FOUR YEAR UNDERGRADUATE PROGRAM(2024 – 28)
DEPARTMENT OF INDUSTRIAL CHEMISTRY
COURSE CURRICULUM-2024-28

PART-A: Introduction				
Program: Bachelor in Science *(Honors/Honors with Research)*			**Semester –VII**	Session: **2024-2025**
1	**CourseCode**	**ICSE-05T**		
2	**CourseTitle**	**MODERN ANALYTICAL TECHNIQUES-I**		
3	**CourseType**	**DSE**		
4	**Pre-requisite(if,any)**	***As per program***		
5	**Course Learning. Outcomes(CLO)**	➢ ***Understanding the principles behind various analytical techniques used in modern scientific research.*** ➢ ***Familiarity with the instrumentation and equipment utilized in these techniques*** ➢ ***Ability to critically analyze and interpret data obtained from these techniques*** ➢ ***To learn chromatographic techniques for separation of organic compounds.***		
6	**Credit Value**	**3 Credits**	***Credit = 15 Hours -learning & Observation***	
7	**Total Marks**	**Max. Marks: 100**		**Min Passing Marks:40**

PART -B: Content oftheCourse		
Total No.of Teaching–learning Periods(01 Hr. per period) - 45 Periods (45 Hours)		
Unit	**Topics(Course contents)**	**No.of Period**
I	**Principles, Construction and working of the following measuring equipment's:** Temperature:- Glass Thermometer, Bimetallic thermometer, Pressure spring thermometer Vapour filled, thermometer, Resistance thermometer. Viscosity:- Capillary tub Viscometer, falling sphere viscometer, Rotating cylinder viscometer, viscosity sensitiv rotameter. Density & Specific gravity:-Pycnometer, Hydrometer, Specific gravity balance Liquid Level:- Direct & indirect liquid level methods.	**12**
II	**Colorimetry**:- General discussion, Theory of Colorimetry, Colorimetric methods and apparatus. pHmetry:- Measuring systems, Methods and apparatus.	**11**
III	**Analytical and testing instrumentation**:- Ultra-Violet and Visible Spectrometers, Infra-Red Spectrometers and analyzers, Mass Spectrometers, Conductimetry:- Measuring systems, Methods and apparatus. Potentiometry:- Measuring systems, Methods and apparatus.	**11**
IV	**Chromatographic Techniques:-** Gas chromatography, Liquid chromatography, Paper chromatography, Ion-exchange chromatography.	**11**
Keywords	***Equipment's, Colorimetry, pH metry, Analytical, Chromatographic***	

SignatureofConvener&Members (CBoS):

PART–C:Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. *Jain, S. K. (2008). Chemical kinetics. Vishal Publication. Sharma,*
2. *B. K. (2017). Industrial analysis. Gael Publication.*
3. *Shah, R. K., Vora, J. C., Vora, K. P., & Shah, R. S. (2018). Principles of analytical chemistry.*

References Books Recommended –

1. *Smith, J. M. (1981). Chemical engineering kinetics. McGraw-Hill Book Co.*
2. *Parsania, P. H. (2014). Physico-chemical exercise*

Online Resources–

- **e-Resources / e-books and e-learning portals**
- **https://www.explainthatstuff.com/thermometers.html"**
- **https://www.miepl.com/technical-education-news-description/what-is-the-working-principle-of-bimetal-thermometer-/9167**
- **"https://m.youtube.com/shorts/BnAQWYFggC8**
- **https://m.youtube.com/watch?v=tnXFqGuD3VA**
- **https://www.youtube.com/watch?v=TSXS4FqzxAQ**
- **https://www.youtube.com/watch?v=8ZKKoknV9QU**
- **https://instrumentationtools.com/types-level-measurement/**
- **https://www.ssi.shimadzu.com/products/molecular-spectroscopy/uv-vis/index.html"**
- **https://m.youtube.com/watch?v=wxrAELeXlek**

Online Resources–

- **e-Resources / e-books and e-learning portals**

PART-D: Assessment andEvaluation

Suggested Continuous Evaluation Methods:
Maximum Marks: 100 Marks
Continuous Internal Assessment(CIA):30 Marks
End Semester Exam(ESE):70 Marks

