Basic Analytical Techniques

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Basic Analytical Techniques	**2**	**0**	**0**	**2**	XIIth Pass with Science	NA

Learning Objectives

- To make students aware of the importance and the concepts of chemical analysis of water and soil samples collected from different sources
- To make them learn few techniques like chromatography, analytical techniques and instrumentation techniques, for example: spectrophotometry and flame photometry.

Learning Outcomes

By the end of the course, the students will be able to:

- Handle analytical data
- Determine the pH and conductance of soil samples, which can be useful in agriculture sector
- Do quantitative analysis of metal ions in water samples
- Separate ions using chromatographic techniques
- Estimate macronutrients using Flame photometry.

SYLLABUS

Practicals: (15 WEEKS)

1. Determination of pH of soil samples collected from college nursery, sports ground and the soil collected from Yamuna River Bank.
2. Determination of conductance of soil samples collected from college nursery and sports ground.
3. Determination of pH of different types of aerated drinks and fruit juices.
4. Estimation of Calcium and Magnesium ions as Calcium carbonate (total hardness) by complexometric titration.
5. Determination of pH, acidity, and alkalinity of water samples collected from different water body/supply sources like Yamuna water, MCD supply water, Groundwater, water samples collected from water sewage treatment plants (Delhi /NCR).
6. Determination of dissolved oxygen (DO) of a water sample collected from different sources (at least two sources).
7. Determination of BOD of water sample collected from different water sources.
8. Paper chromatographic separation (*ascending and circular both*) of the mixture of metal ion (Ni^{2+} and Co^{2+}) and (Cu^{2+} and Cd^{2+}).
9. To study the use of phenolphthalein in trap cases.
10. Estimation of macro-nutrients: Potassium, calcium and magnesium in soil samples by flame photometry.
11. Spectrophotometric determination of Iron in vitamin / dietary tablets / different solutions of iron.
12. Spectrophotometric identification and determination of caffeine and benzoic acid in soft drink.
13. Spectrophotometric determination of cadmium and chromium in the given water sample.
14. Determination of ion exchange capacity of anion / cation exchange resin (using batch procedure if use of column is not feasible).
15. Visit STP plants and different chemical industries.

References:

1. Svehla, G. (1996), **Vogel's Qualitative Inorganic Analysis**, Prentice Hall.
2. Mendham, J.; Denney, R.C.; Barnes, J.D.; Thomas, M.J.K. (2007), **Vogel's Quantitative Chemical Analysis**, 6th Edition, Prentice Hall.
3. De, A. K. (2021), **Environmental Chemistry**, 10th edition. New Age International Pvt. Ltd.

Note: Learners are advised to use the latest edition of readings.