper – XVI
Semester IV
Course Title: Applied Organic chemistry
Course Code:P-AOC-442

Marks:100 **Periods:60**
Credit: 04 **04 Per Week**

Learning Objective:

1. Introduction of supramolecularchemistry

2.To know in detail about structural features of carbohydrate and vitamins

3.To familiarize with role of green reagents in organicsynthesis.

4. To learn about green synthetic routes of reactions.

Course Outcome:
After successful completion of the course the students will:

1. Learn about supramolecular chemistry and structures of supramolecules likenucleic acid, crown ether, cyclophanes,calixarenes

2.To know in detail about structural features of carbohydrate andvitamins

3.To familiarize with role of green reagents in organicsynthesis.

4. To learn about green synthetic routes ofreactions.

Unit - I SupramolecularChemistry: **15 Periods**

Principles of molecular associations and organizations as exemplified in biological macromolecules like nucleic acids, proteinsandenzymes. **(3L)**

Synthetic molecular receptors: receptors with molecular cleft, molecular tweezers, receptors with multiplehydrogensites. **(3L)**

Structures and properties of crown ethers, cyclophanes, calixarenes, Synthesis of crown ethers, cryptandsandcalixarenes. **(6L)**

Unit - II Carbohydrates andVitamins: 15Periods

A) Carbohydrates

Introduction to naturally occurring sugars: Deoxysugars,aminosugars, branched sugars, structure elucidation of lactose, D-glucosamine and mesoinositol (synthesis not expected), Strucural features and applications of inositol, starch, cellulose,and heparin.

B) Vitamins

Classification, sources, biological functions, deficiency diseases and synthesis of A, B1, B2, B6, and E.

Unit - III GreenChemistry-I: 15Periods

Introduction, basic principles of green chemistry, designing a green synthesis: Green starting materials, green reagents, green solvents and reaction conditions, green catalysts**.**

Use of the following in green synthesis with suitable examples:

a) Green reagents:dimethylcarbonate.

b) Green catalysts: Acid catalysts, oxidation catalysts, basic catalysts, phase transfer catalysts [benzyltrimethyl ammonium chloride (TMBA), Tetra-n-butyl ammonium chloride.

c) Green solvents: water, ionic liquids, deep eutectic solvents, supercritical carbon dioxide

Unit - IV:Green Chemistry-II 15 Periods

a) Solid state reactions: solid phase synthesis, solid supportedsynthesis.

b) Microwave assisted synthesis: reactions in water, reactions in organic solvents, solvent free reactions

c) Ultrasound assisted reactions.

d) Multicomponentreaction

References :

1. Bioorganic, Bioinorganic and Supramolecular chemistry, P.S. Kalsi and J.P.Kalsi. New Age InternationalPublishers
2. Supramolecular Chemistry; Concepts and Perspectives, J. M. Lehn,VCH.
3. Crown ethers and analogous compounds, M. Hiraoka, Elsevier,1992.
4. Large ring compounds, J.A.Semlyen, Wiley-VCH,1997
5. Enzyme catalysis in organic synthesis, 3rd edition. Edited by KarlheinzDrauz,Harold Groger, and Oliver May, Wiley-VCH Verlag GmbH & Co KgaA,2012.
6. Biochemistry, Dr U Satyanarayan and Dr U Chakrapani, Books and Allied (P)Ltd.
7. Bioorganic,BioinorganicandSupramolecularchemistry,P.S.KalsiandJ.P.Kalsi.New Age InternationalPublishers
8. The Organic Chemistry of Enzyme-Catalysed Reactions, Academic Press, ByRichard B.Silverman
9. Enzymes:PracticalIntroductiontostructure,mechanismanddataanalysis,ByRobert A.Copeland, Wiley-VCH,Inc.
10. The Organic Chemistry of Biological Pathways By John McMurry, TadhgBegley byRobert and companypublishers
11. Biochemistry ByLehninger
12. Bioorganic Chemistry- A practical approach to Enzyme action, H. Dugas andC. Penny.SpringerVerlag,1931
13. Biochemistry: The chemical reactions in living cells,By E. Metzler. AcademicPress.
14. Concepts in biotechnology by D. Balasubrarnanian&others
15. Principals of biochemistry by Horton &others.
16. Bioorganic chemistry - A chemical approach to enzyme action by Herman Dugasand Christopher Penney.
17. Natural product chemistry, A mechanistic, biosynthetic and ecologicalapproach, Kurt B.G. Torssell, Apotekarsocieteten – Swedish pharmaceuticalpress.
18. NaturalproductsChemistryandapplications,SujataVBhat,B.A.Nagasampagiand S.Meenakshi, Narosa PublishingHouse
19. Natural Products Volume- 2, By O. P.Agarwal
20. Chemistry of Natural Products, F. F. Bentley and F. R. Dollish,1974

21. Natural Product Chemistry Vol.1 and 2, K. Nakanishi J. Goto. S.ItoMajori andS. Nozoo,Academic Press,1974.
22. Chemistry of natural products, V.K. Ahluwalia, Vishal PublishingCo.
23. GreenChemistry:AnIntroductoryText,2ndEdition,PublishedbyRoyalSocietyof Chemistry, Authored by MikeLancater
24. Organic synthesis in water. By Paul A. Grieco,Blackie.
25. Green chemistry, Theory and Practical, Paul T.Anastas and JohnC.Warner.
26. New trends in green chemistry By V.K.Ahulwalia and M.Kidwai, 2ndedition, Anamaya Publishers, NewDelhi
27. An introduction to green chemistry, V.Kumar, Vishal PublishingCo
28. Organic synthesis: Special techniques. V.K.Ahulwalia and RenuAggarwal.

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Elective

Chemistry Paper – XVI

Semester IV

P-POC-342 (B)

Course Title: Dyes and Intermediates

Marks:100 **Periods:60**
Credit: 04 **04 Per Week**

Learning Objective:

1.To understand the concepts of Commercial processes for Azo dyes, reactive dyes

2.To know about Diazotization, mechanism and different methods ofdiazotization, Evaluation ofdyes.

3.TofamiliarizewithFluorescentWhiteningAgents,TypesofFibresAndBasicOperations In DyeingProcess.

CourseOutcome:

After completion of course students will understand:

1.Concepts of Commercialprocesses for Azo dyes, reactive dyes, thermal sensitive dyes, dispensesdyes.

2. Synthesis of Monoazo dyes, Bisazo dyes and Azoic dyes. Evaluation ofdyes

3. Theory of fluorescence–Classification of FWA, Various methods of dyeing,Different classes of organic pigments andsynthesis.

UNIT-I DyesandIntermediates **15periods**

Synthesis of important dye intermediates. Commercial processes for Azo dyes, reactive dyes, optical brighteners, thermal sensitive dyes, dispenses dyes.

UNIT-IIAZODYES **15 periods**

General Introduction: Diazotization, mechanism and different methods of diazotization and laws of coupling, General introduction, classification and synthesis of Monoazo dyes, Bisazo dyes and Azoic dyes. Evaluation of dyes. Synthesis of the following: Disperse Red 13, Acid

Blue 92, Mordant Black 11, Acid Black 1, Acid Blue 113, Direct Blue 15, Direct Violet 1, Direct Red 28, Naphthol AS-BR, Fast Orange GGD.

UNIT-III **15 Periods**

(A) Fluorescent WhiteningAgents

Introduction, Theory of fluorescence–Classification of FWA and synthesis of important member of each class and their uses.

