

A Textbook of General Pharmacology

BP304T

For B.Pharm II year students

As per New PCI Syllabus 2026 (NEP 2020)

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Preface

General pharmacology is the grammar of the subject. Before any student can reason about a diuretic, an antibiotic, or an anticancer agent, they must understand what a drug does to the body, what the body does to the drug, and how both are measured, modified, and made safe. This book teaches that grammar for the third-semester B.Pharm student, following the Pharmacy Council of India syllabus for BP304T in full.

The organising idea is simple. A drug is useful only when enough of it reaches the right target, acts selectively, and does so within a margin that separates benefit from harm. The five units of the syllabus map onto that idea: pharmacokinetics follows the drug from the site of administration to the site of action and out again; pharmacodynamics explains the selective interaction that produces an effect; drug discovery and toxicology together form the filter that removes unsafe candidates before a human is exposed. Each chapter opens with the working question its topic answers, states the governing definition, lays out the full classification, and then derives the mechanism rather than asserting it.

The treatment is comprehensive without being padded. Where a syllabus line implies a class, the class is covered member by member; where it implies a method, the variants and their trade-offs are given. Every figure is original and drawn to print cleanly in black and white. Every table earns its place. The self-assessment at the end of each chapter mirrors the university question paper: short notes, long-answer questions with structured model answers, multiple-choice questions, and worked numericals where the subject demands them.

Facts have been checked against the prescribed references and, where exact values or regulatory guideline numbers are involved, against the primary standards themselves. Accuracy has been treated as the first duty of a textbook.

Authors

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Course Objectives

The objectives of this course are:

1. To provide a foundational understanding of the history of pharmacology, focusing on the evolution of drug discovery and development.
2. Introducing the concepts of pharmacodynamics and pharmacokinetics, helping students understand the mechanisms of drug action, absorption, distribution, metabolism, and excretion.
3. To familiarize students with the principles behind new drug development, including preclinical testing, drug screening methods, and safety pharmacology.
4. To enable students to learn about toxicity testing, ensuring they understand different methods of evaluating drug safety and the regulatory guidelines involved in toxicity assessment.
5. To prepare students for understanding the pharmacology of different therapeutic drug classes, by applying basic pharmacological knowledge to current trends in drug development and screening.

Course Outcomes

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

1. Relate the fundamental principles of pharmacodynamics and pharmacokinetics of drugs actions on the human body.
2. Illustrate the processes involved in the drug metabolism, toxicity, and safety evaluation to relate their significance in the preclinical development of new drugs.
3. Apply the knowledge of pharmacological principles to efficacy, toxicity, and safety evaluation of new drug candidates.
4. Assess the ethical and scientific principles underlying drug safety, efficacy, and toxicity testing.
5. Appraise the recent trends in pharmacology.

Syllabus

Unit	Topics	No. of lectures
I	Introduction to Pharmacology a) Definition, historical perspectives, branches of pharmacology and their scope, drug, nature and sources of drugs, International Classification of Diseases (ICD) and International Non-proprietary Names (INN) for drugs b) Concept of generic medicines, essential drugs and rational drug use (RDU). Indian Government's initiatives to promote these concepts. c) Routes of drug administration along with their advantages and disadvantages.	08 Hours
II	Pharmacokinetics a) Drug absorption, mechanisms of drug absorption, membrane transporters, bioavailability, bioequivalence, factors affecting drug absorption. b) Drug distribution in different compartments, volume of distribution, storage sites, plasma protein binding and its therapeutic importance. c) Drug biotransformation, microsomal, non-microsomal metabolism and cytochrome P450 enzyme system, phase I and II reactions, first-pass metabolism, entero-hepatic cycling, concept of prodrugs. d) Drug excretion and its kinetics.	07 Hours
III	Pharmacodynamics a) Types drug action and mechanisms of drug action, dose response relationship. b) Receptor theories, structure of receptors, classification and regulation of receptors, spare receptors. Concept of agonist, inverse agonist, partial agonist and antagonist. c) Signal transduction mechanisms of receptors. d) Factors modifying drug action including the concepts of tachyphylaxis, idiosyncrasy, drug tolerance, dependence, addiction, and the combined effect of drugs (Additive effect & Synergism). e) Adverse drug reactions (ADR) and types of ADRs.	10 Hours

	f) Drug interaction, types, pharmacokinetic and pharmacodynamic drug-drug interactions.	
IV	Overview of drug discovery and evaluation of new drug a) Brief discussion on drug discovery and preclinical evaluation of new drugs. b) Human relevant screening techniques: Reconstructed human epidermis, organ-on-Chip model, skin irritancy test by reconstructed corneal epithelium, skin corrosivity testing by Direct Peptide Reactivity Assay. c) Advantages and disadvantages of in vitro and in silico Pharmacological screening and evaluation Recent trends in pharmacology a) Chronopharmacology: Introduction, biological clock, types of rhythms, hormones, diseases and drugs affected by circadian rhythm. Introduction to chrono kinetics and importance of chronotherapeutic and future scope. b) Introduction, general principles, applications and scope of Pharmacogenomics, Gene therapy, Biosimilars and Precision medicine.	12 Hours
V	Toxicology a) Introduction to toxicology and its branches. Classification of poisons based on actions and lethal doses, types of antidotes. b) General principles of treatment of acute poisoning include heavy metal poisoning. Management of poisoning. c) Definition and basic knowledge of preclinical toxicity testing-acute toxicity, sub-acute toxicity, combined chronic and carcinogenicity testing as per OECD norms. d) Basic understanding of principles of genotoxicity and teratogenicity as per OECD guidelines. e) Definition and concepts of safety pharmacology as per ICH and OECD guidelines.	08 Hours

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