Program	B. Pharmacy
Semester	1st semester
Subject /Course	General Pharmacy (Theory)
Subject/Course ID	BP 102T
Module No.	01
Module Title	Introduction to the Profession of Pharmacy
Course coordinator	Dr. Gurjeet Singh

Learning Outcome of Module-

LO	Learning Outcome (LO)	Course Outcome Code
LO1	Describe the development and milestones of the pharmacy profession, education, and industry within the Indian context.	BP102.1
LO2	Explain the diverse roles and responsibilities of pharmacists across retail, hospital, clinical, and industrial pharmacy sectors.	BP102.1
LO3	Navigate and interpret the structure, content, and specific monographs of the Indian Pharmacopoeia (IP) and other international standards.	BP102.1
LO4	Identify the various parts of a prescription and demonstrate the ability to handle them accurately using correct Latin terminology.	BP102.1
LO5	Summarize the role of pharmaceutical organizations in the evolution of the pharmacy profession in India.	BP102.1

Module Content Table

No.	Topic
1.	History of the Profession of Pharmacy in India: In relation to pharmacy education, pharmaceutical industries and organizations – evolution, development and milestones
2.	Scope of the Pharmacy Profession: Role and responsibilities of pharmacists in retail/community pharmacy, hospital and clinical pharmacy, and industrial pharmacy including research and development.
3.	Pharmacopoeias: Introduction to IP, BP, USP, BPC, International Pharmacopoeia, other pharmacopoeias and the National Formulary of India; structure and content of the Indian Pharmacopoeia; study of one model IP monograph.
4.	Introduction to Prescription: Structure and format/parts of prescription, handling of prescriptions, Latin terminology related to prescriptions.

HISTORY OF PROFESSION OF PHARMACY IN INDIA IN RELATION TO PHARMACY EDUCATION

The history of pharmacy as a profession in India is closely linked to the evolution of pharmacy education across the country. The roots of formal pharmaceutical learning can be traced back to the mid-19th century, when modern medicine began taking shape under British rule. The earliest structured pharmacy training started in 1860 at Madras Medical College, where students were taught the fundamentals of compounding, dispensing, and labelling medicines. At this stage, the focus was primarily on preparing assistants who could support physicians by compounding formulations, as medicines were not available in ready-made industrial forms.

By the early decades of the 20th century, the demand for trained personnel grew, pushing institutions to introduce more organized curricula. **A** two-year diploma course for "Chemists and Druggists" was launched in 1937 at Madras Medical College and at Visakhapatnam. This course included subjects like Materia Medica, Chemistry, and Practical Pharmacy. Around the same period, a compounder's course was also introduced in Bengal, Bihar, Bombay, and the United Provinces (now Uttar Pradesh). In the Portuguese colony of Goa, an advanced diploma in pharmacy was implemented, marking one of the earliest attempts to create higher-level technical training for pharmacy professionals.

A major milestone in the academic progress of pharmacy was achieved with the launch of the first degree-level program, B.Sc. in Pharmaceutical Chemistry**,** at Banaras Hindu University (BHU) in 1932. This initiative was championed by Prof. Mahadev Lal Schroff, who is often celebrated as the *Father of Modern Indian Pharmacy Education*. Five years later, in 1937, BHU advanced further by initiating a full-fledged three-year Bachelor of Pharmacy (B.Pharm) program, supported by a dedicated team of pharma

pioneers including G.P. Srivastava, N.K. Basu, G.B. Singh, S. Prasad, D.N. Majumdar, and N.C. Neogi. These developments created a nationwide momentum, motivating several other universities—such as Andhra University, Madras University, the University of Bombay, Punjab University, and Lallubhai Motilal College of Pharmacy in Ahmedabad—to introduce formal pharmacy programs.

After Independence, pharmacy education continued to expand rapidly. The Department of Pharmacy at Birla Institute (now BITS, Pilani) was founded around 1950 by Prof. Schroff, further strengthening the academic landscape. During the same decade, universities like Nagpur and Sagar introduced B.Pharm programs. In 1940, BHU also began offering the first M.Pharm program**,** initially of one-year duration, which later increased to one and a half years by 1952–53. Soon after, numerous universities—including Punjab University, University of Madras, Andhra University, and SMS Medical College, Jaipur—established postgraduate and doctoral programs in pharmacy, expanding both academic and research capacities in the country.

A landmark step in elevating pharmacy research and advanced training came with the establishment of the National Institute of Pharmaceutical Education and Research (NIPER) in 1994. Designed as a premier national institute under the Government of India, NIPER paved the way for high-quality research, innovation, and specialized education. Around the same time, the BV Patel PERD Centre in Ahmedabad emerged as another key institution committed to research, professional development, and national-level scientific gatherings.

Over the last 150 years, pharmacy education in India has transformed significantly. With the dramatic expansion of pharmaceutical sciences—ranging from drug synthesis and formulation to computer-aided drug design and advanced drug delivery systems—the expectations from pharmacy

graduates have broadened. For many decades after independence, the curriculum was heavily oriented toward industrial pharmacy, preparing graduates mainly for roles in production, quality control, formulation development, and marketing. However, by the 1980s and 1990s, widespread misuse of medicines, growing antimicrobial resistance, and rising adverse drug reactions highlighted the urgent need for pharmacists to take on a more patient-centric role.

This shift led to the emergence of clinical pharmacy in India, redefining the role of pharmacists from purely industrial contributors to vital members of the healthcare team. Clinical pharmacy emphasized patient compliance, rational drug use, therapeutic monitoring, and collaboration with physicians—bridging the gap between the pharmaceutical industry and patient care. This development marked a critical turning point, transforming pharmacy into a profession deeply involved in improving therapy outcomes and community health.

Today, India offers a broad spectrum of pharmaceutical education programs, including D.Pharm**,** B.Pharm**,** Pharm.D**,** M.Pharm**,** and Ph.D. The system functions under the combined regulation of the Pharmacy Council of India (PCI) and the All India Council for Technical Education (AICTE)**,** which together oversee academic standards, curriculum design, and professional competency.

HISTORY OF THE PROFESSION OF PHARMACY IN INDIA IN RELATION TO INDUSTRY AND ORGANIZATION

The development of the pharmacy profession in India is closely linked with the growth of the pharmaceutical industry and the establishment of various regulatory and professional organizations. Over the decades, pharmacy in India has evolved from a small-scale, traditional practice to a scientifically

driven and globally recognized profession. This transformation took place gradually, shaped by social needs, scientific progress, industrial expansion, and government policies.

Early Developments (Before 1900s)

In ancient India, healthcare practices were primarily based on Ayurveda, Siddha, and Unani systems. Medicines were prepared by practitioners themselves using herbs, minerals, and natural materials. There was no separate professional role of a "pharmacist"; preparation and dispensing were integrated into the work of traditional healers. With the arrival of the British, western medicine entered India, introducing manufactured drugs and modern concepts of pharmacy.

