"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

(2023-24)

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

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous)
ESTD JUNE 1964

Vivekanand College, Kolhapur (Empowered Autonomous)

Teaching Plan

Academic Year: 2023-24 **Semesters: B.Sc. II, Sem- IV** **Department: Chemistry**

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

Month: December			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	1. Amines and Diazonium Salts	• Theory :Introduction Amines- Definition Classification **Practicals** - Conductometry -02, organic spotting and organic preparation
01	08	09		
Month: Januarty			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	Continued…	• Theory -Preparation of Primary , secondary and Tertiary amines.- Chemical Reactions • **Practicals**- Chemical Kinetics, and Viscosity • Preparation of Mohr's salt • Semi-micro mixture analysis- Two
01	32	33		
Month: February			Module/Unit:	Sub-units planned
02	32	34	Continued…	• Continued…Diazonium Salts-Definition, exxamples • Preparation of diazonium salts from aromatic amines and HNO2 • Electrophilic Substitution reactions and Sandmeyer's reactions. • **Practicals** – Semimicro analysis- 1 mixture
Month: March			Module/Unit:	Sub-units planned
-	-	-	-	Reaction of diazonium salt with beta naphthol, and different electrophiles. Semimicro Mixture Analysis : 02 mixtures
	Month: April			Theory and Practical Examinations.

Dr. S. D. Shirke

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: 2023-24 [Semesters: B.Sc. I (Major/Minor), Sem-I] Department: Chemistry

Subject: Chemistry Course Title: DSC03CHE11/MIN03CHE11: Inorganic Chemistry

Name of the Teacher: Dr. Sanjay Shivram Ankushrao

<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">Induction</td><td rowspan="2">• General Introduction
• Discussion on Course Structure
• Discussion on Examination pattern
• Discussion on Syllabus</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 Bonding and Molecular structure -Ionic Bonding</td><td rowspan="2">• General introduction
• Types of Bond
• Formation of ionic Solid
• Factors Governing to Formation of ionic Solid</td></tr>
<tr><td>12</td><td>16</td><td>28</td></tr>
<tr><td colspan="3">Month: September</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>12</td><td>16</td><td>28</td><td>Chemical Bonding and Molecular structure -Ionic Bonding</td><td>• Born-Haber Cycle
• Applications of Born-Haber Cycle
• Fajan's Rule
• Applications of Fajan's rule
• % of Covalent Character in Ionic Comp.</td></tr>
<tr><td colspan="3">Month: October</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>12</td><td>16</td><td>28</td><td>Chemical Bonding and Molecular structure-Valence bond theory (VBT)</td><td>• Valence Bond Theory: Introduction, Assumptions, Applications and Limitations.
• Concept of hybridization, different types of hybridization and geometry of molecule.
• Linear geometry $BeCl_2$ (sp hybridization)
• Planer trigonal geometry BF_3 (sp^2 hybridization)
• Tetrahedral geometry $SiCl_4$ (sp^3 hybridization)</td></tr>
<tr><td colspan="3">Month: November</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>06</td><td>08</td><td>14</td><td>Chemical Bonding and Molecular structure-Valence bond theory (VBT)</td><td>• Trigonal bipyramidal geometry PCl_5 (sp^3d hybridization)
• Octahedral geometry SF_6 (sp^3d^2 hybridization)
• Pentagonal bipyramidal geometry(IF_7)
• (sp^3d^3 hybridization)
• Valence Shell Electron Pair Repulsion (VSEPR) Theory H_2O, ClF_3, ICl_4^-</td></tr>
</table>

Dr. S. S. Ankushrao

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: 2023-24 [Semesters: B.Sc. I (OE), Sem-I] Department: Chemistry

Subject: Chemistry Course Title: OEC03CHE11: General Aspects of Inorganic Chemistry

Name of the Teacher: Dr. Sanjay Shivram Ankushrao

Month: July			Module/Unit:	Sub-units planned
Lectures	Practicals hr	Total	Induction	• General Introduction • Discussion on Course Structure • Discussion on Examination pattern • Discussion on Syllabus
06	-	06		
Month: August			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	Water	• Introduction • Sources of water • Water quality parameters (definition, causes and estimation) like Colour, odour, pH, acidity, alkalinity.
12	16	28		
Month: September			Module/Unit:	Sub-units planned
12	16	28	Water	• Water quality parameters (definition, causes and estimation) like hardness, chlorides, total solids, dissolved oxygen, Chemical oxygen demand.
Month: October			Module/Unit:	Sub-units planned
12	16	28	Water	• Ill effects of hard water in domestic and industrial purposes • Treatment of water by lime soda method, sterilization (chlorination), • Zeolite process, ion exchange process, reverse osmosis.

Dr. S. S. Ankushrao

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

Vivekanand College, Kolhapur (Empowered Autonomous)

Annual Teaching Plan

Academic Year: 2023-24 [Semesters: B.Sc. I (Major/Minor), Sem-II] Department: Chemistry

Subject: Chemistry

Course Title: DSC03CHE21: Physical Chemistry

Name of the Teacher: Dr. Sanjay Shivram Ankushrao

<table>
<tr><td colspan="3">Month: December</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 Energetics
A) Thermodynamics</td><td rowspan="2">• Introduction, Spontaneous and nonspontaneous process with examples,</td></tr>
<tr><td>06</td><td>-</td><td>06</td></tr>
<tr><td colspan="3">Month: January</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 Energetics
A) Thermodynamics</td><td rowspan="2">• Statements of second law of thermodynamics</td></tr>
<tr><td>12</td><td>16</td><td>28</td></tr>
<tr><td colspan="3">Month: February</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>12</td><td>16</td><td>28</td><td>Chemical Energetics
A) Thermochemistry</td><td>• Carnot's cycle and its efficiency</td></tr>
<tr><td colspan="3">Month: March</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>09</td><td>16</td><td>25</td><td>Chemical Energetics
A) Thermochemistry</td><td>• Problems based on Carnot Cycle</td></tr>
</table>

Dr. S. S. Ankushrao

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

Vivekanand College, Kolhapur (Empowered Autonomous)

Annual Teaching Plan

Academic Year: 2023-24 **[Semesters: B.Sc. I (OE), Sem-II]** **Department: Chemistry**

Subject: Chemistry

Course Title: OEC03CHE21: General Aspects of Physical Chemistry

Name of the Teacher: Dr. Sanjay Shivram Ankushrao

Month: December			Module/Unit:	Sub-units planned
Lectures	Practicals hr	Total	Thermodynamics	• Introduction, Spontaneous and nonspontaneous process with examples,
06	-	06		
Month: January			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	Thermodynamics	• Terms used in the study of thermodynamics
12	16	28		
Month: February			Module/Unit:	Sub-units planned
12	16	28	Thermodynamics	• Statements of second law of thermodynamics • Third Law of Thermodynamics

Dr. S. S. Ankushrao

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: 2023-24 [Semesters: B.Sc. I (IKS), Sem-II] Department: Chemistry

Subject: Chemistry

Course Title: IKS03GEC21: IKS

Name of the Teacher: Dr. Sanjay Shivram Ankushrao

<table>
<tr><td colspan="3">Month: December</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">Chemistry of Ancient and Medieval India</td><td rowspan="2">• Introduction, Chemistry in pre-Harrapan period,</td></tr>
<tr><td>06</td><td>-</td><td>06</td></tr>
<tr><td colspan="3">Month: January</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Chemistry of Ancient and Medieval India</td><td rowspan="2">• Chemistry in Indus Valley civilization, Chemistry in post-Harrapan period,</td></tr>
<tr><td>12</td><td>16</td><td>28</td></tr>
<tr><td colspan="3">Month: February</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>12</td><td>16</td><td>28</td><td>Chemistry of Ancient and Medieval India</td><td>• Chemistry in Vedic and Ayurvedic: Chemistry in Charaka and Sushruta, Chemistry in Tantric Period: Rasaratnakara of Nagarjuna, Iatrochemical period.</td></tr>
</table>

Dr. S. S. Ankushrao

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: 2023-24 **Semesters: B.Sc. II, Sem-III** **Department: Chemistry**

Subject: Chemistry
Chemistry **Course Title: DSC-1002D: Physical and Analytical & Industrial**

Name of the Teacher: Dr. Sanjay Shivram Ankushrao

Month: July			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	Unit Operations & Unit Processes	• Introduction, Meaning of unit operations and processes & its types.
4	-	4		
Month: August			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	Unit Operations & Unit Processes	• Distillation-Distillation of liquid mixtures, Types of distillation • Types of columns, packings and Condensers, Vacuum distillation, Spinning-band distillation and Steam distillation.
4	-	04		
Month: September			**Module/Unit:**	**Sub-units planned**
4	-	04	Unit Operations & Unit Processes	• Modes of Manufacturing: Batch, Semi-batch, Continuous • Study of Unit processes & unit operations involved in manufacturing of ethanol by catalytic hydration of ethylene in vapour phase.
Month: October			**Module/Unit:**	**Sub-units planned**
-	-	-	-	-

Dr. S. S. Ankushrao

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

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

Vivekanand College, Kolhapur (Empowered Autonomous)

