"Dissemination of Education through Knowledge, Science and Culture"
-Shikshanmaharshi Dr. Bapuji Salunkhe

Shri Swami Vivekanand Shikshan Sanstha, Kolhapur's

Vivekanand College, Kolhapur

(Empowered Autonomous)

(Affiliated with Shivaji University, Kolhapur)

DEPARTMENT OF CHEMISTRY

TEACHING PLAN

(2024-25)

Sr. No.	Name of Faculty	Designation
1	Dr. Mrs. S. D. Shirke	Head of Department
2	Prof. Dr. A. S. Kumbhar	Professor
3	Dr. A. N. Ambhore	Associate Professor
4	Mr. S. S. Kadam	Assistant Professor
5	Dr. S. S. Ankushrao	Assistant Professor
6	Dr. Mrs. S. D. Shinde	Assistant Professor
7	Dr. Mrs. A. S. Tapase	Assistant Professor
8	Dr. D. S. Gaikwad	Assistant Professor
9	Dr. A. A. Patravale	Assistant Professor
10	Mr. A. T. Mane	Assistant Professor
11	Dr. Ms. S. D. Kharade	Assistant Professor
12	Dr. Ms. A. S. Rajmane	Assistant Professor
13	Ms. S. N. Inamdar	Assistant Professor
14	Ms. P. A. Gholap	Assistant Professor
15	Ms. V. S. Rajmane	Assistant Professor

VIVEKANAND COLLEGE KOLHAPUR (EMPOWERED AUTONOMOUS) ESTD JUNE 1964

Shirke

(Dr. Mrs. S. D. Shirke)

HEAD
DEPARTMENT OF CHEMISTRY
VIVEKANAND COLLEGE, KOLHAPUR
(EMPOWERED AUTONOMOUS)

Vivekanand College, Kolhapur (Empowered Autonomous)

Department: Chemistry : Teaching Plan

Academic Year: 2024-25 **Semesters: B.Sc. I, Sem- I**

Subject: Chemistry **Course Title: DSE-1002E2: Organic & Analytical Chemistry**

Name of the Teacher: Dr. Mrs. Shirke S.D.

Month: June			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	1.Stereochemistry	• Induction lecture • Introduction, Optical activity – Lactic acid • Tartaric acid, 2,3-dihydroxybutandioc acid • 2.3 – dihydroxy butanoic acid ,
02	-	02		
Month: July			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	Continued…	• Elements of Symmetry • Geometric isomerism -Alkenes, • Oximes and Cyclic compounds. • Threo and Erythro Nomenclature • Examples
O8	-	08		
Month: August			Module/Unit:	Sub-units planned
08	32	40	Continued 2.Heterocyclic compound	• R and S, E and Z Nomenclature, • Problems • Heterocyclic Compounds- Introduction • Practicals – As per syllabus
Month: September			Module/Unit:	Sub-units planned
08	32	40	Continued..	'N' containing heterocycles – Pyrrole and Pyridine 1.Structure according to MOT and VBT Preparation methods of Pyrrole , reactivity and its chemical reactions.
	October		Module/Unit	
06	16	22	Continued…	2. Pyridine- Structure and reactivity. Preparation methods Chemical properties of Pyrrole- Electrophilic substitution reactions.

Dr. S. D. Shirke

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

Dr. S. D. Shirke
HEAD
DEPARTMENT OF CHEMISTRY
VIVEKANAND COLLEGE, KOLHAPUR
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Vivekanand College, Kolhapur (Empowered Autonomous)

Department: Chemistry : Teaching Plan

Academic Year: 2024-25 **Semesters: B.Sc. II, Sem-III**

Subject: Chemistry **Department: Chemistry**

Course Title: DSE: LAB/Practicals (No theory paper)

Name of the Teacher: Dr. Mrs. Shirke S.D.

Month: June			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	Practicals	• Not started
	-	04		
Month: July			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	Continued…	• Introduction. • Organic Spotting-02 • Viscosity of Liquids • Estimation of Acetone
	16	16		
Month: August			Module/Unit:	Sub-units planned
	32	32	Continued…	• Chemical Kinetics- I • Chemical Kinetics – II • Preparation of Mohr's Salt • Preparation of Benzoic acid
Month: September			Module/Unit:	Sub-units planned
	32	32	Continued…	• Hardness of Water • Preparation of p-Nitroacetanilide • Potentiometry • Organic Spotting-02 • Alkalinity of Water
Month: October			Module/Unit:	Sub-Units planned
	16	16	Continued…	• Refractometry-01 • Conductometry-02 • Chemical Kinetics-III

Dr. S. D. Shirke

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

Dr. S. D. Shirke
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Vivekanand College, Kolhapur (Empowered Autonomous)

Department: Chemistry : Teaching Plan

Academic Year: 2024-25 **Semesters: B.Sc. III, Sem-V**

Subject: Organic Chemistry , Analytical Chemistry

Department: Chemistry

Course Title: DSE: 1 0 0 2 E 3

Name of the Teacher: Dr. Mrs. Shirke S.D.

<table>
<tr><td colspan="3">Month: June</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">1. ------</td><td rowspan="2">• Admission process</td></tr>
<tr><td></td><td>-</td><td></td></tr>
<tr><td colspan="3">Month: July</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">1. NMR Spectroscopy</td><td rowspan="2">Introduction : Definition spin states, Nuclear resonance, Precessional frequency,
• Instrumentation
• Magnetic and Nonmagnetic Nuclei</td></tr>
<tr><td>08</td><td>14</td><td>16</td></tr>
<tr><td colspan="3">Month: August</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>08</td><td>28</td><td>30</td><td>Continued…</td><td>• Chemical shift,
• Coupling Constant, Factors affecting chemical shift, Coupling Constant
• Shielding and Deshielding
• Spin spin coupling-Types- Problems</td></tr>
<tr><td colspan="3">Month: September</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>08</td><td>32</td><td>32</td><td>2.Flame photometry</td><td>• Principle,
• Theory, Instrumentation
• Accessories
• Role of each part</td></tr>
<tr><td colspan="3">Month: October</td><td>Module/Unit:</td><td>Sub-Units planned</td></tr>
<tr><td></td><td>16</td><td>16</td><td>Continued…</td><td>• Applications and Advantages of Flame Photometry</td></tr>
</table>

Dr. S. D. Shirke

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

Dr. S. D. Shirke
HEAD
DEPARTMENT OF CHEMISTRY
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Vivekanand College, Kolhapur (Empowered Autonomous)

Academic Year: 2024-25 **Class : M.Sc.-I, Sem- I** **Department: Chemistry**

Subject: Chemistry **Course Title : CH.1 – Elective Paper- I : Organic Chemistry -I**

Unit-II: Study of Aromaticity

Name of the Teacher: Dr. Mrs. Shirke S. D.

Month June			Module/Unit:	Sub-units planned
Lectures	Practicals	Total		Admission started
04	-----	04	------	
Month: July			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	**Unit-II : Study of Aromaticity** **A) Nonbenzenoid aromatic compounds-,**	**A)** Introduction : Annulenes, heteroannulenes, fullerenes C60, tropone, tropolone. Azulene,fulvene,tropylium salts, ferrocene **B) Aromatic Electrophilic Substitution** • The arenium ion mechanism • General reactivity and Orientation
04	-----	04		
Month: August			Module/Unit:	Sub-units planned
04	---- -	04	Continued…	Orientation and Reactivity in Nitration, Sulphonation, Halogenation reaction, Friedal Craft's Alkylation and Acylation reaction with energy profile diagram.
Month: September			Module/Unit:	Sub-units planned
04	----	04	Continued…	• Continued… Ortho/para ratio, ipso attack and their orientation in ring system, Diazo Coupling, Haak reaction and Von Richter rearrangement,
Month: October			Module/Unit:	Sub-Units planned
04	---	04	C)Nucleophilic aromatic substitution reaction-	• Nucleophilic aromatic substitution reactions, SN1 and SN2 .

Dr. S. D. Shirke

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Vivekanand College, Kolhapur (Empowered Autonomous)

Academic Year: 2024-25 **Classs: M.Sc.-II, Sem- III** **Department: Chemistry**

Subject: Chemistry **Course Title : CH.3 – Elective Paper- Drug and Heterocycles :**

Unit-II: Study of following types of drugs

Name of the Teacher: Dr. Mrs. Shirke S. D.

Month June			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	------	Admission started
04	-----	04		
Month: July			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	**Study of Following types of Drugs. -**	a) Antimalerials - Trimethoprim b)Analgesic and Antipyretic-Paracetamol, meperidine, methadone and aminopyrine
04	-----	04		
Month: August			Module/Unit:	Sub-units planned
04	-----	04	Continued…	c) Antiinflammatry- Diclophenac, Indomethacin. d) Antitubercular and antineoplastic- Dapsone. e) Anaesthetic – Lidocaine and Thiopental.
Month: September			Module/Unit:	Sub-units planned
04	----	04	Continued…	f) Antihistamine- Diphenylhydramine. g) Tranquilizer- Diazepam, Trimeprazine h) Antiaids – General study.
Month: October			Module/Unit:	Sub-Units planned
04	---	04	Continued…	Introduction, structure and life cycle of AIDS virus and recent development Azedothymidine (AZT) derivatives.

Dr. S. D. Shirke

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Vivekanand College, Kolhapur (Autonomous)

Annual Teaching Plan

Academic Year: 2024-25 **Semesters: B.Sc. II, Sem-III** **Department: Chemistry**

Subject: Chemistry **Course Title: DSC-V: DSC03CHE31: Physical Chemistry**

Name of the Teacher: Dr. Arjun Shankar Kumbhar

Month: July			Module/Unit:I	Sub-units planned
Lectures	Practicals hr	Total	Kinetic Theory of gases	General Introduction
02	-	02		
Month: August			Module/Unit:I	Sub-units planned
Lectures	Practicals	Total	Kinetic Theory of gases	Introduction, postulates of Kinetic Theory of Gases and derivation of the kinetic gas equation, Deviation of real gases from ideal behavior, Compressibility factor, causes of deviation, van der Waals equation of state for real gases, Boyle temperature (derivation not required),
5	-	05		
Month: September			Module/Unit:II	Sub-units planned
5	-	05	Thermodynamics	Introduction, first and second law of thermodynamics, Concept of Entropy: Definition, mathematical expression, unit, spontaneity criteria for change in entropy. Physical significance of Entropy. Entropy changes for reversible and irreversible processes in isolated systems.
Month: October			Module/Unit: II	Sub-units planned
3	-	03	Thermodynamics	Entropy change in mixing of gases. Introduction of Concept of Enthalpy and Internal energy, Integral and differential enthalpy of solution. Variation of Enthalpy of reaction with temperature (Kirchhoff's equation)/Third law of thermodynamics, standard entropy, application of third law of thermodynamics in determination of absolute entropy, Entropy changes in chemical reactions, Numerical problems.

