Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Structure and Curriculum of Four Year Multidisciplinary Degree (Honors/Research) Programme with Multiple Entry and Exit option

Undergraduate Programme of Science and Technology

B.Sc. (Honors/Research) in Chemistry

Board of Studies

in

Chemistry

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

w.e.f. June, 2023

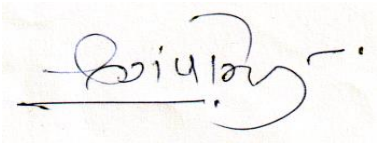
(In Accordance with NEP-2020)

CERTIFICATE

I hereby certify that the documents attached are the Bonafide copies of the Curriculum of **B.Sc. (Honors/Research) in Chemistry** Programme to be effective from the **Academic Year 2023-24.**

Date: 14/07/2023

Place: Latur



Prof. Dhananjay Palke

Chairperson

Board of Studies in Chemistry

Rajarshi Shahu Mahavidyalaya, Latur

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Shiv Chhatrapati Shikshan Sanstha's

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Members of Board of Studies in the Subject Chemistry

Under the Faculty of Science and Technology

Sr. No.	Name	Designation	In position
1	**Prof. Dhananjay Palke** Head, Department of Chemistry, Rajarshi Shahu Mahavidyalaya (Autonomous), Latur	Chairperson	HoD
2	**Prof. Vijay Bhosale** Department of Chemistry, Yeshwant Mahavidyalaya, Nanded.	Member	V.C. Nominee
3	**Prof. S. P. Hangiragekar Department of** Chemistry, Shivaji University, Kolhapur	Member	Academic Council Nominee
4	**Dr. Bapu B. Shingate** Department of Chemistry, Dr. B. A. M. U. Aurangabad	Member	Academic Council Nominee
5	**Prof. S. B. Patwari** Chemistry, Laal Bhadur Shastri, Mahavidyalaya, Dharmabad	Member	Expert from outside for Special Course
6	**Dr. Pinak M. Chincholkar** Springer Nature Technology & Publishing Solutions. Tower 8 and 9 Magarpatta City, Hadapsar. Pune.	Member	Expert from Industry
7	**Dr. R. V. Hangarge** Department of Chemistry, Tai Golwalkar Mahavidyalaya, Ramtek.	Member	P.G. Alumni
8	**Dr. K. I. Momin** Assistant Professor, Rajarshi Shahu Mahavidyalaya (Autonomous), Latur	Member	Faculty Member
9	**Dr. K. C. Tayade** Assistant Professor, Rajarshi Shahu Mahavidyalaya (Autonomous), Latur	Member	Faculty Member
10	**Mr. M. S. Sudewad** Assistant Professor, Rajarshi Shahu Mahavidyalaya (Autonomous), Latur	Member	Faculty Member
11	**Dr. K. D. Sawant** Department of Botany , Rajarshi Shahu Mahavidyalaya (Autonomous), Latur	Member	Member from same Faculty

From the Desk of the Chairperson…

The Department of Chemistry was established in the academic year 1971-72. Need of Chemist, is at the forefront of the noteworthy growth in industries, the college took initiative in starting the B.Sc. Chemistry Program from 1971-72 at Undergraduate (B.Sc.) level. Now, this course is successfully flourishing the need of industries by availing Chemist with sound subject knowledge. Also, Post graduate Program in Chemistry started from Academic Year 2014-2015. From Academic Year 2023-24 we are implementing National Education Policy-2020 (NEP-2020) & Started B.Sc. (Honors/Research) Chemistry Programme to be effective from the same academic year. Department has well equipped laboratories with number of sophisticated instruments. In 2006-07, UGC recognized this department as a "Star Department" in the college and awarded CPE status.

The B.Sc. Chemistry Programme is designed to give sound knowledge and understanding of Chemistry to undergraduate students of the B.Sc. Degree course. The goal of the Programme is to make the study of Chemistry as stimulating, interesting, and relevant as possible. The curriculum is prepared with the aim of making the students capable of studying Chemistry in academic and industrial courses. Also, to expose the students to Chemistry and build up their interest in various fields of chemistry. The new and updated Curriculum is based on National Education Policy-2020 (NEP-2020) Guidelines which includes multiple entries & multiple Exit & interdisciplinary approach with vigor and depth. The curriculum is designed on the basis of Feedbacks & suggestion given by Various Stakeholders and by considering the syllabi of Competitive examination like, IIT-JAM, NET, SET, GATE examinations, UGC model curriculum, syllabi of different entrance examinations and syllabi of other Universities.

Our Vision to evolve as a world class dynamic center of higher education disseminating knowledge rigorously at affordable cost and to emerge as a premier centre that promotes technological competence and democratic values.

* "Pursuit of Excellence" in higher education to make our students globally competent.
* Enable students to develop as responsible citizens with human values.
* Provide value and need based education.
* Develop scientific attitude among students.

Prof. Dhananjay Palke
Chairperson
Board of Studies in Chemistry
Rajarshi Shahu Mahavidyalaya, Latur
(Autonomous)

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Index

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Faculty of Science and Technology

Structure for Four Year Multidisciplinary Undergraduate Degree Programme in Chemistry

Multiple Entry and Exit (In accordance with NEP-2020)

Year & Level	Sem	Major		Minor	GE/OE	VSC/ SEC (VSEC)	AEC/ VEC	OJT,FP,CEP, RP	Credit per Sem.	Cum./Cr. per exit
		DSC	DSE							
1	**2**	**3**		**4**	**5**	**6**	**7**	**8**	**9**	**10**
I 4.5	I	DSC I: 04 Cr. DSC II: 04 Cr.	NA	NA	GE-I: 04 Cr.	VSC-I: 02 Cr. SEC-I: 02 Cr.	AEC-I MIL: 02 Cr. VEC-I: 02 Cr.	CC-I: 02 Cr. (NSS, NCC, Sports, Cultural)/ CEP-I: 02 Cr. (SES-I)/ OJT: 02 Cr. / Mini Project: 02 Cr.	22	44 Cr. UG Certificate
	II	DSCIII: 04 Cr. DSC IV: 04 Cr. (IKS)	NA	NA	GE-II: 04 Cr.	VSC-II: 02 Cr. SEC-II: 02 Cr.	AEC-II MIL: 02 Cr. VEC-II: 02 Cr.	CC-II: 02 Cr. (NSS, NCC, Sports, Cultural)/ CEP-II: 02 Cr. (SES-II)/ OJT: 02 Cr. / Mini Project: 02 Cr.	22	
	Cum. Cr.	16	-	-	08	04+04=08	04+02+02=08	04	44	
Exit Option: Award of UG Certificate in Major with 44 Credits and Additional 04 Credits Core NSQF Course/Internship or continue with Major and Minor										

Abbreviations:

1. **DSC : Discipline Specific Core (Major)**
2. **DSE : Discipline Specific Elective (Major)**
3. **DSM : Discipline Specific Minor**
4. **GE/OE : Generic/Open Elective**
5. **VSEC : Vocational Skill and Skill Enhancement Course**
6. **VSC : Vocational Skill Courses**
7. **SEC : Skill Enhancement Course**
8. **AEC : Ability Enhancement Course**
9. **MIL : Modern Indian Languages**
10. **IKS : Indian Knowledge System**
11. **FSRCE : Fostering Social Responsibility & Community Engagement**
12. **VEC : Value Education Courses**
13. **OJT : On Job Training**
14. **FP : Field Projects**
15. **CEP : Community Engagement and Service**
16. **CC : Co-Curricular Courses**
17. **RP : Research Project/Dissertation**
18. **SES : Shahu Extension Services**

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Rajarshi Shahu Mahavidyalaya, Latur

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Department of Chemistry and Analytical Chemistry

B.Sc. (Honors/Research) Chemistry

Year & Level	Semester	Course Code	Course Title	Credits	No. of Hrs.
I 4.5	I	101CHE1101 (DSC-I)	Inorganic Chemistry-I	03	45
		101CHE1103	Lab Course-I	01	30
		101CHE1102 (DSC-II)	Organic Chemistry-I	03	45
		101CHE1104	Lab Course-II	01	30
		GE-I	From Basket	04	60
		101CHE1501 (VSC-I)	Systematic Chemistry Laboratory Techniques (SCLT)	02	45
		(SEC-I)	From Basket	02	30
		(AEC-I)	From Basket	02	30
		(VEC-I)	Constitution of India	02	30
		AIPC/OJT-I		02	60
	Total Credits			**22**	
	II	101CHE2101 (DSC-III)	Physical Chemistry-I	03	45
		101CHE2103	Lab Course-III	01	30
		101CHE2102 (DSC-IV)	General Analytical Chemistry -I	03	45
		101CHE2104	Lab Course-IV	01	30
		GE-II	From Basket	04	60
		101CHE2501 (VSC-II)	Analytical Laboratory Techniques	02	45
		(SEC-II)	From Basket	02	30
		(AEC-II)	From Basket	02	30
		(VEC-II)	FSRCE (CBPR)	02	30
		AIPC/OJT-II		02	60
	Total Credits			**22**	
Total Credits (Semester I & II)				**44**	

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

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Faculty of Science & Technology

Programme Specific Outcomes (PSOs) for B.Sc. Chemistry (Honors/Research)	
PO No.	Upon completion of this programme the students will be able to
PO 1	Have firm foundations in the fundamentals and application of current chemical and scientific theories.
PO 2	integrate their knowledge from each of these areas with critical thinking skills in order to become problem solvers
PO 3	Be proficient in the chemistry laboratory, especially with respect to the abilities to follow and understand general laboratory practice guidelines, including safety. Perform qualitative & Quantitative chemical analyses. Perform chemical synthesis & Understand and use modern chemical instrumentation.
PO 4	Find gainful employment in industry or government, be accepted at graduate or professional schools (law, medicine, etc.), or find employment in school systems as instructors or administrators.
PO 5	Demonstrate a systematic or coherent understanding of the fundamental concepts, principles and processes underlying the academic field of chemistry, its different subfields (analytical, inorganic, organic and physical), and its linkages with related disciplinary areas/subjects;
PO 6	Demonstrate a procedural knowledge that creates different types of professionals in the field of chemistry and related fields such as pharmaceuticals, chemical industry, teaching, research, environmental monitoring, product quality, consumer goods industry, food products, cosmetics industry, etc.;
PO 7	Demonstrate a skills related to specialisation areas within chemistry as well as within subfields of chemistry (analytical, inorganic, organic and physical), and other related fields of study, including broader interdisciplinary subfields (life, environmental and material sciences).
PO 8	Apply appropriate methodologies in order to conduct chemical syntheses, analyses or other chemical investigations; and apply relevant knowledge and skills to seek solutions to problems that emerge from the subfields of chemistry as well as from broader interdisciplinary subfields relating to chemistry;
PO 9	Use chemical techniques relevant to academia and industry, generic skills and global competencies, including knowledge and skills that enable students to undertake further studies in the field of chemistry or a related field, and work in the chemical and nonchemical industry sectors.
PO 10	Undertake hands on lab work and practical activities which develop problem solving abilities required for successful career in pharmaceuticals, chemical industry, teaching, research, environmental monitoring, product quality, consumer goods industry, food products, cosmetics industry, etc.

Semester - I

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Chemistry

Course Type: DSC-I

Course Title: Inorganic Chemistry-I

Course Code: 101CHE1101

Credits: 03 **Max. Marks: 75** **Lectures: 45 Hrs.**

Learning Objectives:

LO 1. To understand the fundamental concepts like, Electronic configuration, Pauli's exclusion principle, Hund's rule, Aufbau principle, etc.

LO 2. To clarify the concepts of Elements and the periodic Table like: Periodicity, Fundamental properties of atoms, Ionization energy, Electron affinity, Electronegativity and its trends in periodic table.

LO 3. To confront students with periodic Properties of s & p block elements

LO 4. To Study the spectral & magnetic Properties of Transition Metals

Course Outcomes:

After completion of course the student will be able to-

CO 1. Describe the Periodicity, Fundamental properties of atoms, Ionization energy, Electron affinity and Electronegativity.

CO 2. Describe the periodic Properties of s & p block elements.

CO 3. Write the spectral & magnetic Properties of Transition Metals.

CO 4. Explain types of Bonds and Theories of Chemical Bonding

Unit No.	Title of Unit & Contents	Hrs.
I	**Elements and the periodic Table**	**10 Hours**
	1. Electronic configuration: Pauli's exclusion principle, Hund's rule, Aufbau principle and their role in writing the electronic configuration. 2. Periodicity: Periodic law, arrangement of elements in the periodic table period, group, diagonal relationship in the periodic table. 3. General properties of atoms: Size of atoms and ions, atomic radii, ionic radii, covalent radii, trends in Periodic table.	