Introduction of Modern Pharmaceuticals (1900–1940)

By the early 20th century, imported medicines from Europe began to dominate the Indian market. There was no regulation on drug quality, leading to widespread circulation of substandard medicines. This situation highlighted the urgent need for trained personnel in drug manufacturing and dispensing. Small drug production units began appearing in Bengal, Bombay, and Madras, marking the early industrial groundwork. A landmark step during this period was the publication of the Poison Act (1919) and the Drugs Inquiry Committee Report (1930), which drew attention to the lack of quality control and professional standards in drug handling.

Establishment of Formal Pharmacy Education (1940–1950)

Modern pharmacy education in India began in **1937**, when Professor M.L. Schroff introduced the first systematic course in pharmacy at Banaras Hindu University (BHU). This marked the beginning of professional identity for pharmacists. The rapid expansion of the drug industry during World War II further emphasized the demand for trained pharmaceutical personnel. As a

result:

- Universities started diploma and degree programs in pharmacy.
- The government recognized pharmacy as a distinct profession.
- Efforts intensified to regulate drug quality within the growing pharmaceutical market.

Regulatory Framework and Professional Identity (1950–1970)

A turning point came with the Drugs Act of 1940 (later called the Drugs and Cosmetics Act, 1940), which gave the government authority to control drug import, manufacture, sale, and distribution. To standardize pharmacy practice, the Pharmacy Act, 1948 was passed, establishing:

- Pharmacy Council of India (PCI)
- State Pharmacy Councils
- Minimum standards for pharmacy education
- Mandatory registration of pharmacists

This period witnessed the formation of prominent pharmaceutical organizations such as the Indian Pharmaceutical Association (IPA) and Indian Drug Manufacturers Association (IDMA). These bodies played a crucial role in shaping ethical standards, industrial policies, and professional development.

During the 1950s and 1960s, India saw the rise of public-sector drug manufacturers like Hindustan Antibiotics Limited (HAL) and Indian Drugs and Pharmaceuticals Limited (IDPL), which strengthened self-sufficiency in bulk drug production and reduced dependence on imports.

Expansion of the Pharmaceutical Industry (1970–1990)

The next major milestone was the Indian Patents Act, 1970, which allowed only process patents for pharmaceuticals. This act helped Indian firms innovate cost-effective manufacturing methods and produce affordable generic medicines. As a result, India rapidly transformed into a major producer of bulk

drugs and formulations. Pharmacy practice also diversified during this period. New roles emerged in:

- Industrial pharmacy
- Quality control and quality assurance
- Research and development
- Hospital and community pharmacy

Professional bodies continued to support this expansion through conferences, training programs, and collaboration with international organizations.

Era of Modernization and Global Recognition (1990–Present)

With economic liberalization in the early 1990s, the Indian pharmaceutical industry entered a phase of global integration. Indian companies began exporting medicines to developed markets, complying with international quality standards like WHO-GMP, US-FDA, and EU regulations. This period introduced advancements such as:

- Biotechnology and biopharmaceuticals
- Clinical research and pharmacovigilance
- Good Manufacturing Practices (GMP) and Good Pharmacy Practice (GPP)
- Use of automation in manufacturing
- Rise of multinational pharmaceutical companies in India

Pharmacy education also expanded, with the introduction of B.Pharm, M.Pharm specializations, Pharm.D, and research-oriented doctoral programs. Regulatory organizations such as PCI, CDSCO, NPPA, and ICMR strengthened drug control, pricing mechanisms, and clinical regulations.

Role of Organizations in Shaping the Profession

Several national bodies played crucial roles in defining the structure and

direction of pharmacy practice in India:

- Pharmacy Council of India (PCI): Ensures proper education and ethical standards.
- Central Drugs Standard Control Organization (CDSCO): Regulates safety, efficacy, and quality of medicines.
- Indian Pharmaceutical Association (IPA): Promotes professional development and pharmacy practice.
- Indian Drug Manufacturers Association (IDMA): Supports the interests of the pharmaceutical industry.
- National Institute of Pharmaceutical Education and Research (NIPER): Enhances research capabilities and advanced training.

Together, these organizations established a strong relationship between the pharmaceutical workforce, industrial production, academic training, and public health needs.

The history of the pharmacy profession in India reflects a steady journey from traditional healing practices to a scientifically advanced and globally respected discipline. The growth of the pharmaceutical industry, coupled with the establishment of regulatory and professional organizations, played a central role in shaping modern pharmacy. Today, India stands as one of the world leaders in pharmaceutical manufacturing, research, and healthcare delivery—an achievement built upon decades of development in pharmacy education, industry, and organizational support.

SCOPE OF THE PHARMACY PROFESSION

Pharmacy is a profession that integrates the principles of health sciences, chemical sciences, and biomedical research to ensure safe and effective use of medicinal substances. Over time, it has grown into a dynamic discipline that supports public health, pharmaceutical innovation, patient care, and clinical

decision-making. As healthcare systems evolve, the pharmacist's role continues to expand from traditional dispensing to specialized functions in industry, research, and clinical practice.

Introduction

Pharmacy as a career involves the study of drugs—beginning from their discovery and development to their manufacturing, distribution, and therapeutic use. A pharmacist is recognized as a medication expert responsible for ensuring that patients receive appropriate, safe, and effective drug therapy. The profession appeals to students with an interest in science, problem-solving, and a desire to contribute to the improvement of community health.

Pharmacy education in India is structured to build both theoretical knowledge and practical competency. The discipline offers multiple entry points, enabling graduates to choose from a wide range of professional pathways in healthcare and the pharmaceutical sector.

Nature and Scope of the Profession

The scope of pharmacy extends across several domains, reflecting the diverse responsibilities associated with medicines and patient care.

Role in Healthcare Delivery

Pharmacists participate in drug dispensing, medication counseling, monitoring of therapy, and prevention of medication-related problems. Their involvement ensures rational drug use and contributes significantly to improved treatment outcomes.

Contribution to the Pharmaceutical Industry

The pharmaceutical industry relies on pharmacists for formulation development, quality testing, regulatory compliance, production supervision, and research activities. Their scientific training enables them to support manufacturing processes and maintain international quality standards.

Expansion into Clinical and Emerging Fields

Modern healthcare emphasizes patient-centered services. As a result, pharmacists are increasingly engaged in clinical pharmacy, pharmacovigilance, pharmacogenomics, biotechnology, and various specialized therapeutic areas.

Educational Pathways in Pharmacy

Pharmacy education is organized in progressive levels to develop professional competence:

Diploma in Pharmacy (D.Pharm)

A two-year foundational program focusing on basic pharmaceutical sciences and dispensing practices. Graduates are eligible for registration as pharmacists and can work in community or hospital pharmacy settings.

Bachelor of Pharmacy (B.Pharm)

A four-year undergraduate degree covering pharmaceutical chemistry, pharmaceutics, pharmacology, pharmacognosy, and related subjects. This program prepares students for careers in manufacturing, quality control, marketing, and further studies.

Doctor of Pharmacy (Pharm.D)

A six-year professional program with strong emphasis on clinical practice. Pharm.D graduates are trained to participate directly in patient care, therapeutic planning, and clinical decision-making within hospitals.

Master of Pharmacy (M.Pharm)

A two-year postgraduate program offering specialization in areas such as pharmaceutics, pharmacology, pharmaceutical chemistry, pharmacognosy, biotechnology, and regulatory affairs.

Doctoral Studies (Ph.D.)

Doctoral research enables students to pursue careers in scientific research, academia, and advanced pharmaceutical innovation.

Major Career Opportunities

Community Pharmacy

Community pharmacists dispense medications, provide patient counseling, maintain drug records, and contribute to public health initiatives. They play a key role in guiding patients on safe medication practices.

Hospital Pharmacy

Hospital pharmacists are involved in preparing medication charts, monitoring drug therapy, managing sterile preparations, and working closely with the medical team to ensure optimal treatment outcomes.

Pharmaceutical Industry

The industry offers opportunities in:

- Drug formulation and development
- Production and manufacturing
- Quality control and quality assurance
- Regulatory affairs and documentation
- Research and development (R&D)
- Medical writing and scientific communication

Clinical Pharmacy and Therapeutic Management

Clinical pharmacists evaluate prescriptions, identify drug interactions, advise on dosage adjustments, and help manage chronic disease therapy. Their contribution is vital in reducing medication errors and improving patient safety.

Research and Development

R&D pharmacists work on drug discovery, preclinical testing, formulation innovation, and technology-based drug delivery systems. This field is essential for developing new and improved medicines.

Pharmacovigilance

Pharmacovigilance professionals monitor adverse drug reactions, maintain safety databases, and assist in evaluating the risk–benefit profile of medicines throughout their lifecycle.

Academia

Pharmacists with advanced qualifications contribute to education and research by teaching in pharmacy colleges, guiding students, and participating in scientific investigations.

Government and Regulatory Services

Pharmacists are employed as Drug Inspector in drug control departments, public health institutions, armed forces medical services, and government-run hospitals. They ensure compliance with drug laws, monitor quality, and support national health programs.

Entrepreneurship

Pharmacists may establish community pharmacies, wholesale drug distribution firms, manufacturing units, or nutraceutical and herbal product ventures, contributing to economic and healthcare development.

Pharmacy offers a broad and rewarding career that combines scientific expertise with human service. Its diverse opportunities—ranging from patient care and research to industry and entrepreneurship—make it a versatile and respected profession. As the pharmaceutical and healthcare sectors continue to grow, the importance of pharmacists in ensuring safe, effective, and rational drug use will remain central to public health.

PHARMACOPOEIAS: INTRODUCTION AND OVERVIEW

A **pharmacopoeia** is an official book of drug standards that provides authoritative information on the quality, purity, strength, and testing methods of medicines and pharmaceutical substances. It serves as a legal and scientific reference for manufacturers, pharmacists, regulatory agencies, and healthcare

professionals. Pharmacopoeias ensure that medicines supplied to the public meet established standards of safety, efficacy, and quality.

A standard pharmacopoeia contains:

- Monographs of drugs and formulations
- Standards for identity, purity, and potency
- Methods of analysis and assay
- Limits for contaminants and impurities
- Storage and packaging conditions
- Guidelines for dosage forms and excipients

Pharmacopoeias are recognized worldwide as essential documents for drug regulation and quality assurance. Every country maintains its own pharmacopoeia or adopts an internationally accepted one for regulatory purposes.

INDIAN PHARMACOPOEIA (IP): INTRODUCTION

The Indian Pharmacopoeia (IP) is the official book of standards for drugs manufactured and marketed in India. It is published by the Indian Pharmacopoeia Commission (IPC) under the Ministry of Health and Family Welfare, Government of India. The IP provides legally enforceable standards for the quality of active pharmaceutical ingredients, excipients, dosage forms, and herbal products used in the country.

The primary objectives of the IP are to:

1. Establish uniform standards for drugs in India.
2. Ensure quality, purity, and strength of medicines.
3. Provide validated analytical methods for testing.
4. Promote patient safety through quality assurance.
5. Support the pharmaceutical industry by harmonizing standards with

international norms.

The first attempt to create standards for Indian drugs began during British rule, but the first official Indian Pharmacopoeia was published after independence, reflecting Indian healthcare needs and indigenous medicinal substances.

Key Features of the Indian Pharmacopoeia

- Legally binding standards for drug quality in India.
- Includes monographs on modern medicines, traditional herbal drugs, and biological products.
- Provides validated analytical procedures, including modern instrumental techniques.
- Periodically revised to meet scientific and industrial advancements.
- Harmonized with international pharmacopoeias like BP (British Pharmacopoeia) and USP (United States Pharmacopeia).

Table: All Editions of the Indian Pharmacopoeia (IP) with Years

Edition	Year of Publication	Remarks
1st Edition	**1955**	First official Indian Pharmacopoeia after independence
2nd Edition	**1966**	Expanded list of modern drugs
Addendum	**1975**	Supplement to 1966 edition
3rd Edition	**1985**	Updated analytical methods and quality standards
Addendum	**1989**	Included additional monographs
Addendum	**1991**	Updated pharmacopeial standards
4th Edition	**1996**	Major revision with new drug monographs
Addendum	**2000**	Additional standards for specific drug groups
Addendum	**2002**	Final supplement before next revision
5th Edition	**2007**	Published by Indian Pharmacopoeia Commission (IPC)

Addendum	**2008**	Added new monographs and excipients
Addendum	**2010**	Included veterinary products and biologics
6th Edition	**2010**	Major restructuring and harmonization
7th Edition	**2014**	More monographs on herbal and biotech products
Addendum	**2015**	Supplement to 2014 edition
8th Edition	**2018**	Extensive updates in analytical techniques
Addendum	**2019**	Included additional monographs
9th Edition	**2022**	Latest complete edition with modern standards

Significance of the Indian Pharmacopoeia in Pharmaceutical Practice

1. **Legal standard:** Drug manufacturers must comply with IP standards for all products sold in India.
2. **Quality assurance:** Ensures the quality and safety of pharmaceuticals across the country.
3. **Industry support:** Helps Indian pharmaceutical companies meet global regulatory expectations.
4. **Public health impact:** Prevents the circulation of substandard and counterfeit medicines.
5. **Scientific growth:** Encourages research in pharmaceutical analysis and regulatory sciences.

The Indian Pharmacopoeia plays a vital role in maintaining the quality and integrity of medicines available in India. Its regular revisions reflect the growth of the Indian pharmaceutical industry and the need for updated scientific standards. By laying down uniform and legally enforceable drug standards, the IP continues to safeguard public health and strengthen the nation's regulatory framework.

BRITISH PHARMACOPOEIA (BP): INTRODUCTION

The British Pharmacopoeia (BP) is one of the oldest and most authoritative drug standard reference books in the world. It serves as the official collection of quality standards for medicinal substances, formulations, and pharmaceutical products in the United Kingdom. Published under the authority of the Medicines and Healthcare products Regulatory Agency (MHRA) on behalf of the British Government, the BP provides legally enforceable standards that ensure the identity, purity, strength, and quality of

medicines.