Dr. A. S. Kumbhar

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

Dr. S. D. Shirke
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DEPARTMENT OF CHEMISTRY
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Vivekanand College, Kolhapur (Autonomous)
Annual Teaching Plan
Academic Year: 2024-25
Department: Chemistry
Name of the Teacher: Dr. Ajay Niwruttirao Ambhore

<table>
<tr><th colspan="6">B.Sc. III (Sem- V): - Course Title: DSE-1002E2 Organic Chemistry</th></tr>
<tr><th colspan="3">Month: July</th><th>Module/Unit:</th><th colspan="2">Sub-units planned</th></tr>
<tr><td>Lectures</td><td>Practical</td><td>Total</td><td rowspan="2">Introduction</td><td colspan="2" rowspan="2">• General Introduction
• Discussion on Syllabus
• Basic introduction on spectroscopy</td></tr>
<tr><td>04</td><td>-</td><td>04</td></tr>
<tr><th colspan="3">Month: August</th><th>Module/Unit:</th><th colspan="2">Sub-units planned</th></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">IR Spectroscopy</td><td colspan="2" rowspan="2">• General introduction
• Principles of IR Spectroscopy
• Instrumentation, schematic diagram.
• Fundamental modes of vibrations, types and calculation.
• Conditions for absorption of IR radiations.
• Regions of IR spectrum,
• Hook's Law.
• Factors affecting IR absorption frequency.
• Characteristic of IR absorption of functional groups.</td></tr>
<tr><td>09</td><td>-</td><td>09</td></tr>
<tr><th colspan="3">Month: September</th><th>Module/Unit:</th><th colspan="2">Sub-units planned</th></tr>
<tr><td>08</td><td>-</td><td>08</td><td>Colorimetry and Spectrophotometry</td><td colspan="2">• Introduction
• Lambert Beer's law. Terms used.
• Classification of methods
• Photoelectric colorimeter method
• Spectrophotometer method.
• Determination of unknown concentration
• Applications.</td></tr>
<tr><th colspan="3">Month: October</th><th>Module/Unit:</th><th colspan="2">Sub-units planned</th></tr>
<tr><td>08</td><td>-</td><td>08</td><td>Potentiometric titrations</td><td colspan="2">• Introduction.
• Determination of pH.
• Quinhydrone and Glass electrodes.
• Potentiometric titrations: Classical and analytical methods
• Acids- Bases titration
• Redox titration with suitable example.</td></tr>
<tr><th colspan="3">Month: November</th><th>Module/Unit:</th><th colspan="2">Sub-units planned</th></tr>
<tr><td>04</td><td>-</td><td>04</td><td>Potentiometric titrations</td><td colspan="2">• Precipitation titration
• Basic circuit of potentiometer.
• Advantages of potentiometric titrations.</td></tr>
</table>

Dr. A. N. Ambhore

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

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Vivekanand College, Kolhapur (Autonomous)
Annual Teaching Plan
Academic Year: 2024-25
Department: Chemistry
Name of the Teacher: Dr. Ajay Niwruttirao Ambhore

<table>
<tr><th colspan="6">M.Sc. I (Sem-I): - Course Title: DSE14CHE11 Organic Chemistry</th></tr>
<tr><th colspan="3">Month: July</th><th>Module/Unit:</th><th colspan="2">Sub-units planned</th></tr>
<tr><td>Lectures</td><td>Practical</td><td>Total</td><td rowspan="2">Introduction</td><td colspan="2" rowspan="2">• General Introduction
• Basic terms in reaction mechanism
• Generation, structure, stability and reactivity of Reactive Intermediates: Carbocations, Carbanions</td></tr>
<tr><td>02</td><td>-</td><td>02</td></tr>
<tr><th colspan="3">Month: August</th><th>Module/Unit:</th><th colspan="2">Sub-units planned</th></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">▪ Reaction Mechanism: Structure and Reactivity</td><td colspan="2" rowspan="2">• General introduction
• Generation, structure, stability and reactivity of Reactive Intermediates: free radicals, arynes, carbene, N-heterocyclic carbene,</td></tr>
<tr><td>04</td><td>-</td><td>04</td></tr>
<tr><th colspan="3">Month: September</th><th>Module/Unit:</th><th colspan="2">Sub-units planned</th></tr>
<tr><td colspan="3">04 - 04</td><td>▪ Reaction Mechanism: Structure and Reactivity
▪ Elimination Reaction</td><td colspan="2">• Generation, structure, stability and reactivity of Reactive Intermediates: nitrine, Nitrogen, sulphur and phosphorus ylides
• E1, E2 & E1Cb mechanism
• Orientation in elimination reactions</td></tr>
<tr><th colspan="3">Month: October</th><th>Module/Unit:</th><th colspan="2">Sub-units planned</th></tr>
<tr><td colspan="3">04 - 04</td><td>• Elimination Reaction</td><td colspan="2">• Hofmann versus Saytzeff elimination
• Pyrolytic syn elimination
• Competition between substitution and elimination reaction</td></tr>
<tr><th colspan="3">Month: November</th><th>Module/Unit:</th><th colspan="2">Sub-units planned</th></tr>
<tr><td colspan="3">02 - 02</td><td>• Elimination Reaction</td><td colspan="2">• Reactivity: effect of substrate, structures, attacking base, leaving group, nature of medium on elimination reaction</td></tr>
</table>

Dr. A. N. Ambhore

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

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DEPARTMENT OF CHEMISTRY
VIVEKANAND COLLEGE, KOLHAPUR
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Vivekanand College, Kolhapur (Autonomous)
Annual Teaching Plan
Academic Year: 2024-25
Department: Chemistry
Name of the Teacher: Dr. Ajay Niwruttirao Ambhore

<table>
<tr><th colspan="6">M.Sc. II (Sem-III): - Course Title: DSE14CHE32 Advanced Spectroscopic methods</th></tr>
<tr><th colspan="3">Month: July</th><th>Module/Unit:</th><th colspan="2">Sub-units planned</th></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Ultraviolet Spectroscopy</td><td colspan="2" rowspan="2">• Introduction spectroscopy,
• Woodward-Fisher rile for conjugated dienes and calculated compounds
• Calculation of λ max</td></tr>
<tr><td>02</td><td>-</td><td>02</td></tr>
<tr><th colspan="3">Month: August</th><th>Module/Unit:</th><th colspan="2">Sub-units planned</th></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Ultraviolet Spectroscopy</td><td colspan="2" rowspan="2">• Woodward-Fisher rile for conjugated dienes and calculated compounds
• Calculation of λ max</td></tr>
<tr><td>04</td><td>-</td><td>04</td></tr>
<tr><th colspan="3">Month: September</th><th>Module/Unit:</th><th colspan="2">Sub-units planned</th></tr>
<tr><td>04</td><td>-</td><td>04</td><td>Ultraviolet Spectroscopy
Infrared Spectroscopy</td><td colspan="2">• Ultraviolet spectra of aromatic and heterocyclic compounds, steric effect in biphenyls
• Introduction to IR spectroscopy
• Characteristics of vibrational frequencies of alkane, alkenes, and alkynes, aromatic compounds</td></tr>
<tr><th colspan="3">Month: October</th><th>Module/Unit:</th><th colspan="2">Sub-units planned</th></tr>
<tr><td>04</td><td>-</td><td>04</td><td>Infrared Spectroscopy</td><td colspan="2">• Characteristics of vibrational frequencies of alcohol, phenol and amines
• Detailed study of vibrational frequencies of carbonyl compounds (aldehydes, ketones, esters, amides, acids, anhydrides, lactones, lactams and conjugated carbonyl compounds)</td></tr>
<tr><th colspan="3">Month: November</th><th>Module/Unit:</th><th colspan="2">Sub-units planned</th></tr>
<tr><td>02</td><td>-</td><td>02</td><td>Infrared Spectroscopy</td><td colspan="2">• Effects of hydrogen bonding and solvent effect on vibrational frequencies, overtones, combination bands and Fermi resonance. FT-IR of gaseous, solid and polymeric materials.</td></tr>
</table>

Dr. A. N. Ambhore

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

Dr. S. D. Shirke
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Vivekanand College, Kolhapur (Empowered Autonomous)

Annual Teaching Plan

Academic Year: 2024-25 **Semesters: B.Sc. I Sem-I** **Department: Chemistry**

Subject: Chemistry **Course Title: DSC03-CHE12-Organic Chemistry**

Name of the Teacher: Mr. Satish Suresh Kadam

Month: July			Module/Unit:	Sub-units planned
Lectures	Practical	Total	• Introduction • Fundamentals of Organic Chemistry	• General Introduction • Discussion on Syllabus • Basic terms in organic Chemistry • General introduction • Cleavage of Bonds Homolysis and Heterolysis • Structure, shape and reactivity of organic molecules: Nucleophiles and electrophiles.
06	-	06		
Month: August			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	• Fundamentals of Organic Chemistry	• Displacements: Inductive Effect, Electromeric Effect, Resonance and Hyperconjugation. • Reactive Intermediates: Carbocations, Carbanions and free radicals • Carbene, Nitrene,Benzyne
6	16	22		
Month: September			Module/Unit:	Sub-units planned
6	16	22	• Chemistry of aromatic compounds	• Introduction to homocyclic and polycyclic Aromatic hydrocarbons. • Meaning of important terms aromatic,non aromatic,antiaromatic • Huckels Rule and their applications • Benzene structure-MOT and VBT
Month: October			Module/Unit:	Sub-units planned
3	16	19	• Chemistry of aromatic compounds	• Aromatic electroplhilic substitution reaction: General mechanism,effect of substitution groups,Mechanism of nitration,sulfonation,halogenations,Friedel-crafts alkylation and acylationreaction of benzene.

