(Bachelor of Science) (Undergraduate)
B. Sc. (UG) Semester -V

Course Code	**US05MACHE01**	Title of the Course	**ORGANIC CHEMISTRY-I**
Total Credits of the Course	04	Hours per Week	04

Course Objectives:	To make students familiar with: 1. Organic Chemistry as a subject. 2. Advanced topics of organic chemistry and spectroscopy. 3. Understanding of heterocyclic compounds, reaction mechanism and Spectroscopy.

Course Content		
Unit	Description	Weightage* (%)
1.	**HETEROCYCLIC COMPOUNDS** Heterocyclic systems, Structure of Pyrole, furan and thiophene, Source of Pyrole, furan and thiophene, Electriphilic substitution in Pyrrole, furan and thiophene Reactivity and orientation, Saturated five – membered heterocycle, Structure of pyridine, Sources of pyridine compounds, Reactions of pyridine, Electrophilic substitution in pyridine, Nucleophilic substitution in pyridine, Basicity of pyridine, Reduction of pyridine, Quinoline. The skraup synthesis of Quinoline, The Bischler–Napieralski synthesis of Isoquinoline. Knorr pyrrole synthesis**.**	**25%**
2.	**REACTION MECHANISM** Baeyer-Villiger oxidation, Hofmann rearrangement, Mannich reaction, Curtius–Schmidt rearrangement, Benzilic acid rearrangement, Sommlet rearrangement, Birch reduction, Favorskii rearrangement, Benzoin condensation, Beckmann rearrangement, Wittig reaction, Perkin reaction.	**25%**

3.	**INFRARED SPECTROSCOPY** Introduction, principle of IR spectroscopy, instrumentation, sampling technique, selection rules, types of bonds, absorption of common functional groups. Factors affecting frequencies. Differentiate two compounds by the IR frequencies. Problems pertaining to the structure elucidation of organic compounds using IR.	**25%**
4.	**NMR SPECTROSCOPY** The nuclear magnetic resonance (NMR) spectrum. Number of signals, NMR positions of signals. Chemical shift, NMR peak area and proton counting, NMR Splitting of signals. Spin-spin coupling, NMR coupling constant, Problems based on above spectroscopic techniques.	**25%**

Teaching-Learning Methodology	Conventional method (classroom blackboard teaching), ICT. Courses for B. Sc. Chemistry programme are delivered through classroom, laboratory work in a challenging, engaging, and inclusive manner that accommodates a variety of learning styles and tools (Power Point presentations, audio visual resources, e-resources, seminars, workshops, models).

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage (%)
1.	Internal Continuous Assessment in the form of Class test/Internal Written test 15 Marks (30%), Quiz 15 Marks (30%) Active learning 05 Marks (10%), Home Assignments 05 Marks (10%), Class Assignments 05 Marks (10%), Attendance 05 Marks (10%), (As per SPU Letter No. E-3/2748 dated 02/02/2024) [Total 50 Marks (100%)].	50
2.	Semester End Examination [Total 50 Marks (100%)].	50

Course Outcomes: Having completed this course, the learner will be able to learn	
1.	About basic concept of heterocyclic compounds, reaction mechanism and IR & NMR

	spectroscopy.
2.	Aplication in further higher studies and in industries.

Suggested References Books:	
Sr. No.	References
1.	Organic chemistry of natural products by Gurdeep Chatwal, Vol.II.
2.	Organic chemistry by Morrison and Boyd, 6th ed.
3.	Organic reaction mechanism by R. K. Bansal, 3rd ed.
4.	Organic chemistry by S. M. Mukherji, S. P. Singh and R. P. Kapoor. Vol. II.
5.	Synthetic organic chemistry by Gurdeep R. Chatwal
6.	Organic chemistry, Vol II, by I.L.Finar.
7.	Principles of Organic synthesis, by ROC Norman.
8.	Heterocyclic chemistry vol.II by R. R. Gupta, M. Kumar and V. Gupta
9	Organic Spectroscopy by P. S. Kalsi 3. Organic Spectroscopy by J R Dyer.
10	Elementary Spectroscopy by Y R Sharma
11	Introduction to Spectroscopy: Donald L. Pavia, Gary M. Lampman, George S.Kriz Cengage Learning; 4th Edition.
12	Applications of spectroscopic techniques in Organic Chemistry: P.S. Kalsi, New Age International; 6th Edition.

