

**(B.Pharm)**  
**(Semester- I)**

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<b>Course Code</b>	<b>BP102T</b>
<b>Course Title</b>	<b>Pharmaceutical Analysis I – Theory</b>

**Scope:**

This course deals with the fundamentals of analytical chemistry and principles of electrochemical analysis of drugs

**Objectives:**

Upon completion of the course student shall be able to

1. Understand the principles of volumetric and electro chemical analysis
2. Carryout various volumetric and electrochemical titrations
3. Develop analytical skills

**Course Learning Outcomes (CLO):**

At the end of the course, students will be able to -

1. Understand the basics of different types of titrimetric methods.
2. Describe the principle, instrumentation and electrodes of various electro analytical methods
3. Analyze the different sources and types of the error
4. Prepare solutions of different strengths used in pharmaceutical field (Molar, Normal etc.)

**Syllabus:**

**Teaching hours: 45 Hours**

**UNIT-I**

**10 Hours**

- **Pharmaceutical analysis**- Definition and scope
  - i) Different techniques of analysis
  - ii) Methods of expressing concentration
  - iii) Primary and secondary standards.
  - iv) Preparation and standardization of various molar and normal solutions- Oxalic acid, sodium hydroxide, hydrochloric acid, sodium thiosulphate, sulphuric acid, potassium permanganate and ceric ammonium sulphate
- **Errors:** Sources of errors, types of errors, methods of minimizing errors, accuracy, precision and significant figures
- Pharmacopoeia, Sources of impurities in medicinal agents, limit tests.

**UNIT-II**

**10 Hours**

- **Acid base titration:** Theories of acid base indicators, classification of acid base titrations and theory involved in titrations of strong, weak, and very weak acids and bases, neutralization curves
- **Non aqueous titration:** Solvents, acidimetry and alkalimetry titration and estimation of Sodium benzoate and Ephedrine HCl

**UNIT-III****10 Hours**

- **Precipitation titrations:** Mohr's method, Volhard's, Modified Volhard's, Fajans method, estimation of sodium chloride.
- **Complexometric titration:** Classification, metal ion indicators, masking and demasking reagents, estimation of Magnesium sulphate, and calcium gluconate.
- **Gravimetry:** Principle and steps involved in gravimetric analysis. Purity of the precipitate: co-precipitation and post precipitation, Estimation of barium sulphate.
- Basic Principles, methods and application of diazotisation titration.

**UNIT-IV****08 Hours**

- **Redox titrations**
    - (a) Concepts of oxidation and reduction
    - (b) Types of redox titrations (Principles and applications)
- Cerimetry, Iodimetry, Iodometry, Bromatometry, Dichrometry, Titration with potassium iodate

**UNIT-V****07 Hours**

- **Electrochemical methods of analysis**
  - **Conductometry-** Introduction, Conductivity cell, Conductometric titrations, applications.
  - **Potentiometry** - Electrochemical cell, construction and working of reference (Standard hydrogen, silver chloride electrode and calomel electrode) and indicator electrodes (metal electrodes and glass electrode), methods to determine end point of potentiometric titration and applications.
  - **Polarography** - Principle, Ilkovic equation, construction and working of dropping mercury electrode and rotating platinum electrode, applications

**Tutorials****Teaching hours: 15 Hours**

Tutorials will be based on above syllabus

**Suggested Readings<sup>^</sup>:** (Latest edition)

1. Beckett, A. H., & Stenlake, J. B. (Eds.). Practical Pharmaceutical Chemistry: Part I & II. A&C Black.
2. Mendham, J. Vogel's textbook of quantitative chemical analysis. Pearson Education India.
3. P. Gundu Rao, Inorganic Pharmaceutical Chemistry. Vallabh Publications.
4. Driver, J. E. Bentley & Driver's text-book of pharmaceutical chemistry. London.
5. Kennedy, J. H. Analytical Chemistry: Principles. Harcourt School.
6. Indian Pharmacopoeia

L= Lecture, T= Tutorial, P= Practical, C= Credit

<sup>^</sup> this is not an exhaustive list

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