Mr. S. S. Kadam

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VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

Vivekanand College, Kolhapur (Empowered Autonomous)

Annual Teaching Plan

Academic Year: 2024-25 **Semesters: B. Sc. I (OE), Sem-I** **Department: Chemistry**

Subject: Chemistry **Course Title: 2OEC03CHS11: Practical Course in Chemistry-I**

Name of the Teacher: Mr. Satish Suresh Kadam

Month: August			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	-	• Water analysis: To determine the alkalinity of water sample by using Phenolphthaline and Methyl Orange Indicator • To prepare standard 0.1 N $KMnO_4$ solution and to determine the strength of given oxalic acid solutions.
-	8	8		
Month: September			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	-	• To determine quantity of Fe (II) ions from the given solutions by titrating it with 0.1 N $K_2Cr_2O_7$ solutions by using internal indicator. • Estimation of amount of Acetic acid from the given vinegar sample by titrimetric method • Estimation of Aniline • Estimation of Acetamide
-	16	16		
Month: October			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total		• Estimation of Aspirin from given pharmaceutical tablet. • Preparation and purification of Oximes of ketones.
-	8	8		
Month: November				• Theory and Practical Examination
Lectures	Practicals	Total		
-	-	-		

Mr. S. S. Kadam

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Vivekanand College, Kolhapur (Empowered Autonomous)

Annual Teaching Plan

Academic Year: 2024-25 **Semesters: B.Sc. III, Sem-V** **Department: Chemistry**

Subject: Chemistry **Course Title: DSE - 1002E3 - Organic Spectroscopic Techniques**
Chemistry (SEC-SE) Laboratory Safety Management

Name of the Teacher: Mr. Satish Suresh Kadam

Month: July			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	• Introduction to Spectroscopy • Ultra-Violet (UV)- Spectroscopy	• Meaning of spectroscopy, • Nature of electromagnetic radiation, • Types of spectroscopy and advantages of spectroscopic methods. • Energy types and energy levels of atoms and molecules. • Introduction, Beer-Lamberts law • , Terms used in U.V. Spectroscopy- Chromophore, Auxochrome, Bathochromic shift, hypsochromic shift, hyperchromic and hypochromic effect,
08	-	08		
Month: August			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	• Ultra-Violet (UV) Spectroscopy	• Modes of electromagnetic transitions. Effect of conjugation on position of U.V. band, • Calculation of λ-max by Woodward and Fisher rules for dienes and enones systems, • Colour and visible spectrum, • Applications of U.V. Spectroscopy
8	28	36		
Month: September			**Module/Unit:**	**Sub-units planned**
8	28	36	• General Safety & Safe Handling of Chemicals	• General Safety and Operational Rules • Handling and transportation of chemicals • Waste Management & Disposal • Housekeeping
Month: Octomber			**Module/Unit:**	**Sub-units planned**
4	14	18	• Combined problems based on NMR,IR,UV	• To solve Combined problems based on NMR,IR,UV

Mr. S. S. Kadam

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

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Vivekanand College, Kolhapur (Empowered Autonomous)

Annual Teaching Plan

Academic Year: 2024-25 **Semesters: B. Sc. I, Sem-I** **Department: Chemistry**

Subject: Chemistry **Course Title: 2DSC03CHE11: Inorganic Chemistry**

Name of the Teacher: Dr. Mrs. Sarita Dattajirao Shinde

<table>
<tr><td colspan="3">Month: July</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Atomic Structure and Periodicity of Elements</td><td rowspan="2">• Introduction to atom
• Bohr's theory of hydrogen atom and its limitations, Wave particle duality,
• Heisenberg uncertainty principle,
• Quantum numbers and their significance,
• Shapes of s, p and d atomic orbitals,</td></tr>
<tr><td>6</td><td>-</td><td>6</td></tr>
<tr><td colspan="3">Month: August</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Atomic Structure and Periodicity of Elements</td><td rowspan="2">• Electrons filling rules in various orbitals: a) Aufbau's principle b) Hunds rule of maximum multiplicity c) Pauli's exclusion principle,
• Electronic configuration of elements.
• Stability of empty, half-filled and completely filled orbitals,
• Periodicity General discussion of the following properties of the elements with reference to s block elements: a) electronic configuration b) atomic radii c) ionic radii d) ionization energy e) electron affinity f) electronegativity g) metallic characters h) reactivity i) oxidation state j) melting and boiling points
• Water analysis: To determine the alkalinity of water sample by using Phenolphthaline and Methyl Orange Indicator
• To prepare standard 0.1 N $KMnO_4$ solution and to determine the strength of given oxalic acid solutions.</td></tr>
<tr><td>6</td><td>8</td><td>14</td></tr>
<tr><td colspan="3">Month: September</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Atomic Structure and Periodicity of Elements,

p-Block Elements (Group13, 14, 15)</td><td rowspan="2">• Chemical properties of the elements
• Position of elements in periodic table.
• Characteristics of group 13^{th}, 14^{th} and 15^{th} elements with special reference to electronic configuration and periodic properties.
• Compounds of group 13^{th}, 14^{th} and 15^{th} elements.
• Boron-diborane (only structure).
• To determine quantity of Fe (II) ions from the given solutions by titrating it with 0.1 N $K_2Cr_2O_7$ solutions by using internal indicator.
• Estimation of amount of Acetic acid from the given vinegar sample by titrimetric method.
• Estimation of Aniline
• Estimation of Acetamide</td></tr>
<tr><td>4</td><td>16</td><td>20</td></tr>
<tr><td colspan="3">Month: October</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td>p-Block</td><td>• Allotropes of carbon and phosphorus.</td></tr>
</table>

2	8	10	Elements (Group13, 14, 15)	• Oxyacids of Nitrogen (HNO_2, HNO_3). • Estimation of Aspirin from given pharmaceutical tablet. • Preparation and purification of Oximes of ketones.
Month : November			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	-	• Theory and Practical Examination
-	-	-		

Dr. S. D. Shinde

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

Dr. S. D. Shirke

HEAD
DEPARTMENT OF CHEMISTRY
VIVEKANAND COLLEGE, KOLHAPUR
(EMPOWERED AUTONOMOUS)

Vivekanand College, Kolhapur (Empowered Autonomous)

Annual Teaching Plan

Academic Year: 2024-25 **Semesters: B. Sc. I (OE), Sem-I** **Department: Chemistry**

Subject: Chemistry **Course Title: 2OEC03CHS11: Inorganic Chemistry**

Name of the Teacher: Dr. Mrs. Sarita Dattajirao Shinde

<table>
<tr><td colspan="3">Month: August</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">-</td><td rowspan="2">• Water analysis: To determine the alkalinity of water sample by using Phenolphthaline and Methyl Orange Indicator
• To prepare standard 0.1 N $KMnO_4$ solution and to determine the strength of given oxalic acid solutions.</td></tr>
<tr><td>-</td><td>8</td><td>8</td></tr>
<tr><td colspan="3">Month: September</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">-</td><td rowspan="2">• To determine quantity of Fe (II) ions from the given solutions by titrating it with 0.1 N $K_2Cr_2O_7$ solutions by using internal indicator.
• Estimation of amount of Acetic acid from the given vinegar sample by titrimetric method
• Estimation of Aniline
• Estimation of Acetamide</td></tr>
<tr><td>-</td><td>16</td><td>16</td></tr>
<tr><td colspan="3">Month: October</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2"></td><td rowspan="2">• Estimation of Aspirin from given pharmaceutical tablet.
• Preparation and purification of Oximes of ketones.</td></tr>
<tr><td>-</td><td>8</td><td>8</td></tr>
<tr><td colspan="3">Month: November</td><td></td><td rowspan="3">• Theory and Practical Examination</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2"></td></tr>
<tr><td>-</td><td>-</td><td>-</td></tr>
</table>

Dr. S. D. Shinde

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Vivekanand College, Kolhapur (Empowered Autonomous)

Annual Teaching Plan

Academic Year: 2024-25 **Semesters: B. Sc. II, Sem-III** **Department: Chemistry**

Subject: Chemistry **Course Title: Chemistry Practicals**

Name of the Teacher: Dr. Mrs. Sarita Dattajirao Shinde

<table>
<tr><td colspan="3">Month: August</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">-</td><td rowspan="2">• To determine the unknown concentration of given coloured compounds ($KMnO_4$/ $CuSO_4$) colorimetrically.
• Estimation of (i) Mg^{2+} or (ii) Zn^{2+} by complexometric titrations using EDTA.
• Preparation of Tetrammine Copper Sulphate.
• Preparation of Ferrous ammonium sulphate (Mohr's salt).</td></tr>
<tr><td>-</td><td>16</td><td>16</td></tr>
<tr><td colspan="3">Month: September</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">-</td><td rowspan="2">• Organic Spotting: Carboxylic acids, phenolic,
• Estimate the amount of metal present in a given solution gravimetrically- Fe as $Fe(OH)_3$
• To determine volumetrically the amounts of sodium carbonate and sodium hydroxide present together in the given solution.</td></tr>
<tr><td>-</td><td>16</td><td>16</td></tr>
<tr><td colspan="3">Month: October</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">-</td><td rowspan="2">• Organic Spotting: aldehydic, ketonic, amide, nitro, amines
• Determination of alkali content of antacid tablet using HCl.
• To estimate H_2O_2 by Iodometric method.
• Preparation of Potash Alum.</td></tr>
<tr><td>-</td><td>16</td><td>16</td></tr>
<tr><td colspan="3">Month: November</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">-</td><td rowspan="2">• Theory and Practical Examination</td></tr>
<tr><td>-</td><td>8</td><td>8</td></tr>
</table>

Dr. S. D. Shinde

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

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Vivekanand College, Kolhapur (Empowered Autonomous)