On-line resources to be used if available as reference material
On-line Resources: Google books, INFLIBNET, Google Web

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(Bachelor of Science) (Undergraduate)
B. Sc. (UG) Semester - V

Course Code	**US05MACHE02**	Title of the Course	**ANALYTICAL CHEMISTRY**
Total Credits of the Course	04	Hours per Week	04

Course Objectives:	To make students familiar with: 1. Analytical Chemistry as a subject. 2. Advanced topics of analytical chemistry. 3. Understanding methods of analysis and chromatography.

Course Content		
Unit	Description	Weightage* (%)
1.	**pH-METRY:** Introduction, types of indicator electrodes and reference electrodes, types of titrations. **POTENTIOMETRY:** Introduction, types of titrations, graphical method for end point determination. **CONDUCTIMETRY:** Introduction, types of conductance, effect of dilution, conductivity cells, types of titration.	**25%**
2.	**CHROMATOGRAPHY – I** Introduction, classification, paper chromatography, thin layer chromatography, column chromatography, ion-exchange chromatography, experimental details for all the techniques.	**25%**
3.	**CHROMATOGRAPHY-II** **GAS CHROMATOGRAPHY** Introduction, Technique of Gas Liquid Chromatography, Apparatus of Gas Liquid Chromatography (Carrier Gas, Injection Port, Columns, The solid inert support, The stationary liquid phase), Detectors, Thermal Conductivity Detectors, Flame Ionization Detectors, Electron Capture Detectors. **HIGH PERFORMANCE LIQUID CHROMATOGRAPHY (HPLC)** Introduction, Principle and Apparatus of HPLC (Solvent delivery system, Pumps, Sample Injection System, Columns, Column Packing materials, Column packing), Choice of supporting materials for	**25%**

	separation, Detectors.	
4.	**SOLVENT EXTRACTION METHODS:** The Distribution Law, Extraction process, Liquid liquid extraction, Factor affecting Extraction, Technique for Solvent Extraction, Quantitative treatment of solvent Extraction eqillibria, Classification of Solvent Extraction system, Types of extraction system, Advantage of Solvent Extraction system, Application of Liquid extraction, Solvent extraction methods in Metallurgy, Solid-Liquid Extraction	**25%**

Teaching-Learning Methodology	Conventional method (classroom blackboard teaching), ICT. Courses for B. Sc. Chemistry programme are delivered through classroom, laboratory work in a challenging, engaging, and inclusive manner that accommodates a variety of learning styles and tools (Power Point presentations, audio visual resources, e-resources, seminars, workshops, models).

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage (%)
1.	Internal Continuous Assessment in the form of Class test/Internal Written test 15 Marks (30%), Quiz 15 Marks (30%) Active learning 05 Marks (10%), Home Assignments 05 Marks (10%), Class Assignments 05 Marks (10%), Attendance 05 Marks (10%), (As per SPU Letter No. E-3/2748 dated 02/02/2024) [Total 50 Marks (100%)].	50
2.	Semester End Examination [Total 50 Marks (100%)].	50

Course Outcomes: Having completed this course, the learner will be able to	
1.	From the study of this paper, student will learn about basic concept of analytical techniques like pH metry, Potentiometry and Conductometry, solvent extraction and chromatography.
2.	This study will helpful them in further studies and in industries.

Suggested References Books:	
Sr. No.	References Books:
1.	Instrumental methods of Chemical Analysis by B. K. Sharma
2.	Instrumental methods of Chemical Analysis by Gurdeep R Chatwal
3.	Quantitative Analysis by Skoog & West

On-line resources to be used if available as reference material
On-line Resources: Google books, INFLIBNET, Google Web

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(Bachelor of Science) (Undergraduate)
B. Sc. (UG) Semester -V

Course Code	**US05MACHE03**	Title of the Course	**CHEMISTRY PRACTICAL**
Total Credits of the Course	04	Hours per Week	08

Course Objectives:	To make students familiar with: 1. Practical chemistry as a subject 2. Practical aspects of physical, organic, inorganic and analytical chemistry. 3. Advanced practical aspects of different branches of chemistry.

Course Content	**Total Marks : 100**
Unit	Description
Practical -I	**Title Of Subject : ORGANIC CHEMISTRY PRACTICAL (SIX TYPES AND 2 LIQUID MIX.)** Separation and Identification of two component organic mixture using chemical and physical methods (water soluble, insoluble & liquid + liquid) **Solid Acid**: Benzoic acid, salicylic acid, cinnamic acid, phthalic acid , succinic acid, oxalic acid. **Solid phenol**:- α- naphthol, β-naphthol, resorcinol. **Solid neutrals**:- p-dichlorobenzene, naphthalene, anthracene, benzamide, urea, thiourea, acetanilide, m-dinitrobenzene. **Solid Base**:- o-, m- & p-nitroaniline, p-toluidene, **Liqui d base**:- aniline, **Liquid neutral**:- ethyl acetate, methyl acetate, acetone, methyl alcohol, ethylalcohol, benzaldehyde, chlorbenzene, nitrobenzene, $CHCl_3$, acetohpenone **(Derivative of any one out of two compounds)** **VIVA EXAMINATION**
Practical -II	**Title Of Subject : ANANLYTICAL CHEMISTRY PRACTICAL** **1. Gravimetric Analysis (Mixture with interfering radicals like removal of Cu) [Any one experiment can be asked in University Exam]** 1. Ba as $BaSO_4$ 2. Al as Al_2O_3 3. Mn as $Mn_2P_2O_7$ 4. Zn as $Zn_2P_2O_7$ **2. Volumetric Analysis by self preparation of EDTA**

	1. Estimation of Bi^{3+} by EDTA. 2. Estimation of Ni^{2+} by EDTA. 3. Estimation of Chloride by silver nitrate (Mohr's Method). 4. Estimation of Fe^{3+} by EDTA (Back Titration). **VIVA EXAMINATION**

Teaching-Learning Methodology	Hands on training of Practicals and Instruments. Courses for B. Sc. Chemistry programme are delivered through classroom, laboratory work in a challenging, engaging, and inclusive manner that accommodates a variety of learning styles and tools (PowerPoint presentations, audio visual resources, e-resources, seminars, workshops, models).

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage (%)
1.	Internal Continuous Assessment in the form of Labwork assessment 20 Marks (40%), lab quiz/viva voce 20 Marks (40%) and attendance 10 Marks (20%). [Total 50 Marks (100%)].	50
2.	Semester End Examination Labwork assessment 40 Marks (80%), lab quiz/viva voce 10 Marks (20%) . [Total 50 Marks (100%)].	50

Course Outcomes: Having completed this course, the learner will be able to	
1.	Learn performing chemical experiments using qualitative and quantitative methods for qualitative method to separate organic mixture in to its constituents and gravimetric as well as complexometric titrations.
2.	Apply in further studies and in industries.

References Books:	
Sr. No.	**References Books**

1.	Experimental Physical Chemistry by R. C. Das & B. Behera
2.	Advanced Physical Chemistry by J. B. Yadav
3.	Comprehensive practical organic chemistry Preparation and qualitative analysis by V. K. Ahuwalia and Renu Agarwal.
4.	Organic Preparation by A. I. Vogel
5.	Vogel's Text book of Quantitative Chemical Analysis, 5th Edition By G. H. Jeffery, J. Basset, J. Mendham, R. C. Denney.
6.	Vogel's Textbook Of Qualitative Inorganic Analysis By G. Svehla
7.	Practical Chemistry By O. P. Pandey, D. N. Bajpai & S. Giri
8.	An Advanced Course In Practical Chemistry By Ghoshal, Mahapatra & Nad

On-line resources to be used if available as reference material
On-line Resources: Google books, INFLIBNET, Google Web

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SARDAR PATEL UNIVERSITY
Vallabh Vidyanagar, Gujarat
(Reaccredited with 'A' Grade by NAAC (CGPA 3.11)
(Effect from : 2025-26)

(Bachelor of Science) (Undergraduate)
B. Sc. (UG) Semester - V

Course Code	**US05MICHE01**	Title of the Course	**INORGANIC CHEMISTRY**
Total Credits of the Course	02	Hours per Week	02

Course Objectives:	To make students familiar about: 1. Inorganic Chemistry as a subject. 2. Advanced topics of Inorganic chemistry. 3. Understanding of chemistry of organo metallic compounds and principles of metallurgy.