Unit No.	Title of Unit & Contents	Hrs.
	4. Ionization energy: Definition, factors effecting, Inert–pair effect, trends of ionization energy in Periodic table, application to explain the chemical behavior of an atom. 5. Electron affinity: Definition, factors affecting, trends of electron affinity in Periodic table, application to explain the chemical behavior of an atom. 6. Electronegativity: Definition, factors affecting, trends of Electronegativity in Periodic table, application to explain chemical bonding.	
	Unit Outcomes: UO 1. Use the Periodic Table to rationalize similarities and differences of elements, including physical and chemical properties and reactivity. UO 2. Define Ionization energy, Electron affinity and Electronegativity.	
II	**s and p- Block Elements**	**10**
	1. Position of the elements in the periodic table 2. Electronic configuration of elements 3. Hydrides of Alkali & Alkaline earth metals 4. Reducing Properties of S-Block elements 5. Anomalous behavior of first member of each group in P-Block elements 6. Atomic and Ionic Size 7. Ionization energy 8. Electronegativity 9. Oxidation state 10. Bonding and shapes of P_4O_{10}, Diamond, Fullerene, Graphite.	
	Unit Outcome: UO 1. Tabulate properties of s & p block elements. UO 2. Identify the different allotropes of carbon.	
III	**d- Block Elements**	**10**
	1. Definition, Elements of first, second and third transition series, Electronic Configuration of first transition series. 2. General characteristics of d-block elements, properties of d-block elements (First transition series) such as: Metallic character. Atomic and ionic radii, Melting and Boiling Points,	

Unit No.	Title of Unit & Contents	Hrs.
	Ionization enthalpies, Reactivity, Oxidation states, Standard electrode potentials, Reducing properties, Colour of ions, Magnetic properties, Catalytic properties and Complex forming tendency.	
	Unit Outcomes: UO 1. Identify paramagnetic and diamagnetic transition metal compound. UO 2. Differentiate between colored and colorless compounds.	
IV	**Chemical Bonding & Acid Base Theories**	**15**
	1. Cause of chemical bonding, types of bonding, octet rule. 2. Ionic bond – Nature of ionic bond, conditions for the formation of ionic compounds, properties of ionic compounds, ion polarization and Fajan's rule. Born-Haber's cycle 3. Covalent bond – Polar and non– polar covalent bond. Percentage ionic character in a polar covalent bond. Hanny and Smyth equation, numericals, properties of covalent compounds. 4. Coordinate bond – Conditions for the formation of coordinate bond, properties of coordinate bond, and properties of coordinate compounds. 5. Metallic bond – Nature of metallic bond (electron pool theory), properties of metals. 6. Hydrogen bond – Nature of hydrogen bond, properties of hydrogen bonding. 7. Vander-waals forces – Types, Nature and origin of Vander -waals forces. Factors affecting the strength of Vander Waals forces. Application of Vander Waals forces. 8. Lewis acid-base concepts and its limitations. 9. Hard-soft acids and bases (Pearson's classification). 10. HSAB Principle. 11. Lux-Flood and Solvent Concept	
	Unit Outcomes: UO 1. Define Ionic, Covalent and Co-ordinate bond. UO 2. Identify Soft acids and bases & hard acids and bases.	

Learning Resources:

1. Puri, Sharma, Kalia Text Book Of Inorganic Chemistry, Milestone Publications-
2. W.L. Jolly , Modern Inorganic Chemistry (Mc Graw Hill Book company

3. J.E. Huheey, E.A. Keiter, R.L. Keiter Inorganic Chemistry - By Pearson
4. Gurudeep Raj, Chatwal Anand Advanced Inorganic Chemistry Goel Pub., 1974
5. Satyaprakash, G.D. Tuli, S.K. Basu, R.D.Madan, Advanced Inorganic Chemistry, S chand pulicatioin
6. Wilkinson and Cotton, Inorganic Chemistry, Wiley; Third edition
7. J. D. Lee: Fifth Edition, Concise Inorganic Chemistry, Wiley, 2008.
8. Bodie Douglas and Darl Mcdaniel: Concepts and Models of Inorganic Chemistry ,Third Edition, Wiley, 1983.
9. Duward Shriver, P. W. Atkins: Inorganic Chemistry, Fifth Edition, Oxford University Press 2002

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Chemistry

Course Type: DSC

Course Title: Lab Course –I (Based on DSC-I)

Course Code: 101CHE1103

Credits: 01 **Max. Marks: 50** **Hours: 30**

Leaning Objectives

LO 1. To estimate the amount of substance / ions in given mixture by volumetrically

LO 2. To analyze qualitatively two acidic and two basic radicals.

Course outcomes

After completion of course the student will be able to-

CO 1. Analyze the two acidic and two basic radicals qualitatively

CO 2. Estimate the amount of substances in given mixture by volumetric methods.

Practical No.	Unit
1	Prepare standard Na_2CO_3 solution. Standardize the given HCl solution and estimate the amount of NaOH in the given solution.
2	Estimate the amount of NaOH and Na_2CO_3 in the given mixture using standard HCl solution.
3	Estimate the amount of Fe^{++} and Fe^{+++} separately in the given mixture using standard $K_2Cr_2O_7$ solution.
4	Estimate the amount of Cu^{++} in the given solution using standard $Na_2S_2O_3$ solution.
5	Find out the strength of supplied $AgNO_3$ solution using standard $AgNO_3$ solution. NH_4SCN as link solution (Volhard's method).
6	Find out the strength of supplied NaCl solution using standard NaCl and $AgNO_3$ as link solution (Mohr's method).
7	**Inorganic Qualitative analysis** Qualitative analysis with two acidic radicals and two basic radicals in the form of mixture (Minimum five mixtures) containing one interfering radical: **Acidic radicals:** Carbonate, Chloride, Bromide, Iodide, Nitrate, Sulphate. **Basic radicals:** Copper, Bismuth, Ferric, Aluminum, Manganese, Nickel, Zinc, Barium, Calcium, Magnesium, Ammonium, Potassium.

N.B.: Any Ten Practicals from above.

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Chemistry

Course Type: DSC-II

Course Title: Organic Chemistry-I

Course Code: 101CHE1102

Credits: 03 **Max. Marks: 75** **Lectures: 45 Hrs.**

Learning Objectives

LO 1. To clarify the concept of IUPAC nomenclature and structure of organic compound

LO 2. To gain the knowledge of different types of reactions and their mechanism

LO 3. To understand the preparation and properties of saturated unsaturated and aromatic hydrocarbons

LO 4. To determine the Saponification value, Iodine value and Acid value of fats and oil

Course outcomes

After completion of course the student will be able to-

CO 1. Write the IUPAC name of any organic compounds from their structure and draw its structure from its IUPAC name

CO 2. Identify the types of reactions and write its mechanism

CO 3. Explain the preparation and properties of saturated, unsaturated and aromatic hydrocarbons

CO 4. Determine the Saponification value, Iodine value and Acid value of fats and oil

Unit No.	Title of Unit & Contents	Hrs.
I	**Nomenclature of Organic Compounds & Introduction to Reaction Mechanism**	**11**
	1.Development of organic chemistry, unique properties of organic compound 2.Functional groups and types of organic compounds, Basic rules of IUPAC nomenclature, Nomenclature of mono- and bi-functional compounds on the basis of priority order of the following classes of compounds: alkanes, alkenes, alkynes, haloalkanes, alcohols, ethers, aldehydes, ketones, carboxylic acids, carboxylic acid derivatives (acid halides, esters, anhydrides, amides), nitro compounds, nitriles and amines	