Annual Teaching Plan

Academic Year: 2024-25 **Semesters: B.Sc. III, Sem-V** **Department: Chemistry**

Subject: Chemistry **Course Title: 1002E2: Inorganic Chemistry**

Name of the Teacher: Dr. Mrs. Sarita Dattajirao Shinde

<table>
<tr><td colspan="3">Month: June</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Metals, Semiconductors, Superconductors and Nanomaterials</td><td rowspan="2">• Introduction,
• Properties of metallic solids.</td></tr>
<tr><td>02</td><td>-</td><td>02</td></tr>
<tr><td colspan="3">Month: July</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Metals, Semiconductors, Superconductors and Nanomaterials</td><td rowspan="2">• Theories of bonding in metal. i) Free electron theory. ii) Molecular orbital theory (Band theory).
• Classification of solids as conductor, insulators and semiconductors on the basis of band theory.
• Semiconductors. Types of semiconductors - intrinsic and extrinsic semiconductors.
• Applications of semiconductors.
Superconductors: Ceramic superconductors - Preparation and structures of mixed oxide $YBa_2Cu_3O_{7-x}$
• Applications of superconductors.</td></tr>
<tr><td>08</td><td>21</td><td>29</td></tr>
<tr><td colspan="3">Month: August</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Metals, Semiconductors, Superconductors and Nanomaterials</td><td rowspan="2">• Introduction and Importance of nanomaterials,
• Properties (Comparison between bulk and nanomaterials): i) Optical properties ii) Electrical conductivity and iii) Mechanical properties,
• Methods of preparation: Top-down, bottom-up fabrication a) Co-precipitation method b) Sol-gel method c) Chemical reduction method d) Hydrothermal method,
• Applications of Nanomaterials.
• Preparation of tetra amine copper (II) sulphate.
• Preparation of ammonium diamminetetrathiocynatochromate (III)
• Preparation of tris(thiourea) cuprous sulphate.</td></tr>
<tr><td>08</td><td>28</td><td>36</td></tr>
<tr><td colspan="3">Month: September</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Acids, Bases and Non aqueous Solvents</td><td rowspan="2">• Introduction to theories of Acids and Bases – Arrhenius concept, Bronsted-Lowry concept, Lewis Concept, Lux-Flood Concept (definition and examples),
• Hard and Soft Acids and Bases (HSAB Concept), Classification of acids and bases as hard, soft and borderline, Pearson's HSAB concept, Acid – Base strength and hardness-softness,
• Applications and limitations of HSAB principle.
• Determination of percentage purity of tetrammine copper (II) sulphate.
• Determination of percentage purity of ferrous</td></tr>
<tr><td>08</td><td>28</td><td>36</td></tr>
</table>

<table>
<tr><td colspan="3"></td><td></td><td>ammonium sulphate.
• Determination of percentage purity of potassium trioxalato aluminate.
• Preparation of Urea formaldehyde resin.</td></tr>
<tr><td colspan="3">Month: October</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Acids, Bases and Non aqueous Solvents</td><td rowspan="2">• Introduction, definition and characteristics of solvents,
• Classification of solvents, Physical properties and Acid-Base reactions in Liquid Ammonia (NH_3) and Liquid Sulphur Dioxide (SO_2).
• Gravimetric estimation of aluminium as aluminium oxide from the given solution containing potash alum, copper sulphate and free sulphuric acid.
• Gravimetric estimation of barium as barium sulphate from the given solution containing barium chloride, ferric chloride and free hydrochloric acid.
• Gravimetric estimation of iron as ferric oxide from the given solution containing ferrous ammonium sulphate, copper sulphate and free sulphuric acid.
• Preparation of sodium cuprous thiosulphate</td></tr>
<tr><td>5</td><td>28</td><td>5</td></tr>
<tr><td colspan="3">Month : November</td><td>-</td><td>• Theory Examination</td></tr>
</table>

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

Dr. S. D. Shinde

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Vivekanand College, Kolhapur (Empowered Autonomous)

Annual Teaching Plan

Academic Year: 2024-25 **Semesters: M. Sc. II, Sem-III** **Department: Chemistry**

Subject: Analytical Chemistry **Paper No. - IX: Advanced Analytical Technique**

Name of the Teacher: Dr. Mrs. Sarita Dattajirao Shinde

Month: July			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	Introduction to Nanotechnology and Nano Chemistry	• Definition of nanomaterials and nanotechnology, • significance of nanotechnology,
3	-	3		
Month: August				
Lectures	Practicals	Total	Introduction to Nanotechnology and Nano Chemistry	• size and properties, • types of nanomaterials like 0D (quantum dots), 1D, 2D and 3D,
4	-	4		
Month: September			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	Introduction to Nanotechnology and Nano Chemistry	• introduction to physical, chemical and biological synthesis of nanomaterials with suitable examples, • top down and bottom-up approach,
3	-	3		
Month: October			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	Introduction to Nanotechnology and Nano Chemistry	• chemical synthesis of nanomaterials - Different types and processes for synthesis of nanomaterials using wet chemical approaches. • Fabricating nanomaterials with different morphology intended for specific applications, • Applications of Nanotechnology
5	-	5		
Month: November			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	-	• Theory and Practical Examination
-	-	-		

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Vivekanand College, Kolhapur (Autonomous)

Annual Teaching Plan

Academic Year: 2024-25 **Semesters: B.Sc. II (Major), Sem-III** **Department: Chemistry**

Subject: Chemistry **Course Title: DSC-1002C-Part-I: Physical Chemistry**

Name of the Teacher: Dr. Asmita Shashikant Tapase

<table>
<tr><td colspan="3">Month: July</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals hr</td><td>Total</td><td rowspan="2">Chemical Kinetics</td><td rowspan="2">• Introduction,
• The concept of reaction rates, order and molecularity of a reaction, zero, first order reaction</td></tr>
<tr><td>06</td><td>-</td><td>06</td></tr>
<tr><td colspan="3">Month: August</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Chemical Kinetics</td><td rowspan="2">• Second order reactions (both for equal and unequal concentrations of reactants) of general equations for rate constants,
• Characteristic properties of second order reaction, examples.
• General methods for determination of order of a reaction
• Concept of activation energy:
1) Activated complex theory
2) Collision Theory and calculation of activation energy by Arrhenius equation,
• Numerical Problems.</td></tr>
<tr><td>08</td><td>08</td><td>16</td></tr>
<tr><td colspan="3">Month: September</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>08</td><td>16</td><td>24</td><td>Electrochemistry</td><td>• Introduction, molar and equivalence conductance,
• Relation between equivalent and molar conductance
• Transference number and its experimental determination
• Kohlraush law
• Applications of Kohlraush law</td></tr>
<tr><td colspan="3">Month: October</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>04</td><td>08</td><td>12</td><td>Electrochemistry</td><td>• Determination of degree of ionization of weak and strong electrolyte
• Conductometric titrations</td></tr>
</table>

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

Dr. A. S. Tapase

Dr. S. D. Shirke

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Vivekanand College, Kolhapur (Autonomous)

Annual Teaching Plan

Academic Year: 2024-25 **Semesters: B.Sc. II (Minor), Sem-III** **Department: Chemistry**

Subject: Chemistry **Course Title: DSC-1002C-Part-I: Physical Chemistry**

Name of the Teacher: Dr. Asmita Shashikant Tapase

<table>
<tr><td colspan="3">Month: July</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals hr</td><td>Total</td><td rowspan="2">Chemical Kinetics</td><td rowspan="2">• Introduction,
• The concept of reaction rates, order and molecularity of a reaction, zero, first order reaction</td></tr>
<tr><td>06</td><td>-</td><td>06</td></tr>
<tr><td colspan="3">Month: August</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Chemical Kinetics</td><td rowspan="2">• Second order reactions (both for equal and unequal concentrations of reactants) of general equations for rate constants,
• Characteristic properties of second order reaction, examples.
• General methods for determination of order of a reaction
• Concept of activation energy:
1) Activated complex theory
2) Collision Theory and calculation of activation energy by Arrhenius equation,
• Numerical Problems.</td></tr>
<tr><td>08</td><td>08</td><td>16</td></tr>
<tr><td colspan="3">Month: September</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>08</td><td>16</td><td>24</td><td>Electrochemistry</td><td>• Introduction, molar and equivalence conductance,
• Relation between equivalent and molar conductance
• Transference number and its experimental determination
• Kohlraush law
• Applications of Kohlraush law</td></tr>
<tr><td colspan="3">Month: October</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>04</td><td>08</td><td>12</td><td>Electrochemistry</td><td>• Determination of degree of ionization of weak and strong electrolyte
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Dr. A. S. Tapase

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

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Vivekanand College, Kolhapur (Empowered Autonomous)

Annual Teaching Plan

Academic Year: 2024-25 **Semesters: B. Sc. I, Sem-I** **Department: Chemistry**

Subject: Chemistry **Course Title: Chemistry Practicals**

Name of the Teacher: Dr. Asmita Shashikant Tapase

Month : August			Module/Unit:	Sub-units planned
Lectures -	Practicals 4*4=16	Total 16	Thermodynamics	• Estimation of Acetic acid from the given vinegar sample by titrimetric method. • Estimation of Cu (II) ions by iodometric titration by using Na2S2O3 solution • Spot Tests (Any Two) Detection of following cations using spot tests: Cu^{2+}, Co^{2+}, Ni^{2+}, Fe+, Al^{3+}, Zn^{2+}. Mg^{2+}, Pb^{2+}
Month : September			Module/Unit:	Sub-units planned
Lectures -	Practicals 4*4=16	Total 16	Thermodynamics	Paper Chromatography (Any Three) • Detection of following cations using Paper Chromatography: Cu^{2+}+ Co^{2+}, Co^{2+} + Ni^{2+}, Ni^{2+} + Cu^{2+} • Preparation of Derivatives: Preparation of Urea Oxalate. • Organic Spotting – Compounds containing C, H, (O) (Any Two)
Month : October			Module/Unit:	Sub-units planned
Lectures -	Practicals 4*4=16	Total 16	Thermodynamics	• Preparation of Derivatives: • Preparation of 2, 4-DNP of ketones. • Preparation of Osazone. To determine normality of bulk solution of HCl/ H_2SO_4. • Estimation of Phenol
Month : November			Module/Unit:	Sub-units planned
Lectures	Practicals 2*4=8	Total 8	Theory and [practical exams]	Organic Spotting – Compounds containing C, H, (O) (Any Two)

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

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Vivekanand College, Kolhapur (Autonomous)

Annual Teaching Plan

Academic Year: 2024-25 **Semesters: M.Sc. I, Sem-I** **Department: Chemistry**

Subject: Chemistry **Course Title: Analytical Chemistry**

Name of the Teacher: Dr. Asmita Shashikant Tapase

<table>
<tr><td colspan="3">Month: July</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Surface characterization by spectroscopy</td><td rowspan="2">• Introduction
a) Electron scattering chemical analysis or X-ray photoelectron spectroscopy
Principle, instrumentation, qualitative and quantitative applications</td></tr>
<tr><td>03</td><td>-</td><td>03</td></tr>
<tr><td colspan="3">Month: August</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Surface characterization by spectroscopy</td><td rowspan="2">b) Auger spectroscopy
Principle, instrumentation, qualitative and quantitative applications</td></tr>
<tr><td>04</td><td>-</td><td>04</td></tr>
<tr><td colspan="3">Month: September</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Surface characterization by spectroscopy</td><td rowspan="2">c) Secondary ion-mass spectrometry
Principle, instrumentation, qualitative and quantitative applications</td></tr>
<tr><td>04</td><td>-</td><td>04</td></tr>
<tr><td colspan="3">Month: October</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Surface characterization by spectroscopy</td><td rowspan="2">d) Ion scattering and Rutherford backscattering spectroscopy
Principle, instrumentation, qualitative and quantitative applications</td></tr>
<tr><td>04</td><td>-</td><td>04</td></tr>
<tr><td colspan="3">Month: November</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">-</td><td rowspan="2">• Theory and Practical Examination</td></tr>
<tr><td></td><td></td><td></td></tr>
</table>

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

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Vivekanand College, Kolhapur (Empowered Autonomous)

Department- Chemistry

Annual Teaching Plan for the Academic Year - 2024-25

(B.Sc. I Sem. I; B.Sc. III Sem. V; M.Sc. II Sem. III)

Name of the Teacher – Dr. D. S. Gaikwad

Month – June					
M.Sc.II Sem III Organic Chemistry:- DSC14CHE32 (Paper: Advanced synthetic methods)					
Lectures	Practicals	Total		Unit	Subunit planned
02	--	02		Applications of following metal in organic synthesis	Introduction to organometallic chemistry, Applications of palladium and Rhodium metal in organic synthesis.
B.Sc.III Sem V Chemistry:- DSE-1002E4 **Analytical Chemistry**					
02	--	02		Chromatography	General information, Basic principle of chromatography. Introduction to Column chromatography.
Month – July					
B.Sc.I Sem I (NEP) **Chemistry**:- DSC03CHE11 **Inorganic chemistry**					
Lectures	Practicals	Total		Unit	Sub-Units Planned
05	--	05		Chemical bonding and Molecular structure: Ionic bonding	Introduction, Types of chemical bonds, Ionic bond, covalent bond, Co-ordinate bond, metallic bond, Hydrogen bond, Vander waals force of attraction. Definition and formation of ionc bond. General characteristics of ionic bonding.
M.Sc.II Sem III Organic Chemistry:- DSC14CHE32 (Paper: Advanced synthetic methods)					
Lectures	Practicals	Total		Unit	Sub-Units Planned
06	04	10		Applications of following metal in organic synthesis	Applications of Rhodium, Silicon and Thalium metal in organic synthesis.
B.Sc.III Sem V Chemistry:- DSE-1002E4 **Analytical Chemistry**					
Lectures	Practicals	Total		Unit	Sub-Units Planned
06	--	06		Chromatography	Principal of column chromatography, solvent system, stationary phases, Methodology-column packing, applications of sample, development and detection methods, recovery of components,

					Applications.
Month – August					
B.Sc.I Sem I (NEP) **Chemistry**:- DSC03CHE11 **Inorganic chemistry**					
Lectures	Practicals	Total		Unit	Sub-Units Planned
05	--	05		Chemical bonding and Molecular structure: Ionic bonding	Energetics in Ionic bond formation. Born haber cycle for NaCl and its applications. Fajans Rule, Applications of Fajans rule.
M.Sc.II Sem III Organic Chemistry:- DSC14CHE32 (Paper: Advanced synthetic methods)					
Lectures	Practicals	Total		Unit	Subunit planned
08	12	20		Applications of Metals	Applications of Irridium and grubbs catalyst in organic synthesis.
				Organic practicals	Ternary Mixture analysis, Two step preparations.
B.Sc.III Sem V Chemistry:- DSE-1002E4 **Analytical Chemistry**					
Lectures	Practicals	Total		Unit	Sub-Units Planned
03	--	03		Chromatography	Ion exchange chromatography, Introduction, Principle, Types and properties of ion exchangers, methodology-column packing, applications of sample, elution, detection/analysis and applications.
B.Sc.III Sem V Chemistry:- DSE-1002E2 **Inorganic Chemistry**					
03	--	03		Catalysis	Introduction, Classification of a catalytic reaction- Homogenous and heterogenous, Types of catalysis, Characteristics of catalytic reaction:
Month – September					
B.Sc.III Sem V Chemistry:- DSE-1002E2 **Inorganic Chemistry**					
Lectures	Practicals	Total		Unit	Sub-Units Planned
08	--	08		Catalysis	Mechanism of catalysis, Intermediate compound formation theory and adsorption theory, Industrial applications of catalysis.
				Organometallic chemistry	Definition, Nomenclature and EAN fule of oraganometallic compounds, Synthesis and structural study of alkyl and aryl compound of Li, Be and Al, Zeiss salt and ferrocene

					preparation
M.Sc.II Sem III Organic Chemistry:- DSC14CHE32 (Paper: Advanced synthetic methods)					
Lectures	Practicals	Total		Unit	Sub-Units Planned
12	24	36		Carbon-13 NMR Spectroscopy	General introduction to 13C NMR spectroscopy; chemical shift values [aliphatic, olefinic, alkyne, aromatic, heteroaromatic and carbonyl compounds]; proton coupled, proton decoupled 13C NMR spectra, advanced 13C NMR techniques (NOE, DEPT, Off resonance, HETCOR), Heteronuclear coupling, problems associated with 13C NMR.
				Combined spectral problems	Structural problems based on combined spectroscopic techniques (including reaction sequences)
B.Sc.I Sem I (NEP) **Chemistry**:- DSC03CHE11 **Inorganic chemistry**					
Lectures	Practicals	Total		Unit	Sub-Units Planned
06	--	06		Chemical bonding and Molecular structure: Valence bond theory	Introduction, Heitler-London theory, Pauling-Slatter theory. Valence bond theory, Concept of hybridization. different types of hybridization and geometry of following molecules, SP, SP2, SP3 hybridization.
Month – October					
M.Sc.II Sem III Organic Chemistry:- DSC14CHE32 (Paper: Advanced synthetic methods)					
Lectures	Practicals	Total		Unit	Sub-Units Planned
02	--	02		Combined spectral problems	Structural problems based on combined spectroscopic techniques (including reaction sequences)
B.Sc.I Sem I (NEP) **Chemistry**:- DSC03CHE11 **Inorganic chemistry**					
Lectures	Practicals	Total		Unit	Sub-Units Planned
02	--	02		Chemical bonding and Molecular structure: Valence bond theory	Sp3D, SP3d2, SP3d3 hybridization, VSEPR theory with reference to ammonia and water.

Dr. D. S. Gaikwad

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

Dr. Mrs. S. D. Shirke
HEAD
DEPARTMENT OF CHEMISTRY
VIVEKANAND COLLEGE, KOLHAPUR
(EMPOWERED AUTONOMOUS)

Vivekanand College, Kolhapur (Empowered Autonomous)
Annual Teaching Plan
Academic Year - 2024-25
Department- Chemistry (BSc Sem III, V & MSc II Sem III)
Name of the Teacher – Dr. A. A. Patravale

Month – June / Jully					
M.Sc.II Sem III :- Course Title:- Organic Chemistry (Paper: Drugs and hetercocyles)					
Lectures	Practicals	Total		Unit	Subunit planned
08	--	08		Drug Design	Introduction of drug, Development of new drugs,
B.Sc.III Sem V:- Course Title:- Physical Chemistry Practical					
--	24	24		Practical's	Basic concepts of Physical chemistry practical's Introduction Non-Instrumental Chemical Kinetics
Month – August					
B.Sc.II Sem III (NEP):- **Course Title:- Analytical and Industrial Chemistry**					
Lectures	Practicals	Total		Unit	Sub-Units Planned
04	-	04		Unit Operation & Unit Process	Introduction, Unit operation, Batch and continues process. Distilation types of condensers.
M.Sc.II Sem III :- Course Title:- Organic Chemistry (Paper: Drugs and hetercocyles)					
04	-	04		Drug Design	Procedures followed in drug design. Structure Activity Relationship. SAR of B-Lactam
B.Sc.III Sem V:- Course Title:- Physical Chemistry Practical					
04	-	04		Fertilizer	Introduction of Fertilizer, Necessity of fertilizer
-	24	24		Practical	Non-Instrumental Chemical Kinetics
Month – September					
B.Sc.II Sem III (NEP):- **Course Title:- Analytical and Industrial Chemistry**					
Lectures	Practicals	Total		Unit	Sub-Units Planned
04	-	04		Gravimetric Analysis	Introduction, General terms in Gravimetric analysis, Types of PPT, Nucleation, Crystal Growth.
B.Sc.III Sem V:- Course Title:- Physical Chemistry Practical					

	24	24		Practical	Physical chemistry Experiment Non instrumental experiments Chemical Kinetics
04	-	04		Fertilizer	Classification of fertilizer, Analysis of Nitrogen fertilizer by Kindjals method.
M.Sc. II Sem III :- Course Title:- Organic Chemistry (Paper: Drugs and hetercocyles)					
Lectures	Practical's	Total		Unit	Sub-Units Planned
04	--	04		Drug Design	Concepts of drug receptors, SAR of cephalosporin ring.
Month – October					
M.Sc. II Sem III :- Course Title:- Organic Chemistry (Paper: Drugs and hetercocyles)					
Lectures	Practical's	Total		Unit	Sub-Units Planned
04	--	04		Drug Design	Relation of chemical structure and chemical activity. Classification of Antibiotics.
B.Sc. III Sem V: - Course Title: - Chemistry (Paper: Industrial Analytical Chemistry)					
Lectures	Practical's	Total		Unit	Subunit planned
04	-	04		Fertilizer	Classification of fertilizer, Analysis of Phosphorus fertilizer by Phosphate molybdenum method.
--	24	24		Practical	Physical chemistry Experiment Non instrumental experiments Chemical Kinetics
B.Sc.II Sem III (NEP):- **Course Title:- Analytical and Industrial Chemistry**					
04	-	04		Gravimetric Analysis	Process of Gravimetry, Inclusion, Occlusion, Digestion. Examples of gravimetric estimation. BA, Pb etc

Dr. A. A. Patravale

VIVEKANAND COLLEGE KOLHAPUR (An Autonomous) ESTD JUNE 1934

Dr. Mrs. S. D. Shirke

HEAD
DEPARTMENT OF CHEMISTRY
VIVEKANAND COLLEGE, KOLHAPUR
(EMPOWERED AUTONOMOUS)

Vivekanand College, Kolhapur (Empowered Autonomous)

Department of Chemistry

Academic Year: 2024-25

Annual Teaching Plan

Name of the teacher: Mr. A. T. Mane

Programme: M.Sc. II Semester III

Subject: Chemistry **Course Title:** Analytical Chemistry

Month : July/			Module/Unit:	Sub-units planned
Lectures 07	Practicals -	Total07	Drug Analysis	Introduction, classification, sources of impurities in pharmaceutical raw materials Limit tests: Limit test for impurities for Pb, As, Fe, Se, etc. Estimation of moisture (K-F method), halide (Schnoiger's oxygen flask method), sulfate, boron, etc
Month : August			Module/Unit:	Sub-units planned
Lectures 08	Practicals -	Total 03 05	Drug Analysis Analysis of vitamins	Analysis of commonly used drugs such as antihistamines, sulfa drugs, barbiturates, etc. using non-aqueous titrations, sodium nitrite titrations, differential UV methods, colorimetric and fluorimetric methods of analysis. Analysis of vitamins (thiamine, ascorbic acid, Vit. A, Vit. B6, Vit. K) and hormones (progesterone, oxytocin, insulin) chemical, instrumental and biological assay, wherever 65 applicable
Month : September			Module/Unit:	Sub-units planned
Lectures 08	Practicals -	Total 08	Hyphenated Techniques	Advanced techniques of analysis: UV-Visible, IR, 1H-NMR (Recapitulation), 13CNMR, Mass spectrometry
Month : Octomber			Module/Unit:	Sub-units planned
Lectures 07	Practicals -	Total 07	Hyphenated Techniques	Problems related to structure determination and applications of spectroscopic techniques as analytical tools.

