Programme: M. Sc. Part-II (Analytical Chemistry)
Course Code: ACC-502
Title of the Course: Techniques in Chemical Analysis
Number of Credits: 3 **Effective from AY:** 2019-20

Prerequisites for the course:	Students should have studied the theory/ instrumentation and application of some of the basic analytical techniques such as colorimetry, pH-metry, emission techniques at B. Sc. or M. Sc. Part I level for better understanding of the course content	
Course Objectives:	1. Introduction of various experimental techniques for analysis. 2. Evaluate the utility of various analytical techniques as a qualitative and quantitative tool.	
Course Outcomes:	1. Students should be in a position to differentiate between various analytical techniques based on their theory and sensitivity achieved. 2. Exposure to various electrochemical and optical techniques for its application to qualitative and quantitative estimation at trace level.	
Content:	**1. Principles and practise of optical analytical techniques –Part-1** 1.1. Nephelometry and Turbidimetry: Introduction to principle, instrumentation and application of nephelometry, turbidimetry. Factors affecting measurement, choice between nephelometry and turbidimetry; turbidimetry and colorimetry; nephelometry and fluorimetry; applications of nephelometry and turbidimetry. 1.2. Introduction, principle and Instrumentation of Polarimetry; application of optical rotation method in rate constant determination; acid- catalyzed muta rotation of glucose; inversion of cane sugar; relative strengths of acids. Introduction to terms such as optical rotatory dispersion (ORD), plan curves, cotton effect curves, circular dichroism, octant rule for ketones. **2. Principles and practise of optical analytical techniques –Part-2** 2.1. Principles and practices of Spectrophotometric Analysis: Introduction; law of absorption; absorbance and transmittance spectrum; technique for colour comparison; spectrophotometer instrumentation- single and double beam spectrophotometer; applications 2.2. Principles of Emission Techniques: Theory; excitation techniques; electrodes and their shapes; Quantitative and qualitative application, brief introduction to ICP-MS **3. Principles and practise of electro analytical and thermal techniques** 3.1. Introduction to Ion selective electrodes; construction, application and selectivity coefficient of Ion selective electrode; pH measurement; buffer solution; glass electrode; instrument for pH measurement. 3.2. Thermoanalytical Methods: Thermogravimetry, Differential Thermal Analysis (DTA), and Differential Scanning Calorimetry: DSC 3.3. Basic aspects of conductometric titration; types of conductometric titration; advantages and disadvantages of conductometric titration;	10hrs 10hrs 16hrs

	Introduction; theory; instrumentation; advantages, disadvantages and applications of High frequency titrations. 3.4. Karl Fischer Titration: Introduction; theory; instrumentation; advantages, disadvantages and applications; Karl Fischer reagent- Introduction; determination of water content in industrial samples.	
Pedagogy:	lectures/ tutorials/ seminars/ term papers/assignments/ presentations/ self-study or a combination of some of these. Sessions shall be interactive in nature to enable peer group learning.	
Text Books/ References / Readings	1. B. K Sharma, *Instrumental methods of chemical analysis*, Goel Publishing House, Meerut, 2004 2. A. I. Vogel, *Text Book of Quantitative Inorganic Analysi,* Longman Scientific & Technicial, 1989 3. G.W. Ewing, *Instrumentation Methods of Chemical Analysis*, McGraw Hill; 1985 4. S. M. Khopkar, *Basic Concepts of Analytical Chemistry*, New Age International, 1998 5. R. D. Barun, *Introduction to Instrumental analysis*, Pharma Med Press, Hyderabad, 2012 6. G. D. Christian, *Analytical Chemistry*, Fifth Edition, John Wiley and Sons, NY, 2014 7. G. Chatwal & S. Anand, *Instrumental Methods of Chemical Analysis,* Himalaya publishing House, Mumbai, 2018 8. D.A. Skoog, D.M. West, F.J. Hollar, S.R. Crouch; *Fundamentals of Analytical Chemistry*, Belmont: Brooks/Cole: Cengage Learning, cop. 2014. 9. H. Willard, L.L. Merritt, J.A. Dean, F.A. Settle, *Instrumental Methods of Analysis*, HCBS Publishing New Delhi, 2004 10. H. Gunzler and A. Williams; *Handbook of Analytical Techniques*, WILEY-VCH Verlag GmbH; 2001	