(B) Types of FibresAnd Basic Operations In DyeingProcess

Types of fibres: Natural, semisynthetic and synthetic, Dyeing and Interactions: Ionic Interactions, Hydrogen bond, Van der Waal's Interactions and Covalent Interactions. Basic Operations in Dyeing Process: Preparation of the fibres, Preparation of the dyebath, application of the dyebath and finishings, Various methods of dyeing: Direct dyeing, Vat dyeing, Mordant dyeing, Disperse dyeing and Formation of dye on the fibre, Dyeing of wool with the acid dyes, Dyeing with the reactive dyes, Fastness properties: Colour fastness, Light fastness, Sublimation fastness and Burnt gas fumes fastness.

UNIT-IV **15 Periods**

(A)HeterocyclicDyes

Pyrazolone dyes, cyanine dyes, dyes containing azine, oxazine and thiazine ring systems. Thiazole dyes.

(B)Pigments

Different classes of organic pigments and synthesis.

Synthesis of only the following: Basic Yellow 11, Basic Orange 21, Safranine B, Rosinduline GG, Sirius Supra Blue FFRL, Brilliant Alizarin Blue 3R, Sirius Supra Yellow RT, Acid Yellow 19, Copper Phthalocyanine, Sirius Supra Light Green FFGL.

References

1. The chemistry of synthetic Dyes, Vol. I to VII by Venkataraman, Academic Press,New York.
2. Chemistry of Synthetic Dyes & Pigments byLubs.
3. Dyes and their intermediates by E. N.Abrahart.
4. Handbook of synthetic dyes and pigments, Vol. I & II by K. M.Shah.
5. Industrial Dyes by Klans Hunger, Germany byWiley-VCH.
6. DevelopmentintheChemistryandtechnologyofOrganicDyesbyJ.Griffiths,Blackwell Sci. Pub., Oxford,London.
7. Principles of colour Technology by Fred W. Billmeyer and Max Saltzman, John Wiley & Sons.

M. Sc. IV Semester

Laboratory Course-XII

Mixture Analysis

Course Code: P-LAC-443

Marks:50 **Periods:60**

Credit:02 **06 Periods PerWeek**

Learning Objective:

1.To perform the semi-micro qualitative analysis of ternary mixturescontaining single/poly functional compounds by Chemical and PhysicalMethod.

2. To check the purityof compounds by performing TLCmethod.

Course Objective:

1.Students can perform semi-micro qualitative analysis of ternarymixtures.

2. They can check purity of compounds byTLC.

Qualitative Analysis (At least 05 Organic Mixtures):

Semi-micro Qualitative Analysis of Ternary Mixtures (One Solid and Two Liquids) containing single/poly functional compounds by Chemicaland Physical Method with Chromatographic Separation (TLC) for purity of all three components and its Expected Theoretical Spectral Data (IR, ^{1}H NMR &^{13}C NMR).

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M. Sc. Semester IV
Laboratory Course-XIII
Physico-OrganicEstimations
Course Code:P-LAC-444

Marks:50 **Periods:60**
Credit:02 **06 Periods PerWeek**

Learning Objective:

1.Todeveloptheskillintheisolationandpurificationofnaturalproductslikebeta carotene, piperinelicopene.

2.To estimate the amount of drug sample by instrumentalmethods.

Course Outcome:

1.Students can develop the skill in the isolation and purification of natural productslike beta carotene, piperinelicopene.

2.They can perform assay ofdrugs.

A] Isolation of natural products. (At least three)

a) Isolation of caffeine from tealeaves.

b) Isolation of piperine from blackpepper

c) Isolation of β-carotene fromcarrots

d) Isolation of lycopene fromtomatoes

e) Isolation of limonene from lemonpeel

f) Isolation of euginol fromcloves

B] Estimation of Drugs by Instrumental Methods: (At least Two)

a) Assay of Riboflavin by UV-VisSpectrophotometer.

b) Estimation of carbohydrates, amino acids, proteins by UV-Visspectrophotometer.

c) Determination of Hammett constants and determine its substitutioneffect.

i) Benzoic acid, ii) P-Nitro Benzoic acid, iii) P-Methoxy Benzoic acid, iv) PMethyl benzoic acid, v) P-Chloro benzoic acid.