Unit No.	Title of Unit & Contents	Hrs.
	3.Substrate and Reagents, Electrophiles & Nucleophiles 4. Homolytic and Heterolytic bond fission. 5.Inductive effect & its, Types Mesomeric Effect, Hyperconjugation & Steric effect 6. Formation and Stability of reactive intermediates: Carbocations, Carbanions, Free radicals, Carbenes, Nitrenes & Arynes 7. Types of organic reactions: Substitution, Addition, Elimination and Rearrangement.	
	Unit Outcome: UO 1. Describe the rules of IUPAC Nomenclature. UO 2. Write the IUPAC name of any organic compounds. UO 3. Define reaction intermediates.	
II	**Hydrocarbons - I**	**12**
	1. Alkanes: Introduction, Methods of formation of alkanes by i. Kolbe's electrolytic method ii.Frankland reaction Chemical Properties: halogenation (mechanism), nitration (mechanism). **2. Cycloalkanes:** Introduction, Formation of cycloalkanes by Freund's method Concept of angle strain, stability and reactivity of cycloalkanes: Bayer's strain theory. Ring opening reaction with H_2 & HI. **3. Alkenes**: Introduction Methods of formation by: i.dehydration of alcohols (with mechanism) ii.dehydrohalogenation of alkyl halides (with mechanism). Chemical Reactions: (with mechanism) i. Electrophilic addition of Br_2 to ethane. ii.Free radical addition of HBr to propene (Peroxide effect)	
	Unit Outcome: UO 1. Classify organic compounds by structure. UO 2. Predict the products of reactions of alkenes and describe the mechanisms showing how the products are formed.	

Unit No.	Title of Unit & Contents	Hrs.
III	**Hydrocarbons - II**	**11**
	1. Dienes: a. Introduction & classification of dienes b. Resonance & M.O. structure of 1, 3 – butadiene c. Formation of 1, 3 – butadiene from 1, 4 – butanediol d. Chemical properties: i. Addition of H_2& H_2O on 1,3-butadiene ii. Diels – Alder reaction **2. Alkynes:** a. Introduction b. Methods of formation of acetylene (ethyne) from: i. Iodoform ii. Hydrolysis of calcium carbide c. Chemical properties: i. Electrophilic addition reactions of ethyne with Br_2& HBr (with mechanism) ii. Nucleophilic addition reactions of ethyne with by HCN (with mechanism) **3.Benzene:** a. Introduction b. Characteristics of aromatic compounds. c. Kekule structure d. Stability of benzene: resonance and molecular orbital structure of benzene e. Modern theory of aromaticity. f. Hackle's rule & its applications to benzene, naphthalene, Anthracene, furan, pyrrole, pyridine, thiophene, cyclohexene, cyclooctatetrene, cyclopropene, cylclopropenyl cation and cyclopentadienyl anion and antiaromaticity. g. Reactions of benzene - Electrophilic substitution reactions (with mechanism), nitration, halogenation, sulphonation, Friedal-craft alkylation and acylation.	
	Unit Outcomes: UO 1. Correctly represent the structures and bonding of alkynes, and describe the mechanisms for reactions of alkynes and predict the	

Unit No.	Title of Unit & Contents	Hrs.
	products of such reactions. UO 2. Describe the structure of Benzene and its aromatic nature.	
IV	**Halogen Compounds And Fat & Oils**	**11**
	1. Vinyl Chloride: a. Introduction b. Structure- Molecular orbital & Resonance c. Methods of formation of vinyl chloride from: i. Ethene ii. Ethylene dichloride iii.Ethyne. d. Physical properties of vinyl chloride Chemical Reactions of vinyl Chloride: Addition reactions with Br_2 and HBr. **2. Halo Arenes:** a. Introduction structure and stability of chlorobenzene b. Synthesis of chlorobenzene from: i. Hunsdiecker reaction ii. Gattermann reaction c. Chemical reactions of chlorobenzene: i. Electrophilic substitution reactions ii. Nucleophilic reactions **3. Oils & Fats:** a. Introduction b. Chemical nature c. General chemical properties: i. Hydrolysis ii. Analysis of Fats and Oils: Saponification number (Saponification value), Iodine number (Iodine value), Acid value	
	Unit Outcomes: UO 1. Explain Structure and reactions of Vinyl Chloride. UO 2. Determine the Saponification value of Oils and Fats.	

Learning Resources:

1. S.M. Mukherji, S.P. Singh, R.P. Kepoor (Vol. I & II) Organic chemistry New Age International (P) Ltd., Publishers
2. Organic chemistry by – Jagdamba Singh, L.D.S. Yadav (Vol. I & II),Pragati Prakashan
3. P.L. Soni, A text book of organic chemistry Sultan Chand, 1983
4. K.S. Tewari, S.N. Mehrotra, N.K. Vishnoi. A text book or organic chemistry, Vikas Publishing House
5. Arun Bahl & B.S. Bahl. A text book of organic chemistry S Chand & Company
6. M.K. Jain. Principal of organic chemistry, S. Nagin,
7. Morrison and Boyd. Organic chemistry , Pearson Education
8. Carey. Organic chemistry by Publisher: James M. Smith
9. Jerry March. Advanced Organic chemistry, Wiley
10. P.S. Kalsi. Organic reactions and their mechanism
11. Peter Sykes, A guide book to mechanism in organic chemistry.

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

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Department of Chemistry

Course Type: DSC

Course Title: Lab Course –II (Based on DSC-II)

Course Code: 101CHE1104

Credits: 01 **Max. Marks: 50** **Hours: 30**

Learning Objectives

LO 1. To find out Melting point and boiling point of given organic compounds.

LO 2. To study the Crystallization, sublimation and distillation methods of purification of organic compounds.

Course outcomes

After completion of course the student will be able to-

CO 1. Determine the Melting point and Boiling point of given Organic Compounds.

CO 2. Purify the given organic compound by recrystallization, sublimation and distillation.

Practical No.	Unit
1	**A)** Determine the Nature, functional group and physical constant of organic compounds: B-naphthol, benzaldehyde, benzoic acid, p-nitroaniline, acetanilide, nitrobenzene, ethylalcohol and aniline.
2	**B)** Methods of Purification of organic compounds: a) Recrystallization: Benzoic acid, β–naphthol, cinnamic acid, m–nitroaniline and acetanilide b) Sublimation: Naphthalene, camphor. c) Simple distillation: (any one) i) Separate ethanol & water from mixture ii) Separate acetone & water from mixture

N.B.: Any Ten Practicals from above.

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Chemistry

Course Type: VSC-I

Course Title: Systematic Chemistry Laboratory Techniques (SCLT)

Course Code: 101CHE1501

Credits: 02 **Max. Marks: 50** **Lectures: 30 Hrs.**

Learning Objectives:

The course covers the broad objectives as to:

LO 1.Introduce the learners about the basic facilities available in school, college and industrial level chemistry laboratories.