Annual Teaching Plan

Academic Year: 2023-24 **Semesters: B.Sc. II, Sem-IV** **Department: Chemistry**

Subject: Chemistry **Course Title: DSC-1002D: Inorganic and Organic Chemistry**

Name of the Teacher: Dr. Sanjay Shivram Ankushrao

Month: December			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	Crystal Field Theory	• Introduction • Assumptions of CFT • Crystal field stabilization energy (CFSE) • Crystal field splitting of'd' orbital in octahedral Complexes.
4	-	4		
Month: January			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	Crystal Field Theory	• Comparison of CFSE for *Oh* and *Td* complexes • Crystal field effects for weak and strong fields ligands, Tetrahedral symmetry, • Crystal field splitting of 'd' orbital in Tetrahedral and square planar complex
4	-	04		
Month: February			Module/Unit:	Sub-units planned
4	-	04	Crystal Field Theory	• Jahn-Teller distortion, • Limitations of CFT. • Factors affecting the Magnitude of 10 Dq, Spectrochemical series
Month: March			Module/Unit:	Sub-units planned
-	-	-	-	-

Dr. S. S. Ankushrao

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

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

Vivekanand College, Kolhapur (Empowered Autonomous)

Annual Teaching Plan

Academic Year: 2023-24 **Semesters: B.Sc. III, Sem-V** **Department: Chemistry**

Subject: Chemistry **Course Title: DSE-1002E1: Physical & Inorganic Chemistry**
DSE-1002E2: Organic & Analytical Chemistry

Name of the Teacher: Dr. Sanjay Shivram Ankushrao

Month: July			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	Bio-inorganic Chemistry	• Introduction. • Essential and trace elements in biological process. • Metalloporphyrins with special reference to hemoglobin and myoglobin. • Biological role of alkali and alkaline earth metal ions with special reference to Na+ , K+ and Ca2+
04	-	04		
Month: August			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	Theory of Titrimetric Analysis	• Introduction • Neutralization Indicators (Acid-Base Indicators) • Theory of indicators w.r.t. Ostwald's colour change interval and Ostwald's Quinoid theory
08	28	60		
Month: September			Module/Unit:	Sub-units planned
08	28	60	Theory of Titrimetric Analysis	• Neutralization curves and choice of indicators for the following titration, i. Strong acid-strong base ii. Strong acid-weak base iii. Strong base - weak acid • Complexometric titration: General account • Types of EDTA titration
Month: October			Module/Unit:	Sub-units planned
08	28	60	Theory of Titrimetric Analysis	• Metallochromic indicators w.r.t. Eriochrome Black-T indicator
Month: November			Module/Unit:	Sub-units planned
03	14	16	Theory of Titrimetric Analysis	• Redox titrations: General introduction, theory of redox indicators, Use of diphenyl amine and ferroin as redox indicators

Dr. S. S. Ankushrao

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

Vivekanand College, Kolhapur (Empowered Autonomous)

Annual Teaching Plan

Academic Year: 2023-24 **Semesters: B.Sc. III, Sem-VI** **Department: Chemistry**

Subject: Chemistry **Course Title: DSE-1002F1: Physical & Inorganic Chemistry**
DSE-1002F2: Organic & Industrial Chemistry

Name of the Teacher: Dr. Sanjay Shivram Ankushrao

Month: December			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	Corrosion and Passivity	• Introduction of corrosion • Electrochemical theory of corrosion • Factors affecting on corrosion, i. Position of metals in the electrochemical series on the basis of standard reduction potential ii. Purity of metal
06	-	06		
Month: January			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	Corrosion and Passivity	• iii. Effect of moisture iv. Effect of oxygen • Hydrogen overvoltage • Methods of protections of metals from corrosion • Passivity i. Definition ii. Types of passivity iii. Oxide film theory and evidences • iv. Applications of passivity
8	28	60		
Month: February			Module/Unit:	Sub-units planned
8	28	60	Introduction to Chemical Industry	• General introduction, Indian Scenario of chemical industries, types of chemical industry, basic requirements of chemical industries, chemical production and raw materials; unit processes and unit operations and its types; modes of manufacturing-batch, semi-batch and continuous process;
Month: March			Module/Unit:	Sub-units planned
6	-	06	Introduction to Chemical Industry	• Introduction to various departments in industry: Quality control, Quality assurance, process development, Research and Development, Analytical development, Environmental health and safety. • Industrial legislations-copy right act, patent act, trademarks; MSDS of hazardous chemicals.

Dr. S. S. Ankushrao

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: 2023-24 **Semesters: M.Sc. I, Sem-II** **Department: Chemistry**

Subject: Chemistry **Course Title: CC-1140 B: Analytical Chemistry-II**

Name of the Teacher: Dr. Sanjay Shivram Ankushrao

Month: December			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	Thermal Analysis	Introduction to thermal analysis, types of thermal analysis, significance of thermal analysis in Analytical Chemistry, effect of heat on materials, chemical decomposition, phase transformation etc. and general thermal analysis applications, advantages and disadvantages.
02	-	06		
Month: January			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	Thermal Analysis	a) Thermogravimetry analysis (TGA): principle, instrumentation, working, types of TGA, factors influencing TGA, curve to show nature of decomposition reactions, the product and qualities of compounds expelled, TGA in controlled atmosphere, TGA curves, analysis, research and analytical implications of TGA.
04	-	12		
Month: February			Module/Unit:	Sub-units planned
04	-	12	Thermal Analysis	b) Differential thermal analysis (DTA) and differential scanning calorimetry (DSC), instrumentation, methodology, application and research implications.
Month: March			Module/Unit:	Sub-units planned
04	-	08	Thermal Analysis	Thermometric titrations method and applications
Month: April			Module/Unit:	Sub-units planned
02	-	06	Thermal Analysis	**Problems:** Simple problems based on TGA, DTA and DSC.

Dr. S. S. Ankushrao

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: 2023-24 **Semesters: M.Sc. II, Sem-III** **Department: Chemistry**

Subject: Chemistry **Course Title: CC-1144 C: Advanced Spectroscopic Methods**

Name of the Teacher: Dr. Sanjay Shivram Ankushrao

<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">Proton NMR Spectroscopy</td><td rowspan="2">Part [A]: Recapitulation of proton NMR spectroscopy</td></tr>
<tr><td>02</td><td>-</td><td>02</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">Proton NMR Spectroscopy</td><td rowspan="2">Factors affecting coupling constants (Karplus curve variation, dihedral angle, bond order, electronegativity), analysis of First order spectra,</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>04</td><td>-</td><td>04</td><td>Proton NMR Spectroscopy</td><td>Complex spin-spin splitting of second order spectra, different spin systems (AB, AM, AX, ABX/AMX spin systems with examples).
Simplification of complex spectra (High field strength, chiral resolving agent, effect of deuteration, nuclear magnetic double resonance,</td></tr>
<tr><td colspan="3">Month: October</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>04</td><td>-</td><td>04</td><td>Proton NMR Spectroscopy</td><td>Shift reagent, solvent effect); Spectra of Homotopic, Enantiotropic and Diastereotopic systems.
Part [B] Advanced NMR techniques (5)
Fourier transform technique, nuclear overhauser effect (NOE),</td></tr>
<tr><td colspan="3">Month: November</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>02</td><td>-</td><td>02</td><td>Proton NMR Spectroscopy</td><td>COSY, NOESY, Resonance of other nuclei – 19F, 31P.</td></tr>
</table>

Dr. S. S. Ankushrao

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

Vivekanand College, Kolhapur (Empowered Autonomous)

Annual Teaching Plan

Academic Year: 2023-24 **Semesters: B.Sc. I, Sem-II** **Department: Chemistry**

Subject: Chemistry

Course Title: DSC-1002B: Physical and Analytical & Industrial Chemistry

Name of the Teacher: Mr. Satish Suresh Kadam

Month: December			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	Chemical Kinetics	• Introduction • Terms in Chemical Kinetics
4		4		
Month: January			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	Chemical Kinetics	• Factors affecting on Rate of reaction • Order and molecularity • First order reaction . • First order reaction Expression
4	16	20		
Month: February			Module/Unit:	Sub-units planned
4	16	20	Chemical Kinetics	• Second order reaction-Introduction • Derivaion of second order reaction • Examples
Month: March			Module/Unit:	Sub-units planned
4	16	20	Chemical Kinetics	• Characteristics of second order reactions •Numerical problems
Month: April				
	8	8	Properties of liquids	• Introduction, Classification of Physical properties, • Surface tension and chemical constitusion, • Viscosity • Refracive index • Numerical problems

Mr. S. S. Kadam

VIVEKANAND COLLEGE KOLHAPUR (E.A.) ESTD JUNE 1964 (Empowered Autonomous)

Dr. S. D. Shirke

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

Vivekanand College, Kolhapur (Empowered Autonomous)

Annual Teaching Plan

Academic Year: 2023-24 **Semesters: B.Sc. II, Sem-IV** **Department: Chemistry**

Subject: Chemistry **Course Title: DSC-1002D: Inorganic and Organic Chemistry**
Name of the Teacher: Mr. Satish Suresh Kadam

Month: December			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	Carboxylic acids and their derivatives	• Introduction • Carboxylic acids (aliphatic and aromatic • *Preparation:* Acidic and Alkaline hydrolysis of esters.
4	-	4		
Month: January			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	Carboxylic acids and their derivatives	• *Reactions:* Hell -Vohlard - Zelinsky Reaction. • Carboxylic acid derivatives (aliphatic) :Preparation • preparation of Esters with mechanism • Comparative study of nucleophilicity of acyl derivatives
4	16	20		
Month: February			Module/Unit:	Sub-units planned
4	16	20	Carboxylic acids and their derivatives	• Reformatsky Reaction • Perkin condensation with mechanism and their applications.
Month: March			Module/Unit:	Sub-units planned
4	16	20	Transition Elements	• Introduction • General group trends • Colour, magnetic and catalytic properties of transition elements.
4	16	20	Transition Elements	• Formation of complexes • Applications

