

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

Course Code (Major)	US01MAICH01	Title of the Course	Industrial Aspects of Chemistry
Total Credits of the Course	4	Hours per Week	4
Course Objectives:	To make students familiar with: 1. Industrial Aspects of Chemistry as a subject. 2. Basic concepts related to Measurements, inorganic and analytical chemistry.		

Course Content		
Unit	Description	Weightage*(%)
1.	BASIC CONCEPT Matter, elements, compounds, atoms, molecules, molecular formula, mole concept, Avogadro's number, gram-atomic weight, gram molecular weight, equivalent weight, STP, Avogadro's hypothesis and its application, derivation of general gas equation $PV=nRT$, Dalton's law of partial pressure.	25%
2.	ATOMIC STRUCTURE 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. MODERN PERIODIC TABLE 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.	25%
3.	CONCEPT OF MEASUREMENT AND ACCURACY Principle, construction and working of temperature measuring instruments. Direct and indirect method of level measurement, Sp. Gravity scales, Density and sp. Gravity measurement, Viscosity measurement.	25%
4.	TITRIMETRIC METHODS OF CHEMICAL ANALYSIS 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 & indicators.	25%

Teaching-Learning	Conventional method (classroom blackboard teaching), ICT. Courses for B. Sc. Industrial Chemistry program are delivered through classroom, engaging, and
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Methodology	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 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.	Modern Organic Chemistry by M K Jain
2.	Industrial Instrumentation & Process Control by Kulkarni
3.	Unit Operations: Volume I & II, by K. A. Gavhane
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 rd edition
6.	Analytical Chemistry: Principles – by J. H. Kennedy, Saunders college publishers, 2 nd edition, 1990
7.	Introduction to Chemical Analysis – by R. D. Braun, Mc-Graw Hill Book Co. 2 nd edition 1995;
8.	Dr. A. S. Patel, Dr. K. M. Shah, Applied Science I: Chemistry, Ahmedabad, Atul Prakashan; 2000

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

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

Course Code (Major Practical)	US01MAICH02	Title of the Course	Practical (Major)
Total Credits of the Course	04	Hours per Week	08

Course Objectives:	Develop the skill to analyze and identify the chemicals, Develop skills in the scientific method of calibrating the glassware. Enhance the skill of preparation and standardization of analytical solutions. Develop skills in understanding, planning and performing experiments for titrimetric analysis.
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Course Content	
<p>Part: I (02 Credit ; 04 Hours per week)</p> <ul style="list-style-type: none"> ➤ Calibration of Volumetric Glassware. ➤ Preparation & Standardization of Analytical Solutions (Modes of Concentration) ➤ Volumetric Analysis (Acid – Base titrations). ➤ Measurement of pH ➤ Measurement of Specific Gravity. ➤ Measurement of Viscosity. <p>Part: II (02 Credit ; 04 Hours per week)</p> <ul style="list-style-type: none"> ➤ Organic qualitative analysis: (Mono functional) ➤ Purification and Melting point & Boiling Point concept 	

Teaching-Learning Methodology	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.	University Examination	100%

Course Outcomes: Having completed this course, the learner will be able to

Acquire practical knowledge of basic chemical laboratory tools and analytical concept for the subject of industrial chemistry.

Suggested References:

1. Brian S. Furniss (1989, 5th edition) *Vogel's Textbook of Practical Organic Chemistry*. Hoboken: John Willey & Sons (ISBN: 0-582-462363).
2. Hassner, A. (2012, 3rd 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, 5th edition) *Vogel's Textbook of Quantitative Chemical Analysis*. Hoboken: John Willey & Sons (ISBN: 0-582-44693-7).

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

Course Code (Minor)	US01MIICH01	Title of the Course	Introduction to Industrial Chemistry - I
Total Credits of the Course	2	Hours per Week	2
Course Objectives:	To make students familiar with: 1. Introduction to Industrial Aspects of Chemistry. 2. Basic concepts related to Measurements, and analytical chemistry.		