LO 2. Impart knowledge of the basics and structure of organization and management of laboratories.

LO 3.Train the learners in the operation and maintenance of chemicals & common apparatus used in laboratories.

LO 4. Familiarize them to develop skills in common laboratory techniques.

LO 5.Trained them in the procedures of procurement and storage of laboratory equipment, apparatus, glassware and chemicals.

LO 6. Enable them to follow appropriate disposal procedures and safety measures required for chemistry laboratories.

Course Outcomes:

After completion of course the student will be able to-

CO 1. Knowledge of all commonly used chemicals, glasswares, apparatus, minor equipment etc

CO 2. Familiarity to cleaning and maintenance of glassware, equipment, apparatus and laboratory.

CO 3. Understanding of theoretical aspects and working principles of chemistry lab wares.

CO 4. Preparation of standard solutions, buffer solutions, indicators, common laboratory reagents.

CO 5. Knowledge to perform the some basic experiments.

CO 6. Knowledge of all safety measures in the chemistry laboratory, proper disposal of chemicals, chemical wastes and other waste materials.

CO 7. Awareness about the handling of corrosive chemicals, lab accidents, fire extinguishers and other safety means.

CO 8. Knowledge of computer for proper organization and management of chemistry laboratories, minor electronic equipment, maintain lab record, inventory etc.

Unit No.	Title of Unit & Contents	Hrs.
I	**Introduction of Chemistry Lab**	**05**
	1. General introduction of chemistry laboratory, common instruction for safe working in chemical laboratories, 2. Lab design, Storage, ventilation, lighting, fume, cupboard, arrangement of store, Safety provisions, 3. Organization of practical work, 4. Maintenance of laboratory, equipment/apparatus Cleaning of laboratories and preparation room. 5. Glass apparatus-Beaker, Test tube, boiling tube, funnel, separating funnel, filtration flask, round bottom flask, flat bottom flask, condenser Liebig flask, watch glass etc. measuring conical or condenser, petri dish, desiccators.	
	Unit Outcomes: UO 1. Identify various equipments & glassware. UO 2. Glassware handles with care.	
II	**Introduction of Lab Apparatus**	**05**
	1. Volumetric Apparatus - Measuring cylinder, burette, pipette, Volumetric flask, etc. 2. Miscellaneous apparatus- Buchner funnel, Bunsen burner, burette stand, retort clamp, china dish/evaporating basin, wire gauze, cork borers, filter pumps, crucible, mohr clip, clay pipe triangle, pestle and mortar, sprit lamp, spatulas, thermometer, pH meter/pH paper etc. and laboratory centrifuge. 3. Apparatus for heating: Bunsen burner, water bath, oil bath hot plate, sand bath, hot air oven, heating mantle etc. Handling and storage of glass apparatus Kipp's apparatus.	
	Unit Outcomes: UO 1. Read the volume of a particular solution in burette. UO 2. Use the water bath, oil bath & sand bath for heating.	
III	**Solution Preparation**	**05**
	1. Water as solvent, types of water, solutions, components of a solution. 2. Types of solution, solubility, concentration of solutions: percentage, molarity, normality, molality (in ppm) 3. Calculation of masses and volumes for preparation of solutions solids, liquids.	
	Unit Outcome: UO 1. Calculate amount of solute required for the preparation of standard solution of desired concentration.	

	UO 2. Prepare standard solution of primary standard grade reagent.	
IV`	**Common Laboratory Techniques**	**05**
	1. Refluxing: Apparatus with interchangeable ground glass joints (Quick fit),Filtration: Techniques and filter media, filter paper, simple filtration, 2. Recrystallization: Choice of solvent and precautions with flammable solvents, 3. Distillation: recovery of solvents through partial distillation, distillation under reduced pressure, and Determination of Boiling Point.	
	Unit Outcomes: UO 1. Recrystallize organic compound in suitable solvent. UO 2. Separate ethyl alcohol from the mixture of ethyl alcohol & water mixture.	
V	**Practicals**	**10**
	1. Handling of common laboratory equipment 2. Calibration of volumetric glassware 3. Weighing of chemicals using analytical balance 4. Preparation of solutions, indicators and reagents. 5. Preparation of buffer solutions and determination of their pH Values. 6. Preparation of some organic compound and determination of their boiling point and melting point. 7. Simple acid-base titration. 8. Preparation of distilled/deionized water. 9. Purification of organic compounds by recrystallization.	

Learning Resources:

1. A.I. Vogel. Practical Organic Chemistry.
2. D.V. Jahagirdar, Experiments in chemistry.
3. Dr. O.P. Panday, D.N. Bajpai & Dr. S.Giri, Practical Chemistry, Chand & Company, New Delhi.
4. Day & Underwood, Qualitative analysis: A laboratory manual.
5. O.P. Agarwal. Advanced Practical Organic chemistry.
6. N.K. Vishnoi. Advanced Practical Organic Chemistry.
7. A.I. Vogel. Vogels Qualitative Analysis.
8. A.I. Vogel. Vogels Quantitative Analysis.
9. J.N. Gurutu & R. kapoor. Advanced Experimental Chemistry Vol I, II, III.
10. Balwantraisatuja. Practical Chemistry, Physical-Inorganic-Organic & Viva Voce.

Semester - II

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Chemistry & Analytical Chemistry

Course Type: DSC-III

Course Title: Physical Chemistry-I

Course Code: 101CHE2101

Credits: 03 **Max. Marks: 75** **Lectures: 45 Hrs.**

Learning Objectives

LO 1.To determine concentrations of solution and colligative Properties

LO 2. To determine heat of solution, heat of displacement

LO 3. To determine the viscosity and surface tension of given liquid.

LO 4. To determine the refractive index by using Abbes refractometer.

Course outcomes

After completion of course the student will be able to-

CO 1. Derive the kinetic gas equation; solve the numerical on critical constants and Vander Waals constants.

CO 2. Define the concept of Vapour pressure, Surface Tension, Viscosity and Refractive Index of liquid.

CO 3. Describe Bohr's atomic model, concept of shells, sub shells and orbitals, dual nature of electron

CO 4. Identify Structure of metal crystals, Symmetry elements in the crystals.

Unit No.	Title of Unit & Contents	Hrs.
I	**Solution and Colligative Properties**	**09**
	1. Mole concept, atomic weight, molecular weight and equivalent weight (Definition) 2. Concentration of solution – methods of expressing concentration of solution such as percent by mass, percent by volume, molarity, molality, normality, formality, mole fraction, parts per thousand (ppt), parts per million (ppm) and parts per billion (ppb), numerical. 3. Concentration of bulk solutions used in the laboratory and preparation of standard Solutions from them. (e.g. HCl, H2SO4, HNO3, CH3COOH and NH3). Numerical problems on Normality, Molarity and Molality.	

