

**SARDAR PATEL UNIVERSITY**  
 (Bachelor of Science) (Undergraduate) (Industrial Chemistry Vocational)  
 B. Sc. (UG) Semester – I (Effective from JUNE 2023)

Course Code (Major)	<b>US01MAICV01</b>	Title of the Course	<b>Applied Chemistry</b>
Total Credits of the Course	04	Hours per Week	04
Course Objectives:	To make students familiar with: 1. Applied Chemistry as a subject. 2. Basic concepts related to industrial, inorganic and analytical chemistry.		

Course Content		
Unit	Description	Weightage*(%)
1.	<b>ATOMIC STRUCTURE</b> Brief introduction to Bohr's model and its limitation, Concept of shells and subshells Shape of orbital, electron configuration of elements using Auf-bau principle, Hund's rule and Pauli's exclusion principle. <b>MODERN PERIODIC TABLE</b> Brief introduction to Mendeleev's periodic table and its drawback, Classification of element on the basis of their electronic configuration, periodic trend of ionization energy, electron affinity and electron negativity of elements in periodic table.	<b>25%</b>
2.	<b>HYBRIDIZATION</b> Hybridization, Sigma and pi bonds, Hydrogen bond, Inductive effect, electronic effect, Resonance effect, Hyper-conjugation, Homolytic and heterolytic cleavage of a covalent bond, Structure and stability of free-radical, Carbocations and Carbanions. Types of organic reactions.	<b>25%</b>
3.	<b>SOLUTIONS</b> Types of solutions, different methods of expressing strength of solutions, viz. molarity, molality, normality, formality, weight percent, preparation of standard solutions, Vapor pressure and Rault's law, ideal and non-ideal solution, positive and negative deviation of non-ideal solution from Rault's law.	<b>25%</b>
4.	<b>TITRIMETRIC METHODS OF CHEMICAL ANALYSIS</b> General principle of titrimetry, Types of reactions in titrimetry, Standard solution, Basic requirements of titrimetry, Equivalence point and end point, Aqueous Acid Base Titrations, Concept of acid base titration.	<b>25%</b>

Teaching-Learning Methodology	Conventional method (classroom blackboard teaching), ICT. Courses for B. Sc. Industrial Chemistry program 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).
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Acquire knowledge of different basic terms included in chemistry like atomic structure, periodic properties, chemical bonding, equilibrium and water hardness treatment etc.
2.	Relate the formula of mass, moles, atoms, molecules & different way of expressing concentration of the solution & their preparation.
3.	The students will learn the concepts of measurements and analytical aspects.
4.	Know about use of various theoretical analytical methods and their applications.

Suggested References:	
Sr. No.	References
1.	Organic Chemistry , Paula Yurkanis Bruice
2.	Industrial Instrumentation & Process Control by Kulkarni
3.	David E Goldberg., Chemistry foundation. New york McGraw-Hill; 1991
4.	Vogel's Text book of Quantitative Chemical Analysis – by G. H. Jeffery, J. Mendham, R.C. Denney
5.	Analytical Chemistry-by G. D. Christian, Jhon Willey & Sons, 3 <sup>rd</sup> edition
6.	Analytical Chemistry: Principles – by J. H. Kennedy, Saunders college publishers, 2 <sup>nd</sup> edition, 1990
7.	Introduction to Chemical Analysis – by R. D. Braun, Mc-Graw Hill Book Co. 2 <sup>nd</sup> edition 1995;
8.	Arun Bahl, B. S. Bahl, G. D. Tuli, Essential of Physical chemistry. New Delhi: S. Chand publication; 2009.
9.	Dr. A. S. Patel, Dr. K. M. Shah, Applied Science I: Chemistry, Ahmedabad, Atul Prakashan; 2000
10.	V.P. Mehta., Polytechnique chemistry, New Delhi, Jain Brothers; 2017
11.	General Chemistry, Darrell D. Ebbing & Steven D Gammon, Houghton Mifflin

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

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Course Code (Major-Practical)	<b>US01MAICV02</b>	Title of the Course	<b>Practical – Major</b>
Total Credits of the Course	04	Hours per Week	08

Course Objectives:	To make students familiar with applied Chemistry as a subject and basic concepts related to analytical chemistry.
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Course Content
<p>Part: I – (Credit: 02; 04 Hours)          Calibration of Volumetric Glassware, Preparation &amp; Standardization of Analytical Solutions (Modes of Concentration).</p> <p>Part: II – (Credit: 02; 04 Hours)          Organic qualitative analysis: (Mono functional), Volumetric Analysis – Acid–Base&amp; Redox titrations.          Measurement of pH, Measurement of Specific Gravity., Measurement of Viscosity.</p>