Course Content		
Unit	Description	Weightage*(%)
1.	Principle, construction and working of temperature measuring instruments. Direct and indirect method of level measurement, Sp. Gravity scales, Density and sp. Gravity measurement, Viscosity measurement.	50%
2.	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.	50%

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:

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1.	Modern Organic Chemistry by M K Jain
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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

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 (Bachelor of Science) (Undergraduate) (Industrial Chemistry)
 B. Sc. (UG) Semester – I (Effective from JUNE 2023)

Course Code (Minor Practical)	US01MIICH02	Title of the Course	Practical (Minor)
Total Credits of the Course	02	Hours per Week	04
Course Objectives:	Develop the skill to analyze and identify the chemicals, Develop skills in the scientific method of calibrating the glassware. Enhance the skill of preparation and standardization of analytical solutions. Develop skills in understanding, planning and performing experiments for titrimetric analysis.		

Course Content	
<ul style="list-style-type: none"> ➤ Organic qualitative analysis: (Mono functional) ➤ Calibration of Volumetric Glassware. ➤ Preparation & Standardization of Analytical Solutions (Modes of Concentration) ➤ Measurement of pH, Specific Gravity and Viscosity. 	

Teaching- Learning Methodology	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.	University Examination	100%

Course Outcomes: Having completed this course, the learner will be able to
The students will learn the concepts of measurements and analytical aspects., Know about use of various theoretical analytical methods and their applications.

Suggested References:

1. Brian S. Furniss (1989, 5th edition) *Vogel's Textbook of Practical Organic Chemistry*. Hoboken: John Willey & Sons (ISBN: 0-582-462363).
2. Hassner, A. (2012, 3rd edition) *Organic Syntheses Based on Name Reactions*. Philadelphia: Elsevier Publishing company (ISBN: 978-0-08-096630-4).
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 B. Sc. (UG) Semester – I (Effective from JUNE 2023)

Course Code (Inter-Disciplinary)	US10IDICH01	Title of the Course	Introduction to Instrumentation and Process Control - I
Total Credits of the Course	02	Hours per Week	02
Course Objectives:	To make students familiar with: Basic concepts related to Measurement.		

Course Content		
Unit	Description	Weightage*(%)
1.	Classification of instruments, metrological terms, definitions, units and standards, performance characteristics, calibration requirement, Hierarchy of standards and traceability, measurement of uncertainty codes and symbols etc.	50%
2.	Instruments for indicating, recording and control of pressure (including mud pressure), flow, temperature, viscosity, level, pH, density, weight, penetration, torque, RPM, magnetic flux.	50%

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 industrial chemistry.

Suggested References:

Sr. No.	References
1.	Process Instrumentation and Control by A P Kulkarni, Nirali Prakashan.
2.	Industrial Instrumentation & Process Control by Kulkarni
3.	Unit Operations: Volume I & II, by K. A. Gavhane
4.	Arun Bahl, B. S. Bahl, G. D. Tuli, Essential of Physical chemistry. New Delhi: S. Chand publication; 2009.
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Course Code (Skill Enhancement Course)	US01SEICH01	Title of the Course	Industrial Safety & Hygiene – I
Total Credits of the Course	2	Hours per Week	2

Course Objectives:	<ul style="list-style-type: none"> ➤ Students will understand the basic concepts of fire and safety at industry. ➤ It will increase the knowhow of various safety procedures and measures taken at plant site during working with hazardous chemicals.
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Course Content		
Unit	Description	Weightage*(%)
1.	Introduction of safety & Hazards Safety in chemical industries, Introduction of hot & cold processes, types of furnace & use of safety measures, Need of safety in industries, Indian standards, safety Terminology.	50%
2.	Fire & Explosion Hazard in chemical Industries. Fire phenomena, Nature of fire, Need of fire, triangle of fire, Factors to contributing fire, Classification of fire & extinguishers, Fire prevention & Protection systems, General control measure for fire detection and alarm systems, portable fire extinguishers, Automatic water sprinklers, water spray systems.	50%

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

Students will understand the basic concepts of fire and safety at industry. It will increase the knowhow of various safety procedures and measures taken at plant site during working with hazardous chemicals.

Suggested References:

1. Fundamental of industrial safety & Health –volume-1 by Dr. K.U.Mistry
2. Fundamental of industrial safety & Health –volume-2 by Dr. K.U.Mistry
3. Occupational & safety health by David H Goetsch.

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