(Out of two compounds one compound must be benzoic acid and another should be substituted benzoic acid is given to the students)

Note:

1. All required solutions must be prepared by thestudents.
2. In examination one experiment is on Instrumental and one should be on noninstrumental.

References :

1. Moden Experimental organic chemistry by Royston M.Robert, John C.Gilbert, LyuuB.Rodewald&alanS.Wingrove, Saunder InternationalEdition
2. Advanced practical organic chemistry byN.K.Vishnoi
3. Experimental organic chemistry by L. M. Harwood & C. I. Moody, Blackwell Scientific Publications.
4. The systematic identification of organic compounds by R.L.Shriner&D.Y.Curtin
5. Semi-microqualitative organic analysis by N.D.Cheronis, J.B.Entrikin&E.M.Wodnett
6. Small scale organic preparation byP.J.Hill
7. Vogel's textbook of practical organic chemistry by ELBS,Longmann.

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M. Sc. Semester IV

Laboratory Course- XIV
Synthesis of OrganicMolecules
Course Code:P-LAC-445

Marks:50 **Periods:60**
Credit:02 **06 Periods PerWeek**

Learning Objective:

1.To develop the skill in the synthesis of different antibacterial, abticancer,anti-convulsant drugs.

2.To use ultrasound techniques in the synthesis of heterocycliccompounds.

Course Outcome:

1.Students can synthesize different drugs like antibacterial, abticancer, anti-convulsant etc.

2.They can use ultrasound techniques in the synthesis of heterocyclic compounds.

1. Synthesis of Drug Molecules (At leastFour)

a) Synthesis of anaesthetic drugBenzocaine.

b) Synthesis of anticancer drug 6-methyluracil.

c) Synthesis of antibacterial drugsulfanilamide.

d) Synthesis of anti-epileptic drugantypyrine.

e) Synthesis of anti-convulsant drugPhenytoin.

2. Use of ultrasound in organic synthesis. (OneEach)

a) Ultrasound assisted Hantzchdihydropyridine synthesis from aldehydes, ethyl acetoacetate andurea.

b) Synthesis of coumarin by Knoevenagel synthesis using salicyladehyde, ethyl acetate in presence of base by ultrasoundassistance.

c) Ultrasound promoted synthesis of dihydropyrimidones from Biginelli Reactionby acid-catalyzed, three component reaction between an aldehyde, ß-ketoester and urea.

Note:

1. Synthesis is carried out in molar quantities (Less than 5gm).
2. Reaction with possiblemechanism.
3. Calculate Theoritical and practical %yield.
4. Product conformation by Physical constant andTLC.
5. Give expected spectral data (IR and NMR) of starting material, intermediate and final product.
6. All the prepared organic compounds should be stored as a sample and present at the time of Universityexamination.

M. Sc. Semester IV
Laboratory Course-XV
Course Code:P-LAC-446
Project

Marks:50 **Periods:60**
Credit:04 **06 Periods PerWeek**

Learning Objective:

1.To learn about Literature Survey,synthesis of different naturalproducts.

2.To learn about different standardization of reaction Conditionsand their synthetic methods.

Course Outcome:

1.Students can learn about literature survey,synthesis of different natural products. 2.

2.They can understand about different standardization of reaction Conditions and their syntheticmethods.

Literature Survey, Studies of Reactions, Synthesis, Mechanism, Isolation of Natural Products, Standardization of Reaction Conditions, New Synthetic Methods etc.

Note:

1. External and Internal Examiners will examine this project jointly at the time of practical examination.
2. The students will have to give at least one seminar in each semester in their subject of specialization iscompulsory.
3. Project work must be carried out only in specializedbranch.
4. All synthesized organic compounds should be submitted at the time of University Examination.
5. The project work carried out during the year should be presented in power point presentation in presence of UniversityExaminers.

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