



**Gyanmanjari**  
Innovative University

**Course Syllabus**  
**Gyanmanjari Pharmacy College**  
**Semester-1(B.Pharm.)**

**Subject:** Pharmaceutical Analysis- I (BPHBP11304)

**Type of course:** Major

**Prerequisite:** NA

**Rationale:** The purpose of Pharmaceutical Analysis is to identify substances, purify them, separate them, quantify them, determine the molecular structures of chemical compounds that make up pharmaceuticals, and determine how these compounds are combined to make up a pharmaceutical product.

**Teaching and Examination Scheme:**

Teaching Scheme			Credits C	Examination Marks				Total Marks
CI	T	P		Theory Marks		Practical Marks	CA	
			ESE	MSE	VP	ALA		
3	1	4	6	75	25	35	15	150

*Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.*

**Continuous Assessment:**

(For each activity maximum-minimum range is 5 to 10 marks)

Sr. No	Active Learning Activities	Marks
1.	<b>Concentration based Calculations:</b> Faculty will provide task and student solve the problems and upload on moodle.	05
2.	<b>Assignment:</b> Faculty will provide title of topic and student write principle and applications for the given titrations and upload on moodle.	05
3.	<b>Drawing and applications:</b> Faculty will provide name of equipment or apparatus student write the draw the diagram and give applications of it and upload on moodle.	05
Total		15



**Course Content:**

Sr. No	Course content	Hrs	% Weightage
1	<p><b>(a) Pharmaceutical analysis-</b> Definition and scope</p> <p>i) Different techniques of analysis</p> <p>ii) Methods of expressing concentration</p> <p>iii) Primary and secondary standards.</p> <p>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</p> <p><b>(b)Errors:</b> Sources of errors, types of errors, methods of minimizing errors, accuracy, precision and significant figures</p> <p><b>(c)Pharmacopoeia,</b> Sources of impurities in medicinal agents, limit tests</p>	10	23%
2	<p><b>Acid base titration:</b> 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</p> <p><b>Non aqueous titration:</b> Solvents, acidimetry and alkalimetry titration and estimation of Sodium benzoate and Ephedrine HCl</p>	10	23%
3	<p><b>Precipitation titrations:</b> Mohr's method, Volhard's, Modified Volhard's, Fajans method, estimation of sodium chloride.</p> <p><b>Complexometric titration:</b> Classification, metal ion indicators, masking and demasking reagents, estimation of Magnesium sulphate, and calcium gluconate.</p> <p><b>Gravimetry:</b> 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.</p>	10	23%
4	<p><b>Redox titrations:</b></p> <p>(a) Concepts of oxidation and reduction</p> <p>(b) Types of Redox titrations (Principles and applications)</p> <p>Cerimetry, Iodimetry, Iodometry, Bromatometry, Dichrometry, Titration with potassium iodate</p>	08	18%
5	<p><b>Electrochemical methods of analysis</b></p> <p><b>Conductometry-</b> Introduction, Conductivity cell, Conductometric titrations, applications.</p>	07	13%

<p><b>Potentiometry</b> - 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 Potentiometry titration and applications.</p> <p><b>Polarography</b> - Principle, Ilkovic equation, construction and working of dropping mercury electrode and rotating platinum electrode, applications</p>		
--	--	--

**Suggested Specification table with Marks (Theory):75**

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	30%	40%	10%	10%	10%	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

**Course Outcome:**

After learning the course the students should be able to:	
CO1	Explain the various methods of expressing concentration and requirement of primary standards.
CO2	Describe the preparation and standardization of different reagents used in volumetric analysis.
CO3	Discuss validation of results achieved in analytical measurements.
CO4	Explain the principle of acid base, non aqueous and precipitation titration with examples.
CO5	Describe the principle of complexometric and gravimetric estimation with examples.



**List of Practical**

(Minimum-10 practical):

Sr. No	Descriptions	Unit No	Hrs
1.	Preparation and standardization of Sodium hydroxide	1	4
2.	Preparation and standardization of Sulphuric acid	1	4
3.	Preparation and standardization of Sodium thiosulfate	1	4
4.	Preparation and standardization of Potassium permanganate	1	4
5.	Preparation and standardization of Ceric ammonium sulphate	1	4
6.	Assay of the following compounds along with Standardization of titrant Ammonium chloride by acid base titration	2	4
7.	Assay of the following compounds along with Standardization of titrant Ferrous sulphate by Cerimetry.	3	4
8.	Assay of the following compounds along with Standardization of titrant Copper sulphate by Iodometry	3	4
9.	Assay of the following compounds along with Standardization of titrant Calcium gluconate by complexometry	3	4
10	Assay of the following compounds along with Standardization of titrant Hydrogen peroxide by Permanganometry by non-aqueous titration.	4	4
11.	Assay of the following compounds along with Standardization of titrant Sodium benzoate by non-aqueous titration.	4	4
12.	Assay of the following compounds along with Standardization of titrant Sodium Chloride by precipitation titration	4	4
13.	Determination of Normality by electro-analytical methods conductometric titration of strong acid against strong base.	5	4
14.	Determination of Normality by electro-analytical methods conductometric titration of strong acid and weak acid against strong base.	5	4
15.	Determination of Normality by electro-analytical methods Potentiometric titration of strong acid against strong base	5	4
		Total Hrs	60

**Instructional Method:**

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction. Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory. The internal evaluation will be done on the basis of Active Learning Assignment Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

**Reference Books:**

1. A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II, Stahlone Press of University of London
2. A.I. Vogel, Text Book of Quantitative Inorganic analysis
3. P. Gundu Rao, Inorganic Pharmaceutical Chemistry
4. Bentley and Driver's Textbook of Pharmaceutical Chemistry
5. John H. Kennedy, Analytical chemistry principles
6. Indian Pharmacopoeia.
7. Organic Medicinal and Phamaceutical Chemistry, J. Lippincott Co., Philadelphia. Discher L A, Modem Inorganic Pharmaceutical Chemistry. Eliel E L.