Teaching-Learning Methodology	Courses for B. Sc. Industrial Chemistry Vocational program 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).
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	University Examination	100%

Course Outcomes: Having completed this course, the learner will be able to
<p>Relate the formula of mass, moles, atoms, molecules &amp; different way of expressing concentration of the solution &amp; their preparation., The students will learn the concepts of measurements and analytical aspects.,          Know about use of various theoretical analytical methods and their applications.</p>

Suggested References:

1. Brian S. Furniss (1989, 5<sup>th</sup> edition) *Vogel's Textbook of Practical Organic Chemistry*. Hoboken: John Willey & Sons (ISBN: 0-582-462363).
2. Hassner, A. (2012, 3<sup>rd</sup> edition) *Organic Syntheses Based on Name Reactions*. Philadelphia: Elsevier Publishing company (ISBN: 978-0-08-096630-4).
3. Jeffery, G. H.; Bassett, J.; Mendham, J.; Denny, R. C. (1989, 5<sup>th</sup> edition) *Vogel's Textbook of Quantitative Chemical Analysis*. Hoboken: John Willey & Sons (ISBN: 0-582-44693-7).

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B. Sc. (UG) Semester – I (Effective from JUNE 2023)

Course Code (Minor)	<b>US01MIICV01</b>	Title of the Course	<b>Introduction to Industrial Chemistry</b>
Total Credits of the Course	2	Hours per Week	2
Course Objectives:	To make students familiar with: 1. Industrial Chemistry as a subject. 2. Basic concepts related to Industrial, inorganic and analytical chemistry.		

Course Content		
Unit	Description	Weightage*(%)
1.	<p><b>ATOMIC STRUCTURE</b> Brief introduction to Bohr's model and its limitation, Concept of shells and subshells Shape of orbital, electron configuration of elements using Auf-bau principle, Hund's rule and Pauli's exclusion principle.</p> <p><b>MODERN PERIODIC TABLE</b> Brief introduction to Mendeleev's periodic table and its drawback, Classification of element on the basis of their electronic configuration, periodic trend of ionization energy, electron affinity and electron negativity of elements in periodic table.</p>	<b>50%</b>
2.	<p><b>TITRIMETRIC METHODS OF CHEMICAL ANALYSIS</b> General principle of titrimetry, Types of reactions in titrimetry, Standard solution, Basic requirements of titrimetry, Equivalence point and end point, Aqueous Acid Base Titrations, Concept of acid base titration.</p>	<b>50%</b>

Teaching-Learning Methodology	Conventional method (classroom blackboard teaching), ICT. Courses for B. Sc. Industrial Chemistry vocational program 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).
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%

3.	University Examination	70%
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Course Outcomes: Having completed this course, the learner will be able to

1.	Acquire knowledge of different basic terms included in chemistry like atomic structure, periodic properties, chemical bonding, equilibrium and water hardness treatment etc.
2.	Know about use of various theoretical analytical methods and their applications.

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1.	David E Goldberg., Chemistry foundation. New york McGraw-Hill; 1991
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 B. Sc. (UG) Semester – I (Effective from JUNE 2023)

Course Code (Minor-Practical)	<b>US01MIICV02</b>	Title of the Course	<b>Practical – Minor</b>
Total Credits of the Course	02	Hours per Week	04

Course Objectives:	To make students familiar with applied Chemistry as a subject and Basic concepts related to analytical chemistry.
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Course Content
Calibration of Volumetric Glassware., Preparation & Standardization of Analytical Solutions (Modes of Concentration), Organic qualitative analysis: (Mono functional ), Volumetric Analysis – Acid – Base titrations., Measurement of pH, Measurement of Specific Gravity., Measurement of Viscosity.

Teaching-Learning Methodology	Courses for B. Sc. Industrial Chemistry Vocational program 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).
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	University Examination	100%

Course Outcomes: Having completed this course, the learner will be able to
Relate the formula of mass, moles, atoms, molecules & different way of expressing concentration of the solution & their preparation., The students will learn the concepts of measurements and analytical aspects., Know about use of various theoretical analytical methods and their applications.

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3. Jeffery, G. H.; Bassett, J.; Mendham, J.; Denny, R. C. (1989, 5<sup>th</sup> edition) *Vogel's Textbook of Quantitative Chemical Analysis*. Hoboken: John Willey & Sons (ISBN: 0-582-44693-7).

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