The BP acts as a primary regulatory tool for manufacturers, pharmacists, analysts, and healthcare professionals. It ensures that medicines supplied to the public meet uniform scientific specifications. Over the years, the BP has gained international recognition, and many countries—especially those following British regulatory traditions—adopt or reference it in their drug control systems.

Historical Background of the BP

Before the BP was established, drug standards in Britain were scattered across regional or privately prepared formularies. With the rapid expansion of medical science during the 19th century, the need for a unified national standard became urgent.

This led to:

- The merging of various pharmacopoeias used in different parts of the UK
- The formation of an official committee to create a common standard
- The publication of the First British Pharmacopoeia in 1864

Since then, the BP has been revised at regular intervals, keeping pace with scientific advancements and the introduction of new medicines.

Purpose and Functions of the British Pharmacopoeia

The BP aims to:

1. Provide legally binding drug standards for the UK and countries that recognize the BP.
2. Ensure quality and safety of active pharmaceutical ingredients, excipients, formulations, and biological products.
3. Offer validated analytical methods for identification, purity testing, assay methods, and impurity profiling.

4. Support pharmaceutical industries in maintaining global regulatory compliance.
5. Harmonize standards with international pharmacopoeias such as the European Pharmacopoeia (Ph. Eur.) and United States Pharmacopeia (USP).

The BP is revised annually today, reflecting rapid growth in pharmaceutical technology, analytical techniques, and regulatory expectations.

Key Features of the BP

- Legally enforceable standards for all medicinal substances in the UK
- Extensive monographs, including modern drugs, biologicals, vaccines, radiopharmaceuticals, herbal materials, and excipients
- Detailed analytical procedures, including chromatographic and spectroscopic methods
- Inclusion of reference standards for quality testing
- Alignment with the European Pharmacopoeia for shared monographs
- Annual publication since 2013 to keep pace with global regulatory changes

Table: All Editions of the British Pharmacopoeia (BP) with Years

Edition	Year of Publication	Remarks
1st Edition	**1864**	First unified pharmacopoeia for the United Kingdom
2nd Edition	**1867**	Revised and expanded content
3rd Edition	**1885**	Major update with new monographs
4th Edition	**1898**	Included modern analytical improvements
5th Edition	**1914**	Pre-World War I revision

6th Edition	**1932**	Included newer synthetic drugs
7th Edition	**1948**	Post-war revision with updated therapeutic agents
8th Edition	**1953**	Introduced new standards for purity
9th Edition	**1958**	Expanded pharmaceutical formulations
10th Edition	**1963**	Included more refined analytical methods
11th Edition	**1973**	Major overhaul; aligned with European standards
12th Edition	**1980**	Updated monographs and testing procedures
13th Edition	**1988**	Introduction of more modern instrumental tests
14th Edition	**1993**	Revision to meet regulatory demands
15th Edition	**1999**	Included biotechnology-based products
16th Edition	**2009**	Extensive modernization; included digital access
Annual Editions Begin	**2013 onwards**	BP becomes an *annual* publication
BP 2013	2013	First annual edition
BP 2014	2014	Updated monographs and harmonization
BP 2015	2015	Major additions in biological standards
BP 2016	2016	Included new antibiotic and excipient tests
BP 2017	2017	Expanded coverage of herbal medicines
BP 2018	2018	Increased harmonization with Ph. Eur.
BP 2019	2019	Added new radiopharmaceutical standards
BP 2020	2020	Revised impurity profiles
BP 2021	2021	Updates for COVID-related therapeutics

BP 2022	2022	Further harmonization and modernization
BP 2023	2023	Latest annual regulatory update
BP 2024	2024	Most recent edition (including digital BP Online)

Significance of the BP in Global Pharmaceutical Practice

1. **International acceptance:** Used by many Commonwealth and Asian countries.
2. **High scientific credibility:** Trusted for its rigorous and modern testing methods.
3. **Industrial relevance:** Helps pharmaceutical companies maintain global market standards.
4. **Legal importance:** Acts as a statutory reference for drug regulation.
5. **Public health impact:** Ensures that medicines meet standardized levels of quality, potency, and purity.

The British Pharmacopoeia stands as one of the world's most respected drug standard reference works. Its long history, scientific depth, and global influence make it essential for anyone involved in drug manufacturing, testing, distribution, or regulation. With annual revisions and its close alignment with European standards, the BP continues to maintain its relevance in modern pharmaceutical practice.

UNITED STATES PHARMACOPEIA (USP)

The **United States Pharmacopeia (USP)** is an authoritative and legally recognized reference book that sets quality standards for medicines, dietary supplements, and several healthcare products used in the United States. It was first published in 1820 and has continued to evolve with advances in science, manufacturing, and regulatory needs.

The main purpose of the USP is to ensure that drugs are safe, pure, effective,

and consistent in quality, regardless of where they are manufactured. It includes detailed standards for various aspects of pharmaceutical substances, such as:

- Identity (to confirm the substance is genuine)
- Strength (correct amount of active ingredient)
- Quality parameters and Purity tests
- Manufacturing requirements
- Packaging and storage recommendations
- Analytical methods and assays

USP standards are recognized under U.S. law, meaning any drug sold in the country must meet the required specifications. These norms are prepared through scientific research, expert committees, and public review processes. The USP also collaborates with global organizations to support international drug quality programs.

In addition to the main pharmacopeia, USP publishes companion texts such as the **National Formulary (NF)**, which contains monographs on excipients and pharmaceutical preparations. Together, the USP–NF serves as a trusted guide for pharmacists, manufacturers, regulators, healthcare professionals, and researchers.

EXTRA PHARMACOPOEIA (MARTINDALE'S EXTRA PHARMACOPOEIA)

The Extra Pharmacopoeia, widely known today as Martindale: The Complete Drug Reference, originated in the late 19th century as an independent and comprehensive reference text for medicines. Unlike a national pharmacopeia that provides official legal standards, Martindale serves as a scientific compendium of information on drugs used worldwide.

This text includes:

- Descriptions of pharmaceuticals from multiple nations
- Clinical uses and indications
- Pharmacological actions and adverse effects
- Dosage forms and recommended doses
- Drug interactions and toxicity details
- Therapeutic categories and brief treatment guidelines

One of its distinguishing features is that it covers both approved medicines and investigational agents, making it valuable for clinicians, pharmacists, academicians, and researchers who need an international perspective on drug therapy.

While it does not possess regulatory authority, Martindale complements official pharmacopeias by giving practical insights on drug usage, therapeutic alternatives, and comparative information across different countries. Because of its depth and reliability, it is often treated as an authoritative textbook in pharmacy and medical education.

PRESCRIPTION: DEFINITION AND PARTS OF A PRESCRIPTION

A **prescription** is a formal written, electronic, or verbal order given by a registered medical practitioner to a pharmacist, directing the preparation, dispensing, and administration of a particular medication for a patient. In simple terms, it acts as a communication bridge between the doctor and the pharmacist, ensuring that the patient receives the correct drug in the correct dose, form, and duration. A well-written prescription is not just a piece of paper; it reflects the doctor's clinical judgment, the patient's health needs, and the pharmacist's responsibility to dispense medicines safely and accurately. It also serves as a legal document, meaning every element written on it carries professional accountability and must comply with medical and pharmaceutical regulations.

