

Course Title: Chemistry-DSE: Analytical Methods In Chemistry, <i>w.e.f. the session 2024-25 and onwards</i>	
Class: Pt.-III / Semester-VI	Course code: BCH-E601
Lectures: 60	Credits: 04
M.M.: 70	Exam. Hrs.: 3:00

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.

Qualitative and quantitative aspects of analysis:

Sampling, evaluation of analytical data, errors, accuracy and precision, methods of their expression, normal law of distribution if in determinate errors, statistical test of data; F, Q and t test, rejection of data, and confidence intervals.

Basic principles of quantitative analysis: estimation of metal ions from aqueous solution, geometrical isomers, keto-enol tautomers. Determination of composition of metal complexes using Job's method of continuous variation and mole ratio method.

Optical methods of analysis:

Origin of spectra, interaction of radiation with matter, fundamental laws of spectroscopy and selection rules, validity of Beer-Lambert's law.

UV-Visible Spectrometry: Basic principles of instrumentation (choice of source, monochromator and detector) for single and double beam instrument;

Infrared Spectrometry: Basic principles of instrumentation (choice of source, monochromator & detector) for single and double beam instrument; sampling techniques.

Structural illustration through interpretation of data, Effect and importance of isotope substitution.

Flame Atomic Absorption and Emission Spectrometry: Basic principles of instrumentation (choice of source, monochromator, detector, choice of flame and Burner designs. Techniques of atomization and sample introduction; Method of background correction, sources of chemical interferences and their method of removal. Techniques for the quantitative estimation of trace level of metal ions from water samples.

Thermal methods of analysis:

Theory of thermogravimetry (TG), basic principle of instrumentation.

Techniques for quantitative estimation of Ca and Mg from their mixture.

Reference Books:

- Vogel, Arthur I: A Testbook of Quantitative Inorganic Analysis (Rev. by G.H. Jeffery and others) 5th Ed. The English Language Book Society of Longman .
- Willard, Hobert H. et al.: Instrumental Methods of Analysis, 7th Ed. Wardsworth Publishing Company, Belmont, California, USA, 1988.
- Christian, Gary D; Analytical Chemistry, 6th Ed. John Wiley & Sons, New York, 2004.
- Harris, Daniel C: Exploring Chemical Analysis, Ed. New York, W.H. Freeman, 2001.
- Khopkar, S.M. Basic Concepts of Analytical Chemistry. New Age, International Publisher, 2009.
- Skoog, D.A. Holler F.J. and Nieman, T.A. Principles of Instrumental Analysis, Thomson Asia Pvt. Ltd. Singapore.
- Mikes, O. & Chalmes, R.A. Laboratory Hand Book of Chromatographic & Allied Methods, Elles Harwood Ltd. London.

Course objects

- 1.To enable student to identify a problem spectroscopic technique
- 2.Understanding of students TGA,DTA and DSC technique
3. Understanding of students qualitative and quantitative analysis

Course Outcomes (COs)

On successful completion of the course with General Inorganic Chemistry, the student will be able to:

- CO:1 Helped students in attaining basic concepts with a balanced knowledge of qualitative analysis.
- CO:2 Created awareness about Optical methods of analysis for better industrial employment.
- CO:3 Developed interest among students for chemistry and its application in various measurements and monitoring techniques of UV-Visible Spectrometry.
- CO:4 Upgrade students' knowledge about basic concepts of Infrared Spectrometry and its applications.
- CO:5 Developed and enhanced knowledge about the introduction to Flame Atomic Absorption and Emission Spectrometry and skills for its industrial employments.
- CO:6 Created awareness about the role of spectroscopy.
- CO:7 Created the skill in students in Thermal methods of analysis

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
CO:3	X		X					
CO:4		X		X				
CO:5	X			X				X
CO:6	X		X				X	
CO:7			X				X	

Note: put 'X' in relevant column of the mapping