Unit No.	Title of Unit & Contents	Hrs.
	4. **Colligative Properties**: Elevation in boiling point, Depression in freezing point, Osmotic pressure, Raoult's law, Relative lowering of vapour pressure.	
	Unit Outcome: UO 1. Apply these concepts to ideal and real solutions of electrolytes and non-electrolytes and to colligative properties. UO 2. Define concentrations and prepare solution of desire concentration.	
II	**Atomic Structure**	**11**
	1. Introduction , concept of Atom, Theories of Atomic structure , Discoveries & Properties of Subatomic Particles 2. Bohr's atomic model – Postulates, derivation for radius and energy of Bohr's orbit. Atomic spectra, applications of Bohr's theory to spectra of hydrogen, limitations of Bohr's theory. Numerical on radius and energy of Bohr's orbit 3. Planck's quantum theory of radiation 4. Compton Effect, Photoelectric effect, explanation on the basis of quantum theory 5. De-Broglie hypothesis – Derivation of de-Broglie equation 6. Heisenberg's uncertainty principle, (Statement, explanation) 7. Concept of Orbit and orbital's, Quantum Numbers – Types, explanation and uses	
	Unit Outcome: UO 1. Recognize the importance of the quantization of energy. UO 2. Explain atomic structure and the application of the concept of quantization of energy of different orbitals.	
III	**Gaseous State**	**10**
	1. Introduction : Gas laws (Derivation) 2. Kinetic molecular theory of gases – postulates, derivation of kinetic gas equation. 3. Real and ideal gases - behavior, deviation of gases from ideal behavior, compressibility factor (Z), explanation of deviation – Vander Waal's equation. 4. Critical phenomenon – Andrew's isotherms of CO2, application of Vander Waals equation to Andrew's isotherm, relation between critical	

Unit No.	Title of Unit & Contents	Hrs.
	constants and Vander Waals constants. Numerical based on this relation. 5. Molecular velocities – RMS, average and most probable velocities. Numerical	
	Unit Outcomes: UO 1. Manipulate the gas laws to describe real and ideal gas behavior UO 2. Derive the kinetic gas equation	
IV	**Liquid State and Solid State**	**15**
	1. Introduction – Intermolecular forces and molecular interactions in liquids. 2. Physical properties of liquids. 3. Vapour pressure – definition, units, effect of temperature. Determination by static and dynamic method, effect of vapour pressure on boiling points. 4. Surface Tension – definition, units, effect of temperature, determination by Stalagmometer (drop no. method). Numerical problems. 5. Viscosity – definition, units, effect of temperature, determination by Ostwald's viscometer. 6. Solid State: Introduction, space lattice, unit cell. The seven type of crystals (Bravais) lattices. 7. Types of cubic systems: simple cubic, BCC, FCC with examples. 8. Structure of metal crystals – HCP and CCP arrangements. 9. Crystallography – Laws of crystallography. i) Law of constancy of interfacial angles. ii) Law of rational indices iii) Law of symmetry. 10. Symmetry elements in the crystals. 11. Weiss indices and Miller indices. Numerical 12. Diffraction of X–rays, Derivation of Bragg's equation	
	Unit Outcomes: UO 1. Define the concept of vapour pressure, surface tension, viscosity and refractive Index of liquid. UO 2. Describe different types of solids and their crystal structure.	

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Chemistry

Course Type: DSC

Course Title: Lab Course –III (Based on DSC-III)

Course Code: 101CHE2103

Credits: 01 **Max. Marks: 50** **Hours: 30**

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1. To determine equivalent weight.
2. To determine heat of solution, heat of displacement
3. To determine the viscosity, surface tension.
4. To determine the refractive index using Abbes refractometer.

Course Outcomes:

1. Determine equivalent weight of magnesium.
2. Determine the heat of solution, heat of reaction of displacement of copper by zinc.
3. Determine the viscosity, surface tension.
4. Determine the refractive index using Abbes refractometer.

Practical No.	Unit
1	Prepare As2S3 from As2O3 and compare the precipitation power of NaCl and MgCl2.
2	Study the distribution of benzoic acid between benzene and water.
3	Determine the Heat of solution of KNO3/ NH4Cl.
4	Determine the heat of reaction of displacement of copper by zinc.
5	Determine the equivalent weight of magnesium by using Eudiometer.
6	Prepare buffer solutions of different pH values i) Sodium acetate-acetic acid ii) Ammonium chloride-ammonium hydroxide
7	Determine the viscosity of given liquid by using Oswald's viscometer.
8	Determine the viscosity of mixture of two liquids A & B and find the composition of the mixture of two liquids. (Density of liquids, viscosity of water to be given) [Any two liquids from: Acetone, CCl4, Chloroform, Ethyl alcohol. Benzyl alcohol, Ethylene glycol and n-propyl alcohol].
9	Determine the surface tension of a given liquid by using Stalagmometer/Tensiometer.

10	Study the kinetics of hydrolysis of methyl acetate in presence of HCl.
11	Study the variation of viscosity with different concentration of sugar Solutions.
12	Construct the various crystal models of NaCl unit cell.
13	Determine the refractive index of given liquids & calculate Molar refractions. using Abbes refractometer

Reference Books Practical Chemistry

1. A Text book of Practical Chemistry for B.Sc. By V.V. Nadkarny A.N. Kothari and Y.V. Lawande.
2. Experimental Physical Chemistry by A. Findlay.
3. Advanced Practical Physical Chemistry by J.B. Yadav
4. Experiments in Physical Chemistry by R.C. Das and B. Behra
5. Advanced experimental chemistry Vol-I, II and III by J.N. Gurutu and R. Kapoor
6. Systematic experimental Physical Chemistry by S.W. Rajbhoj and Chondekar
7. Experimental in Physical Chemistry by J.C. Ghosh
8. Practical Physical Chemistry by B.D. Khosala and V.C. Garg
9. Experiments in Chemistry by D.V. Jahagirdar
10. Practical Chemistry, Physical – Inorganic – Organic and Viva-Voce by Balwantrai Satuja

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Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Chemistry & Analytical Chemistry

Course Type: DSC-IV

Course Title: General Analytical Chemistry-I

Course Code: 101CHE2102

Credits: 03 **Max. Marks: 75** **Lectures: 45 Hrs.**

Learning Objectives

LO 1. To study Principles and Theories of Volumetric Analysis involving Acid and Base.

LO 2. To study Principles and Theories of Redox, Precipitation and Complexometric Titration.

LO 3. To know Unit operations

LO 4. To gain the Concepts in Chemometrics.

Course outcomes

After completion of course the student will be able to-

CO 1. Comprehend the principle of Volumetric analysis.