A prescription generally consists of several important components, each serving a specific purpose to avoid confusion, ensure safety, and provide clear therapeutic instructions. Although formats may differ from hospital to hospital, the core parts remain the same because they are essential for proper understanding and execution of drug orders.

TRINITY POLYCLINIC
KMC Reg. No: 436

Dr. John, M.D.
No.100, 7th Cross,
Langford Town,
Bangalore-560025

Phone No: 25546789
Mobile No: 9678543210

Name: **Gender:**
Age: **Date:**

℞

Sig:

Refill 0 1 2 3 4

Signature

Figure: Prescription Blank

PARTS OF A PRESCRIPTION

Patient Information

This portion includes basic details such as the patient's name, age, sex, weight (especially important for children), and address. These details help the

pharmacist verify the identity of the patient and ensure that the medication is appropriate for their age and condition. Weight is crucial in pediatric cases where dosing is often calculated on a mg/kg basis.

Date

The date on which the prescription is issued is always mentioned. It helps track the validity of the prescription and prevents misuse or repeated dispensing of medications such as antibiotics, controlled drugs, or expensive treatments

Superscription

Traditionally, this section begins with the symbol "℞" (Rx), which is derived from the Latin word *recipe*, meaning "take thou." It indicates that the instructions written by the physician should be carried out by the pharmacist. The superscription marks the start of the doctor's therapeutic message.

Inscription

The inscription contains the names and quantities of the drugs prescribed. This is the core of the prescription and may include:

- The active drug or drugs
- The strength or concentration
- The dosage form (tablet, capsule, syrup, ointment, injection, etc.)

The clarity of the inscription is vital because any misinterpretation can affect the patient's treatment and safety.

Subscription

The subscription provides instructions to the pharmacist regarding the preparation and dispensing of the medication. In modern practice, where most medicines are commercially prepared, this section may be brief or sometimes omitted. However, in cases like compounded formulations, topical preparations, or reconstitutions, the subscription tells the pharmacist exactly how much to dispense and in what form.

Signa (Directions for Use)

Also known as "Sig" or "Signatura," this section carries instructions for the patient. It tells them how to take the medication—dose, route, frequency, duration, and any special precautions. For example, “Take one tablet twice daily after food” or “Apply a thin layer to the affected area at night.” This section ensures that patients use the medication correctly and safely.

Prescriber’s Information and Signature

This includes the doctor’s name, qualification, registration number, and signature. It is a legal requirement and confirms the authenticity of the prescription. The pharmacist must dispense medicines only when the prescription is issued by a valid registered practitioner. In case clarification is needed, the prescriber’s details allow direct communication.

Refill or Renewal Instructions (if applicable)

If a medication needs to be continued for a long period, the doctor may mention whether and how many times the prescription can be refilled. This prevents unauthorized repetition of therapy and ensures that the patient undergoes proper follow-up.

Special Instructions or Warnings

Sometimes the doctor may add specific notes such as:

- “Do not substitute”
- “For emergency use only”
- “Dispense in original container”
- Dietary or lifestyle instructions

These notes guide both the pharmacist and the patient for safe and effective use of the medicine.

A prescription is a structured and legally binding medical order that ensures patients receive safe, accurate, and appropriate treatment. Understanding the parts of a prescription helps pharmacy students recognize the clinical, legal,

and therapeutic importance behind every line written by a doctor. It also highlights the pharmacist's crucial role in checking, interpreting, and dispensing medications in a responsible manner.

HANDLING OF PRESCRIPTION

The primary responsibility of a pharmacist is to safely and properly dispense medication to the patients. The manner in which a pharmacist processes a prescription order is an important aspect of his/her professional responsibilities. The important steps in processing a prescription order are described as follows:

Receiving the prescription: It is desirable that the patient present the prescription to the pharmacist directly. This enhances the patient–pharmacist relationship. The individual receiving the prescription should be trained to accept the prescription in a professional manner. While receiving or reading the prescription, the pharmacist should not show any signs of confusion or surprise, as it may cause anxiety in the patient.

Reading and checking the prescription: The prescription order should be read completely and carefully in the privacy of the prescription department. Any doubt regarding the prescription should be cleared by consulting a fellow pharmacist, the prescriber, or even by checking the posological table. A pharmacist should never guess the meaning of a distinct word or unrecognized abbreviation. If any important data is omitted, it should be verified by contacting the prescriber.
Sometimes, the prescriptions are received by a senior pharmacist over telephone. In such cases, the prescription should be immediately written down and should be verified by repeating it. This is important because there are a number of drugs with the same pronunciation, for example, Digoxin and Digitoxin.

Collecting and weighing the ingredients: Once the procedure for the formulation is decided, the pharmacist assembles the necessary materials in a

single location on the prescription counter. As each ingredient is used, it is transferred to another location away from the workstation. The use of this technique provides the pharmacist with a mechanical check on the introduction of each ingredient.

Through this process, the pharmacist has the opportunity to read the label of each ingredient three times—once when the container is removed from the shelf, again when the contents are weighed and measured, and finally when the container is returned to the shelf.

Preparing the prescription: After reading and checking the prescription, the pharmacist should decide on the exact procedure to be followed in dispensing or compounding the ingredients.

Most prescriptions call for dispensing medications already formulated into dosage forms by pharmaceutical manufacturers. Care must be exercised by the pharmacist to ensure that the product dispensed is of the prescribed dosage form, strength, and number of dosage units.

The pharmacist should verify the manufacturer's label by comparing it with the prescription order before and after filling the order to ascertain its correctness. Products that show signs of poor manufacturing, have undergone deterioration, or have crossed the expiry date as stated on the label should never be dispensed.

For prescriptions that need compounding, the pharmacist must acquire and maintain the knowledge and skills necessary to accurately prepare them. The pharmacist should also take into consideration the compatibility of all the ingredients, the right order of mixing, the need for special adjuvants/additives or techniques, and the mathematical calculations to be followed. Any calculations or compounding information that would be useful in refilling the prescription at a later date should be noted on either the face or back of the prescription order. The adjuvants used in the formulation, order of mixing, quantity of each ingredient,

capsule size used, type and size of the container, name and product identification number of the manufacturer, auxiliary labels used, clarification of illegible words or numbers, price charged, and any special notations should be recorded. Failure to do this may result in difference in the appearance of the prescription when refilled and possibly create doubt and apprehension in the mind of the patient.

Packaging: In filling a prescription, the pharmacist may select a container from among various shapes, sizes, mouth openings, colors, and compositions. Selection is based primarily on the type and quantity of medication to be dispensed and the method of its use.

Most of the prescription containers are usually available in colorless or amber-colored glass or plastic containers. However, amber-colored containers are most widely used because they pro- vide maximum protection to their contents against photochemical deterioration.

Labeling: The prescription label is usually prepared by the pharmacist. The label should be aesthetic and professional in appearance. The size of the label should be appropriate to the size of the container and should be written or typed in indelible ink.

