GANPAT UNIVERSITY

FACULTY OF PHARMACY

Programme	Bachelor of Pharmacy	Branch/Spec.	General
Semester	I	Version	3.0.0.0
Effective from Academic Year	2026-27	Effective for the Batch admitted in	July 2026
Course Code	BP106T	Course Name	Pharmaceutical Inorganic and Analytical Chemistry (Theory)

Scheme	Teaching Scheme (Per week)					Examination Scheme (Marks)			
	L	TU	P	TW	Total		CE	SEE	Total
Credit	3	0	0	--	3	Theory	30	45	75
Hours	3	0	0	--	--	Practical	-	-	-

Pre-requisites	Nil / Basic knowledge of Chemistry and Biology

COURSE OBJECTIVES

The objectives of this course are to:
1. Understand the importance of errors, impurities in pharmaceuticals.
2. Comprehend the principles of buffer systems.
3. Develop skills in performing and interpreting limit tests and titrimetric analysis.
4. Emphasize the importance of inorganic compounds and radiopharmaceuticals in Pharmacy
5. Explain synthesis and analysis of inorganic compounds/products of pharmaceutical importance

Course Outcomes

On successful completion of the course, the students will be able to:

CO1	Identify sources and types of errors in pharmaceutical analysis, and impurities in products.
CO2	Apply concepts of acid-base chemistry, buffer systems with importance of electrolytes.
CO3	Describe and differentiate various analytical techniques used in pharmaceutical analysis, including titrimetric methods, and their specific applications in quality assessment.
CO4	Analyze the properties, mechanisms, and therapeutic uses of gastrointestinal agents, radiopharmaceuticals, expectorants, antidotes, and other pharmaceutical compounds.
CO5	Describe the drugs used in expectorants, emetics, haematinics, poison and antidote and astringents.

Theory Syllabus

Unit	Content	Hrs.
I	Introduction to Pharmaceutical Analysis • Different techniques of analysis, methods of expressing strength of solutions, primary and secondary standards with examples. • Errors: Sources of errors, types of errors, methods of minimizing errors, accuracy, precision and significant figures. • Impurities: Definition, types, contents and regulatory importance. Sources and types of impurities in pharmaceuticals. Limit tests for chloride, sulphate, iron, arsenic, lead, heavy metals, and modified limit test for chloride and sulphate.	07
II	Acid-Base Chemistry and Buffer Systems in Pharmacy • Definition of acids, bases, buffers, pH Scale and its significance, Buffer equation, calculation of pH for Buffer solution. Isotonicity and its application in IV Fluids and Ophthalmic Solutions.	08

	• Major extra and intracellular electrolytes: Functions of major physiological ions. Electrolytes used in replacement therapy: Sodium chloride, Potassium chloride, Calcium chloride and Oral Rehydration Salt (ORS). Physiological acid-base balance.	
III	Titrimetric Methods • Acid-base titrations: Theories of acid-base indicators, classification of acid-base titrations. Preparation and standardization of HCl and NaOH. Neutralization curves. Assay of Ammonium hydroxide. • Non-aqueous titrations: Types of solvents, acidimetric and alkalimetric titrations. Estimation of Sodium benzoate. • Precipitation titrations and gravimetry: Principle and steps in gravimetric analysis, Mohr's method, Volhard's, Modified Volhard's, Fajans method. Estimation of barium sulphate. • Complexometric titrations: Classification, metal ion indicators, masking and demasking reagents, preparation and standardization of disodium EDTA. Estimation of Magnesium sulphate and Calcium gluconate. • Redox titrations: Concepts of oxidation and reduction. Types: Permanganometry, Cerimetry, Iodimetry, Iodometry and titrations with potassium iodate.	14
IV	Gastrointestinal Agents and Radiopharmaceuticals • Acidifiers: Sodium acid phosphate and Dilute Hydrochloric acid. • Antacids: Ideal properties, combinations, Sodium bicarbonate, Aluminium hydroxide gel. • Agents promoting bowel movements: Magnesium hydroxide, Sodium orthophosphate, Sodium Potassium tartrate and Magnesium trisilicate. • Antimicrobials: Mechanism, classification, Potassium permanganate, Boric acid, Hydrogen peroxide, Chlorinated lime, Iodine and its preparations. • Radiopharmaceuticals: Basics of radioactivity, applications of radioisotopes – Sodium Iodide I-131, Technetium-99m, Cobalt-60, Phosphorus-32; safe handling, storage, and disposal.	10
V	Miscellaneous Compounds • Expectorants: Potassium iodide, Ammonium chloride. • Emetics: Copper sulphate, Sodium potassium tartrate. • Haematinics: Ferrous sulphate, Ferrous gluconate. • Poison and Antidote: Definition, classification of antidotes, Sodium thiosulphate.	06

Text Books

1. Bentley, R. and Driver, J. Bentley and Driver's Textbook of Pharmaceutical Chemistry. Oxford University Press.
2. Vogel, A.I. Vogel's Textbook of Quantitative Chemical Analysis. Pearson Education Limited, Essex.
3. Beckett, A.H. and Stenlake, J.B. Practical Pharmaceutical Chemistry. Parts I & II. The Athlone Press, London.

Reference Books

4. Schroff, M.L. Inorganic Pharmaceutical Chemistry. Oxford Book Company, New Delhi.
5. Indian Pharmacopoeia Commission. Indian Pharmacopoeia. Ghaziabad, India.

ICT / MOOCs Reference

6. NPTEL – Pharmaceutical Analysis
7. Online IP resources (ipc.nic.in)
8. ACS (American Chemical Society) e-resources

Mapping of CO with PO and PSO:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PEO1	PEO2	PEO3	PEO4	PEO5
CO1	2	1	-	3	1	-	-	-	-	-	2	2	1	1	-	3
CO2	1	3	1	3	2	-	-	-	-	-	2	2	2	3	-	2
CO3	1	2	3	3	2	-	-	-	-	-	2	2	3	2	-	2
CO4	2	3	3	3	3	-	1	-	1	-	2	3	3	3	1	2
CO5	2	3	2	3	3	-	2	1	1	-	2	3	2	3	1	2