Course Title**: DSC**: Physical Chemistry and Related Techniques of Analysis, ***w.e.f. the session 2025-26 and onwards***	
Class: B.Sc. Pt.-IV / Semester-VIII	Course code: BCH-C803
Lectures :60	Credits: 04
MM: 70	Exam Hrs.:03

NOTE: The question paper shall consist of Two sections (Sec.-A and Sec.-B). Sec.-A shall contain 10 short answer (about 150 words) type questions of SIX marks each and student shall be required to attempt any five questions. Sec.-B shall contain 08 descriptive type questions of TEN marks each and student shall be required to attempt any four questions. Both sections shall have questions from the entire syllabus. The previous year paper/model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Treatment of Data in Quantitative Analysis: Accuracy, Precision, Methods for expressing the accuracy and precision, Standard deviation, Types of errors, Elimination and minimization of errors, Significant figures, Criterion for the rejection of data. (Lectures: 10)

Signal, Noise, Sensitivity Detection Limits, FT: Elementary idea of signal to noise ratio, Sensitivity and detection limits, Types and sources of noise (Thermal, shot, Flicker and Environmental noise). Eliminations/Minimization of noise, Time domain & frequency domain plots in emission spectroscopy. Basic idea and applications of Fourier transformation. (Lectures: 10)

Polarisation and Overvoltage: Theories of Hydrogen overvoltage, Ilkovic equation, d.m.e., Half wave potential, Diffusion current, Polarography and its simple and general applications. (Specific applications not required)

Ion Exchange: Cation and Anion exchangers, their Stability, Selectivity and Characteristics, General applications including Ion Exchange Chromatography. (Lectures: 10)

Conductometric, Potentiometric and pH–metric Titrations: Theory, Technique and applications of Conductometric, Potentiometric and pH- metric titrations.

Solvent Extraction: Principles, Techniques and applications. (Lectures: 10)

Chromatographic Techniques: Basic principles, Experimental techniques, Simple and general applications of Column, Paper, Thin layer, Gas-solid, Gas- liquid and High-Performance Liquid Chromatography (excluding specific applications). (Lectures: 10)

Suggested Readings:

1. Instrumental Methods of Analysis by: Willard Merit, Dean and Seatle
2. Instrumental Methods of Chemical Analysis by: G. W. Ewing
3. Text book Physical Chemistry by: S. Glasstone
4. Hand Book of Chromatography for Chemists and Engineers by: M. K. Shingari
5. Analytical Chemistry by: I. M. Kolthoff
6. Quantitative Analysis by: Vogel
7. Qualitative Analysis by: Vogel
8. Mathematics and Statistics for Chemists by: C. J. Brooks, I. G. Betteley and S. M. Lexsten
9. Molecular Spectroscopy by: C. J. Benwell

Course Objectives

1. To Treatment of Data in Quantitative Analysis, Signal, Noise, Sensitivity Detection Limits, FT
2. Studies on Polarization, Overvoltage, Basic Polarography and Ion Exchange
3. Knowledge of Conductometric, Potentiometric and pH–metric Titrations and Solvent Extraction
4. To develop skill in chromatographic Techniques

Course Outcomes (COs)

On successful completion of the course with Physical Chemistry and Related Techniques of Analysis, the student will be able to:

CO:1 Helped students in attaining basic concepts with a balanced knowledge of treatment of Data in Quantitative Analysis.

CO:2 Created awareness about Signal, Noise, Sensitivity Detection Limits for better industrial employment.

CO:3 Developed interest among students for chemistry and its application in various measurements and monitoring techniques of Fourier transformation infra-red spectroscopy and handling of instruments.

CO:4 Upgrade students' knowledge about basic concepts of polarization and over voltage. Educated in various measurements and monitoring techniques of industrial waste management for better industrial employment.

CO:5 Developed and enhanced knowledge about the ion exchange and skills for its Management of chromatography.

CO:6 Created awareness about the Conductometric, Potentiometric and pH–metric Titrations.

CO:7 Created the skill in students for better employment in chromatography R & D laboratories.

CO:8 Created chemical knowledge in Vedic chemistry with analysis of data.

Mapping of course Outcomes (COs) with program outcomes (POs)

Course Outcomes/Program outcomes	1	2	3	4	5	6	7	8
CO:1		X						X
CO:2	X			X				X
CO:3	X		X					
CO:4				X				X
CO:5		X		X			X	
CO:6			X	X	X			
CO:7			X				X	X
CO:8						X		

Note: put 'X'in relevant column of mapping