Mr. A. T. Mane

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

Dr. Mrs. S. D. Shirke

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DEPARTMENT OF CHEMISTRY
VIVEKANAND COLLEGE, KOLHAPUR
(EMPOWERED AUTONOMOUS)

Vivekanand College, Kolhapur (Empowered Autonomous)

Department of Chemistry

Academic Year: 2024-25

Annual Teaching Plan

Name of the teacher: Mr. A. T. Mane

Programme : M.Sc. I Semester I

Subject: Chemistry **Course Title:** Organic/ Analytical Chemistry

<table>
<tr><td colspan="3">Month : July/</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">1)Chemistry of transition elements</td><td rowspan="2">General properties of transition elements, crystal field theory, crystal field stabilisation energy (CFSE), spectrochemical series, Jahn- Teller effect,.</td></tr>
<tr><td>10</td><td>12</td><td>22</td></tr>
<tr><td colspan="3">Month: August</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">1)Bioinorganic Chemistry</td><td rowspan="2">Role of metal ions in biological processes, , cytochromes, ferrodoxins and iron sulphur proteins, metal ion transport and storage: PS-I, PS -II, , metal complexes in medicines.</td></tr>
<tr><td>5</td><td>12</td><td>17</td></tr>
<tr><td colspan="3">Month :September</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Study of organometallic compounds.</td><td rowspan="2">Organo-lithium, copper, aluminium</td></tr>
<tr><td>7</td><td>10</td><td>17</td></tr>
<tr><td colspan="3">Month :Octomber</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Study of organometallic compounds</td><td rowspan="2">zinc, Titanium, Mercury, Cobalt.</td></tr>
<tr><td>8</td><td>10</td><td>18</td></tr>
</table>

Mr. A. T. Mane

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

Dr. Mrs. S. D. Shirke

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DEPARTMENT OF CHEMISTRY

VIVEKANAND COLLEGE, KOLHAPUR

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Vivekanand College, Kolhapur (Empowered Autonomous)

Department of Chemistry

Academic Year: 2024-25

Annual Teaching Plan

Name of the teacher: Dr. S. D. Kharade

Programme: M.Sc. I Semester I

Subject: Chemistry **Course Title:** Research Methodology

Month July			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	**Data Interpretation by following techniques**	General introduction of interpretation of spectral data by following techniques: UV-visible, IR, NMR, Mass
4	-	4		
Month August			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	**Data Interpretation by following techniques**	SEM, TEM-SAED Pattern, EDX, AFM
4	-	4		
Month September			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	**Data Interpretation by following techniques**	XRD, XPS TGA, DSC, DTA,
4	-	4		
Month October			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	**Data Interpretation by following techniques**	BET, Particle Size Analyzer VSM (Vibrating Sample magnetometer)
4	-	4		

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

Dr. S. D. Kharade

Head
Department Of Chemistry

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Vivekanand College, Kolhapur (Empowered Autonomous)

Department of Chemistry

Academic Year: 2024-25

Annual Teaching Plan

Name of the teacher: Dr. S. D. Kharade

Programme: M.Sc. I Semester I

Subject: Chemistry **Course Title:** Analytical Chemistry (Elective)

<table>
<tr><td colspan="3">Month July</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Atomic absorption and Inductively coupled plasma (ICP) Spectroscopy</td><td rowspan="2">a) Atomic Absorption Spectroscopy (AAS): Introduction, Principal, difference between AAS and FES, Advantages of AAS over FES, advantages and disadvantages of AAS,</td></tr>
<tr><td>4</td><td>-</td><td>4</td></tr>
<tr><td colspan="3">Month August</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Atomic absorption and Inductively coupled plasma (ICP) Spectroscopy</td><td rowspan="2">Interferences, Applications.</td></tr>
<tr><td>4</td><td>-</td><td>4</td></tr>
<tr><td colspan="3">Month September</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Atomic absorption and Inductively coupled plasma (ICP) Spectroscopy</td><td rowspan="2">Graphite furnace atomic absorption spectroscopy, general description, advantages and disadvantages. Flame photometry, Cold Vapor Mercury, Hydride Generation, Spark emission, challenges and limitations.</td></tr>
<tr><td>4</td><td>-</td><td>4</td></tr>
<tr><td colspan="3">Month October</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Atomic absorption and Inductively coupled plasma (ICP) Spectroscopy</td><td rowspan="2">b) Inductively Coupled Plasma Spectroscopy: Introduction, Nebulisation Torch, Plasma, Instrumentation, Interferences, and Applications. c) Problems: Simple problems based on AAS and ICP</td></tr>
<tr><td>4</td><td>-</td><td>4</td></tr>
</table>

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

Dr. S. D. Kharade

Head

Department Of Chemistry

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VIVEKANAND COLLEGE, KOLHAPUR
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Vivekanand College, Kolhapur (Autonomous)

Department of Chemistry

Academic Year: 2024-25

Annual Teaching Plan

Name of the teacher: Dr. S. D. Kharade

Programme: M.Sc. II Semester III

Subject: Chemistry **Course Title:** Analytical Chemistry

<table>
<tr><td colspan="3">Month July</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Advanced Instrumentation Techniques-A</td><td rowspan="2">Scanning Electron Microscope (SEM) - Introduction, principle, instrumentation, applications Transmission Electron Microscope (TEM) - Introduction, principle, instrumentation, applications Electron Dispersion Spectroscopy (EDS) - Introduction, principle, instrumentation, applications Energy Dispersive applications</td></tr>
<tr><td>8</td><td>4*3 = 12</td><td>20</td></tr>
<tr><td colspan="3">Month August</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Advanced Instrumentation Techniques-A</td><td rowspan="2">Scanning Tunneling Microscopy (STM) - Introduction, principle, instrumentation, applications Atomic Force Microscopy (AFM) - Introduction, principle, instrumentation, applications Practical applications and examples in analytical chemistry and research.</td></tr>
<tr><td>8</td><td>4*3 = 12</td><td>20</td></tr>
<tr><td colspan="3">Month September</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Clinical Analysis</td><td rowspan="2">Biological significance, analysis of assay of enzymes (pepsin, monoamine, oxidase, tyrosinase), Composition and detection of</td></tr>
<tr><td>8</td><td>4*3=12</td><td>20</td></tr>
</table>

				abnormal level of certain constituents leading to diagnosis of diseases. Sample collection and preservation of physiological fluids, analytical methods to the constituents of physiological fluids (blood, urine and serum).
Month October			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	**Clinical Analysis**	Blood- Estimation of glucose, chlolesterol, urea, hemoglobin and bilirubin, Urine- urea, uric acid, creatinine, calcium, phosphate, sodium, potassium and chloride.
8	4*3=12	20		

Dr. S. D. Kharade

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

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Department Of Chemistry

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DEPARTMENT OF CHEMISTRY
VIVEKANAND COLLEGE, KOLHAPUR
(EMPOWERED AUTONOMOUS)

Vivekanand College, Kolhapur (Empowered Autonomous)

Annual Teaching Plan

Academic Year: 2024-25 **Semesters: M.Sc. I (Sem-I)** **Department: Chemistry**

Subject: Chemistry **Course Title: RMD14CHE11: Research Methodology**

Name of the Teacher: Dr. Archana Sanjay Rajmane

Month:July			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	UNIT III:Computer Applications	(A)Database Search Engines: Scirus, reaxys, Synthia, Google Scholar, ChemIndustry, Wiki-Databases, ChemSpider, Science Direct, SciFinder, Scopus, inflibinet, Cambridge structural database, Web of Science, Indian Citation Index. (B) Publishers in Chemical Sciences: American Chemical Society, Royal Society of Chemistry, Taylor and Francis, Elsevier, Springer, Bentham, Wiley, Themie. **Practicals:** Organic Estimation I Organic Estimation II
08	32	40		
Month: August			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	UNIT III:Computer Applications	(C) Chemometrics: Computer-based laboratory, statistics, and data interpretation, Computer-based information systems for e.g docking. (D) Software for Chemistry: Chemdraw, Chemdoodle, Marvinsketch, Origin, MestreNova, XRD Software **Practicals:** Organic Preparation I Organic Preparation II
08	32	40		
Month:September			Module/Unit:	Sub-units planned
08	32	40	UNIT I: Fundamentals of Research Methodology	(a) Meaning, Objectives, Motivation and Types of Research, (b) Research Approaches (c) Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Importance of Knowing How Research is done? **Practicals:** Organic Estimation III Organic Estimation IV
Month: October			Module/Unit:	Sub-units planned
06	32	38	UNIT I: Fundamentals of Research Methodology	(d) Criteria of Good Research, research process and steps involved (e) Hypothesis: Meaning, function and types of hypothesis; Null/Alternative hypothesis (f)Literature survey, sources of information, review. (g) Ethical issues and intellectual property rights. (h) Publication process, selection of journals, citation index, impact factor, h-index, i10 index, Journal Cite Score, Google scholar index, Research gate, and Academia. **Practicals:** Organic Preparation III Organic Preparation IV

Rajmane

Dr. A. S. Rajmane

Dr. S. D. Shirke

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DEPARTMENT OF CHEMISTRY
VIVEKANAND COLLEGE, KOLHAPUR
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Vivekanand College, Kolhapur (Empowered Autonomous)