Course Content		
Unit	Description	Weightage* (%)
1.	**(A) ORGANO METALLIC CHEMISTRY:** Introduction, General methods of preparations, General properties, Organo metallic compounds of alkali metals, Organo metallic compounds of beryllium, Organo metallic compounds of magnesium, Organo metallic compounds of aluminium, Metal olefin (alkenes) complexes **(B) CYCLOPENTADIENYL COMPLEXES:** Preparation of metallocenes and their derivatives, Some properties of ferrocene molecule, Structure and bonding in ferrocene molecule, Ionic cyclopentadienyl compounds.	**50%**
2.	**PRINCIPLES OF METALLURGY AND CHEMISTRY OF Pb, Fe, & Cu:** Metals, Occurrence of metals, Mineral wealth of India, Metallurgy, Concentration and ore, Calcinations and roasting, Standard electrode potentials and metallurgy, Thermodynamics of metallurgy, Reducing behaviour of carbon, Reduction of mineral to metal, Refining of metals, Physical methods of refining, Chemical methods of refining, Types of furnaces used, Pb: occurrence & extraction, properties & uses of lead, white lead, Fe: occurrence and commercial forms of ion, manufacture of cast iron & steel, Cu: occurrence & extraction electrolytic refining of copper, properties and uses of copper.	**50%**

Teaching-Learning Methodology	Conventional method (classroom blackboard teaching), ICT. Courses for B. Sc. Chemistry programme are delivered through classroom, laboratory work in a challenging, engaging, and inclusive manner that accommodates a variety of learning styles and tools (Power Point presentations, audio visual resources, e-resources, seminars, workshops, models).

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage (%)
1.	Continuous and compression evaluation: Class test/Internal written test 10 Marks (40%), Quiz 05 Marks (20%), Home Assignments 05 Marks (20%), Attendance 05 Marks (20%), (As per SPU Letter No. E-3/2748 dated 02/02/2024) [Total 25 Marks (100%)].	50
2.	Semester End Examination [Total 25 Marks (100%)].	50

Course Outcomes: Having completed this course, the learner will be able to	
1.	Learn about basic concepts of organo metallic compounds and metallurgy.
2.	Know the basics to enable student in further studies and prepare for role in industries.

Suggested References Books:	
Sr. No.	References Books:
1.	Textbook of Inorganic Chemistry -20thedition, Chapter-13 By P. L. Soni & Mohan Katyal
2.	Advanced Inorganic Chemistry Volume II By Satya Prakash, G. D. Tuli, S. K. Basu, R. D. Madan
3.	CONCISE INORGANICCHEMISTRY : 5TH EDITION BY: J.D.LEE
4.	Basic Inorganic Chemistry- 3rd Edition By F. Albert Cotton, Geoffery Wilkinson & Paul L. Gaus

On-line resources to be used if available as reference material
On-line Resources: Google books, INFLIBNET, Google Web

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(Bachelor of Science) (Undergraduate)
B. Sc. (UG) Semester - V

Course Code	**US05MICHE02**	Title of the Course	**INORGANIC QUANTITATIVE ANALYSIS PRACTICAL**
Total Credits of the Course	02	Hours per Week	04

Course Objectives:	To make students familiar about: 1. Inorganic Chemistry practical as a subject. 2. Redox and acid-base estimations. 3. Practical aspects of chemistry 4. Basic concepts related to volumetric analysis. 5. Hands on training of laboratory practices.

Practical	Description
Practical	Volumetric analysis : Neutralization Titrations : (For the following exercise student has to prepare solution of titrant) (i) Standardization of NaOH using Succinic acid. (ii) Standardization of HCl using NaOH solution. (iii) Titration of Oxalic Acid → NaOH (iv) Titration of Succinic acid → KOH (v) Titration of Oxalic Acid → KOH TITRIMETRIC ANALYSIS (REDOX TITRATION) (vi) Titration of $KMnO_4$ → $FeSO_4(NH4)_2.SO_4$ .6 H_2O (vii) Titration of $K_2Cr_2O_7$ → $FeSO_4$ .7H_2O using internal indicator diphenylamine sulphate. (viii) Titration of $KMnO_4$ → Oxalic acid (ix) Titration of $KMnO_4$ → $FeSO_4.7H_2O$

Teaching-Learning Methodology	Hands on training to Practical Courses are delivered through classroom, laboratory work in a challenging, engaging, and inclusive manner that accommodates a variety of learning styles and tools.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage (%)
1.	Continuous and compression evaluation: Class test/Internal written test 10 Marks (40%), Quiz 05 Marks (20%), Home Assignments 05 Marks (20%), Attendance 05 Marks (20%), (As per SPU Letter No. E-3/2748 dated 02/02/2024) [Total 25 Marks (100%)].	50
2.	Semester End Examination [Total 25 Marks (100%)].	50

Course Outcomes: Having completed this course, the learner will be able to	
1.	Learn about hands on training of Volumetric analysis.
2.	Improve practical skills of students.

Suggested References Book:	
Sr. No.	References Books:
1.	Mendham, J., Denney, R. C., Barnes, J. D., Thomas, M. J. K., Vogel's textbook of quantitative chemical analysis, 6th Edition.
2.	Pandey, O. P., Bajpai, D. N., Giri, S., Practical Chemistry.
3.	Ghoshal, Mahapatra, Nad , An Advanced course in Practical Chemistry.

On-line resources to be used if available as reference material
On-line Resources: Google books, INFLIBNET, Google Web

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(Bachelor of Science) (Undergraduate)
B. Sc. (UG) Semester - V

Course Code	**US05MICHE03**	Title of the Course	**PHYSICAL CHEMISTRY**
Total Credits of the Course	02	Hours per Week	02

Course Objectives:	To make students familiar about: 1. Physical Chemistry topics like photochemistry and colloidal state. 2. Understanding of significance of photochemistry.

Course Content		
Unit	Description	Weightage* (%)
1.	**PHOTOCHEMISTRY:** Introduction, Types of chemical reactions, Difference between Dark and Photochemical reaction, Absorption of light, Laws of photochemistry, Quantum yield (or) Quantum efficiency, Deviation in the law of photochemical equivalence, Reasons of high and low quantum yield, Factors affecting quantum yield, Luminescence, Fluroescence and Phosphorescence, Numerical	**50%**
2.	**COLLOIDAL STATE:** Types of Colloidal system, Classifications of Colloids, Lyophobic and Lyophilic Sols, Size range, Preparation and Properties of colloids solution, Dialysis, Electro dialysis, Ultra filtration, Electrical Double Layer, Electrophoresis, Electro osmosis, Importance and Applications of Colloids, Numerical.	**50%**

Teaching-Learning Methodology	Conventional method (classroom blackboard teaching), ICT. Courses for B. Sc. Chemistry programme are delivered through classroom, laboratory work in a challenging, engaging, and inclusive manner that accommodates a variety of learning styles and tools (Power Point presentations, audio visual resources, e-resources, seminars, workshops, models).

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage (%)
1.	Continuous and compression evaluation : Class test/Internal written test 10 Marks (40%), Quiz 05 Marks (20%), Home Assignments 05 Marks (20%), Attendance 05 Marks (20%), (As per SPU Letter No. E-3/2748 dated 02/02/2024) [Total 25 Marks (100%)].	50
2.	Semester End Examination [Total 25 Marks (100%)].	50

Course Outcomes: Having completed this course, the learner will be able to	
1.	Learn about basic concepts of photochemistry and colloidal states.
2.	Know the basics to enable student in further studies and prepare for role in industries.

Suggested References Books::	
Sr. No.	References Books:
1.	Advanced Physical Chemistry by Gurdeep Raj.
2.	Text book of physical chemistry by Samuel Glasstone.
3.	Principles of Physical Chemistry by Puri, Sharma and Pathania. 38th Edition.
4.	Essential of physical chemistry by Bahl, Bahl and Tuli. 25th edition.
5.	Physical Chemistry by G. M. Barrow, 5th ed.
6.	Textbook of physical chemistry by P.L. Soni, O.P. Dharmarha, U. N. Dash
7.	University chemistry by Bruce H Mahan
8.	Principles of Physical chemistry, S H Marron, Karl F prutton

9.	Physical Chemistry, Ira Levine
10.	Physical Chemistry, Atkins
11.	Principles of polymers Science by P. Bahadur and N. V. Sastry (2nd Edition)
12.	Polymer Science by V. R. Gowariker, N. V. Vashwanathan and Jaydev Shreedhar.

On-line resources to be used if available as reference material
On-line Resources: Google books, INFLIBNET, Google Web

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(Bachelor of Science) (Undergraduate)
B. Sc. (UG) Semester - V

Course Code	**US05MICHE04**	Title of the Course	**Chemistry Practical**
Total Credits of the Course	02	Hours per Week	04

Course Objectives:	To make students familiar with: 1. Practical aspects of inorganic chemistry. 2. Hands on experience of inorganic volumetric titration. 3. Basic concepts related to practical inorganic chemistry.

