

Shri Swami Vivekanand Shikshan Sanstha's  
Lal Bahadur Shastri College of Arts, Science and Commerce, Satara

DEPARTMENT OF CHEMISTRY  
B.Sc. Chemistry  
Course Outcomes (COS)

| Class and Duration                              | Courses                               |      | Course Outcomes (CO'S)   |
|---|---------------------------------------|------|--|
| B.Sc. I<br>(CBCS)<br>2018- 19<br>To<br>2021- 22 | Paper I<br>(Inorganic<br>Chemistry)   | CO 1 | Getting to know the structure of atoms and their principles, details of periodic table                                       |
|   |                                       | CO 2 | Knowing various types of ionic bond and ionic compound study   |
|   |                                       | CO 3 | Knowing study of Molecular orbital Theory  |
|   | Paper II<br>(Organic<br>Chemistry)    | CO 1 | Understanding the fundamentals of Organic Chemistry  |
|   |                                       | CO 2 | Imparting the knowledge of stereochemistry of different organic compounds among the students                                 |
|   |                                       | CO 3 | Studying aromaticity, electrophilic substitution reactions and their mechanism   |
|   |                                       | CO 4 | Knowing various method of preparation and chemical reaction of cyclo alkane, cyclo alkene and alkadiene                      |
|   | Paper III<br>(Physical<br>Chemistry)  | CO 1 | Impart the knowledge regarding chemical thermodynamics and feasibility, direction and equilibrium condition of reactions     |
|   |                                       | CO 2 | Understanding mechanism of reaction and to get optimum conditions for a reaction by utilising the study of Chemical Kinetics |
|   | Paper IV<br>(Analytical<br>Chemistry) | CO 1 | Provide a basic understanding of the principles , instrumentation and applications of chemical analysis                      |
|   |                                       | CO 2 | Study various chromatographic techniques like paper, thin layer, column, and gas chromatography                              |
|   |                                       | CO 3 | Impart basic knowledge regarding titrimetric analysis  |
|   |                                       | CO 4 | Making aware about water and fertilizer analysis   |
| B.Sc. I<br>NEP<br>(2020)<br>2022-23             | Paper I<br>(Inorganic<br>Chemistry)   | CO 1 | Getting to know the structure of atoms and their principles, details of periodic table                                       |
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|   |                                    |      | different organic compounds among the students  |
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|   |                                    | CO 2 | Understanding mechanism of reaction and to get optimum conditions for a reaction by utilising the study of Chemical Kinetics                                  |
|   | Paper IV<br>(Analytical Chemistry) | CO 1 | Provide a basic understanding of the principles , instrumentation and applications of chemical analysis   |
|   |                                    | CO 2 | Study various chromatographic techniques like paper, thin layer, column, and gas chromatography   |
|   |                                    | CO 3 | Impart basic knowledge regarding titrimetric analysis.  |
|   |                                    | CO 4 | Making aware about water and fertilizer analysis  |
| Class and Duration                            | Courses                            |      | Course Outcomes (Cos)   |
| B.Sc. II<br>(Old)<br>2017-18<br>To<br>2018-19 | Paper V<br>(Physical Chemistry)    | CO 1 | Understanding mechanism of reaction and get optimum conditions for a reaction by utilising the study of Chemical Kinetics                                     |
|   |                                    | CO 2 | Making students capable of understanding redox reactions and to construct electrochemical cells learn various laws of electrochemistry and their applications |
|   |                                    | CO 3 | Study the properties of liquids like surface tension  |
|   |                                    | CO 4 | Know about surface phenomena like adsorption w.r.t. its characteristics, determination and applications   |
|   | Paper VI<br>(Industrial Chemistry) | CO 1 | Providing a basic understanding of the principles, instrumentation and applications of chemical analysis  |
|   |                                    | CO 2 | Studying various chromatographic techniques like paper, thin layer, column, and gas chromatography electrochemistry and their applications                    |
|   |                                    | CO 3 | Explaining the difference between classical and industrial chemistry, unit operations, unit processes, flow sheets etc  |
|   |                                    | CO 4 | Knowing the process of corrosion and how to deal with it by using electroplating  |
|   |                                    | CO 5 | Getting familiar with the industrial process with respect to paper industry, soaps and detergents etc   |