Annual Teaching Plan

Academic Year: 2024-25 **Semesters: M.Sc. II (Sem-III)**

Department: Chemistry **Subject: Chemistry**

Course Title: DSC14CHE32 Advanced Synthetic Methods

Course Title: DSE14CHE31: Drugs and Heterocycles

Name of the Teacher: Dr. Archana Sanjay Rajmane

Month: July			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	UNIT II Application of the following reagents	(A)Reagents: (i) Lithium diisopropylamide (LDA), (ii) Tri-n-butyl tin hydride (TBTH), (iii) m-CPBA, (iv) Lead tetra acetate, (v) Diazomethane, (vi) Phase Transfer Catalyst (PTC; including quaternary ammonium salts and crown ethers),(vii) Dess-Martin periodinane,
08	-	08		
Month: August			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	UNIT II Application of the following reagents	((viii) Periodic acid, (ix) Corey Kim oxidation (x) SeO2 (xi) DCC. **(B) Enolates in organic synthesis:** Formation and applications
08	-	08		
Month: September			Module/Unit:	Sub-units planned
08	-	08	UNIT II Application of the following reagents	A) Six-membered heterocycles Synthesis and reactions of (i) Diazines: (ii) 1,2-diazine, (iii) 1,3-diazine, (iv) 1,4-diazine
Month: October			Module/Unit:	Sub-units planned
06	-	06	UNIT IV:Study of six and seven-membered heterocycles containing two or more heteroatoms	(ii) Triazines: 1,2,3-triazine, 1,2,4-triazine 1,3,5-triazine

Rajmane

Dr. A. S. Rajmane

Dr. S. D. Shirke

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DEPARTMENT OF CHEMISTRY
VIVEKANAND COLLEGE, KOLHAPUR
(EMPOWERED AUTONOMOUS)

Vivekanand College, Kolhapur
(Empowered Autonomous)
Department of Chemistry
Academic Year: 2024-25

Annual Teaching Plan

Name of the teacher: Miss. S. N. Inamdar

Programme: M.Sc. I Semester I

Subject: Chemistry **Course Title:** Physical Chemistry

Month: July			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	Chemical kinetics	Introduction to basic concepts, Experimental methods of following kinetics of a reaction.
2	12	14		
Month: August			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	Chemical kinetics	chemical and physical (measurement of pressure, volume, EMF, conductance, diffusion current and absorbance) methods and examples. Steady state approximation and study of reaction between N02 and F2, decomposition of ozone, and nitrogen pentoxide. Ionic reaction: Primary and secondary salt effect.
6	12	18		
Month: September			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	Chemical kinetics	**Catalysis:** Classification of catalysis, mathematical expression of autocatalytic reactions, Michaelis—Menten enzyme catalysis, Homogeneous catalysis: acid and base catalysed reactions.
4	8	12		
Month: October			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	Chemical kinetics	Heterogeneous catalysis: Adsorption of gas on a surface and its kinetics, Catalyzed hydrogen-deuterium exchange reaction.
3	8	11		

Miss. S. N. Inamdar

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

Dr. S. D. Shirke
HEAD
DEPARTMENT OF CHEMISTRY
VIVEKANAND COLLEGE, KOLHAPUR
(EMPOWERED AUTONOMOUS)

Vivekanand College, Kolhapur
(Empowered Autonomous)
Department of Chemistry
Academic Year: 2024-25

Annual Teaching Plan

Name of the teacher: Miss. S. N. Inamdar

Programme: M.Sc. I Semester I

Subject: Chemistry **Course Title:** Inorganic Chemistry

Month: July			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	Studies and applications of Lanthanides and Actinides	Occurrence, properties of f-block elements, electronic configuration and oxidation state.
2	-	2		
Month: August			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	Studies and applications of Lanthanides and Actinides	Colour, spectral and magnetic properties of lanthanides and actinides Lanthanide contraction Modern methods of separation of lanthanides and actinides.
5	-	5		
Month: September			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	Studies and applications of Lanthanides and Actinides	applications of lanthanides and actinides, applications of lanthanide and actinide compounds in industries.
6	-	6		
Month: October			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	Studies and applications of Lanthanides and Actinides	Photoluminescence properties of lanthanide compounds, organometallic chemistry of lanthanides and actinides.
2	-	2		

Miss. S. N. Inamdar

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

Dr. S. D. Shirke
HEAD
DEPARTMENT OF CHEMISTRY
VIVEKANAND COLLEGE, KOLHAPUR
(EMPOWERED AUTONOMOUS)

Vivekanand College, Kolhapur
(Empowered Autonomous)
Department of Chemistry
Academic Year: 2024-25

Annual Teaching Plan

Name of the teacher: Miss. S. N. Inamdar

Programme: M.Sc. II Semester III

Subject: Chemistry **Course Title:** Analytical Chemistry

<table>
<tr><td colspan="3">Month: August</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Pesticides &Forensic Analysis</td><td rowspan="2">Pesticide Analysis: Introduction, classification of pesticides, sampling, sample pretreatment and processin g, analysis of DDT, gammexane, endosulphan, zinab, ziram, malathion, thiram, thiometon, simazine and chloridane.</td></tr>
<tr><td>4</td><td>-</td><td>4</td></tr>
<tr><td colspan="3">Month: September</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Pesticides &Forensic Analysis</td><td rowspan="2">Applications of colorimetric and chromatographic techniques (GC-MS, HPLC-MS) in analysis of pesticide residue. Introduction to EPA regulatory body. Practical applications and examples in analytical chemistry and research. Forensic Analysis: Special features of forensic analysis, sampling, sample storage, sample dissolution, classification of poisons, lethal dose, significance of LD-50 and LC-50.</td></tr>
<tr><td>6</td><td>-</td><td>6</td></tr>
<tr><td colspan="3">Month: October</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Pesticides &Forensic Analysis</td><td rowspan="2">General discussion of poisons with special reference to mode of action of cyanide, organophosphate and snake venom. Estimation of poisonous materials such as lead, mercury and arsenic in biological samples.</td></tr>
<tr><td>5</td><td>-</td><td>5</td></tr>
</table>

Vivekanand College, Kolhapur
(Empowered Autonomous)
Department of Chemistry
Academic Year: 2024-25

Annual Teaching Plan

Name of the teacher: Miss. S. N. Inamdar

Programme: M.Sc. II Semester III

Subject: Chemistry **Course Title:** Analytical Chemistry

Month July			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	Voltammetry Techniques	Introduction, Principle, excitation signals in voltammetry, basic instrumentation based on operational amplifiers, voltammetric electrodes
	-	3		
Month August			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	Voltammetry Techniques	Cyclic Voltammetry: Instrumentation, Determination of analytes using cyclicvoltammetry, Applications. Pulse voltammetry: Introduction, Normal Pulse Voltammetry, Reverse pulse voltammetry, Differential pulse voltammetry, Square wave voltammetry.
6	-	6		
Month September			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	Voltammetry Techniques	Stripping voltammetry: Cathodic and Anodic stripping voltammetry, Electrodeposition step, Voltammetric completion of the analysis, adsorptive striping methods, voltammetry with microelectrodes. Practical applications in analytical chemistry and research.
6	-	6		

				Practical applications and examples in analytical chemistry and research.

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous)
ESTD JUNE 1964

Miss. S. N. Inamdar

Dr. S. D. Shirke
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DEPARTMENT OF CHEMISTRY
VIVEKANAND COLLEGE, KOLHAPUR
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Vivekanand College, Kolhapur (Empowered Autonomous)

Annual Teaching Plan

Academic Year: 2024-25 **Semesters: M.Sc. II, Sem-III** **Department: Chemistry**

Subject: Chemistry **Course Title: Analytical Chemistry**

Name of the Teacher: Miss. P. A. Gholap

<table>
<tr><td colspan="3">Month: August</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practical's</td><td>Total</td><td rowspan="2">Colloids and Emulsions</td><td rowspan="2">• Introduction
• Classification of colloids
• Theories of origin of charge on sol
• Association colloids
• Spontaneous ageing</td></tr>
<tr><td>08</td><td>-</td><td>08</td></tr>
<tr><td colspan="3">Month: September</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practical's</td><td>Total</td><td rowspan="2">Colloids and Emulsions</td><td rowspan="2">• Emulsion
• Types of emulsion
• Emulsifiers
• Gels
• Applications</td></tr>
<tr><td>07</td><td>-</td><td>07</td></tr>
<tr><td colspan="3">Month: October</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practical's</td><td>Total</td><td rowspan="2">Particle size analysis</td><td rowspan="2">• Low angle LASER light scattering
• Photo sedimentation</td></tr>
<tr><td>08</td><td>-</td><td>08</td></tr>
<tr><td colspan="3">Month: November</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practical's</td><td>Total</td><td rowspan="2">Particle size analysis</td><td rowspan="2">• Dynamic light scattering
• Application</td></tr>
<tr><td>04</td><td>-</td><td>04</td></tr>
<tr><td colspan="3">Month: December</td><td></td><td>• Practical and theory Examination</td></tr>
</table>

Miss. P. A. Gholap

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

Dr. Mrs. S. D. Shirke
HEAD
DEPARTMENT OF CHEMISTRY
VIVEKANAND COLLEGE, KOLHAPUR
(EMPOWERED AUTONOMOUS)

Vivekanand College, Kolhapur (Empowered Autonomous)

Annual Teaching Plan

Academic Year: 2024-25 **Semesters: M.Sc. I Sem-I** **Department: Chemistry**

Subject: Chemistry **Course Title: Analytical chemistry**

Name of the Teacher: Miss. P. A. Gholap

<table>
<tr><td colspan="3">Month: July</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practical's</td><td>Total</td><td rowspan="2">Introduction to Quality Control and Quality Assurance</td><td rowspan="2">a) Control Charts
Introduction</td></tr>
<tr><td>04</td><td>-</td><td>04</td></tr>
<tr><td colspan="3">Month: August</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practical's</td><td>Total</td><td rowspan="2">Introduction to Quality Control and Quality Assurance</td><td rowspan="2">b) Quality in Analytical Chemistry</td></tr>
<tr><td>04</td><td>-</td><td>04</td></tr>
<tr><td colspan="3">Month: September</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practical</td><td>Total</td><td rowspan="2">Introduction to Quality Control and Quality Assurance</td><td rowspan="2">c) Good Laboratory Practices</td></tr>
<tr><td>04</td><td>-</td><td>04</td></tr>
<tr><td colspan="3">Month: October</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practical's</td><td>Total</td><td rowspan="3">Introduction to Quality Control and Quality Assurance</td><td rowspan="3">Validation of analytical methods</td></tr>
<tr><td>03</td><td>-</td><td>03</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td colspan="3">Month: November</td><td></td><td>• Practical and theory Examination</td></tr>
</table>

Miss. P. A. Gholap.