Mr. S. S. Kadam

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: 2023-24 **Semesters: B.Sc. III, Sem-VI** **Department: Chemistry**

Subject: Chemistry **Course Title: DSE-1002E1: Physical & Inorganic Chemistry**
DSE-1002E2: Organic & Industrial Chemistry

Name of the Teacher: Mr. Satish Suresh Kadam

Month: December			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	Name reactions	• Introduction. • Beckmann, • Benzilic acid,
04	-	04		
Month: January			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	Name reactions	• Baeyer Villiger, • Diels -Alder reaction, • Mannich Reaction, • Michael Reaction,
4	28	32		
Month: February			Module/Unit:	Sub-units planned
4	28	32	Name reactions	• Fries, • Dienone-Phenol rearrangement • Problems based on reactions.
Month: March			Module/Unit:	Sub-units planned
4	28	32	Electrophilic Addition to >C=C< and −C≡C− bonds	• Addition to Carbon-Carbon double (>C=CC=C< bond) • Ozonolysis (formation of aldehydes & ketones). • Addition to Carbon-Carbon triple (−C≡C−) bond:
Month:April			Module/Unit:	Sub-units planned
03	-	03	Electrophilic Addition to >C=C< and −C≡C− bonds	• Mechanism of electrophilic addition to−C≡C−bond.

Mr. S. S. Kadam

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

VIVEKANAND COLLEGE KOLHAPUR (E.) ESTD JUNE 1964 Empowered Autonomous

Vivekanand College, Kolhapur (Empowered Autonomous)

Annual Teaching Plan

Academic Year: 2023-24 **Semesters: B. Sc. I (Maj+Min), Sem-II** **Department: Chemistry**

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

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

<table>
<tr><td colspan="3">Month: December</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">• Determination of enthalpy of hydration of copper sulphate.
• Study of the solubility of benzoic acid in water and determination of ΔH.
• Determination of enthalpy of neutralization of HCl with NaOH</td></tr>
<tr><td>-</td><td>16</td><td>16</td></tr>
<tr><td colspan="3">Month: January</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 study the reaction rate of hydrolysis of methyl acetate in presence of 0.5N HCl.
• To determine viscosity of given liquid A and B.
• To determine equivalent weight of Mg by Eudiometer.
• Estimation of Aniline</td></tr>
<tr><td>-</td><td>16</td><td>16</td></tr>
<tr><td colspan="3">Month: February</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">• Spot Tests
Detection of following cations using spot tests: Cu^{2+}, Co^{2+},Ni^{2+}, Fe^{3+}, Al^{3+}, Zn^{2+}, Mg^{+2}, Pb^{2+}
• Paper Chromatography
Detection of following cations using Paper Chromatography: Cu^{2+}, Co^{2+}, Co^{2+}, Ni^{2+}, Ni^{2+}, Cu^{2+}
• To estimate amount of Cu (II) ions by iodometric titration by using $Na_2S_2O_3$solution</td></tr>
<tr><td>-</td><td>16</td><td>16</td></tr>
<tr><td colspan="3">Month: March</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</td></tr>
<tr><td>-</td><td>4</td><td>4</td></tr>
<tr><td colspan="3">Month: April-May</td><td></td><td>Practical and Theory Examination</td></tr>
</table>

Dr. S. D. Shinde

Dr. S. D. Shirke

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

Vivekanand College, Kolhapur (Empowered Autonomous)

Annual Teaching Plan

Academic Year: 2023-24 **Semesters: B.Sc. II, Sem-IV** **Department: Chemistry**

Subject: Chemistry **Course Title: DSC-1002D: Inorganic Chemistry**

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

<table>
<tr><td colspan="3">Month: December</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Coordination Chemistry: Theories of Metal Complexes A] Valence Bond Theory</td><td rowspan="2">• Definition and formation of co-ordinate covalent bond in BF_3-NH_3 and $[NH_4]$*,
• Distinguish between double salt and complex salt, Werner's theory i) Postulates, ii) theory as applied to cobalt amines complexes;
• Description of the terms: ligands, co-ordination compounds. Coordination number;
• IUPAC system of nomenclature,
• Preparation of methyl orange
• Preparation of p-nitro acetanilide</td></tr>
<tr><td>8</td><td>16</td><td>24</td></tr>
<tr><td colspan="3">Month: January</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Coordination Chemistry: Theories of Metal Complexes A] Valence Bond Theory</td><td rowspan="2">• Postulates of VBT, Inner and outer orbital complexes w. r .t. coordination numbers 4 and 6; Drawbacks of VBT.
• Structural and stereoisomerism in complexes with coordination numbers 4 and 6;
• Estimate the amount of metal present in a given solution gravimetrically-Ni as Ni-DMG, Ba as $BaSO_4$
• Determination of the surface tension of a liquid or a dilute solution using a Stalagmometer.
• Study of the variation of surface tension of a detergent solution with concentration</td></tr>
<tr><td>8</td><td>16</td><td>24</td></tr>
<tr><td colspan="3">Month: February</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Coordination Chemistry: Theories of Metal Complexes
B] Crystal Field Theory</td><td rowspan="2">• Assumptions of CFT, Crystal field splitting of 'd' orbital in octahedral,
• tetrahedral and square planar complex, Crystal field stabilization energy (CFSE),
• Determination of the relative and absolute viscosity of a liquid or dilute solution using an Ostwald's viscometer.
• To investigate the reaction between potassium per sulphate and KI (Equal Concentration)</td></tr>
<tr><td>8</td><td>16</td><td>24</td></tr>
<tr><td colspan="3">Month: March</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Coordination Chemistry: Theories of Metal Complexes
B] Crystal Field Theory</td><td rowspan="2">• Comparison of CFSE for Oh and Td complexes, Crystal field effects
• for weak and strong fields ligands, Tetrahedral symmetry, Factors affecting
• the Magnitude of 10 Dq, Spectrochemical series, Jahn-Teller distortion,
• Limitations of CFT
• Estimation of Acetone
• Estimations of Vitamin-C from tablets</td></tr>
<tr><td>8</td><td>16</td><td>24</td></tr>
</table>

Month: April - May			Module/Unit:	Sub-units planned
-	-	-		• Practical and Theory Examination

Dr. S. D. Shinde

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

Vivekanand College, Kolhapur (Empowered Autonomous)

Annual Teaching Plan

Academic Year: 2023-24 **Semesters: B. Sc. III, Sem-VI** **Department: Chemistry**

Subject: Chemistry **Course Title: 1002F2: Inorganic Chemistry**

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

<table>
<tr><td colspan="3">Month: December</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Coordination Chemistry
A) Inorganic Reaction mechanism</td><td rowspan="2">• Introduction
• Classification of Mechanism
• Study of Mechanism Association, dissociation, interchange and the rate determining steps
• SN^1 and SN^2 reaction for inert and labile complexes
• Mechanism of substitution in cobalt (III) octahedral complexes
• Trans effect and its theories
• Applications of trans effect in synthesis of Pt (II) complexes
• Determination of percentage of magnesium in the given sample of talcum powder.
• Determination of amount of aluminum in the given solution of potash alum.</td></tr>
<tr><td>8</td><td>28</td><td>36</td></tr>
<tr><td colspan="3">Month: January</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Coordination Chemistry
B) Thermodynamic and Kinetic aspects of metal complexes</td><td rowspan="2">• Introduction, Thermodynamic stability and Kinetic Stability,
• Relation between thermodynamic and kinetic stability, Stepwise stability constant,
• Factor affecting the stability of complexes,
• Determination of Stability constant by Job variation, Mole ratio and Slope ratio method.
• Determination of titrable acidity in the given sample of milk or lassi.
• Determination of Fe in cement.</td></tr>
<tr><td>8</td><td>28</td><td>36</td></tr>
<tr><td colspan="3">Month: February</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Chemistry of f-Block Elements
A) Lanthanides</td><td rowspan="2">• Introduction, Occurrence,
• Electronic Configuration, Oxidation State, Lanthanide contraction,
• Separation of Lanthanides by Ion exchange method.
• Determination of chlorine in bleaching powder.
• Determination of Free acidity in ammonium sulphate fertilizer.
• Determination of percentage of $CaCO_3$ in chalk.
• Determination of COD.</td></tr>
<tr><td>8</td><td>14</td><td>22</td></tr>
<tr><td colspan="3">Month: March</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Chemistry of f-Block Elements
B) Actinides</td><td rowspan="2">• Position in periodic table, Electronic configuration,
• General methods of preparation of transuranic elements - i. Neutron capture - followed by β decay, ii. Accelerated projectile bombardment, iii. Heavy ion bombardment,</td></tr>
<tr><td>6</td><td>-</td><td>06</td></tr>
</table>

				• IUPAC nomenclature of the super heavy elements with atomic number (Z) greater than 100.
Month : April - May				• Practical and theory 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: 2023-24 **Semesters: M. Sc. I, Sem-II** **Department: Chemistry**

Subject: Inorganic Chemistry **Course Title: DSE14CHE21: Applied Inorganic Chemistry**