The label contains the following information:

- ✓ Name and address of the pharmacy
- ✓ Prescription number
- ✓ Prescriber name
- ✓ Patient's name, directions for use, and the date of dispensing

Directions should be written as clearly as possible. Auxiliary labels should be used to emphasize a number of important aspects of the dispensed medication, including its proper use, handling, storage, refill status, necessary warnings, or precautions. Figure gives a few examples of auxiliary labels.

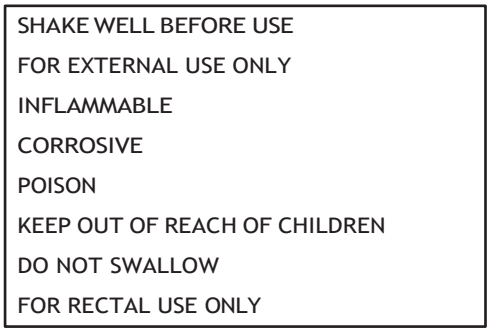

Figure 2 Auxiliary Labels

Rechecking: Every prescription should be rechecked and the ingredients and amounts verified. All details on the label should be rechecked to verify the directions given, patient's name, pre- scription number, date, and prescriber's name.

Dispensing and patient counseling: While delivering the prescription to the patient, the instructions on the label should be reinforced to the patient.

Recording and filing: A record of all the dispensed prescriptions should be maintained in the pharmacy by using prescription files.

Errors in Prescription

Prescription errors are mistakes that occur during writing, interpreting, or dispensing a prescription. Identifying them early helps protect patients from harm and ensures proper treatment.

Illegible Handwriting

- Poor handwriting may lead to misinterpretation of drug names or doses.
- This is one of the most common causes of medication errors.

Incomplete Patient Information

- Missing details such as age, weight, or diagnosis can lead to incorrect dosing, especially in pediatric or geriatric patients.

Wrong Drug Name

- Similar-sounding or look-alike drug names (e.g., Dopamine vs. Dobutamine) may be confused if not written clearly.

Incorrect Dose or Strength

- Errors may occur when the dose is too high, too low, or written in confusing units (mg vs. mcg).

Wrong Dosage Form

- Prescribing a tablet instead of a syrup for a child or a capsule instead of an injection can lead to inappropriate therapy.

Omission of Frequency or Duration

- Missing directions like "once daily" or "for 5 days" makes it difficult for the pharmacist and patient to follow the therapy correctly.

Drug Interactions

- Prescribing multiple drugs without considering major interactions, such as combining NSAIDs with anticoagulants, poses risks to patients.

Writing Unauthorized Abbreviations

- Use of confusing abbreviations (e.g., "OD", "BD", "HS") may lead to misinterpretation and dosing errors.

Contraindicated Drugs

- Medicines that are unsafe for certain patients (e.g., pregnancy, kidney disease, allergy history) may be mistakenly prescribed.

Errors in Quantity

- Mistakes in the total quantity or number of doses can lead to either shortage or excessive supply.

Wrong or Missing Signature of the Doctor

- A prescription without the prescriber's signature or stamp is not legally valid and cannot be dispensed.

Lack of Clear Instructions

- Directions such as “use as needed” or “take medicine properly” are vague and lead to confusion for both pharmacist and patient.

Comprehensive List of Latin Terms and Abbreviations in Pharmacy

The following table combines dosage forms, methods of administration, timing, body parts, and general dispensing instructions.

Category	Latin Term	Abbreviation	English Meaning
Dosage Forms	Auristillae	auristill.	Ear drops
	Capsula	caps.	Capsule
	Capsula amylacea	caps. amylac.	Cachet
	Cataplasma	cataplasm.	Poultice
	Charta	chart.	Powder
	Collutorium	collut.	Mouthwash
	Collyrium	collyr.	Eye lotion
	Cremor	crem.	Cream
	Emplastrum	emp.	Plaster
	Emulsio	emul.	Emulsion
	Gargarisma	garg.	Gargle
	Gelatina	gelat.	Jelly
	Guttae	gtt.	Drops
	Haustus	ht.	Draught
	Inhalatio / Vapor	inhal. / vap.	Inhalation
	Injectio	inj.	Injection
	Insufflatio	insuff.	Insufflation
	Linctus	linct.	Linctus
	Linimentum	lin.	Liniment
	Liquor	liq.	Solution
	Lotio	lot.	Lotion
	Mistura	mist.	Mixture

Category	Latin Term	Abbreviation	English Meaning
	Naristillae	narist.	Nose drops
	Nebula	neb.	Spray
	Oculentum	oculent.	Eye ointment
	Pasta	past.	Paste
	Pessus	pess.	Pessary
	Pilula	pil.	Pill
	Pulvis	pulv.	Powder
	Suppositorium	suppos.	Suppository
	Tabella	tab.	Tablet
	Unguentum	ung.	Ointment
Administration	Addendus	addend.	To be added
	Applicandus	applicand.	To be applied
	Capiendus / Sumendus	capiend. / sum.	To be taken
	Dandus	dand.	To be given
	Deglutiendus	deglut.	To be swallowed
	Infricandus	infricand.	To be rubbed in
	Inhaletur	inhal.	Let it be inhaled
	Instillandus	instilland.	To be dropped in
	Miscendus	miscend.	To be mixed
	Signa	sig.	Label
	Sugendus	sugend.	To be sucked
Time/Frequency	Semel in die	sem. in die	Once a day
	Bis in die	b.i.d.	Twice a day
	Ter in die	t.i.d.	Three times a day
	Quater in die	q.i.d.	Four times a day
	Primo mane	prim. m.	Early in the morning
	Omni mane	o.m.	Every morning
	Jentaculum	jentac.	Breakfast
	Prandium	prand.	Dinner

Category	Latin Term	Abbreviation	English Meaning
	Nocte	n.	At night
	Omni nocte	o.n.	Every night
	Omni hora	o.h.	Every hour
	Anti cibos	a.c.	Before meals/food
	Post cibos	p.c.	After meals/food
	Inter cibos	i.c.	Between meals/food
Body Parts	Dexter	dext.	Right
	Laevus	laev.	Left
	Part affectae applicandus	p.a.a.	To be applied to the affected part
	Brachio	brach.	To the arm
	Capiti	capiti.	To the head
	Cruri	—	To the leg
	Sterno	stern.	To the chest
	Auri	auri	To the ears
	Gutturi / Jugulo	gutt. / jug.	To the throat
	Naso	—	To the nose
	Oculus	ocul.	To the eye
Miscellaneous	Mitte	mitt.	Send
	Phiala prius agitata	p.p.a.	Shake the bottle before use
	Mitte Tales	mitt. tal.	Send such
	Dolore urgente	dol. urg.	When pain is severe
	Modo dicto	m.d.	As directed
	Pro re nata	p.r.n.	Occasionally
	Statim	stat.	Immediately / At once
	Tussi urgente	tuss. urg.	When cough is troublesome

Points to be Remember

- **Pharmacy in India:** Understand the evolution from traditional practices to modern pharmaceutical education and industrial milestones.
- **Pharmacist Roles:** Be ready to define the specific responsibilities of pharmacists across retail, hospital, clinical, and industrial settings (including R&D).
- **Pharmacopoeias:** Focus on the structure and content of the **Indian Pharmacopoeia (IP)**. Know the abbreviations and importance of others like BP, USP, and the International Pharmacopoeia.
- **The Prescription:** Memorize the different parts of a prescription, how to handle them, and common **Latin terminology** used by prescribers.