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

Dr. Mrs. S. D. Shirke

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DEPARTMENT OF CHEMISTRY
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Vivekanand College, Kolhapur (Empowered Autonomous)

Annual Teaching Plan

Academic Year: 2024-25 **Semesters: M.Sc. I Sem-I** **Department: Chemistry**

Subject: Chemistry **Course Title: Analytical chemistry (Elective)**

Name of the Teacher: Miss. P. A. Gholap

<table>
<tr><td colspan="3">Month: July</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practical's</td><td>Total</td><td rowspan="2">Introduction to Spectroscopy</td><td rowspan="2">• Introduction,
• Region of electromagnetic radiations</td></tr>
<tr><td>04</td><td>-</td><td>04</td></tr>
<tr><td colspan="3">Month: August</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practical's</td><td>Total</td><td rowspan="2">Introduction to Spectroscopy</td><td rowspan="2">• Electronic spectroscopy</td></tr>
<tr><td>04</td><td>-</td><td>04</td></tr>
<tr><td colspan="3">Month: September</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practical</td><td>Total</td><td rowspan="2">Introduction to Spectroscopy</td><td rowspan="2">• Raman spectroscopy</td></tr>
<tr><td>04</td><td>-</td><td>04</td></tr>
<tr><td colspan="3">Month: October</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practical's</td><td>Total</td><td rowspan="3">Introduction to Spectroscopy</td><td rowspan="3">• vibrational Raman spectra, and rotational fine structure</td></tr>
<tr><td>03</td><td>-</td><td>03</td></tr>
<tr><td colspan="3"></td></tr>
<tr><td colspan="3">Month: November</td><td></td><td>• Practical and theory Examination</td></tr>
</table>

Miss. P. A. Gholap.

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

Dr. Mrs. S. D. Shirke
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VIVEKANAND COLLEGE, KOLHAPUR
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Vivekanand College, Kolhapur (Empowered Autonomous)

Annual Teaching Plan

Academic Year: 2024-25 **Semesters: M.Sc. I Sem-I** **Department: Chemistry**

Subject: Chemistry **Course Title: Analytical Chemistry Practical's**

Name of the Teacher: Miss. P. A. Gholap

<table>
<tr><td colspan="3">Month: July</td><td>Module/ Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practical 's</td><td>Total</td><td rowspan="2">-</td><td rowspan="2">1.To verify the Beers- Lamberts law and determine the concentration of given solution using colorimetry.
2. To estimate the amount of calcium from drug sample.</td></tr>
<tr><td>-</td><td>08</td><td>08</td></tr>
<tr><td colspan="3">Month: August</td><td>Module/ Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practical 's</td><td>Total</td><td rowspan="2">-</td><td rowspan="2">4. To estimate amount of sulpha drug from supplied pharmaceutical tablet.
5. To determine solubility of calcium oxalate in presence of different concentration of HCl.</td></tr>
<tr><td>-</td><td>08</td><td>08</td></tr>
<tr><td colspan="3">Month: September</td><td>Module/ Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practical 's</td><td>Total</td><td rowspan="2">-</td><td rowspan="2">7. To analyse the given sample of brass alloy for its copper content by iodometric method.
8. To estimate amount of calcium from chalk by titrimetric method.</td></tr>
<tr><td>-</td><td>08</td><td>08</td></tr>
<tr><td colspan="3">Month: October</td><td>Module/ Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practical 's</td><td>Total</td><td rowspan="2"></td><td rowspan="2">7.To determine the amount of acetyl salicylic acid from given material of pharmaceutical tablet.
8. To estimate amount of phosphoric acid from given sample of cola drink by molybdenum blue method.</td></tr>
<tr><td>-</td><td>08</td><td>08</td></tr>
<tr><td colspan="3">Month: November</td><td></td><td>• Practical and theory Examination</td></tr>
</table>

Miss. P. A. Gholap

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

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Vivekanand College, Kolhapur (Autonomous)

Department of Chemistry

Academic Year: 2024-25

Annual Teaching Plan

Name of the Teacher: MS. V. S. Rajmane.

Programme: M.Sc. II Semester III

Subject: Chemistry **Course Title:** Analytical Chemistry

Month July			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	Unit IV: A)Ion selective electrodes	Terminology, types and construction of electrodes, glass electrode
3	-	3		
Month August			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	A)Ion selective electrodes	solid state and precipitate electrodes, liquid – liquid membrane electrodes
12	4*3 = 12	24		
Month September			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	A)Ion selective electrodes	Enzyme and gas electrodes, and applications. Organic synthesis relating to nucleophilic and electrophilic attack on ligands.
12	4*3=12	24		
Month October			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	Unit IV: Electrophoresis	Introduction: paper electrophoresis: Technique,
12	4*3=12	28		

				factors affecting migration of ions,
Month November			**Module/Unit:**	**Sub-units planned**
			Unit IV: Electrophoresis	Capillary and zone electrophoresis and applications.
12	4*3=12	24		
Month December			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	Unit IV: Electrophoresis	Practical applications in analytical chemistry and research.
12	-	12		

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

MS. V. S. Rajmane

Head

Department Of Chemistry

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Department of Chemistry

Academic Year: 2024-25

Annual Teaching Plan

Name of the Teacher: MS. V. S. Rajmane.

Programme: M.Sc. I Semester I

Subject: Chemistry **Course Title:** AnalyticalChemistry

<table>
<tr><td colspan="3">Month August</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">UNIT III: Electroanalytical Techniques
-</td><td rowspan="2">Polarography: Introduction, Instrumentation, Ilkovic equation and its verification. Polarographic measurements, Dropping mercury electrode</td></tr>
<tr><td>4</td><td>-</td><td>4</td></tr>
<tr><td colspan="3">Month September</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">UNIT III: Electroanalytical Techniques</td><td rowspan="2">Determination of half wave potential, qualitative and quantitative applications</td></tr>
<tr><td>4</td><td>-</td><td>4</td></tr>
<tr><td colspan="3">Month October</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">UNIT III: Electroanalytical Techniques</td><td rowspan="2">Amperometry: Basic principles, instrumentation, Amperometric titration curves, Amperometric indicators procedure for Amperometric titrations, Evaluation of amperometry</td></tr>
<tr><td>4</td><td>-</td><td>4</td></tr>
</table>

				in research and analytical applications.
Month November			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	UNIT III: Electroanalytical Techniques	Voltammetry: Voltammetric methods of analysis, basic principles, instrumentation, voltammetric measurements, Volta metric techniques, current in voltammetry, shape of voltammograms, quantitative and qualitative aspects of voltammetry, quantitative applications, characterization applications, Evaluation of CV in research and analytical applications
4	-	4		

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

MS. V. S. Rajmane

Head

Department Of Chemistry

HEAD DEPARTMENT OF CHEMISTRY VIVEKANAND COLLEGE, KOLHAPUR (EMPOWERED AUTONOMOUS)

Head of department

Vivekanand College, Kolhapur (Autonomous)

Department of Chemistry

Academic Year: 2024-25

Annual Teaching Plan

Name of the Teacher: MS. V. S. Rajmane.

Programme: M.Sc. II Semester III

Subject: Chemistry **Course Title:** AnalyticalChemistry

<table>
<tr><td colspan="3">Month August</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">UNIT-IV: Advanced Instrumentation Techniques-B</td><td rowspan="2">Raman Spectroscopy-Introduction, principle, instrumentation, applications X-Ray Fluorescence Spectroscopy (XFS) - Introduction, principle, instrumentation, applications</td></tr>
<tr><td>4</td><td>-</td><td>4</td></tr>
<tr><td colspan="3">Month September</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">UNIT-IV: Advanced Instrumentation Techniques-B</td><td rowspan="2">Electron Spin Resonance Spectroscopy (ESR)-Introduction, principle, instrumentation, applications</td></tr>
<tr><td>4</td><td>-</td><td>4</td></tr>
<tr><td colspan="3">Month October</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">UNIT-IV: Advanced Instrumentation Techniques-B</td><td rowspan="2">X-Ray Photoelectron Spectroscopy (XPS)-</td></tr>
<tr><td>4</td><td>-</td><td>4</td></tr>
</table>

				Introduction, principle, instrumentation, applications
Month November			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	UNIT-IV: Advanced Instrumentation Techniques-B	Auger Electron Spectroscopy - Introduction, principle, instrumentation, applications Secondary Ion Mass Spectrometry (SIMS) - Introduction, principle, instrumentation, applications Practical applications and examples in analytical chemistry and research.
4	-	4		

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

Rajmane

MS. V. S. Rajmane

Head

Department Of Chemistry

HEAD
DEPARTMENT OF CHEMISTRY
VIVEKANAND COLLEGE, KOLHAPUR
(EMPOWERED AUTONOMOUS)

Vivekanand College, Kolhapur (Autonomous)

Department of Chemistry

Academic Year: 2024-25

Annual Teaching Plan

Name of the Teacher: MS. V. S. Rajmane.

Programme: M.Sc. II Semester III

Subject: Chemistry **Course Title:** Organic Chemistry

<table>
<tr><td colspan="3">Month August</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Unit IV: (A) Five- Study of five and six-membered heterocycles containing one membered heterocycles</td><td rowspan="2">Synthesis and reactions of (i) Pyrrol (ii) Furan, (iii) Thiophene, (iv) Benzopyrroles</td></tr>
<tr><td>4</td><td>-</td><td>4</td></tr>
<tr><td colspan="3">Month September</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Unit IV: (A) Five- Study of five and six-membered heterocycles containing one membered heterocycles</td><td rowspan="2">(v) Benzofurans, and (vi) Benzothiophenes.</td></tr>
<tr><td>4</td><td>-</td><td>4</td></tr>
<tr><td colspan="3">Month October</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">(B)Six-membered heterocycles with one heteroatom</td><td rowspan="2">Synthesis and reactions of (i) Pyridine,</td></tr>
<tr><td>4</td><td>-</td><td>4</td></tr>
<tr><td colspan="3">Month November</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">(B)Six-membered heterocycles with one heteroatom</td><td rowspan="2">(ii)Quinoline, and (iii) Coumarin.</td></tr>
<tr><td>4</td><td>-</td><td>4</td></tr>
</table>

Rajmane

MS. V. S. Rajmane

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

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