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

<table>
<tr><td colspan="3">Month: December</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Metal Compounds in Medicine</td><td rowspan="2">• Medicinal use of metal complexes as antibacterial, antiviral, antibiotics & related compounds.</td></tr>
<tr><td>3</td><td>-</td><td>3</td></tr>
<tr><td colspan="3">Month: January</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Metal Compounds in Medicine</td><td rowspan="2">• Metal deficiency and diseases: iron, zinc and copper deficiency,
• Metals used for diagnosis</td></tr>
<tr><td>4</td><td>-</td><td>4</td></tr>
<tr><td colspan="3">Month: February</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Metal Compounds in Medicine</td><td rowspan="2">• chemotherapy with particular reference to anti cancer drugs,
• Chelate therapy, chemotherapy with compounds of some non essential elements;</td></tr>
<tr><td>4</td><td>-</td><td>4</td></tr>
<tr><td colspan="3">Month: March</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Metal Compounds in Medicine</td><td rowspan="2">• Lithium in psycho pharmacological drugs,
• Antimicrobial agents.
• use of cis-platin as antitumor drug,
• Gold containing drugs used in the therapy of Rheumatic-Arthritis and cancer,</td></tr>
<tr><td>4</td><td>-</td><td>4</td></tr>
</table>

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 (Autonomous)

Annual Teaching Plan

Academic Year: 2023-24 **Semesters: B.Sc. III, Sem-V** **Department: Chemistry**

Subject: Chemistry **Course Title: DSE-1002E1: Physical Chemistry**

Name of the Teacher: Dr. Asmita Shashikant Tapase

Month: June			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	Quantum Theory	• Introduction, • Dual nature of matter and energy: De Broglie hypothesis
02	-	02		
Month: July			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	Quantum Theory	• The Heisenberg's uncertainty principle, • Concept of energy operators (Hamiltonian) • Derivation of Schrodinger wave equation, Physical interpretation of ψ and ψ^2 , • Particle in a one dimensional box, Schrodinger wave equation for hydrogen atom, Concept of quantum numbers.
08	21	29		
Month: August			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	Quantum Theory Photochemistry	• Particle in a one dimensional box, • Schrodinger wave equation for hydrogen atom • Concept of quantum numbers. • Introduction – • Difference between thermal and photochemical processes. • Laws of photochemistry: • i) Grothus - Draper law, • ii) Lambert law, • iii) Lambert-Beer's law (with derivations), • iv) Stark-Einstein law
08	28	36		
Month: September			Module/Unit:	Sub-units planned
08	28	36	Photochemistry	• Quantum yield, • reasons for high and low quantum yield, • Factors affecting Quantum yield, • Photosensitized reactions–dissociation of H_2, photosynthesis, • Exapmles of Photochemical recations- 1)Photo-dimerization of anthracene, 2) decomposition of HI and HBr, • Photophysical and photochemical processes

Month: October			Module/Unit:	Sub-units planned
5	28	5	Photochemistry	• Jablonaski diagram depicting various processes occurring in the excited state: • Qualitative description of fluorescence and phosphorescence, • Chemiluminescence, • Electroluminescence, • Numerical problems
Month : November			-	• Theory Examination

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

Dr. A. S. Tapase

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

Vivekanand College, Kolhapur (Empowered Autonomous)

Annual Teaching Plan

Academic Year: 2023-24 **Semesters: B. Sc. II, Sem-II** **Department: Chemistry**

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

Name of the Teacher: Dr. Asmita Shashikant Tapase

<table>
<tr><td colspan="3">Month: December</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 normality strong acid and weak acid by titrating against strong base conductometricaly
• To determine the normality strong acid by titrating against strong base potentiometrically
• To investigate the reaction between potassium per sulphate and KI (equal conc.)
• To investigate the reaction between potassium per sulphate and KI (unequal conc.)</td></tr>
<tr><td>-</td><td>16</td><td>16</td></tr>
<tr><td colspan="3">Month: January</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">• Preparation of Ferrous ammonium sulphate
• Preparation of potash alum
• Preparation of Tetraamine copper sulphate
• Preparation of p-nitro aniline</td></tr>
<tr><td>-</td><td>16</td><td>16</td></tr>
<tr><td colspan="3">Month: February</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">• Semi micro qualitative analysis (2 cations, 2 anions)</td></tr>
<tr><td>-</td><td>16</td><td>16</td></tr>
<tr><td colspan="3">Month: March</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</td></tr>
<tr><td>-</td><td>4</td><td>4</td></tr>
<tr><td colspan="3">Month: April-May</td><td></td><td>Practical and Theory Examination</td></tr>
</table>

Dr. A. S. Tapase

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: 2023-24 **Semesters: B. Sc. I, Sem-II (OE)** **Department: Chemistry**

Subject: Chemistry **Course Title: General Aspects of Physical Chemistry**

General Aspects of Analytical Chemistry

Name of the Teacher: Dr. Asmita Shashikant Tapase

<table>
<tr><td colspan="3">Month: December</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Nuclear Chemistry</td><td rowspan="2">• Determination of enthalpy of hydration of copper sulphate.
• Study of the solubility of benzoic acid in water and determination of ΔH.
• Determination of enthalpy of neutralization of HCl with NaOH</td></tr>
<tr><td>04</td><td>-</td><td>04</td></tr>
<tr><td colspan="3">Month: January</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Nuclear Chemistry</td><td rowspan="2">• To study the reaction rate of hydrolysis of methyl acetate in presence of 0.5N HCl.
• To determine viscosity of given liquid A and B.
• To determine equivalent weight of Mg by Eudiometer.
• Estimation of Aniline</td></tr>
<tr><td>04</td><td>16</td><td>16</td></tr>
<tr><td colspan="3">Month: February</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">Environmental Chemistry</td><td rowspan="2">• Concept and scope of Environmental Chemistry
• Environmental segments
• The nature of cycles of the environment-general introduction of Hydrogen Cycle, Oxygen Cycle, Nitrogen Cycle,
• Phosphate Cycle, Sulphur cycle</td></tr>
<tr><td>04</td><td>16</td><td>16</td></tr>
<tr><td colspan="3">Month: March</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
</table>

Lectures	Practicals	Total	Environmental Chemistry	• Detail explanation of Oxygen Cycle • Composition of the atmosphere • Toxic trace elements in the natural water and waste water • Air pollutants • Chemistry of acid rain
04	4	4		
Month: April-May				Practical and Theory Examination

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

Dr. A. S. Tapase

Dr. S. D. Shirke

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

Vivekanand College, Kolhapur (Empowered Autonomous)

Annual Teaching Plan

Academic Year: 2023-24 **Semesters: B. Sc. III, Sem-VI** **Department: Chemistry**

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

Name of the Teacher: Dr. Asmita Shashikant Tapase

Month: December			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	▪ Adsorption -	• Introduction, Adsorption as a surface phenomenon (mechanism), • Definition of important basic terms: absorption, adsorption, adsorbant, adsorbate, interface etc., • Distinction between adsorption and absorption, • Characteristics of adsorption, • Factors affecting adsorption, Types of adsorption, • Distinction between physical adsorption and chemical adsorption, Adsorption isotherms: Freundlich, Langmuir adsorption isotherm, BET equation (derivation not expected), determination of surface area using Langmuir method and BET equations
08	28	36		
Month: January			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	▪ Thermodynamics -	• Introduction. • Free energy: Gibbs function (G) and Helmholtz function (A), Criteria for thermodynamic equilibrium and spontaneity. • Relation between ΔG and ΔH : Gibbs-Helmholtz equation. • Phase equilibria : Clapeyron – Clausius equation and its applications.
08	28	36		

				Thermodynamic derivation of law of mass action, Van't – Hoff isotherm and isochore
Month: February			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	▪ Thermodynamics	• Thermodynamic derivation of law of mass action, Van't – Hoff isotherm and isochore. • Fugacity and activity concepts. • Partial molar quantities, Partial molar volume, Concept of chemical potential, GibbsDuhem equation. • Numerical problems
08	28	36	Chemical Kinetics -	• Introduction • Third Order Reaction -Derivation of rate constant and properties and examples. • Simultaneous reactions such as • Opposing reaction: (Derivation of rate equation for first order opposed by first order expected)
Month: March			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	Chemical Kinetics -	i. Side reaction. ii. Consecutive reactions. iii. Chain reaction. iv. Explosive reaction (Derivation of rate equation)
04	14	18		
Month: April-May				Practical and Theory Examination

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

Dr. A. S. Tapase

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

Vivekanand College, Kolhapur (Empowered Autonomous)

Annual Teaching Plan

Academic Year: 2023-24 **Semesters: M. Sc. II, Sem-IV** **Department: Chemistry**

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

Name of the Teacher: Dr. Asmita Shashikant Tapase

<table>
<tr><td colspan="3">Month: December</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">▪ Applications of nanomaterials -</td><td rowspan="2">• Carbon nanomaterials
• Nanocomposites include metal nanomaterials such as single particle as well as</td></tr>
<tr><td>04</td><td>-</td><td>36</td></tr>
<tr><td colspan="3">Month: January</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">▪ Applications of nanomaterials -</td><td rowspan="2">• coreshell nanomaterials. Fuel cell, Solar cell, medicinal aplications, agro-food
• applications
• c) Polymer Nanotechnology</td></tr>
<tr><td>04</td><td>-</td><td>04</td></tr>
<tr><td colspan="3">Month: February</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">▪ Applications of nanomaterials</td><td rowspan="2">• Organic Electronics
• Nanotribology</td></tr>
<tr><td>04</td><td>-</td><td>04</td></tr>
<tr><td colspan="3">Month: March</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practicals</td><td>Total</td><td rowspan="2">▪ Applications of nanomaterials -</td><td rowspan="2">• Nanobiotechnology</td></tr>
<tr><td>03</td><td>-</td><td>03</td></tr>
<tr><td colspan="3">Month: April-May</td><td></td><td>Practical and Theory Examination</td></tr>
</table>