CO 2. Comprehend the principle of Redox, Precipitation and Complexometric titration.

CO 3. Know Unit operations

CO 4. Calculate chemometrics and Statistical Analysis.

Unit No.	Title of Unit & Contents	Hrs.
I	**Volumetric Analysis – I**	**10**
	1. Definition of terms: Titrant, titrand, analyte, end point and equivalence point, indicator, standard titrant, titration. 2. Acid-base titration: Theory of acid base indicators, Theory of acid-base titration, titration of strong acid-strong base, weak acid-strong base, strong acid-weak base with titration curve and choice of indicators.	
	Unit Outcome: UO 1. Able to define Basic Terms in volumetric analysis. UO 2.Able to identify various types of Acid Base titration.	
II	**Volumetric Analysis – II**	**12**
	1. Redox Titration: Theoretical basis of volumetric analysis involving (i) Potassium Permanganate (ii) Potassium dichromate and (iii) Iodine.	

Unit No.	Title of Unit & Contents	Hrs.
	2. **Precipitation titration:** Titration curve for precipitation reaction, end point detection, Mohr's method and Volhard's method. 3. **Complexometric Titration:** Theory of complexometric titration, indicators for EDTA titration, Types of EDTA titration-direct and back titration.	
	Unit Outcome: UO 1. Able to define Redox, Precipitation and Complexometric Titration. UO 2. Able to Choose suitable indicators for various Redox, Precipitation and Complexometric Titration.	
III	**Analytical Data Handling**	**10**
	1. Statistical treatment of analytical data, confidence limits, confidence interval, confidence level, student's t-test, paired t-test, rejection of data: Q test, 4d rule and 2.5d rule. 2. Graphical representation of results, methods of averages, methods of least squares. 3. Significant figures, Reporting of analytical data, Numerical	
	Unit Outcome: UO.1 Able to apply proper Unit operations. UO.2 Able to apply Graphical representation of Analytical Data.	
IV	**Chemometrics**	**13**
	1. Mole Concept, molecular weight, formula weight, and equivalent weight. 2. Concentration units: Normality, Molarity, Molality, Formality, Mole fraction, Percent by weight, Percent by volume, Parts per thousand, Parts per million, Parts per billion, p-functions (pX, pH, pOH, pM), milli equivalents, milli moles and titer, Numericals, 3. Concentration of Bulk Chemicals.	
	Unit Outcome: UO.1: Able to determine concentration from given data. UO.2: Able to Calculate pH , pOH, Px, etc from given data.	

Reference Books:

1. Analytical chemistry: an introduction: D. A. Skoog, D. M. West and F. J. Holler, Saunders the College publishers, 6 edition.
2. An introduction to analytical chemistry, S. A. Iqbal, M. Satake, Y. Mido and M. S. Shethi.
3. Modern analytical chemistry: W. F. Pickering, Marcel Decker INC. New York.

4. Analytical Chemistry, 7th Edition, By Gary D. Christian, Purnendu K. Dasgupta, Kevin Schug · 2013
5. Basic concepts of analytical chemistry: S. M. Khopkar.
6. Fundamentals of analytical chemistry: D. A. Skoog, D.M. West and H. J. Holler, 7 edition.
7. Analytical Chemistry Principles: J. H. Kennedy, W. B. S. Saunders pub. Ltd.
8. Analytical Chemistry: Principles and Techniques: L. G. Hargis, Prentice Hall.
9. Principles in semi-micro qualitative analysis: G. R. Chatwal edited by M. Arora.
10. College Analytical Chemistry: Baliga Shetty.
11. Fundamentals of Analytical Chemistry: Dr. S. D. Salunke.

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Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Chemistry

Course Type: DSC

Course Title: Lab Course –IV (Based on DSC-IV)

Course Code: 101CHE2104

Credits: 01 **Max. Marks: 50** **Hours: 30**

Leaning Objectives

LO 3. To prepare standard solution of reagent.

LO 4. To estimate the amount of substance / ions in given solution by volumetrically.

Course outcomes

After completion of course the student will be able to-

CO 3. Prepare standard solution of reagent.

CO 4. Estimate the amount of substances in given solution by volumetric methods.

Practical No.	Unit
1	Preparation of standard solution of potassium hydrogen phthalate and standardization of sodium hydroxide solution.
2	Preparation of standard solution of K2Cr2O7 and standardization of given FAS solution.
3	Preparation of standard solution of oxalic acid and estimation of given KMnO4 solution.
4	Preparation of Iodine solution and its standardization using Sodium Thiosulphate
5	Preparation of standard solution of NaCl and standardization of given AgNO3 solution.
6	Assay of commercial sodium hydroxide/barium hydroxide.
7	Estimation of H2O2 solution.
8	Estimation of formaldehyde.
9	Determination of alkalinity of water sample.
10	Preparation of standard solution of Zinc Sulphate and estimation of given EDTA solution.
11	Estimation of Nickel by EDTA Titration.

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Chemistry and Analytical Chemistry

Course Type: VSC-II

Course Title: Analytical Laboratory Techniques (ALT)

Course Code: 101CHE2501

Credits: 02 **Max. Marks: 50** **Lectures: 30 Hrs.**

Learning Objectives: The objective of this course is to train students about:

LO 1. Practical aspects and approach of theoretical content such as experimental procedures for quantitative determination of various ions by volumetric/gravimetric analysis.

LO 2. Calibration of analytical instruments

LO 3. Preparation of solutions of buffers

LO 4. Operation of software's in chemistry

LO 5. Application and implementation of knowledge

Course outcomes

After completion of the course the student will be able to-

CO 1. Perform standardization and volumetric/gravimetric analysis.

CO 2. Calibrate analytical instruments

CO 3. Prepare solutions of buffers

CO 4. Handle softwares in chemistry

CO 5. 3rd and4thlevelofBloomsTaxonomy i.e. Application and Analysis.

Practical No.	Unit
1	Preparation of buffers.
2	Preparation of standard solution of EDTA.
3	Estimation of sodium carbonate by titrating with hydrochloric acid.
4	Determination of iron in a given solution by using an internal indicator.
5	Determination of iron in a given solution by using an external indicator
6	Homogeneous precipitation of the Nickel as its Dimethylglyoxime.
7	Determination of refractive index of given organic liquids by Abbe's Refractometer.
8	Calibration of UV-visible spectrophotometer/pH Meter/ Potentiometer/ Conductometer/etc.

9	Determination of pH of soil.
10	Titration of acid-base using pH meter.
11	Use of pH meter: Determinations of pH of given dilute solutions of shampoos and soaps.
12	Determination of aspirin by conductometry.
13	Verification of Lambert-Beers law using colorimetry.
14	To draw chemical structures in chemdraw.
15	To draw chemical structures in chemsketch.