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|  | Paper VII<br>(Inorganic<br>Chemistry) | CO 1 | Knowing study of 14 elements in the periodic table  |
|  |                                       | CO 2 | Knowing the new productivity  |
|  |                                       | CO 3 | Knowing the Studying of electronic configuration, oxidation state, colour spectra, and magnetic properties  |
|  |                                       | CO 4 | Knowing about the study of solving energies of the metals, semiconductors and superconductors   |
|  |                                       | CO 5 | Knowing the study of various organ metallic compounds is very useful in various fields like agriculture, pesticides, and pharmaceuticals                      |
|  | Paper VIII<br>(Organic<br>Chemistry)  | CO 1 | Imparting knowledge about the synthesis, reactivity and applications of carboxylic acids  |
|  |                                       | CO 2 | Knowing amines and diazonium salts with respect to classification, preparation and applications   |
|  |                                       | CO 3 | Understanding the nomenclature and reactivity of aldehydes, ketones   |
|  |                                       | CO 4 | Studying the classification, configuration and structure of carbohydrates   |
|  |                                       | CO 5 | Learning the basic knowledge of conformational analysis of organic compounds  |
| B.Sc. II<br>(CBCS)<br><br>2019-20<br>To<br>2022-23 | Paper V<br>(Physical<br>Chemistry)    | CO 1 | Understanding mechanism of reaction and get optimum conditions for a reaction by utilising the study of Chemical Kinetics                                     |
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| B.Sc. III<br>(Old)<br>2018-19<br>To<br>2019-20 | Paper IX<br>(Physical<br>Chemistry)   | CO 1 | Making students capable of understanding redox reactions and to construct electrochemical cells and learning various laws of electrochemistry and their applications |
|  |                                       | CO 2 | Imparting the concepts of quantum mechanics, like Schrodinger equation and quantum numbers   |
|  |                                       | CO 3 | Learning about interaction between radiation and matter which leads to molecular spectroscopy  |
|  |                                       | CO 4 | Understanding various laws of photochemistry and photo physical processes  |
|  | Paper X<br>(Inorganic<br>Chemistry)   | CO 1 | Knowing the study of electronic configuration, oxidation state, colour spectra, and magnetic properties  |
|  |                                       | CO 2 | Studying of co-ordination chemistry needs an understanding of the different terms used further topic covers Werner's theory, EAN, VBT, VSEPR, CFSE, and MO theory    |
|  |                                       | CO 3 | Knowing the study of catalyst, non-aqueous solvents and chelation  |
|  | Paper XI<br>(Organic<br>Chemistry)    | CO 1 | Studying about introduction to spectroscopy  |
|  |                                       | CO 2 | Imparting the knowledge of UV, Visible spectroscopy and its application  |
|  |                                       | CO 3 | Understanding IR Spectroscopy and its application  |
|  |                                       | CO 4 | Studying NMR Spectroscopy and its application  |
|  |                                       | CO 5 | Knowing Mass Spectroscopy and its application  |



