Course Title: Chemistry Core-3: Physical Chemistry and Related Techniques of Analysis *w.e.f. the session 2022-23 and onwards*	
Class: M.Sc. Pt.-I / Semester-II	**Course code: MCH-C203**
Lectures: 60	Credits : 04
MM: 70	Exam Hours: 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.

COURSE CONTENTS:

Unit - I

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.

Unit - II

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.

Unit - III

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.

Unit - IV

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

Solvent Extraction: Principles, Techniques and applications.

Unit - V

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).

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. Treatment of Data in Quantitative Analysis
2. Signal, Noise, Sensitivity Detection Limits, FT
3. Polarisation, Overvoltage, Basic Polarography
4. Ion Exchange
5. Conductometric, Potentiometric and pH–metric Titrations
6. Solvent Extraction
7. Chromatographic Techniques

COURSE OUTCOMES:

On completion of this course, student shall be able to:
CO1: To discuss about the accuracy, precision, errors, significant figures and criteria about the rejeton of data.
CO2:To describe signal to noise ratio, sensitivity and detection limit and FT in emission spectroscopy
CO3:To understand the concept of polarization, overvoltage and polarographic technique in analysis in qualitative and quantitative analysis.
CO4: Familiar with ion exchange and solvent extraction technique for the analysis of various samples of daily use.
CO5: Able to gain knowledge of basic principle, technique and applications of conductometric, potentiometric and pH-metric titrations.
CO6: To explain principle, experimental technique and simple and general applications of paper, column, thin layer, gas solid, gas liquid and high performance liquid chromatography.

Mapping of Course outcomes (Cos) with Programme outcomes (POs)

Course outcomes/ Programme outcomes	1	2	3	4	5	6	7	8
CO 1	X	X			X			X
CO 2	X				X			X
CO 3	X		X			X		
CO 4	X							X
CO 5	X		X					X
CO 6	X		X					X