Dr. A. S. Tapase

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

Dr. S. D. Shirke

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

Vivekanand College, Kolhapur (Autonomous)

Syllabus Completion Report

Academic Year - 2023-24

Sem-I, Sem-III, Sem-V

Department - Chemistry

Name of the Teacher – **Dr. A. S. Tapase**

Name of the Class	Units Allotted	Units Completed	Remark
B.Sc. I	-	-	-
B.Sc. II	▪ Chemical Kinetic ▪ Electrochemistry I ▪ Conductometric Titrations	▪ Chemical Kinetics ▪ Electrochemistry I ▪ Conductometric Titrations	Completed
B.Sc. III	▪ Quantum Theory ▪ Photochemitsry	▪ Quantum Theory ▪ Photochemitsry	Completed
M.Sc. II	▪ Magnetic Materials	▪ Magnetic Materials	Completed
M.Sc. II	▪ Surface characterization by spectroscopy	▪ Surface characterization by spectroscopy	Completed

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

Dr. A. S. Tapase

Dr. Mrs. S. D. Shirke

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

Vivekanand College, Kolhapur (Autonomous)

Syllabus Completion Report

Academic Year - 2023-24

Sem-II, Sem-VI, Sem-IV

Department - Chemistry

Name of the Teacher – **Dr. A. S. Tapase**

Name of the Class	Units Allotted	Units Completed	Remark
B.Sc. I (OE) General aspects of Physical Chemistry	✓ Nuclear Chemistry	✓ Nuclear Chemistry	Completed
B.Sc. I (OE) General aspects of Applied Chemistry	✓ Environmental Chemistry	✓ Environmental Chemistry	Completed
B.Sc. III	▪ Adsorption ▪ Thermodynamics ▪ Chemical Kinetics	▪ Adsorption ▪ Thermodynamics ▪ Chemical Kinetics	Completed
M.Sc. II (Inorganic Chemistry)	▪ Applications of nanomaterials	▪ Applications of nanomaterials	Completed

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

Dr. A. S. Tapase

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

Vivekanand College, Kolhapur (Empowered Autonomous)
Annual Teaching Plan
Academic Year - 2023-24 (Sem II & IV)
Department- Chemistry
Name of the Teacher – **Dr. D. S. Gaikwad**

Month – December				
M.Sc. I Sem. II (NEP):- **Course Title:- Organic Chemistry-II**				
: Lectures	Practicals	Total	Module Unit	Sub-Units Planned
06	--	06	Study of following reactions	a) Study of following reactions Mechanism of condensation reaction involving enolates, Arndt-Eistert, Stobbe, Simon-smith, Ulmann reaction.
M.Sc.II Sem IV :- Course Title:- Organic Chemistry				
Lectures	Practicals	Total	Module Unit	Sub-Units Planned
06	32	38	Vitamins	Introduction of Vitamins, Classification and nomenclature of Vitamins, Sources of vitamins and their deficiency, Synthesis, structure.

Month – January				
M.Sc.I Sem. II:- Course Title:- Organic Chemistry-II				
: Lectures	Practicals	Total	Module Unit	Sub-Units Planned
08	--	08	Study of following reactions	Study of following reactions and their applications: McMurry, Prins, Nef, Passerini, Baylis-Hilman, Mitsunobu reaction.
M.Sc.II Sem IV :- Course Title:- Organic Chemistry				
Lectures	Practicals	Total	Module Unit	Sub-Units Planned
12	48	60	Vitamins	Biological functions of vitamin B1, B2, B5, B6 and Biotin (Vitamin H).
			Alkaloids	Introduction, occurrence, isolation and functions of alkaloids, Structure, stereochemistry and synthesis of the following: Morphine, Reserpine.
M.Sc.II Sem IV :- Course Title:- Analytical Chemistry				
04	--	04	Analysis of Paint, Pigment and Petroleum products	Composition of paint, Preliminary inspection of sample, test on the total coating, separation and estimation of pigments, Binder and thinner of latex paints.
B.Sc. III Sem VI Inorganic Chemistry				

03	--	03		Iron and Steel	Occurrence and ores of ion, Definition of the terms-Ore, Minerals, Slag, Flux, Gangue, Matrix, Calcination.
Month – February					
M.Sc.I Sem. II (NEP):- **Course Title:- Organic Chemistry-II**					
: Lectures	Practicals	Total		Module Unit	Sub-Units Planned
08	--	08		Study of following reactions	Study of following reactions and their applications: Darzen, Duff, Click reaction.
M.Sc.II Sem IV :- Course Title:- Organic Chemistry					
Lectures	Practicals	Total		Module Unit	Sub-Units Planned
16	32	48		Stereochemistry	Stereochemistry of compounds containing no chiral carbon atoms and diastereoisomerism (Geometrical isomerism). a) Stereochemistry of Allenes, Spiranes and Biphenyls
				Alkaloids	Introduction, occurrence, isolation and functions of alkaloids, Structure, stereochemistry and synthesis of the following: Atropine and Conin.
M.Sc.II Sem IV :- Course Title:- Analytical Chemistry					
04	--	04		Analysis of Paint, Pigment and Petroleum products	Flash points, Practical applications and examples in analytical chemistry and research. Introduction to petroleum products, quality control, Specific gravity, Viscosity, cloud point, pour point, flash point, vapour pressure. Calorific value by bomb calorimeter.
B.Sc. III Sem VI Inorganic Chemistry					
03	--	03		Iron and Steel	Reduction, Roasting, Smelting and Leaching, Extraction of iron by Blast furnace. Steel: Defination and types, Heat treatment on steel

Month – March					
M.Sc.II Sem IV :- Course Title:- Analytical Chemistry					
: Lectures	Practicals	Total		Module Unit	Sub-Units Planned
04	--	04		Analysis of Paint, Pigment and Petroleum products	Doctor test, sulphuric acid absorption, aniline point and colour determination. Determination of water, neutralization value, ash content, sulphur and mercaptan sulphur. Determination of lead in petroleum.

M.Sc.II Sem IV :- Course Title:- Organic Chemistry					
Lectures	Practicals	Total		Module Unit	Sub-Units Planned
12	24	36		Stereochemistry	Assignment of configuration b) Configuration of diastereomers (Geometrical isomerism) based on physical and chemical methods.
B.Sc. III Sem VI Inorganic Chemistry					
02	--	02		Iron and Steel	Conversion of Cast iron into steel by Bessemer process and LD process. Heat treatment on steel.

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 - 2023-24
Department- Chemistry (Sem I & III)
Name of the Teacher – Dr. A. A. Patravale

Month – July					
M.Sc.II Sem III :- Course Title:- Organic Chemistry (Paper: Drugs and hetercocyles)					
Lectures	Practicals	Total		Unit	Subunit planned
08	24	32		Drug Design	Development of new drugs, procedures followed in drug design. History and development of Quantitative structure activity relationship (QSAR). Concepts of drug receptors, Relation of chemical structure and chemical activity.
Month – August					
M.Sc.I Sem I (NEP):- **Course Title:- Organic Chemistry** (Optional elective)					
Lectures	Practicals	Total		Unit	Sub-Units Planned
08	--	08		Aromatic Electrophilic Substitutions	Introduction, the arenium ion mechanism, orientation and reactivity in Nitration, Sulphonation, Friedel-Crafts and Halogenation in aromatic systems, energy profile diagrams. The ortho/para ratio, ipso attack, orientation in their ring systems. Diazo-coupling, Vilsmeier Haak reaction, Nucleophilic aromatic substitution reactions SN1, SN2.
M.Sc.II Sem III :- Course Title:- Organic Chemistry (Paper: Drugs and hetercocyles)					
Lectures	Practicals	Total		Unit	Sub-Units Planned
04	---	58		Study of Antibiotics	Introduction, β-lactum Antibiotics, cephalosporin Antibiotics, SAR of β-lactum and cephalosporin, Structural features of tetracycline & macrocyclic antibiotics (no synthesis).
--	54	---		Practical	Major Organic Experiment Minor Organic Experiment
M.Sc. II Sem III :- Course Title:- Organic Chemistry (Paper: Drugs and hetercocyles)					
Lectures	Practicals	Total		Unit	Sub-Units Planned
08	--	08		Study of	**Antimalerials:** Trimethoprim.

				Following types of Drug	**b) Analgesic & Antipyretics:** Paracetamol, Meperidine, methadone, Aminopyrine. **c) Anti- inflammatory:** Oxyphenylbutazone, Diclophenac, Indomethacin.
Month – September					
M.Sc.I Sem II :- Course Title:- Organo **Analytical Chemistry**					
Lectures	Practicals	Total		Unit	Sub-Units Planned
03	--	03		Clinical Analysis	Biological significance, analysis of assay of enzyme (pesine, monoamine, oxidase, tyrosinase,). Composition and detection of some abnormal level of certain constituent leading to diagnosis of diseases, Sample collection and preservation of body fluid.
M.Sc.II Sem III :- Course Title:- Organic Chemistry (paper: **Drugs and Heterocylcles**)					
Lectures	Practicals	Total		Unit	Subunit planned
12	--	44		Study of Following types of Drug	**d) Antitubercular & antileprotic:** Dapsone **e) Anaesthetics:** Lidocaine, Thiopental. **f) Antihistamines:** Diphenylhydramine. **g) Tranquilizers:** Diazepam, Trimeprazine.
M.Sc.I Sem I (NEP):- **Course Title:- Organic Chemistry Practicals**					
--	32	--		Practical	Major Organic Experiment Minor Organic Experiment
M.Sc.I Sem I (NEP):- **Course Title:- Organic Chemistry** (Optional elective)					
Lectures	Practicals	Total		Unit	Sub-Units Planned
03	--	03		**Non benzenoid aromatic Compounds**	Aromaticity in Non- benzenoids compounds Annulenes and heteroannulenes,
Month – October					
M.Sc.I Sem II :- Course Title:- Organo **Analytical Chemistry**					
Lectures	Practicals	Total		Unit	Sub-Units Planned
03	--	03		Clinical Analysis	Analytical method of detection of body fluid, Estimation of Glucose, Cholesterol, Urea, uric acid, Creatinine, Calcium, Phosphate, Sodium, Potassium, Chloride
M.Sc.II Sem III :- Course Title:- Organic Chemistry					
Lectures	Practicals	Total		Unit	Sub-Units Planned
12	--	36		Study of	**h) Anti AIDS:** General study Introduction, structure and life cycle of the

				Following types of Drug	AIDS virus, recent development, Azedothymidine (AZT) derivatives **j) Anti-neoplastic drugs:** Introduction, Cancer chemotherapy, Synthesis of mechloraethamine, cyclophosphamide, Mephalan, uracils, mustards. Recent development in cancer chemotherapy. Hormones and natural products.
M.Sc.I Sem I (NEP):- **Course Title:- Organic Chemistry Practicals**					
--	24	--		Practical	Major Organic Experiment Minor Organic Experiment
M.Sc. II Sem III :- Course Title:- Analytical Chemistry (Organoanalytical chemistry)					
Lectures	Practicals	Total		Unit	Sub-Units Planned
03	--	03		Study of following types of Drugs	**i) Cardiovascular:** Synthesis of dilliazem, quinidine, methyldopa, atenolol, oxyprenol.
Month – November					
M.Sc.II Sem III :- Course Title:- Organic Chemistry					
Lectures	Practicals	Total		Unit	Sub-Units Planned
02	--	02		Organic pratical	Minor Organic Experiment
M.Sc.I Sem I (NEP):- **Course Title:- Organic Chemistry** (Optional elective)					
Lectures	Practicals	Total		Unit	Sub-Units Planned
02	--	02		Non Benzonoides Compounds	fulvene, tropylium salts, ferrocene

Dr. A. A. Patravale

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

Vivekanand College, Kolhapur (Autonomous)
Annual Teaching Plan
Academic Year – 2023-24, M.Sc Sem. II, IV
Department- Chemistry
Name of the Teacher – **Dr. A. A. Patravale**

Month – December					
M.Sc.I Sem. II:- Course Title:- Analytical Chemistry-II					
: Lectures	Practical's	Total		Module Unit	Sub-Units Planned
06	--	06		Practical	Estimation of various drug and chemicals
M.Sc.II Sem IV :- Course Title:- Organic Chemistry					
Lectures	Practical's	Total		Module Unit	Sub-Units Planned
12	32	44		Benzenoid and Non benzenoid aromatic Compounds	a) Polycyclic aromatic compounds: Synthesis, reactions, Linear and non-linear ortho fused polynuclear hydrocarbons.

Month – January					
M.Sc.I Sem. II:- Course Title:- Organic Chemistry-II					
: Lectures	Practical's	Total		Module Unit	Sub-Units Planned
08	--	08		a) Oxidation	Oxidation of alcohol to aldehyde, ketone or acid: Jones reagent, Swern oxidation, Collins reagent, Fetizones reagent, PCC, PDC, IBX, Activated MnO_2, Chromyl chloride (Etard reaction), TEMPO, NMO, Moffatt oxidation.
M.Sc.II Sem IV :- Course Title:- Industrial Analytical Chemistry					
Lectures	Practical's	Total		Module Unit	Sub-Units Planned
12	48	60		Analysis of Soil and Fertilizer	Introduction, Method of Soil analysis, Soil fertility, determination of inorganic constitution of plant,

Month – February					
M.Sc.I Sem. II:- Course Title:- Organic Chemistry-II					
: Lectures	Practical's	Total		Module Unit	Sub-Units Planned
08	--	08		b) Hydroboration c) Enamines	Mechanism and Synthetic Applications Formation and reactivity of enamines
M.Sc.II Sem IV :- Course Title:- Analytical Chemistry					
Lectures	Practical's	Total		Module Unit	Sub-Units Planned
16	32	48		Synthesis and applications of perfumery	Introduction to perfumery compounds and its commercial process, essential oil, method of preparation and importants, synthesis of 2-Phenylethanol, Yara-yara, vanillin
					preparation and importants, synthesis of other food flavours, synthetic musk, Jasmone, ionones, beta-ionones from citral, phenyl acetic acid and its ester, benzy acetate.

Month – March					
M.Sc.I Sem. II:- Course Title:- Organic Chemistry-II					
: Lectures	Practical's	Total		Module Unit	Sub-Units Planned
08	--	08		Analysis of Soil and Fertilizer	Classification of fertilizer, clinical Analysis as measure of soil fertility, fertilizer and its detection method.
M.Sc.II Sem IV :- Course Title:- Analytical Chemistry					
Lectures	Practical's	Total		Module Unit	Sub-Units Planned
12	24	36		Dyes and Intermediates	Classification and synthesis of important dye intermediates by using nitration, sulphonation, diazotization reactions. Commercial processes for azo-dyes, reactive dyes, optical brighteners, thermal sensitive dyes, dispersed dyes and reactive dyes.

Dr. A. A, Patravale

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

Vivekanand College, Kolhapur (Empowered Autonomous)

Department of Chemistry

Academic Year: 2023-24

Annual Teaching Plan

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

Programme: M.Sc. I Semester II

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

Month December			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	-	Theory and Practical Examination of previous term
-	-	-		
Month January			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	UNIT-II A) Stereochemistry and bonding in main group compounds	Introduction to VSEPR theory and drawbacks, bond length, bond angles, bond energies and resonance, Structure and bonding in some inorganic molecules,
4	-	4		
Month February			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	UNIT-II A) Stereochemistry and bonding in main group compounds	some simple reactions of covalently bonded molecules (atomic inversion, Berry pseudorotation, nucleophilic displacement, and free radical reaction).
4	-	4		
Month March			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	UNIT-II A) Stereochemistry and bonding in main group compounds B) Metal - ligand equilibria in solution	Pπ - Pπ and Pπ - dπ bonds, Bent rule, walsh diagram, back bonding. Stability constant, step wise and overall formation constant and their interaction, trends in stepwise constants, factors affecting the stability of
2	-	2		
2	-	2		

				metal complexes with reference to the nature of metal ion and ligand, chelate effect, ternary complexes and factors affecting their stabilities,
Month April			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	UNIT-II B) Metal - ligand equilibria in solution	Stability of metal complexes of crown ether, determination of stability constant for binary complexes using pH-metric (Bjerrums method) and spectrophotometric (Job's and mole ratio) techniques.
4	-	4		
Month May			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	-	Theory and Practical Examinations.
-	-	-		

Dr. S. D. Kharade

VIVEKANAND COLLEGE, KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

Head
Department Of Chemistry

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

Vivekanand College, Kolhapur (Empowered Autonomous)

Department of Chemistry

Academic Year: 2023-24

Annual Teaching Plan

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

Programme: M.Sc. II Semester IV

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

<table>
<tr><td colspan="3">Month December</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 of previous term</td></tr>
<tr><td>-</td><td>-</td><td>-</td></tr>
<tr><td colspan="3">Month January</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 I: Inorganic Reaction Mechanism</td><td rowspan="2">Types of Mechanisms: Basic concepts as stability and lability, stability constants; HSAB principle, chelate effect, Macrocyclic effect; Ligand transfer and electron transfer reactions in coordination compounds, Intimate and stoichiometric mechanism of ligand substitution. Substitution in square planar complexes: trans effect, trans series, applications of trans effect., Electron Transfer reactions: Potential energy diagrams as a conceptual tool, Marcus equation, Types of and factors affecting electron transfer reactions.</td></tr>
<tr><td>16</td><td>4*3 = 12</td><td>28</td></tr>
<tr><td colspan="3">Month February</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 II: Reaction Mechanism of Transition Metal complexes</td><td rowspan="2">Substitution reaction, reactions of Transition Metal complexes, kinetics and mechanism of substitution reactions of octahedral complexes, Stereochemical aspects of substitution</td></tr>
<tr><td>16</td><td>4*3=12</td><td>28</td></tr>
</table>

<table>
<tr><td colspan="3"></td><td></td><td>reaction of Octahedral Complexes: Stereochemical changes in dissociation (SN2) and displacement (SN2) mechanism through various geometries of coordination compounds. Isomerization and racemization reactions in octahedral complexes. steric effects on substitutions.</td></tr>
<tr><td colspan="3">Month March</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: Air Pollution and Control Methods</td><td rowspan="2">Introduction, Source Correction Methods, Control of Particulate emissions, Selection of a particulate collector, Control of Gaseous Pollutants - NOx and Sox, Removal of H2S, Control of CO-pollution, Control of Hydrocarbon emission, Control of Pollutant emission from Mobile sources</td></tr>
<tr><td>16</td><td>4*3=12</td><td>28</td></tr>
<tr><td colspan="3">Month April</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: Water Pollution and Monitoring Control Methods</td><td rowspan="2">Introduction
A. Sewage and Industrial Waste, COD and BOD Estimation methods, Toxic Heavy metal Analysis – Cd, Hg, As, Pb and Cr Control Methods: Water Softening and Municipal Water Purification
B. Techniques in Environmental Analysis ND-IR, FT- IR, AAS, ICT- AES, GCMS, HPLC, Anodic Stripping, Voltametry, etc.</td></tr>
<tr><td>16</td><td>4*3=12</td><td>28</td></tr>
<tr><td colspan="3">Month May</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 Examinations.</td></tr>
<tr><td>-</td><td>-</td><td>-</td></tr>
</table>

Dr. S. D. Kharade

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

Head
Department Of Chemistry

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

Vivekanand College, Kolhapur
(Empowered Autonomous)
Department of Chemistry
Academic Year: 2023-24

Annual Teaching Plan

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

Programme: M.Sc. II Semester IV

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

Month: November			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	Advanced Synthetic Methods of Inorganic Nanomaterials	General Introduction to Nanomaterials, Nanoscience and nanotechnology, History.
2	-	2		
Month: December			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	Advanced Synthetic Methods of Inorganic Nanomaterials	Chemical bath deposition: ionic and solubility products, preparation of binary semiconductors.
4	-	4		
Month: January			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	Advanced Synthetic Methods of Inorganic Nanomaterials	Electrodeposition: Deposition mechanism and preparation of compound thin film.
4	-	4		
Month: February			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	Advanced Synthetic Methods of Inorganic Nanomaterials	successive ionic layer adsorption reaction method (SILAR), Co-precipitation, Micelles-microemulsions, Reduction method.
5	-	5		

Vivekanand College, Kolhapur
(Empowered Autonomous)
Department of Chemistry
Academic Year: 2023-24

Annual Teaching Plan

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

Programme: M.Sc. II Semester IV

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

Month: December			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	Nanotoxicity and Biosafety	Introduction to Nanotoxicology, Nanoetymology, Nanotoxicology challenges
4	-	4		
Month: January			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	Nanotoxicity and Biosafety	Physicochemical characteristic dependent toxicology, Epidemiological evidences.
6	-	6		
Month: February			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	Nanotoxicity and Biosafety	Assessment of nanomaterial toxicity: In vitro toxicity assessment-cell viability.
4	-	4		
Month: March			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	Nanotoxicity and Biosafety	Mechanism of nanotoxicity, in vivo toxicity assessment.
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: 2023-24

Annual Teaching Plan

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

Programme: M.Sc. II Semester IV

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

Month: November			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	Analysis of cosmetics products	Introduction to cosmetics, definition, types of cosmetics, background, development in cosmetic industry, issues in cosmetic industries (contamination and adulteration), future scope and role of analytical chemistry.
2	-	2		
Month: December			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	Analysis of cosmetics products	A) Analysis of cream and lotions: Composition of creams and lotions, determination of water, propylene glycol, non-volatile matter and ash content; estimation of borates, carbonates, sulphates, phosphates, chlorides,ammonia,nitromethane
4	-	4		
Month: January			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	Analysis of cosmetics	oxalic acid, 4- hydroxy benzoic

4	-	4	products-	acid, sodium iodate, freeformaldehyde, H_2O_2, titanium and zinc oxides. Practical applications and examples in analytical chemistry and research. B) Analysis of face powder: Composition of face powder, estimation of boric acid, Mg, Ca, Zn, Fe, Al and Ba.
Month: February			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	Analysis of cosmetics products	Analysis of deodorants and antiperspirants-composition, analysis of fats and fatty acids, boric acid, magnesium, calcium, zinc, iron, titanium, aluminium, phenol, methanamine, hexachlorophenone, sulphonates, urea, etc. Practical applications and examples in analytical chemistry and research.
5	-	5		

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

Miss. S. N. Inamdar

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

Vivekanand College, Kolhapur
(Empowered Autonomous)
Department of Chemistry
Academic Year: 2023-24

Annual Teaching Plan

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

Programme: M.Sc. I Semester II

Subject: Chemistry **Course Title:** Inorganic Chemistry (elective) & Physical Chemistry (Practical)

Month: November			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	Oxygen Transport and Storage	Hemocyanin and hemerythrin
1	8	9		
Month: December			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	Oxygen Transport and Storage	Synthetic oxygen carriers: Collmans compound; Vaska's complex. Co(ll) Schiff base complexes and Perfluorochemicals (PFCs),
4	8	12		
Month: January			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	Oxygen Transport and Storage	Perutz mechanism for structural changes in porphyrin ring system, Oxygenation and deoxygenation,
5	12	17		
Month: February			**Module/Unit:**	**Sub-units planned**
Lectures	Practicals	Total	Oxygen Transport and Storage	Oxygen adsorption isotherm and cooperativity, Role of globin chain in gaemoglobin, Siderophores, Vanadium compounds as insulin mimetic agents in the treatment of diabetics.
5	12	17		

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)

Annual Teaching Plan

Academic Year: 2023-24 **Semesters: M.Sc. I Sem-II** **Department: Chemistry**

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

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

<table>
<tr><td colspan="3">Month: December</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">Advanced Liquid Chromatographic Techniques</td><td rowspan="2">• Introduction</td></tr>
<tr><td>04</td><td>-</td><td>04</td></tr>
<tr><td colspan="3">Month: January</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">Advanced Liquid Chromatographic Technique</td><td rowspan="2">• a) High Performance Liquid Chromatography (HPLC) and Ultra Performance Liquid Chromatography (UPLC)</td></tr>
<tr><td>04</td><td>-</td><td>04</td></tr>
<tr><td colspan="3">Month: February</td><td>Module/Unit:</td><td>Sub-units planned</td></tr>
<tr><td>Lectures</td><td>Practical</td><td>Total</td><td rowspan="2">Advanced Liquid Chromatographic Technique</td><td rowspan="2">• b) Super critical fluid chromatography (SCFC)</td></tr>
<tr><td>04</td><td>-</td><td>04</td></tr>
<tr><td colspan="3">Month: March</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">Advanced Liquid Chromatographic Technique</td><td rowspan="3">• c) Liquid Chromatography-Mass Spectrometry interface</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: April</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. Shrike
HEAD
DEPARTMENT OF CHEMISTRY
VIVEKANAND COLLEGE, KOLHAPUR
(EMPOWERED AUTONOMOUS)

Vivekanand College, Kolhapur (Empowered Autonomous)

Annual Teaching Plan

Academic Year: 2023-24 **Semesters: M.Sc. I Sem-II** **Department: Chemistry**

Subject: Chemistry **Course Title: Physical chemistry (Mandatory)**

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

Month: December			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	Thermodynamics	• Introduction • Practical absolute entropies. • Entropies of phase transition. • Maxwell relations • Thermodynamics of nonelectrolyte solutions. • Raoult's law. • Duhem-Margules equation • Thermodynamic equation of state.
08	-	08		
Month: January			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	Thermodynamics	• Thermodynamics of nonelectrolyte solutions. • Raoult's law. • Duhem-Margules equation • Thermodynamic equation of state. • Gibbs-Duhem equation. • Chemical potential • Henry's law • Excess and mixing thermodynamic properties. • Numerical Problems
07	-	07		
Month: February			Module/Unit:	Sub-units planned
Lectures	Practical	Total	Electrochemistry	• Introduction • Activity and Activity coefficients • Types of electrodes • Determination of activity coefficients of an electrolyte using concentration cells • Instability constant of silver ammonia complex.
08	-	08		
Month: March			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	Electrochemistry	• Acid and alkaline storage batteries, • Abnormal ionic conductance of hydroxyl and hydrogen ions • Electro-osmosis, • Electrophoreses. • Zeta potentials and its determination by electrophoresis.
07	-	07		

Miss. P. A. Gholap.

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

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

Vivekanand College, Kolhapur (Empowered Autonomous)

Annual Teaching Plan

Academic Year: 2023-24 **Semesters: M.Sc. II, Sem-IV** **Department: Chemistry**

Subject: Chemistry **Course Title: Analytical Chemistry (INDUSTRIAL AND ANALYTICAL CHEMISTRY)**

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

<table>
<tr><td colspan="3">Month: December</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">Analysis of Commercial materials</td><td rowspan="2">• Introduction
• Analysis of explosive materials</td></tr>
<tr><td>04</td><td>-</td><td>04</td></tr>
<tr><td colspan="3">Month: January</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">Analysis of Commercial materials</td><td rowspan="2">• Analysis of explosive materials, TNT
• Analysis of explosive materials, RDX
• Analysis of explosive materials, lead azide</td></tr>
<tr><td>04</td><td>-</td><td>04</td></tr>
<tr><td colspan="3">Month: February</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">Analysis of Commercial materials</td><td rowspan="2">• Analysis of explosive materials EDNA (ethylene dinitramide).
• Analysis of conducting polymer, resins and rubber.</td></tr>
<tr><td>04</td><td>-</td><td>04</td></tr>
<tr><td colspan="3">Month: March</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">Analysis of Commercial materials</td><td rowspan="2">• Analysis of luminescent paints,
• Analysis of lubricants and adhesive.</td></tr>
<tr><td>03</td><td>-</td><td>03</td></tr>
<tr><td colspan="3">Month: April</td><td></td><td>• Practical and theory Examination</td></tr>
</table>

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

Miss. P. A. Gholap

Dr. Mrs. S. D. Shirke

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

Vivekanand College, Kolhapur (Empowered Autonomous)

Annual Teaching Plan

Academic Year: 2023-24 **Semesters: M.Sc. II, Sem-IV** **Department: Chemistry**

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

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

<table>
<tr><td colspan="3">Month: December</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">X-ray Diffraction Techniques</td><td rowspan="2">• Introduction
• A] X-ray powder diffraction (XRD)</td></tr>
<tr><td>04</td><td>-</td><td>04</td></tr>
<tr><td colspan="3">Month: January</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">X-ray Diffraction Techniques</td><td rowspan="2">• Diffraction of X-rays with powder diffraction, Instrumentation.
• Identification of compounds using powder diffraction.</td></tr>
<tr><td>04</td><td>-</td><td>04</td></tr>
<tr><td colspan="3">Month: February</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">X-ray Diffraction Techniques</td><td rowspan="2">• Determination of parameters using XRD
• Determination of cubic crystal structure.</td></tr>
<tr><td>04</td><td>-</td><td>04</td></tr>
<tr><td colspan="3">Month: March</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">X-ray Diffraction Techniques</td><td rowspan="2">• Single Crystal X-ray Diffraction:
• X-ray crystal structures in the literature.</td></tr>
<tr><td>03</td><td>-</td><td>03</td></tr>
<tr><td colspan="3">Month: April</td><td></td><td>• Practical and theory Examination</td></tr>
</table>

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

Miss. P. A. Gholap

Dr. Mrs. S. D. Shirke

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

Vivekanand College, Kolhapur (Empowered Autonomous)

Annual Teaching Plan

Academic Year: 2023-24 **Semesters: M.Sc. I Sem-II** **Department: Chemistry**

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

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

<table>
<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">1.To verify the Beers- Lamberts law and determine the concentration of given solution using colorimetry.
2. To determine percentage purity of given olefinic compound by bromination method.
3.To estimate percentage of copper from supplied sample of copper fungicide.</td></tr>
<tr><td>-</td><td>12</td><td>12</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">4. To estimate amount of calcium present in given sample of plaster of Paris.
5. To determine solubility of calcium oxalate in presence of different concentration of HCl.
6. To determine standard deviation from redox titration of Fe^{2+} i.e. is iron solution against standard potassium dichromate.</td></tr>
<tr><td>-</td><td>12</td><td>12</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">-</td><td rowspan="2">7. To determine the Hardness of given water sample.
8. To determine the chlorine content available in given bleaching powder.</td></tr>
<tr><td>-</td><td>08</td><td>08</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 (Autonomous)

Department of Chemistry

Academic Year: 2023-24

Annual Teaching Plan

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

Programme: M.Sc. II Semester IV

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">UNIT-III: Ion Chromatography</td><td rowspan="2">Principles, structure and characteristics of resins, eluent, supressor columns and detectors used in Ion Chromatography, Practical applications and examples in analytical chemistry and research.</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: Ion Chromatography</td><td rowspan="2">Commercial scope, analytical applications, environmental speciation by Ion Chromatography.</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: Ion Chromatography</td><td rowspan="2">Ion Chromatography, Practical applications and examples in analytical chemistry and research.</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>
</table>

Lectures	Practicals	Total	UNIT-III: Ion Chromatography	Ion Chromatography, 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)

Lectures	Practicals	Total	UNIT-III: Chromatographic Techniques.	Ion Chromatography, Practical applications and examples in analytical chemistry and research..
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)

Vivekanand College, Kolhapur (Autonomous)

Department of Chemistry

Academic Year: 2023-24

Annual Teaching Plan

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

Programme: M.Sc. II Semester IV

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">X-ray spectroscopy</td><td rowspan="2">Introduction, X-Ray generation, Properties of X-radiation</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">X-ray spectroscopy</td><td rowspan="2">X-Ray, Instrumentation, X-Ray Absorption,</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">X-ray spectroscopy</td><td rowspan="2">Fluorescence and Diffraction methods of analysis and their applications.</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">X-ray spectroscopy</td><td rowspan="2">Fluorescence and Diffraction methods of analysis and their applications.</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

Head

Department Of Chemistry

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

Vivekanand College, Kolhapur (Autonomous)

Department of Chemistry

Academic Year: 2023-24

Annual Teaching Plan

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

Programme: M.Sc. II Semester IV

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) Kinetic and thermodynamic control of reactions</td><td rowspan="2">Nitration and Sulphonation of naphthalene, Wittig, Enolization,</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) Kinetic and thermodynamic control of reactions</td><td rowspan="2">Friedel-Crafts and Diels Alder reactions.</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">Non-classical carbocations:</td><td rowspan="2">Non-classical carbocations</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">Non-classical carbocations:</td><td rowspan="2">Formation, stability and reactivity.</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

Head

Department Of Chemistry

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

Vivekanand College, Kolhapur (Autonomous)

Department of Chemistry

Academic Year: 2023-24

Annual Teaching Plan

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

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">Unit IV: A)Ion selective electrodes</td><td rowspan="2">Terminology, types and construction of electrodes, glass electrode</td></tr>
<tr><td>3</td><td>-</td><td>3</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">A)Ion selective electrodes</td><td rowspan="2">solid state and precipitate electrodes, liquid – liquid membrane electrodes</td></tr>
<tr><td>12</td><td>4*3 = 12</td><td>24</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">A)Ion selective electrodes</td><td rowspan="2">Enzyme and gas electrodes, and applications. Organic synthesis relating to nucleophilic and electrophilic attack on ligands.</td></tr>
<tr><td>12</td><td>4*3=12</td><td>24</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: Electrophoresis</td><td rowspan="2">Introduction: paper electrophoresis: Technique, factors</td></tr>
<tr><td>12</td><td>4*3=12</td><td>28</td></tr>
</table>

				affecting migration of ions,
Month November			**Module/Unit:**	**Sub-units planned**
			Unit IV: Electrophoresis	
12	4*3=12	24		Capillary and zone electrophoresis and applications.
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

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

Vivekanand College, Kolhapur (Autonomous)

Department of Chemistry

Academic Year: 2023-24

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

Head

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

Vivekanand College, Kolhapur (Autonomous)

Department of Chemistry

Academic Year: 2023-24

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 in research and analytical applications.</td></tr>
<tr><td>4</td><td>-</td><td>4</td></tr>
</table>

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

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: 2023-24

Annual Teaching Plan

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

Programme: M.Sc. II Semester I

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">Unit IV: Atomic Absorption & Inductively Coupled Plasma Spectroscopy -</td><td rowspan="2">Introduction, Principal, the 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 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: Atomic Absorption & Inductively Coupled Plasma Spectroscopy</td><td rowspan="2">Instrumentation, Single and double beam AAS, detection limit and sensitivity, Interferences, applications. Graphite furnace atomic absorption spectroscopy, general description</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: Atomic Absorption & Inductively Coupled Plasma Spectroscopy</td><td rowspan="2">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>
</table>

Month November			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	Unit IV: Inductively Coupled Plasma Spectroscopy:	Introduction, Nebulization Torch, Plasma, Instrumentation, Interferences, and Applications. Problems: Simple problems based on AAS and ICP
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: 2023-24

Annual Teaching Plan

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

Programme: M.Sc. I Semester II

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">UNIT-I: Study of following chromatographic Techniques</td><td rowspan="2">Partition chromatography: general principle, classification of chromatographic Techniques nature of partition forces, chromatographic behaviors of solutes, columns efficiency and resolution.</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-I: Study of following chromatographic Techniques</td><td rowspan="2">Thin layer chromatography Thin Layer Chromatography general principle, and 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-I: Study of following chromatographic Techniques</td><td rowspan="2">Classification of chromatographic Techniques, Thin Layer Chromatography Techniques.</td></tr>
<tr><td>4</td><td>-</td><td>4</td></tr>
</table>

Month November			Module/Unit:	Sub-units planned
Lectures	Practicals	Total	UNIT-I: Study of following chromatographic Techniques	Column chromatograph: principle and theory, adsorp1tion and partition methods.advantages,Disadvantages and application of Column chromatograph
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)

Vivekanand College, Kolhapur (Autonomous)

Department of Chemistry

Academic Year: 2023-24

Annual Teaching Plan

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

Programme: M.Sc. I Semester II

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">UNIT-III: Chromatographic Techniques.</td><td rowspan="2">Principles, structure and characteristics of resins, eluent, supressor columns and detectors used in Ion Chromatography, Practical applications and examples in analytical chemistry and research.</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: Chromatographic Techniques.</td><td rowspan="2">Commercial scope, analytical applications, environmental speciation by Ion Chromatography.</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: Chromatographic Techniques.</td><td rowspan="2">Ion Chromatography, Practical applications and examples in analytical chemistry and research.</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>
</table>

Vivekanand College, Kolhapur (Autonomous)

Department of Chemistry

Academic Year: 2023-24

Annual Teaching Plan

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

Programme: M.Sc. I Semester II

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">UNIT-III: Chromatographic Techniques.</td><td rowspan="2">Principles, structure and characteristics of resins, eluent, supressor columns and detectors used in Ion Chromatography, Practical applications and examples in analytical chemistry and research.</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: Chromatographic Techniques.</td><td rowspan="2">Commercial scope, analytical applications, environmental speciation by Ion Chromatography.</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: Chromatographic Techniques.</td><td rowspan="2">Ion Chromatography, Practical applications and examples in analytical chemistry and research.</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>
</table>

Lectures	Practicals	Total	UNIT-III: Chromatographic Techniques.	Ion Chromatography, 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)