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

UG First Year

Basket I: Generic/Open Elective (GE/OE)

(GEs offered to the Science & Technology students in Sem.-I)

Sr. No.	BoS Proposing GE/OE	Code	Course Title	Credits	Hrs.
1	Commerce	101AAF1401	Mutual Fund Management	04	60
2	Commerce	101MAE1401	Fundamentals of Statistics	04	60
3	English	101ENG1402	English for Science and Technology	04	60
4	Geography	101GEO1401	General Geography	04	60
5	Commerce	101BAI1401	Personal Financial Management	04	60
6	Marathi	101MAR1401	स्पर्धापरीक्षाआणिमराठीभाषा	04	60
7	Political Science	101POL1401	Human Rights	04	60
8	Biotechnology	101BIO1401	Nutrition, Health and Hygiene	04	60
9	Music	101MUS1401	Indian Vocal Classical & Light Music	04	60
10	NCC Studies	101NCC1401	Introduction to NCC	04	60
11	Sports	101SPO1401	Counseling and Psychotherapy	04	60

Note: Student can choose any one GE from the basket.

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

UG First Year

Basket II: Skill Enhancement Courses (SEC)

(SEC offered to the Science & Technology students in Sem.-I)

Sr. No.	BoS Proposing SEC	Code	Course Title	Credits	Hrs.
1	Chemistry	101CHE1601	Pesticides and Green Chemistry	02	30-45
2	Information Technology	101COM1601	Basics of Python Programming	02	30-45
3	Physics	101PHY1601	Physics Workshop Skills	02	30-45
4	Biotechnology	101BIO1601	Food Processing Technology	02	30-45
5	Botany	101BOT1601	Mushroom Cultivation Technology	02	30-45
6	English	101ENG1601	Proof Reading and Editing	02	30
7	Information Technology	101COA1601	PC Assemble and Installation	02	30-45
8	Marathi	101MAR1601	कथा/पटकथालेखन	02	30
9	Zoology	101ZOO1601	Bee Keeping	02	30-45

Note: Student can choose any one SEC from the basket.

(Autonomous)

UG First Year

Basket III: Ability Enhancement Courses (AEC)

(AEC offered to the Science & Technology students in Sem.-I)

Sr. No.	BoS Proposing AEC	Code	Course Title	Credits	Hrs.
1	Marathi	101MAR1701	भाषिक कौशल्य भाग – १	02	30
2	Hindi	101HIN1701	हिंदी भाषा शिक्षण भाग – १	02	30
3	Sanskrit	101SAN1701	व्यावहारीक व्याकरण व नितिसुभाषिते	02	30
4	Pali	101PAL1701	उपयोजित व्याकरण	02	30
5	English*	101ENG1701	Communicative English-I	02	30

Note:

1. **Student (other than Computational Science, Computer Applications & Biotechnology) can choose any one AEC (Sr. No. 1 to 4) from the basket.**
2. ***This course is applicable only for Computational Science, Computer Applications & Biotechnology students.**

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

UG First Year

Extra Credit Activities

Sr. No.	Course Title	Credits	Hours T/P
1	MOOCs	Min. of 02 credits	Min. of 30 Hrs.
2	Certificate Courses	Min. of 02 credits	Min. of 30 Hrs.
3	IIT Spoken English Courses	Min. of 02 credits	Min. of 30 Hrs.

Guidelines:

Extra -academic activities

1. All extra credits claimed under this heading will require sufficient academic input/ contribution from the students concerned.
2. Maximum 04 extra credits in each academic year will be allotted.
3. These extra academic activity credits will not be considered for calculation of SGPA/CGPA but will be indicated on the grade card.

Additional Credits for Online Courses:

1. Courses only from SWAYAM and NPTEL platform are eligible for claiming credits.
2. Students should get the consent from the concerned subject Teacher/Mentor/Vice Principal and Principal prior to starting of the course.
3. Students who complete such online courses for additional credits will be examined/verified by the concerned mentor/internal faculty member before awarding credits.
4. Credit allotted to the course by SWAYAM and NPTEL platform will be considered as it is.

Additional Credits for Other Academic Activities:

1. One credit for presentation and publication of paper in International/National/State level seminars/workshops.
2. One credit for measurable research work undertaken and field trips amounting to 30 hours of recorded work.
3. One credit for creating models in sponsored exhibitions/other exhibits, which are approved by the concerned department.
4. One credit for any voluntary social service/Nation building exercise which is in collaboration with the outreach center, equivalent to 30 hours
5. All these credits must be approved by the College Committee.

Additional Credits for Certificate Courses:

1. Students can get additional credits (number of credits will depend on the course duration) from certificate courses offered by the college.
2. The student must successfully complete the course. These credits must be approved by the Course Coordinators.
3. Students who undertake summer projects/ internships/ training in institutions of repute through a national selection process, will get 2 credits for each such activity. This must be done under the supervision of the concerned faculty/mentor.

Note:

1. The respective documents should be submitted within 10 days after completion of Semester End Examination.
2. No credits can be granted for organizing or for serving as office bearers/ volunteers for Inter-Class / Associations / Sports / Social Service activities.
3. The office bearers and volunteers may be given a letter of appreciation by the respective staff coordinators. Besides, no credits can be claimed for any services/activities conducted or attended within the college.
4. All claims for the credits by the students should be made and approved by the mentor in the same academic year of completing the activity.
5. Any grievances of denial/rejection of credits should be addressed to Additional Credits Coordinator in the same academic year.
6. Students having a shortage of additional credits at the end of the third year can meet the Additional Credits Coordinator, who will provide the right advice on the activities that can help them earn credits required for graduation.

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Examination Framework

Theory:

40% Continuous Assessment Tests (CATs) and 60% Semester End Examination (SEE)

Practical:

50% Continuous Assessment Tests (CATs) and 50% Semester End Examination (SEE)

Course	Marks	CAT & Mid Term Theory				CAT Practical		Best Scored CAT & Mid Term	SEE	Total
1	2	3				4		5	6	5 + 6
		Att.	CAT I	Mid Term	CAT II	Att.	CAT			
DSC/DSE/ GE/OE/Minor	100	10	10	20	10	-	-	40	60	100
DSC	75	05	10	15	10	-	-	30	45	75
Lab Course/AIPC/ OJT/FP	50	-	-	-	-	05	20	-	25	50
VSC/SEC/ AEC/VEC/CC	50	05	05	10	05	-	-	20	30	50

Note:

1. All Internal Exams are compulsory
2. Out of 02 CATs best score will be considered
3. Mid Term Exam will be conducted by the Exam Section
4. Mid Term Exam is of Objective nature (MCQ)
5. Semester End Exam is of descriptive in nature (Long & Short Answer)
6. CAT Practical (20 Marks): Lab Journal (Record Book) 10 Marks, Overall Performance 10 Marks.