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|  |  | CO 6 | Solving combined spectroscopic problems   |
| Paper XII<br>(Industrial<br>Chemistry) |  | CO 1 | Studying various chromatographic techniques like paper, thin layer, column, and gas chromatography  |
|  |  | CO 2 | Imparting basic knowledge regarding titrimetric analysis  |
|  |  | CO 3 | Getting familiar with the industrial process with respect to sugar industry, soaps and detergents, heavy chemicals production industries etc  |
|  |  | CO 4 | Getting introduction the nano materials with respect to preparation, characterisation, and applications   |
| Paper XIII<br>(Physical<br>Chemistry)  |  | CO 1 | Understanding mechanism of reaction and get optimum conditions for a reaction by utilising the study of Chemical Kinetics   |
|  |  | CO 2 | Knowing about surface phenomena like adsorption w.r.t. its characteristics, determination and application   |
|  |  | CO 3 | Getting the knowledge about Phase equilibria, wrt one, two and three component systems study crystal structure by using Bragg's equation  |
|  |  | CO 4 | Developing practical skill regarding chemical kinetics and get acquaint to handle various instruments like potentiometer, conductometer, refractometer, colorimeter, pH meter, viscometer, stalagmometer etc. |
| Paper XIV<br>(Inorganic<br>Chemistry)  |  | CO 1 | Knowing that nuclear energy may be boon and bane and know the radioactivity elements in the series of actinides   |
|  |  | CO 2 | Coming to know that manufacturing process of iron and steel and study of various methods  |
|  |  | CO 3 | Knowing that some biological role of alkali and alkaline earth metals, Hb, Mb, and some enzymes   |
|  |  | CO 4 | Knowing the various types of reaction mechanism of the inorganic co-ordinated compounds   |
| Paper XV<br>(Organic<br>Chemistry)     |  | CO 1 | Making students capable of understanding Name reactions and their mechanism   |
|  |  | CO 2 | Studying the applications of different reagents in organic synthesis  |
|  |  | CO 3 | Imparting the knowledge of different natural products   |
|  |  | CO 4 | Knowing about pharmaceutical chemistry and study of different drugs   |
|  |  | CO 5 | Understanding the knowledge of electrophilic addition to carbon carbon double and triple bond compounds   |
| Paper XVI<br>(Analytical)              |  | CO 1 | Studying various chromatographic techniques like paper, thin layer, column, and gas chromatography  |




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|   | Chemistry)                             | CO 2 | Imparting basic knowledge regarding titrimetric analysis   |
|   |  | CO 3 | Learning about analytical techniques like potentiometry, conductometry, flame photometry, colorimetry, spectrophotometry   |
|   |  | CO 4 | Knowing about pharmaceutical chemistry and study of different drugs  |
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|  |                                     |      | and steel and study of various methods   |
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|  |                                     | CO 4 | Developing practical skill regarding chemical kinetics and get acquaint to handle various instruments like potentiometer, conductometer, refractometer, colorimeter, pH meter, viscometer, stalagmometer etc |
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**HEAD**  
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 of Arts, Science, Commerce, Satara



Shri Swami Vivekanand Shikshan Sanstha's  
 LAL BAHADUR SHASTRI COLLEGE OF ARTS, SCIENCE AND COMMERCE  
 SATARA  
 DEPARTMENT OF CHEMISTRY  
 M. Sc.  
**COURSE OUTCOMES**

| Class and Duration     | Course                             | Course Outcomes   |
|------------------------|------------------------------------|---|
| M.Sc. I<br>(2022-2023) | Paper I<br>(Inorganic Chemistry)   | Getting to know the General characteristic and properties of transition elements, Crystal field splitting.                                      |
|                        |                                    | Understanding the preparation, structure, physical and chemical properties of metal carbonyls.  |
|                        |                                    | Knowing study of Synthesis, bonding, structure and reactivity of organometallic compounds.  |
|                        |                                    | Understanding the Thermodynamic vs. kinetic stability, Stability constant, Stepwise and overall stability constants of metal complexes.         |
|                        | Paper II (Organic Chemistry)       | Understanding the types of reactions & their structure & reactivity..   |
|                        |                                    | Studying aromaticity in Benzenoid and non – Benzenoid compounds.  |
|                        |                                    | Knowing study of Name reaction with mechanism.  |
|                        |                                    | Imparting the knowledge of stereochemistry of different organic compounds among the students  |
|                        | Paper III (Physical Chemistry)     | Impart the knowledge regarding chemical thermodynamics and feasibility, direction and equilibrium condition of reactions.                       |
|                        |                                    | Provide a basic understanding of the thermodynamic probability and entropy.   |
|                        |                                    | Understanding the Colloidal Systems-Sols, Adsorption, adsorption isotherms.   |
|                        |                                    | Provide a basic understanding of the Macromolecules & Chemistry of polymerization.  |
|                        | Paper IV<br>(Analytical Chemistry) | Provide a basic understanding of the Analytical Chemistry, Chemical analysis, instrumental methods, Analytical methods, Techniques of analysis. |
|                        |                                    | Impart the knowledge regarding to the Quantitative Analysis.  |



