

**SARDAR PATEL UNIVERSITY**

Vallabh Vidyanagar, Gujarat

(Reaccredited with 'A' Grade by NAAC (CGPA 3.11))

Syllabus with effect from the Academic Year 2023 - 2024

**B.Sc. (Industrial Chemistry) (Vocational) Sem. 2**

Course Code	US02MAICV01	Title of the Course	Industrial Chemistry
Total Credits of the Course	4	Hours per Week	4

Course Objectives:	To make students familiar with: 1. Industrial Chemistry & Chemical Engineering as a subject. 2. Basic concepts related to Chemical Engineering, inorganic and analytical chemistry.
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Course Content		
Unit	Description	Weightage*(%)
1.	<b>INTRODUCTION &amp; PROPERTIES OF MATERIAL</b> General principles of selection of materials. Definition & explanation of melting point, boiling point, specific heat, thermal conductivity, <b>METALS</b> General comparison of ferrous, non-ferrous & alloys. Properties of metals Cast iron, wrought iron, steel, Aluminum, zinc, chromium, nickel, platinum, silver, lead.	25%
2.	<b>GLASS</b> Introduction of glass, physical properties of glass, chemical properties, characteristic of glass, types of glass, raw materials, chemical reactions, methods of manufacture, some special glasses and its uses. <b>CEMENT</b> Introduction of cement, raw materials, types of cement, setting and hardening of cement, methods of manufacturing and use of cement.	25%
3.	<b>FLOW DIAGRAM DRAWING</b> Flow diagrams drawing preparation of block flow diagram and process flow diagrams using different equipment symbols for a process. diagrams for Chemical Engineering Unit Operations Free hand sketch drawing of various Chemical Engineering Unit Operation equipment's.	25%
4.	<b>WATER</b> Characteristic of water, uses of water, impurities and hardness of natural water, water for steam making and industrial processes, Boiler water treatments, Calculations on water treatments.	25%

Teaching-Learning	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
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Methodology	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.	General Introduction, knowledge, and definition of various materials and their basic properties.
2.	To learn the concept of utility, analysis and important of water for chemical industries.
3.	To draw and understand symbols of chemical engineering equipment's & draw diagrams of various mounting and fitting parts.
4.	To draw diagrams and understand various unit operation equipment's for chemical engineering. To draw flow diagrams for a process.

Suggested References:	
Sr. No.	References
1.	Unit operation Volume I. K.A.Gavhane (NiraliPrakashan).
2.	Introduction to Chemical Engineering. W.L.Badger & J.I. Banchero (McGraw Hill).
3.	Unit operation, Volume II. Coulson & Richardson
4.	Industrial Chemistry of B K Sharma.
5.	D.; M. Gopala Rao, Marshall Sittig. Dryden's Outline of Chemical Technology for 21st Century (3rd Edition). East-West Press.;
6.	McCabe, Warren L., and Julian C. Smith. Unit Operations of Chemical Engineering. New York: McGraw-Hill, 1967.
7.	Walter L. Badger and Julius T. Banchero. Introduction to Chemical Engineering. New York: McGraw-Hill, 1955.
8.	Recommendations on Graphical Symbols for Process Flow Diagram, IS: 3232 – 1965.

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

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B.Sc. (Industrial Chemistry) (Vocational) Sem. 2

Course Code	US02MAICV02	Title of the Course	Practical
Total Credits of the Course	4	Hours per Week	8

Course Objectives:	To make students familiar with chemical analysis and water analysis with flow sheet diagram understanding.
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Course Content
Part: I (Credit: 02; 04 hours) Total solid & Volatile solid, Total Dissolved Solid, Total Suspended Solid, Non filterable & Filterable solid & Non filterable volatile Solid, Acidity, Alkalinity & Turbidity, Hardness of Water & EDTA methods for determination of hardness of water.
Part: II (Credit: 02; 04 hours) Inorganic Qualitative Analysis – Two Radicals – Water Soluble colored compound, Drawing preparation of block flow diagram and process flow diagrams using different equipment symbols for a process.

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
General Introduction, knowledge, and definition of various materials and their basic properties., To learn the concept of utility, analysis and important of water for chemical industries., To draw and understand symbols of chemical engineering equipment's & draw diagrams of various mounting and fitting parts., To draw diagrams and understand various unit operation equipment's for chemical engineering. To draw flow diagrams for a process.

Suggested References:

1. Madan, R. L. (2011, 3<sup>rd</sup> edition) *Chemistry for degree student First year*. New Delhi: S. Chand (ISBN: 978-8121932301).
2. Peter Atkins, Tina Overton, Jonathan Rourke, Mark Weller & Fraser Armstrong (2010, 5<sup>th</sup> edition) *Inorganic Chemistry*. Oxford: Oxford University Press (ISBN: 978-0-19-959960-8).
3. Recommendations on Graphical Symbols for Process Flow Diagram, IS: 3232 – 1965.
4. Brian S. Furniss (1989, 5<sup>th</sup> edition) *Vogel's Textbook of Practical Organic Chemistry*. Hoboken: John Wiley & Sons (ISBN: 0-582-462363).

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B.Sc. (Industrial Chemistry) (Vocational) Sem. 2

Course Code	US02MIICV01	Title of the Course	Introduction to Chemical Plant Utilities
Total Credits of the Course	2	Hours per Week	2

Course Objectives:	To make students familiar with: 1. Industrial Chemistry & Chemical Engineering as a subject. 2. Basic concepts related to Chemical Engineering, inorganic chemistry & plant utilities.
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Course Content		
Unit	Description	Weightage*(%)
1.	<b>INTRODUCTION &amp; PROPERTIES OF MATERIAL</b> General principles of selection of materials. Definition & explanation of melting point, boiling point, specific heat, thermal conductivity, <b>METALS</b> General comparison of ferrous, non-ferrous & alloys. Properties of metals Cast iron, wrought iron, steel, Aluminum, zinc, chromium, nickel, platinum, silver, lead.	50%
2.	<b>WATER</b> Characteristic of water, uses of water, impurities and hardness of natural water, water for steam making and industrial processes, Boiler water treatments, Calculations on water treatments.	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		
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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.	General Introduction, knowledge, and definition of various materials and their basic properties.
2.	To learn the concept of utility, analysis and important of water for chemical industries.

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1.	Unit operation Volume I. K.A.Gavhane (NiraliPrakashan).
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Course Objectives:	To make students familiar with chemical analysis and water analysis with flow sheet diagram understanding.
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Course Content
Total solid & Volatile solid, Total Dissolved Solid, Total Suspended Solid, Non filterable & Filterable solid & Non filterable volatile Solid, Acidity, Alkalinity & Turbidity, Hardness of Water & EDTA methods for determination of hardness of water, Inorganic Qualitative Analysis – Two Radicals – Water Soluble colored compound, Drawing preparation of block flow diagram and process flow diagrams using different equipment symbols for a process.

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