Multiple Choice Questions

Level 1: Remember (Knowledge)

1. **Which was the first official Pharmacopoeia of India published after independence?**

   A) 1945 B) 1955 C) 1966 D) 1985 **Ans: B**

2. **The term 'Pharmacopoeia' is derived from which language?**

   A) Latin B) Greek C) French D) Sanskrit **Ans: B**

3. **What does 'B.P.C.' stand for?**

   A) British Pharmaceutical Council B) British Pharmaceutical Codex C) British Pharmacopoeia Commission D) Basic Pharmaceutical Code **Ans: B**

4. **Which part of the prescription contains the symbol 'Rx'?**

A) Superscription B) Inscription C) Subscription D) Transcription **Ans: A**

5. **The Latin term 'Post cibos' (p.c.) means:**

   A) Before meals B) After meals C) At bedtime D) Twice a day **Ans: B**

6. **The first pharmacy shop in India was opened in which city?**

   A) Mumbai B) Kolkata C) Chennai D) Delhi **Ans: B**

7. **Who is known as the Father of Pharmacy Education in India?**

   A) M.L. Schroff B) R.N. Chopra C) Hippocrates D) Galen **Ans: A**

8. **Which organization is responsible for regulating pharmacy education in India?** A) AICTE B) PCI C) CDSCO D) ICMR **Ans: B**

9. **The 'Subscription' part of a prescription contains directions to the:**

   A) Patient B) Physician C) Pharmacist D) Manufacturer **Ans: C**

10. **In a prescription, the 'Inscription' contains:**

    A) The patient's details B) Names and quantities of ingredients C) Instructions for labeling D) Signature of the doctor **Ans: B**

Level 2: Understand (Comprehension)

11. **What is the primary purpose of a Pharmacopoeia?**

    A) To list the prices of medicines B) To provide mandatory standards for drugs C) To serve as a marketing guide for industries D) To list all doctors in a country **Ans: B**

12. **Which of the following best describes the 'Scope of Pharmacy' in Hospital Pharmacy?**

A) Large scale manufacturing of tablets B) Drug procurement, storage, and dispensing to patients C) Creating advertisements for new drugs D) Regulatory filing for new patents **Ans: B**

13. **Why is Latin terminology still used in prescriptions?**

    A) To keep the medicine secret from the patient B) Because Latin is a "dead" language and terms remain constant globally C) To make the prescription look professional D) Because it is required by the World Health Organization **Ans: B**

14. **What is a 'Monograph' in the context of IP?**

    A) A certificate of registration B) A detailed document containing standards for a specific drug C) A list of all pharmacy colleges D) A historical record of pharmacy **Ans: B**

15. **The evolution of Pharmacy in India is closely linked to which movement?**

    A) Green Revolution B) Swadeshi Movement C) Industrial Revolution D) White Revolution **Ans: B**

Level 3: Apply (Application)

16. **If a prescription says 't.i.d.', how many times should the patient take the medicine?** A) Once a day B) Twice a day C) Three times a day D) Four times a day **Ans: C**

17. **Which section of the Pharmacopoeia would a researcher look into to find the 'identification test' for Paracetamol?**

    A) Preface B) Appendices C) Specific Drug Monograph D) General

Notices **Ans: C**

18. **A pharmacist identifies an error in the dose of a prescription. What is the correct 'handling' procedure?**

    A) Change the dose himself B) Consult the physician who wrote it C) Refuse to dispense and tell the patient it's a mistake D) Dispense half the dose **Ans: B**

19. **If a drug is labeled 'U.S.P.', it means it complies with standards set by:**

    A) United States Pharmacopoeia |B) Union of Standardized Pharmacy C) Universal Systematic Pharmacopoeia D) United States Physicians **Ans: A**

20. **When translating 'Omni nocte', the pharmacist should write which instruction on the label?**

    A) Every morning B) Every night C) Every hour D) As needed **Ans: B**

Level 4: Analyze (Analysis)

21. **Distinguish between the roles of a Clinical Pharmacist and an Industrial Pharmacist:**

    A) Clinical deals with patient care; Industrial deals with mass production B) Clinical deals with sales; Industrial deals with education C) Clinical works in labs; Industrial works in hospitals D) There is no difference in their roles **Ans: A**

22. **What is the significance of the 'National Formulary of India' compared to the IP?** A) IP is for manufacturers; NFI is for physicians/prescribers B) NFI is mandatory; IP is optional C) NFI contains

only prices; IP contains only chemical formulas D) They are exactly the same **Ans: A**

23. **Analyze the 'Superscription'. Why is 'Rx' used instead of just 'Recipe'?**

    A) It is a prayer to Jupiter for healing B) It is a shorthand for 'Take thou' C) It indicates the prescription is legal D) Both A and B are historical interpretations **Ans: D**

24. **In the 'Handling of Prescription', why is 'Reading and Checking' done before 'Compounding'?**

    A) To save time B) To identify potential incompatibilities or errors immediately C) Because the law requires it D) To check if the patient can afford it **Ans: B**

25. **How does the evolution of Pharmacy education in India (from 1932 at BHU) impact current industrial standards?**

    A) It created the foundation for skilled manpower in manufacturing B) it resulted in the ban of traditional medicines C) it decreased the cost of medicines D) It removed the need for pharmacists in hospitals **Ans: A**

Level 5: Evaluate (Evaluation)

26. **Evaluate the necessity of 'Latin Terminology' in modern digital prescriptions. Is it still essential?**

    A) Yes, to maintain international standardization B) No, English is more practical for patient safety C) Yes, because it sounds more scientific D) No, because Latin is difficult to type **Ans: B** (From a safety perspective, though A is the traditional reason).

