

## Semester Lecture Plan

<b>Name of the college:</b> Government College of Arts, Science & Commerce, Sanquelim-Goa							
<b>Name of Faculty:</b> Dr. Dattaprasad D. Narulkar				<b>Subject:</b> Chemistry DSE Selected Instrumentation in Chemistry (Theory) section B			
<b>Paper code:</b> CHD-103			<b>Program/Course:</b> T.Y. B.Sc.			<b>Division:</b> -	
<b>Academic year:</b> 2024 - 2025			<b>Semester:</b> VI			<b>Total Lectures:</b> 30 (Theory)	
<b>Course Objectives:</b> <ol style="list-style-type: none"> <li>1) To explain principles, working and selected applications of photoelectric colorimeters and spectrophotometers</li> <li>2) To describe atomic spectroscopic techniques like atomic absorption spectroscopy and flame photometry, fluorimetry with emphasize on principles, instrumentation, applications and limitations</li> <li>3) To explain thermal methods of analysis like DTA, DSC and discuss the applications in pharmaceuticals</li> <li>4) To solve numerical problems associated with UV-Vis, atomic spectroscopic and thermal techniques</li> </ol>							
<b>Course Learning Outcome:</b> <ul style="list-style-type: none"> <li>• The student will be able to describe the working and principles in photoelectric colorimeters and spectrophotometers and its application in photometric titrations and chemical kinetics.</li> <li>• The student will be able to explain principles, instrumentation, applications and limitations of AAS, fluorimetry, flame photometry and solve the numerical with reference to the technique.</li> <li>• The student will be able to interpret steps involved in thermal methods of analysis DTA, DSC and its applications in pharmaceuticals</li> </ul>							
Month	Lectures From	Lectures To	No . of lectur	Topic, Subtopic to be covered	Exercis e/Assig nment	ICT Tools	Reference books

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<b>December</b>	9/12/2024	14/12/2024	02	UV-Visible Spectroscopy: Interaction of electromagnetic radiation with matter, Quantitative calculations- Beer's and Lambert's law, derivation of Beer-Lambert's law,.		Smart board	Ref. 1 and 4
<b>December</b>	16/12/2024	21/12/2024	02	Principles of instrumentation: Sources, monochromators, cells. Types of instruments: Photoelectric colorimeters and Spectrophotometers: Single & Double beam;		Smart board	Ref. 1 and 2.
<b>December-January</b>	23/12/2024	01/01/2024		Christmas break			
<b>December</b>	02/01/2024	04/01/2025	02	comparison between colorimeter and spectrophotometer; applications: qualitative control of purity, quantitative analysis; identification of structural groups in a molecule;		Smart board	Ref. 1 and 4
<b>January</b>	06/01/2025	11/01/2025	02	study of coordination compound, cis-trans isomerism; chemical kinetics.		Smart board	Ref 1.

<b>January</b>	13/01/2025	18/01/2025	02	Photometric titrations (numerical problems solving).	Numerical problems based on UV-Vis spectroscopy	Smart board	Ref 1.
<b>January</b>	20/01/2025	25/01/2025	02	Atomic spectrometric methods Atomic absorption Spectroscopy: Introduction, principle,		Smart board	Ref. 1 and 2
<b>January</b>	27/01/2025	01/02/2025	02	Instrumentation, applications, limitations.		Smart board	Ref. 1 and 2
<b>January/February</b>	03/02/2025	08/02/2025	02	Flame photometry : introduction, principle, instrumentation,		Smart board	Ref. 1 and 2.
<b>February</b>	10/02/2025	15/02/2025	02	Applications, limitations Differences between flame photometry and atomic absorption spectroscopy.		Smart board	Ref. 1 and 2.
<b>February</b>	17/02/2025	22/02/2025	02	Fluorimetry: principles of fluorescence, chemical structure and fluorescence	Survey of the compounds exhibiting fluorescence	Smart board	Ref. 1 and 2

<b>February</b>	24/02/2025	01/03/2025	02	Relationship between concentration & fluorescence intensity, instrumentation		Smart board	Ref. 1 and 2.
<b>February /March</b>	03/03/2025	08/03/2025	02	Applications. (numerical problems solving)	Numerical problem solving	Smart board	Ref. 1 and 2
<b>March</b>	10/03/2025	15/03/2025	02	Analysis of drug in solid state : Concepts of particle size, size distribution shown as cumulative undersize curve. Thermal methods of analysis: Basic principles of differential thermal analysis (DTA) and Differential Scanning Calorimetry (DSC)		Smart board	Ref 3.
<b>March</b>	17/03/2025	22/03/2025	02	apparatus and methodology, factors affecting DTA results, quantitative DTA, interpretation of results		Smart board	Ref 3
<b>March</b>	24/03/2025	29/03/2025	02	Applications to detect polymorphism and pseudo polymorphism in pharmaceuticals by DSC or DTA.		Smart board	Ref 3
<b>March</b>	31/03/2025	05/04/2025	02	Revision			

<b>April</b>	07/04/2025	11/04/2025	02	Revision			
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- Assessment Rubrics

Component	Max Marks
ISA 1	10
ISA 2	10
Practical	-
Project	-
Semester End Exam	80

## References

1. K. Raghuraman, D. V. Prabhu, C. S. Prabhu and P. A. Sathe, Basic principles in Analytical Chemistry, 5th edition, Shet Publications Pvt. Ltd.
2. Skoog and Leary, Principles of Instrumental analysis, Saunders College Publication.
3. B. K. Sharma. Instrumental Methods of Chemical Analysis: Goel Publishing House, Meerut
4. G. Chatwal and S. Anand, Instrumental Methods of Chemical Analysis, 5th edition (reprint 2003), Himalaya publication