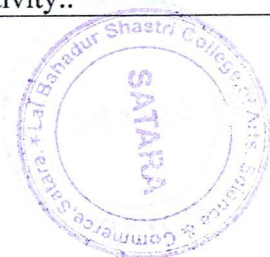
|                              |   |   |
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|                              |   | Study various chromatographic techniques like HPLC, thin layer, column, and gas chromatography.   |
|                              |   | Getting to know the information about various Electroanalytical Techniques.   |
|                              | Paper V (Inorganic Chemistry)             | General discussion on the properties of the non-transition elements.  |
|                              |   | Knowing study of Stereochemistry and bonding in Main group compounds & Non-aqueous solvents.  |
|                              |   | Imparting knowledge about the Solid state chemistry & Bioinorganic Chemistry.   |
|                              |   | Understanding the Chemistry of f-block elements.  |
|                              | Paper VI (Organic Chemistry)              | Studying the rearrangements reactions & Photochemical reactions.  |
|                              |   | Knowing Enamines, Hydroboration, & application of oxidizing agents  |
|                              |   | Understanding the Reduction reactions & Protection of functional group.   |
|                              |   | Studying the Organometallic compounds & Methodologies in organic synthesis  |
|                              | Paper VII (Physical Chemistry)            | Imparting the concepts of quantum mechanics, like Schrodinger equation and quantum numbers  |
|                              |   | Understanding various laws of photochemistry and photophysical processes.   |
|                              |   | Making students capable of understanding redox reactions and to construct electrochemical cells and learning various laws of electrochemistry and their applications. |
|                              |   | Understanding mechanism of reaction and get optimum conditions for a reaction by utilising the study of Chemical Kinetics.  |
|                              | Paper VIII (Analytical Chemistry)         | Studying about various spectroscopy techniques.   |
|                              |   | Knowing about Advanced Analytical Tools like NMR, MS.   |
|                              |   | Studying the various techniques of thermal analysis.  |
|                              |   | Understanding concept of AAS & FES  |
| M.Sc. II (2020-2021) Onwards | Paper IX (Advanced Analytical Techniques) | CO-1 Understanding the principles, Instrumentation, of Mass Spectrometry.   |
|                              |   | CO-2 Knowing study of Nanotechnology and Nano Chemistry.  |



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|  |  | CO-3 Studying of various Advanced Instrumentation Techniques like, SEM,TEM,EDS,EDAX,STM,AFM.   |
|  |  | CO-4 Studying of various Advanced Instrumentation Techniques like, XFS, ESR, XPS, SIMS.  |
|  | Paper X (ORGANO ANALYTICAL CHEMISTRY)                        | CO-1 Provide a basic understanding of the Advanced techniques of analysis: UV-Visible, IR, 1H-NMR (Recapitulation), 13CNMR, Mass spectroscopy. |
|  |  | CO-2 Impart the knowledge regarding Drug Analysis & Vitamins.  |
|  |  | CO-3 Understanding concept of Clinical Analysis & Body fluid analysis.   |
|  |  | CO-4 Impart the knowledge regarding Pesticides Analysis & Forensic Analysis  |
|  | Paper XI (ELECTROANALYTICAL TECHNIQUES IN CHEMICAL ANALYSIS) | CO-1 Impart the knowledge regarding the Voltammetric techniques.   |
|  |  | CO-2 Provide a basic understanding of the classification of colloids,& Types of emulsions.   |
|  |  | CO-3 Understanding the concept of Particle size analysis by laser light scattering.  |
|  |  | CO-4 Studying of ion selective electrode & Electrophoresis.  |
|  | Paper XII (ENVIRONMENTAL CHEMICAL ANALYSIS AND CONTROL)      | CO-1 Provide a basic understanding of the Sampling in analysis.  |
|  |  | CO-2 Impart the knowledge regarding to the various Electrochemical and spectral methods for Environmental analysis.                            |
|  |  | CO-3 Making aware about Air & Water Pollutant.   |
|  |  | CO-4 Making aware about organic pollutants.  |
|  | Paper XIII (MODERN SEPARATION METHODS IN ANALYSIS)           | CO-1 General discussion on the Advanced Gas Chromatographic Techniques. .  |
|  |  | CO-2 Knowing study of Advanced Liquid Chromatographic Techniques.  |
|  |  | CO-3 General discussion on the Ion Chromatography & its Principles, structure and characteristics.   |