Continuous InternalAssessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): **20 /20** Assignment/Seminar- **10** Total Marks -**30**	Better marks out of the two Test / Quiz+ obtained marks in Assignment shall be considered against **30** Marks
End Semester Exam (ESE):	**Two section – A & B** Section A: **Q1**. Objective – **10 x1= 10** Mark; **Q2**. Short answer type- **5x4 =20Marks** Section B: Descriptive answer type qts.,**1out of 2** from each unit- **4x10=40Marks**	

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM(2024 – 28)
DEPARTMENT OF INDUSTRIAL CHEMISTRY
COURSE CURRICULUM

PART-A: Introduction				
Program:Bachelor in Science *(Honors/Honors with Research)*			**Semester - VII**	Session: **2024-2025**
1	**CourseCode**	**CHSE-05P**		
2	**CourseTitle**	**MODERN ANALYTICAL TECHNIQUES-I LAB. COURSE**		
3	**CourseType**	**DSE**		
4	**Pre-requisite**(if,any)	*As per program*		
5	**Course Learning. Outcomes(CLO)**	➢ **Develop knowledge of mixture properties and analysis techniques.** ➢ **Differentiate between volumetric and gravimetric analysis.** ➢ **Understand conductometric and colorimetric analysis.** ➢ **Understand pH metric and potentiometric techniques.**		
6	**CreditValue**	**1 Credits**	*Credit =30 Hours Laboratory or Field learning/Training*	
7	**TotalMarks**	**Max.Marks:50**		**Min Passing Marks:20**

PART -B: Content of theCourse		
TotalNo.of learning-Training/performancePeriods:30 Periods (30 Hours)		
Module	**Topics(Coursecontents)**	**No.ofPeriod**
Lab./Field Training/ Experiment Contents of Course	Paper chromatography for ion separation. Colorimetric analysis for titration method. Determination of sample by Conductometric, Colorimetric, pH metric an Potentiometric method	**30**
Keywords	*Chromatography, Volumetric, Gravimetric, Conductometric, pH Metric.*	

SignatureofConvener&Members (CBoS):

PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Chauhan, M. S. (2013). Analytical Chemistry: A Textbook of Principles and Instrumental Techniques. New Age International Publishers.
2. Sharma, T. R., & Gupta, S. K. (2016). Quantitative Analysis for Management. Kalyani Publishers.
3. Sharma, B. K. (2017). Instrumental Methods of Chemical Analysis. Goel Publishing House.
4. Srivastava, S. K., & Agarwal, R. (2014). Analytical Chemistry: Principles and Techniques. New Age International Publishers.
5. Yadav, M. S., & Yadav, P. (2016). Principles of Analytical Chemistry. S. Chand & Company Ltd.

Reference Books Recommended –

1. *Skoog, D. A., Holler, F. J., & Crouch, S. R. (2017). Principles of Instrumental Analysis. Cengage Learning.*
2. *Bassett, J., Denney, R. C., Jeffery, G. H., & Mendham, J. (1974). Vogel's Textbook of Qualitative Chemical Analysis (5th Ed.). ELBS.*
3.

Online Resources–

- **(https://www.chemguide.co.uk/analysis/index.html)**
- **(https://www.khanacademy.org/science/chemistry/chemical-reactions-stoichiome)**
- **(https://www.youtube.com/playlist?list=PLy2022BX6EspFAK8Bf-TXMmTd8fqmFh_2)**
- **(https://www.chemistrylearner.com/analytical-chemistry-resources.html)**

Online Resources–

- **e-Resources / e-books and e-learning portals**

PART-D: Assessment andEvaluation

Suggested Continuous Evaluation Methods:
Maximum Marks: 50 Marks
Continuous Internal Assessment(CIA):15 Marks
End Semester Exam(ESE):35Marks

Continuous Internal Assessment(CIA): **(By Course Teacher)**	Internal Test / Quiz-(2): **10 &10** Assignment/Seminar +Attendance- 05 Total Marks -**15**	Better marks out of thetwo Test / Quiz +obtained marks in Assignment shall be considered against **15** Marks
End Semester Exam (ESE):	**Laboratory / Field Skill Performance: On spot Assessment** **M. Performed the Task based on lab. work - 20 Marks** **N. Spotting based on tools& technology (written) – 10 Marks** **O. Viva-voce (based on principle/technology) - 05 Marks**	**Managed by Course teacher as per lab. status**

Name and Signature of Convener & Members of CBoS: