

Pharmaceutical Chemistry (Theory)

D. Pharm - First Year

Course Code: ER 20-12T

For First-Year Diploma in Pharmacy Students

Md Golam Hasan

Assistant Professor

Mango Valley Pharmacy College and
Research, West Bengal, India

Dr. Nalini Kanta Sahoo

Dean & Principal

Adesh University, Punjab, India

Kunal Sharad Surwade

Senior Lecturer

SNJB's Shri Deepchand Fakirchand Lodha
Pharmacy College, Nashik, India



Pharmaceutical Chemistry (Theory)

Course Code: ER 20-12T

For first year Diploma in Pharmacy students

Authors: Md Golam Hasan, Dr. Nalini Kanta Sahoo, Kunal Sharad Surwade

Edition: First Edition, August 2026

Language: English

Copyright © 2026 Wiseleaf Scientific Ventures Pvt. Ltd.

All rights reserved.

No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the publisher, except for brief quotations in reviews or scholarly works permitted by copyright law.

ISBN: 978-81-903393-0-8



MRP: 290/-

Published by: Wiseleaf Scientific Ventures Pvt. Ltd.

Address: Wework - Berger Delhi One Floor 19, C-001/A2, Sector 16b, Noida, Uttar Pradesh, 201301, India

Printed by: Patraloka | Prints and More

Immadihalli Main Rd, Immadihalli, Whitefield, Bengaluru, Karnataka 560066

Printed in India

Preface

Pharmaceutical Chemistry is a fundamental subject in the Diploma in Pharmacy curriculum, providing students with essential knowledge of medicinal substances, their chemical properties, uses, and significance in pharmacy practice.

This book covers the full ER20-12T Pharmaceutical Chemistry syllabus in a short, point-wise form so that a first-year D. Pharm student can learn and revise quickly.

The chapters are written in simple language and follow the order of the syllabus. Each drug chapter opens with a classification chart, treats the important members in a table, and shows the chemical structures of the syllabus-starred drugs. Every chapter ends with a summary and exam-style questions.

Two habits run through the book. A “High-yield” line marks a point that is commonly asked in the examination. A “Note the exception” line marks the small detail that students most often get wrong.

We hope this book serves as a useful learning companion for D.Pharm students and helps them develop a strong foundation in Pharmaceutical Chemistry that will support their future studies and professional practice.

Authors

Md Golam Hasan

Dr. Nalini Kanta Sahoo

Kunal Sharad Surwade

How to Use This Book

- **Read the chart first.** The classification chart at the start of each drug chapter shows how the drugs are grouped.
- **Learn the tables.** Class, uses, and storage are set in tables for fast revision.
- **Know the starred structures.** Structures are shown for the drugs the syllabus marks with a star; these are the ones you may be asked to draw.
- **Test yourself.** Use the questions at the end of each chapter to check recall.

Course Objectives

This course discusses the following aspects of the chemical substances used as drugs and pharmaceuticals for various disease conditions:

1. Chemical classification, chemical name, and chemical structure.
2. Pharmacological uses, doses, stability, and storage conditions.
3. Different types of formulations / dosage forms available and their brand names.
4. Impurity testing and basic quality-control tests.

Course Outcomes

Upon successful completion of this course, the student will be able to:

1. Describe the chemical class, structure, and chemical name of commonly used drugs and pharmaceuticals of both organic and inorganic nature.
2. Discuss the pharmacological uses, dosage regimen, stability issues, and storage conditions of such chemical substances commonly used as drugs.
3. Describe the quantitative and qualitative analysis and impurity testing of the chemical substances given in the official monographs.
4. Identify the dosage form and the brand names of the drugs and pharmaceuticals popular in the marketplace.

Syllabus (ER20-12T) - 75 Hours

Chapter	Topic	Hours
1	Introduction to Pharmaceutical Chemistry; sources and types of errors (accuracy, precision, significant figures); impurities in pharmaceuticals and limit tests for chlorides, sulphates, iron, heavy metals, and arsenic	8
2	Volumetric analysis (acid-base, non-aqueous, precipitation, complexometric, redox); gravimetric analysis	8
3	Inorganic Pharmaceuticals: haematinics, gastro-intestinal agents, topical agents, dental products, medicinal gases	7
4	Nomenclature of organic chemical systems, with reference to heterocyclic compounds up to three rings	2
5	Drugs Acting on the Central Nervous System	9
6	Drugs Acting on the Autonomic Nervous System	9
7	Drugs Acting on the Cardiovascular System	5
8	Diuretics	2
9	Hypoglycemic Agents	3
10	Analgesic and Anti-Inflammatory Agents	3
11	Anti-Infective Agents	8
12	Antibiotics	8
13	Anti-Neoplastic Agents	3

Table of Contents

Preface	iii
Course Objectives.....	v
Course Outcomes.....	v
Syllabus (ER20-12T) - 75 Hours.....	vi
Table of Contents	vii
Chapter 1 - Introduction, Errors, and Impurities & Limit Tests.....	1
1.1 Introduction to Pharmaceutical Chemistry	1
1.2 Sources and Types of Errors.....	2
1.3 Significant Figures.....	4
1.4 Impurities in Pharmaceuticals	4
1.5 Limit Tests.....	5
1.6 Chapter Summary	8
1.7 Self-Assessment	8
1.8 Expanded Notes.....	9
1.9 Revision at a Glance (Exam One-Liners).....	10
1.10 Multiple Choice Questions	10
1.11 Fill in the Blanks	12
1.12 Match the Following.....	13
1.13 Exam Question Bank.....	13
Chapter 2 - Volumetric and Gravimetric Analysis.....	14
2.1 Volumetric Analysis - Fundamentals	14
2.2 Types of Titration	15
2.3 Gravimetric Analysis.....	18
2.4 Simple Calculations.....	19
2.5 Chapter Summary	20
2.6 Self-Assessment	20
2.7 Expanded Notes.....	21
2.8 Revision at a Glance (Exam One-Liners).....	22
2.9 More Worked Problems	22
2.10 Multiple Choice Questions	23
2.11 Fill in the Blanks	25
2.12 Match the Following.....	25

2.13 Exam Question Bank	26
Chapter 3 - Inorganic Pharmaceuticals.....	27
3.1 Haematinics	27
3.2 Gastro-Intestinal Agents	28
3.3 Topical Agents.....	30
3.4 Dental Products	31
3.5 Medicinal Gases	31
3.6 Chapter Summary	32
3.7 Self-Assessment	32
3.8 Expanded Notes.....	33
3.9 Revision at a Glance (Exam One-Liners).....	34
3.10 Multiple Choice Questions	34
3.11 Fill in the Blanks	36
3.12 Match the Following.....	37
3.13 Exam Question Bank.....	37
Chapter 4 - Nomenclature of Organic Chemical Systems (Heterocyclic Compounds up to Three Rings)	38
4.1 What is a Heterocyclic Compound?	38
4.2 Basis of Naming	39
4.3 Single-Ring (Monocyclic) Systems.....	39
4.4 Two-Ring (Bicyclic / Fused) Systems.....	40
4.5 Three-Ring (Tricyclic) Systems	41
4.6 Chapter Summary	41
4.8 Revision at a Glance (Exam One-Liners).....	42
4.9 Ring–Drug Link (Quick Table)	43
4.10 Multiple Choice Questions	43
4.11 Fill in the Blanks	44
4.12 Exam Question Bank.....	45
Chapter 5 - Drugs Acting on the Central Nervous System	46
5.1 Anaesthetics (General)	46
5.2 Sedatives and Hypnotics.....	47
5.3 Antipsychotics	48
5.4 Anticonvulsants (Antiepileptics).....	50
5.5 Antidepressants.....	52

5.6 Chapter Summary	53
5.7 Self-Assessment	53
5.8 Expanded Notes.....	54
5.9 Revision at a Glance (Exam One-Liners).....	55
5.10 Multiple Choice Questions	55
5.11 Fill in the Blanks	57
Structure Gallery - Other Important Drugs	58
Match the Following (CNS)	59
Exam Question Bank (CNS)	59
Chapter 6 - Drugs Acting on the Autonomic Nervous System	60
6.1 Sympathomimetic (Adrenergic) Agents.....	60
6.2 Adrenergic Antagonists (Blockers)	62
6.3 Cholinergic Drugs and Related Agents	63
6.4 Cholinergic Blocking Agents (Anticholinergics).....	64
6.5 Chapter Summary	65
6.6 Self-Assessment	65
6.7 Expanded Notes.....	66
6.8 Revision at a Glance (Exam One-Liners).....	67
6.9 Multiple Choice Questions	67
6.10 Fill in the Blanks	69
Structure Gallery - Other Important Drugs	70
Match the Following (ANS).....	70
Exam Question Bank (ANS)	71
Chapter 7 - Drugs Acting on the Cardiovascular System.....	72
7.1 Anti-Arrhythmic Drugs	72
7.2 Anti-Hypertensive Agents	73
7.3 Antianginal Agents	74
7.4 Chapter Summary	75
7.5 Self-Assessment	75
7.6 Expanded Notes.....	76
7.7 Revision at a Glance (Exam One-Liners).....	76
7.8 Multiple Choice Questions	77
7.9 Fill in the Blanks	78
Structure Gallery - Other Important Drugs	79

Exam Question Bank (Cardiovascular)	79
Chapter 8 - Diuretics	80
8.1 Introduction	80
8.2 Classification and Members	80
8.3 Uses and Storage	81
8.4 Chapter Summary	82
8.5 Self-Assessment	82
8.6 Revision at a Glance (Exam One-Liners).....	82
8.6b Multiple Choice Questions	83
8.6c Fill in the Blanks.....	84
Exam Question Bank (Diuretics).....	84
Chapter 9 - Hypoglycemic Agents	85
9.1 Introduction	85
9.2 Insulin and Its Preparations	85
9.3 Oral Hypoglycemic Agents	86
9.4 Chapter Summary	87
9.5 Self-Assessment	87
9.6 Revision at a Glance (Exam One-Liners).....	88
9.6b Multiple Choice Questions	88
9.6c Fill in the Blanks.....	89
Structure Gallery - Other Important Drugs	90
Exam Question Bank (Hypoglycemic Agents)	90
Chapter 10 - Analgesic and Anti-Inflammatory Agents.....	91
10.1 Introduction	91
10.2 Opioid (Narcotic) Analgesics	91
10.3 Non-Steroidal Anti-Inflammatory Agents (NSAIDs)	92
10.4 Chapter Summary	93
10.5 Self-Assessment	94
10.6 Expanded Notes.....	94
10.7 Revision at a Glance (Exam One-Liners).....	95
10.8 Multiple Choice Questions	95
10.9 Fill in the Blanks	97
Structure Gallery - Other Important Drugs	97
Match the Following (Analgesics)	98