

Course No	Course Name	L-T-P-Credits
CY 484	Analytical Chemistry Laboratory	0-0-3: 2
Prerequisite: NIL		
<p>Course Objectives: The main objective of the laboratory course is to provide students with necessary skills of hands on experience with modern instrumentations, basic concepts of the underlying chemical and physical of instrumental methods of analysis including electronic and vibrational spectroscopy, chromatographic techniques, thermal and electrochemical methods and solving problems in the laboratory.</p> <p>Course Outcomes: After the successful completion of the laboratory the students will be able to</p> <ol style="list-style-type: none"> 1. Apply the basic understanding of molecular spectroscopic techniques e.g. UV-vis and fluorescence into different real problems. 2. Understand the various thermal methods and their practical applications. 3. Solve the problems related to electrochemical measurements using modern electrochemistry instrumentation. 4. Understand the physical basis of various separation techniques using chromatographic measurements and their practical applications. 		
SYLLABUS		
Module	Contents	Hours
I	<p>Optical Methods</p> <ol style="list-style-type: none"> 1. Determination of complex ion composition (e.g. ferric-salicylic acid) by Job's method of continuous variation. 2. Determination of some organophosphorus pesticides using absorption spectroscopy. 3. Spectrophotometric estimation of Aspirin. 4. Determination of chlorophyll in olive oil by UV-visible and fluorescence spectroscopy. 5. Spectroscopic determination of caffeine and benzoic acid in a soft drink. 6. Degradation of methylene blue using silver nanoparticles (Creighton Sol) 7. Analysis of Fluoride in Ground Water and Potable Water <p>Chromatography</p> <ol style="list-style-type: none"> 8. Determination of hydrocarbons in a sample by Gas Chromatography. 9. Determination of organics in ground water by Gas Chromatography. 10. Gas Chromatography of an Alcohol Mixture 11. Determination of pesticides (organophosphate) in soil sample using HPLC. 12. Separation of components of soft drinks by HPLC. 	03 h per laboratory experiment

	<p>Thermal Methods</p> <p>13. Analysis of thermal properties of a polystyrene using differential scanning calorimetry.</p> <p>14. TGA/DTA measurement of Calcium Oxalate Monohydrate, $\text{CaC}_2\text{O}_4 \cdot \text{H}_2\text{O}$.</p> <p>Electroanalytical Techniques</p> <p>15. Electrokinetic studies of hydrogen evolution and oxygen reduction reaction in acid and alkaline media.</p> <p>16. Comparison of corrosion behaviour of metal in NaCl and in NaOH solutions</p> <p>17. Determination of Cu, Pb and Cd in Water Sample by Differential Pulse Anodic Stripping Voltammetry.</p>	
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Essential Readings:

1. D. P. Shoemaker, C. W. Garland and J. W. Nibler, "Experimental Physical Chemistry", McGraw-Hill, 8th Edition 2008.
2. F. A Settle, "A Handbook of Instrumental Techniques for Analytical Chemistry", Prentice Hall, 1st Edition 1997.
3. J. B. Yadav, Advanced Practical Physical Chemistry, Krishan Prakshan Media, 1st Edition 2016.
4. V. D. Athawale, P. Mathur, 'Experimental Physical Chemistry', New Age International (P) Limited Publishers, 1st Edition 2001.

Supplementary Readings:

1. Departmental laboratory manuals.