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|  |   | CO-4 Imparting knowledge about the Modern extraction and Chromatographic separation techniques  |
|  | Paper XIV<br>(ORGANIC INDUSTRIAL ANALYSIS)          | CO-1 Studying the Industrial Analysis of oils, Fats, Soaps & detergents.  |
|  |   | CO-2 Understanding the Food and Food Additive Analysis.   |
|  |   | CO-3 Explaining the Analysis of cosmetics products like Cream & lotions.  |
|  |   | CO-4 Studying the analysis of Paints, pigments & the Petroleum Products.  |
|  | Paper XV<br>(ADVANCED METHODS IN CHEMICAL ANALYSIS) | CO-1 Studying the Fluorescence and Phosphorescence Spectrophotometry.   |
|  |   | CO-2 Understanding mechanism of reaction and get optimum conditions for a reaction by utilising the study of Chemical Kinetics.         |
|  |   | CO-3 Study the Basic principles Photoelectron spectroscopy  |
|  |   | CO-4 Knowing about X-ray spectroscopy   |
|  | Paper XVI<br>(APPLIED ANALYTICAL CHEMISTRY)         | Knowing about Spectrochemical Methods of Analysis.  |
|  |   | Understanding concept of Metals & Alloys.   |
|  |   | CO-3 Making aware about Soil and fertilizer analysis.   |
|  |   | CO-4 Understanding concept of Analysis of Commercial materials & explosive materials like TNT, RDX.                                     |
| M.Sc. I<br>(2019-2020) To<br>2021-2022 | Paper I (Inorganic Chemistry)                       | CO-1 Getting to know the General characteristic and properties of transition elements, Crystal field splitting.                         |
|  |   | CO-2 Understanding the preparation, structure, physical and chemical properties of metal carbonyls.                                     |
|  |   | CO-3 Knowing study of Synthesis, bonding, structure and reactivity of organometallic compounds.   |
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|  |                                 | CO-3 Knowing study of Name reaction with mechanism.  |
|  |                                 | CO-4 Imparting the knowledge of stereochemistry of different organic compounds among the students  |
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|  | Paper V (Inorganic Chemistry)   | CO-1 General discussion on the properties of the non–transition elements,  |
|  |                                 | CO-2 Knowing study of Stereochemistry and bonding in Main group compounds & Non-aqueous solvents.  |
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|  |                                 | CO-3 Understanding the Reduction reactions & Protection of functional group.   |



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|                      |   | CO-3 Studying the various techniques of thermal analysis.  |
|                      |   | CO-4 Understanding concept of AAS & FES.   |
| M.Sc. II (2019-2020) | Paper IX (Advanced Analytical Techniques) | CO-1 Understanding the principles, Instrumentation, of Mass Spectrometry   |
|                      |   | Knowing study of Nanotechnology and Nano Chemistry.  |
|                      |   | CO-3 Studying of various Advanced Instrumentation Techniques like, SEM, TEM, EDS, EDAX, STM, AFM.  |
|                      |   | CO-4 Studying of various Advanced Instrumentation Techniques like, XFS, ESR, XPS, SIMS.  |
|                      | Paper X (ORGANO ANALYTICAL CHEMISTRY)     | CO-1 Provide a basic understanding of the Advanced techniques of analysis: UV-Visible, IR, <sup>1</sup> H-NMR (Recapitulation), <sup>13</sup> CNMR, Mass spectroscopy.     |
|                      |   | CO-2 Impart the knowledge regarding Drug Analysis & Vitamins.  |
|                      |   | CO-3 Understanding concept of Clinical Analysis & Body fluid analysis.   |
|                      |   | CO-4 Impart the knowledge regarding Pesticides Analysis & Forensic Analysis.   |
|                      | Paper XI (ELECTROANALYTICAL)              | CO-1 Impart the knowledge regarding the Voltammetric techniques.   |



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| TECHNIQUES IN CHEMICAL ANALYSIS)                        | CO-2 Provide a basic understanding of the classification of colloids,& Types of emulsions.                          |
|   | CO-3 Understanding the concept of Particle size analysis by laser light scattering.                                 |
|   | CO-4 Studying of ion selective electrode & Electrophoresis.   |
| Paper XII (ENVIRONMENTAL CHEMICAL ANALYSIS AND CONTROL) | CO-1 Provide a basic understanding of the Sampling in analysis.   |
|   | CO-2 Impart the knowledge regarding to the various Electrochemical and spectral methods for Environmental analysis. |
|   | CO-3 Making aware about Air & Water Pollutant.  |
|   | CO-4 Making aware about organic pollutants.   |
| Paper XIII (MODERN SEPARATION METHODS IN ANALYSIS)      | CO-1 General discussion on the Advanced Gas Chromatographic Techniques.   |
|   | CO-2 Knowing study of Advanced Liquid Chromatographic Techniques.   |
|   | CO-3 General discussion on the Ion Chromatography & its Principles, structure and characteristics.                  |
| Paper XIV (ORGANIC INDUSTRIAL ANALYSIS)                 | Imparting knowledge about the Modern extraction and Chromatographic separation techniques                           |
|   | CO-1 Studying the Industrial Analysis of oils, Fats, Soaps & detergents   |
|   | Understanding the Food and Food Additive Analysis.  |
|   | CO-3 Explaining the Analysis of cosmetics products like Cream & lotions.  |
| Paper XV (ADVANCED                                      | CO-4 Studying the analysis of Paints, pigments & the Petroleum Products   |
|   | CO-1 Studying the Fluorescence and Phosphorescence Spectrophotometry.   |



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|                     | METHODS IN CHEMICAL ANALYSIS)            | CO-2 Understanding mechanism of reaction and get optimum conditions for a reaction by utilising the study of Chemical Kinetics.         |
|                     |  | CO-3 Study the Basic principles Photoelectron spectroscopy  |
|                     |  | CO-4 Knowing about X-ray spectroscopy   |
|                     | Paper XVI (APPLIED ANALYTICAL CHEMISTRY) | CO-1 Knowing about Spectrochemical Methods of Analysis.   |
|                     |  | CO-2 Understanding concept of Metals & Alloys.  |
|                     |  | CO-3 Making aware about Soil and fertilizer analysis.   |
|                     |  | CO-4 Understanding concept of Analysis of Commercial materials & explosive materials like TNT, RDX                                      |
| M.Sc. I (2018-2019) | Paper I (Inorganic Chemistry)            | CO-1 Getting to know the General characteristic and properties of transition elements, Crystal field splitting.                         |
|                     |  | CO-2 Understanding the preparation, structure, physical and chemical properties of metal carbonyls.                                     |
|                     |  | CO-3 Knowing study of Synthesis, bonding, structure and reactivity of organometallic compounds.   |
|                     |  | Understanding the Thermodynamic vs. kinetic stability, Stability constant, Stepwise and overall stability constants of metal complexes. |
|                     | Paper II (Organic Chemistry)             | CO-1 Understanding the types of reactions & their structure & reactivity..  |
|                     |  | CO-2 Studying aromaticity in Benzenoid and non – Benzenoid compounds.   |
|                     |  | CO-3 Knowing study of Name reaction with mechanism.   |
|                     |  | CO-4 Imparting the knowledge of stereochemistry of different organic compounds among the students                                       |
|                     | Paper III (Physical Chemistry)           | CO-1 Impart the knowledge regarding chemical thermodynamics and feasibility, direction and equilibrium condition of reactions.          |
|                     |  | CO-2 Provide a basic understanding of the thermodynamic probability and entropy.  |
|                     |  | CO-3 Understanding the Colloidal Systems-Sols, Adsorption, adsorption isotherms.  |
|                     |  | CO-4 Provide a basic understanding of the Macromolecules & Chemistry of polymerization  |





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|                                | Paper IV (Analytical Chemistry)  | CO-1 Provide a basic understanding of the Analytical Chemistry, Chemical analysis, instrumental methods, Analytical methods, Techniques of analysis. |
|                                |  | CO-2 Impart the knowledge regarding to the Quantitative Analysis   |
|                                |  | Study various chromatographic techniques like HPLC, thin layer, column, and gas chromatography.  |
|                                |  | CO-4 Getting to know the information about various Electroanalytical Techniques.   |
|                                | Paper V (Inorganic Chemistry)  | CO-1 General discussion on the properties of the non-transition elements,  |
|                                |  | CO-2 Knowing study of Stereochemistry and bonding in Main group compounds & Non-aqueous solvents.  |
|                                |  | CO-3 Understanding the Chemistry of f-block elements.  |
|                                |  | CO-4 Imparting knowledge about the Solid state chemistry & Bioinorganic Chemistry.   |
|                                | Paper VI (Organic Chemistry)   | CO-1 Studying the rearrangements reactions & Photochemical reactions.  |
|                                |  | CO-2 Knowing Enamines, Hydroboration, & application of oxidizing agents.   |
|                                |  | CO-3 Understanding the Reduction reactions & Protection of functional group.   |
|                                |  | CO-4 Studying the Organometallic compounds & Methodologies in organic synthesis.   |
| Paper VII (Physical Chemistry) | CO-1 Imparting the concepts of quantum mechanics, like Schrodinger equation and quantum numbers  |  |
|                                | CO-2 Understanding various laws of photochemistry and photophysical processes.   |  |
|                                | CO-3 Making students capable of understanding redox reactions and to construct electrochemical cells and learning various laws of electrochemistry and their applications. |  |
|                                | CO-4 Understanding mechanism of reaction and get optimum conditions for a reaction by utilising the study of Chemical Kinetics.  |  |




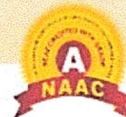
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|   | Paper VIII<br>(Analytical<br>Chemistry)                                      | CO-1 Studying about various spectroscopy techniques.   |
|   |  | CO-2 Knowing about Advanced Analytical Tools like NMR, MS.   |
|   |  | CO-3 Studying the various techniques of thermal analysis.  |
|   |  | CO-4 Understanding concept of AAS & FES.   |
| M.Sc. II<br>(2018-<br>2019)                                     | Paper IX (Advanced<br>Analytical<br>Techniques)                              | CO-1 Understanding the principles, Instrumentation, of Mass Spectrometry.  |
|   |  | CO-1 Knowing study of Nanotechnology and Nano Chemistry.   |
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|   | Paper X (ORGANO<br>ANALYTICAL<br>CHEMISTRY)                                  | CO-4 Studying of various Advanced Instrumentation Techniques like, XFS, ESR, XPS, SIMS.  |
|   |  | CO-1 Provide a basic understanding of the Advanced techniques of analysis: UV-Visible, IR, <sup>1</sup> H-NMR (Recapitulation), <sup>13</sup> CNMR, Mass spectroscopy. |
|   |  | CO-2 Impart the knowledge regarding Drug Analysis & Vitamins.  |
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|   | Paper XI<br>(ELECTROANALY<br>TICAL<br>TECHNIQUES IN<br>CHEMICAL<br>ANALYSIS) | CO-4 Impart the knowledge regarding Pesticides Analysis & Forensic Analysis.   |
|   |  | CO-1 Impart the knowledge regarding the Voltammetric techniques.   |
|   |  | CO-2 Provide a basic understanding of the classification of colloids, & Types of emulsions.  |
|   |  | CO-3 Understanding the concept of Particle size analysis by laser light scattering.  |
|   | Paper XII<br>(ENVIRONMENTA<br>L CHEMICAL                                     | CO-4 Studying of ion selective electrode & Electrophoresis.  |
| CO-1 Provide a basic understanding of the Sampling in analysis. |  |  |