Practical	Description
Practical	Volumetric Titration (By self-preparation of solution of titrant): (i) Determination of total hardness of water sample. (ii) Determination of Ni^{2+} by back titration. (iii) Determination of NO_2^{-1} by back titration. (iv) Estimation of Fe^{3+} by EDTA (Back Titration). (v) Estimation of Bi^{3+} by EDTA. (vi) Estimation of Cu^{2+} by EDTA. (vii) Estimation of Aniline (viii) Estimation of Phenol Viva-Voce Exam

Teaching-Learning Methodology	Hands on training of Practicals: Chemistry practicals are delivered through classroom, laboratory work in a challenging, engaging, and inclusive manner that accommodates a variety of learning styles and tools.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage (%)
1.	Continuous and compression evaluation: Class test/Internal written test 10 Marks (40%), Quiz 05 Marks (20%), Home Assignments 05 Marks (20%), Attendance 05 Marks (20%), (As per SPU Letter No. E-3/2748	50

	dated 02/02/2024) [Total 25 Marks (100%)].	
2.	Semester End Examination [Total 25 Marks (100%)].	50

Course Outcomes: Having completed this course, the learner will be able to	
1.	From the study of this course, students will learn about hands on training of volumetric analysis.
2.	This study will be helpful in further studies and in industries.

Suggested References:	
Sr. No.	References
1.	Vogel's Text book of Quantitative Chemical Analysis, 5th Edition By G. H. Jeffery, J. Basset, J. Mendham, R. C. Denney.
2.	Vogel's Textbook Of Qualitative Inorganic Analysis By G. Svehla
3.	Practical Chemistry By O. P. Pandey, D. N. Bajpai & S. Giri

On-line resources to be used if available as reference material
On-line Resources: Google books, INFLIBNET, Google Web

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SARDAR PATEL UNIVERSITY
Vallabh Vidyanagar, Gujarat
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(Bachelor of Science) (Undergraduate)
B. Sc. (UG) Semester -V

Course Code	**US05SECCHE01**	Title of the Course	**ANALYTICAL AND PHYSICAL CHEMISTRY PRACTICAL**
Total Credits of the Course	02	Hours per Week	04

Course Objectives:	To make students familiar with: 1. Practical chemistry as a subject 2. Practical aspects of physical and analytical chemistry.

Course Content	**Total Marks : 50**
Unit	Description
Practical-I	**Estimation of Functional Group** (i) Estimation of Carboxylic Acid (ii) Estimation of Ketone (iii) Estimation of Ester (iv) Estimation of amide (v) Estimation of aspirin **Chemical Kinetics** (i) Chemical kinetics of a reaction between $K_2S_2O_8$ and KI in an aqueous system. (a=b) (ii) Chemical kinetics of a reaction between $K_2S_2O_8$ and KI in an aqueous system. ($a \neq b$) (iii)To determine the rate constant for the reaction between $KBrO_3$ and KI in an aqueous media. (a=b) **VIVA EXAMINATION**

Teaching-Learning Methodology	Hands on training of Practicals: Courses for B. Sc. Chemistry programme are delivered through classroom, laboratory work in a challenging, engaging, and inclusive manner that accommodates a variety of learning styles and tools (PowerPoint presentations, audio visual resources, e-resources, seminars, workshops, models).

Evaluation Pattern

Sr. No.	Details of the Evaluation	Weightage (%)
1.	Continuous and compression evaluation : Class test/Internal written test 10 Marks (40%), Quiz 05 Marks (20%), Home Assignments 05 Marks (20%), Attendance 05 Marks (20%), (As per SPU Letter No. E-3/2748 dated 02/02/2024) [Total 25 Marks (100%)].	50
2.	Semester End Examination [Total 25 Marks (100%)].	50

Course Outcomes: Having completed this course, the learner will be able to	
1.	Learn performing chemical experiments under time constrain and appreciate the physical and analytical principles useful in chemical science.
2.	Apply in further studies and in industries.

Suggested References Books:	
Sr. No.	References Books:
1.	Practical Chemistry By O. P. Pandey, D. N. Bajpai & S. Giri
2.	An Advanced Course In Practical Chemistry By Ghoshal, Mahapatra & Nad
3.	Comprehensive practical organic chemistry Preparation and qualitative analysis by V. K. Ahuwalia and Renu Agarwal.
4.	Organic Preparation by A. I. Vogel
5.	Vogel's Text book of Quantitative Chemical Analysis, 5th Edition By G. H. Jeffery, J. Basset, J. Mendham, R. C. Denney.
6.	Experimental Physical Chemistry by R. C. Das & B. Behera

On-line resources to be used if available as reference material
On-line Resources: Google books, INFLIBNET, Google Web

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