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| ANALYSIS AND CONTROL )                             | CO-2 Impart the knowledge regarding to the various Electrochemical and spectral methods for Environmental analysis.             |
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|  | CO-4 Making aware about organic pollutants.   |
|  | CO-1 General discussion on the Advanced Gas Chromatographic Techniques.   |
| Paper XIII (MODERN SEPARATION METHODS IN ANALYSIS) | CO-2 Knowing study of Advanced Liquid Chromatographic Techniques.   |
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**HEAD**  
 Department of Chemistry  
 Lal Bahadur Shastri College,  
 of Arts, Science, Commerce, Satara



Est : June 1967

Shri Swami Vivekanand Shikshan Sanstha, Kolhapur's

## Lal Bahadur Shastri College of Arts, Science & Commerce, Satara.

Affiliated to Shivaji University, Kolhapur, Maharashtra

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"ज्ञान, विज्ञान आणि सुसंस्कार यांसाठी शिक्षण प्रसार"

- शिक्षणमहर्षी डॉ. बापूजी साळुंखे

### Department of Chemistry

#### Course outcome

| Sr.no. | Course name                        | Outcome   |
|--------|------------------------------------|---|
| 1      | Preparation of Household Chemicals | <p>Upon successful completion of the Certificate Course in Preparation of Household Chemicals, students will be able to learn.</p> <ul style="list-style-type: none"> <li>➤ The students learn fundamentals household chemicals.</li> <li>➤ The students define house hold products, various processes of household products</li> <li>➤ The students explain preparations and reactions of household chemicals, history of household products.</li> <li>➤ The students learn fundamentals of various cleaning agents.</li> <li>➤ The students explain preparations and reactions of natural, floor, toilet, bathroom and kitchen cleaning agents</li> <li>➤ The students learn technology of soap</li> <li>➤ The students explain preparations and reactions of soap, liquid soap</li> <li>➤ The students learn fundamentals of detergents and surfactants</li> <li>➤ The students define detergents, surfactants</li> <li>➤ 3. The students explain preparations and various types of detergents and surfactants.</li> </ul> |



*Signature*

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## Department of Chemistry

### Course outcome

| Sr.no. | Course name  | Outcome  |
|--------|--|--|
| 1      | " A Certificate Course in Analytical Instrumentation " | <p>Upon successful completion of the Certificate Course in Analytical Instrumentation, students will be able to learn.</p> <ul style="list-style-type: none"> <li>➤ The knowledge, skills, and competencies required to excel in the field of analytical sciences and instrumentation.</li> <li>➤ The fundamental principles underlying various analytical techniques, including spectroscopy, chromatography and electrochemical analysis.</li> <li>➤ The practical competence in operating, calibrating, and maintaining a variety of analytical instruments through hands-on experience.</li> <li>➤ To contribute effectively to the field of analytical sciences, ensuring accurate and reliable measurements for scientific advancement and industrial progress.</li> </ul> |



*Aswani*  
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 of Arts, Science, Commerce, Satara