27. **Why is the 'Indian Pharmacopoeia' updated periodically (e.g., from 1955 to 2022)?** A) To increase the price of the book B) To include new drugs and advanced analytical methods C) To change the color of the cover D) Because of government orders only **Ans: B**

28. **Assess the impact of the Pharmacy Act 1948 on the profession in India.**

    A) It made the profession unregulated B) It provided a legal framework for registration and practice C) It allowed anyone to sell medicines D) It stopped the import of drugs **Ans: B**

29. **Judge the importance of the 'Signature' (Transcription) part of the prescription for patient compliance.**

    A) It is less important than the drug name B) It is vital as it tells the patient how to use the medicine C) It is only for the pharmacist's records D) It is meant for the insurance company **Ans: B**

30. **Which is more critical for a pharmacist in a retail setting: 'Communication Skills' or 'Latin Knowledge'?**

    A) Latin, to read the prescription B) Communication, to ensure the patient understands the therapy C) Both are equally unimportant D) Neither; only counting pills matters **Ans: B**

Level 6: Create (Synthesis)

31. **Which component would you include in a 'Model IP Monograph' for a new herbal drug?**

    A) Purity standards and botanical identification B) Only the price C) The name of the discoverer D) Advertisement slogans **Ans: A**

32. **When designing a modern 'e-prescription' format, which part of the traditional prescription is most likely to be automated?**

    A) Superscription (Patient details) B) Inscription (Drug database lookup) C) Signature (Automatic dosage instructions) D) All of the above **Ans: D**

33. **If you were to draft a history of pharmacy milestones, which year would mark the start of formal pharmacy education in India?**

    A) 1932 B) 1947 C) 1901 D) 1988 **Ans: A**

34. **How would you categorize a pharmacist working in 'Drug Discovery'?**

    A) Community Pharmacist B) R&D (Industrial) Pharmacist C) Hospital Pharmacist D) Clinical Pharmacist **Ans: B**

35. **Propose a solution for 'Prescription Errors' due to poor handwriting.**

    A) Use only block letters B) Move to electronic prescriptions C) Ask the patient what the doctor said D) Both A and B **Ans: D**

Mixed Bloom's Levels (36-50)

36. **'Guttae' in Latin means:**

    A) Ointment B) Drops C) Tablets D) Syrup **Ans: B**

37. **'Mitte' means:**

    A) Send B) Make C) Label D) Take **Ans: A**

38. **'Statim' means:**

    A) Every morning B) Immediately C) At once D) Both B and C **Ans: D**

39. **The first edition of IP was prepared under the chairmanship of:**

A) Dr. B.N. Ghosh B) Dr. B. Mukherji C) Dr. Nityanand D) Dr. R.N. Chopra **Ans: A**

40. **The 'Addendum' to a Pharmacopoeia is:**

A) A list of errors B) A supplement containing new information between editions C) The index D) The history section **Ans: B**

41. **Who is the 'father of medicine'?**

A) Galen B) Hippocrates C) Aristotle D) Dioscorides **Ans: B**

42. **'Pulvis' means:**

A) Liquid B) Powder C) Pill D) Cream **Ans: B**

43. **The role of a pharmacist in 'Clinical Research' involves:**

A) Selling drugs B) Monitoring drug safety (Pharmacovigilance) C) Designing the factory layout D) Teaching students only **Ans: B**

44. **Which pharmacopoeia is recognized as the 'International Pharmacopoeia'?**

A) B.P. B) U.S.P. C) Ph. Int. (WHO) D) I.P. **Ans: C**

45. **What is the meaning of 'Cibus'?**

A) Water |B) Food/Meal C) Sleep D) Morning **Ans: B**

46. **'Agita ante usum' means:**

A) Do not shake B) Shake before use C) Apply locally D) Take with water **Ans: B**

47. **What is the primary role of an 'Industrial Pharmacist' in Quality Control?**

A) Packing the boxes B) Testing the final products for standards C) Interviewing new staff D) Distributing the drugs to shops **Ans: B**

48. **The term 'Sos' (Si opus sit) means:**

    A) As directed B) When required/In emergency C) Every hour D) Before sleep **Ans: B**

49. **In the structure of I.P., the 'Appendices' include:**

    A) Name of drugs B) Methods for biological assays and chemical tests C) History of the committee D) List of pharmacies **Ans: B**

50. **Who was the chairman of the committee that published the 1985 IP?**

    A) Dr. Nityanand B) Dr. B. Mukherji C) Dr. P.K. Das D) Dr. J.N. Ghosh **Ans: A**

Objective Type (2 Marks - Remember/Understand)

1. Who is considered the father of Pharmacy education in India?
2. Define the term 'Pharmacopoeia'.
3. List the four main parts of a prescription.
4. What does the Latin term 't.i.d.' stand for in a prescription?
5. Mention the primary role of a pharmacist in industrial R&D.
6. Which organization published the first edition of the Indian Pharmacopoeia?
7. Define 'Community Pharmacy'.
8. What is the significance of the 'Inscription' in a prescription?
9. Name two international pharmacopoeias other than IP and BP.

10. Identify the milestone year when the first Pharmacy Act was passed in India.
11. State the purpose of the 'National Formulary of India'.
12. What is 'Superscription' represented by?
13. Define a 'Monograph' in the context of IP.
14. List two responsibilities of a clinical pharmacist.
15. What is the full form of BPC?
16. Distinguish between 'Hospital Pharmacy' and 'Retail Pharmacy'.
17. Name the latest edition of the Indian Pharmacopoeia.
18. What does the Latin term 'Post cibos' mean?
19. Mention one evolution milestone of the pharmaceutical industry in India.
20. Define the 'Signature' part of a prescription.

Short Answer (5 Marks - Understand/Apply)

1. Describe the evolution of pharmacy education in India.
2. Explain the scope of pharmacy in the retail and community sectors.
3. Summarize the general structure and content of the Indian Pharmacopoeia (IP).
4. Discuss the legal and ethical handling of a prescription by a pharmacist.
5. Classify the common Latin terms used for dosage instructions.
6. Outline the roles and responsibilities of an industrial pharmacist.

7. Compare the British Pharmacopoeia (BP) and United States Pharmacopeia (USP).
8. Explain the importance of the pharmacist in the healthcare system.
9. Describe the procedure for checking and pricing a prescription.
10. Illustrate a model IP monograph and its components.

Long Answer (10 Marks - Analyze/Evaluate)

1. Trace the historical development of the pharmacy profession in India and its impact on the current healthcare system.
2. Analyze the various parts of a prescription and discuss the errors that may occur during its handling.
3. Critically evaluate the role of pharmacists in clinical and hospital settings compared to industrial roles.
4. Elaborate on the history and development of various pharmacopoeias with a special focus on IP.
5. Discuss the milestones of the Indian pharmaceutical industry and its contribution to global health.
6. Compare and contrast the legal requirements for managing a community pharmacy versus a hospital pharmacy.
7. Formulate a checklist for a pharmacist to ensure patient safety while dispensing medication.
8. Evaluate the significance of the National Formulary of India in modern medical practice.

9. Analyze how Latin terminology maintains professional standards and prevents errors in prescriptions.
10. Detail the structure of the pharmacy profession in India, including the role of regulatory organizations.

Case-Based Learning (CBL)

1. **The Misinterpreted Prescription:** A pharmacist receives a prescription with the Latin term "t.i.d. a.c." for a gastric medication. The patient asks if they should take it after their heavy dinner.
    - **Solution:** The pharmacist must explain that "t.i.d." means three times a day and "a.c." (*ante cibos*) means before meals. Taking it after a heavy dinner would be incorrect and may reduce the drug's efficacy.
2. **The Heritage Query:** A student asks why the Indian Pharmacopoeia (IP) is used instead of the British Pharmacopoeia (BP) in an Indian hospital.
    - **Solution:** Explain that while BP and USP are international standards, the IP is the official legal document for drug standards in India, tailored to the specific climatic conditions, regional disease profiles, and legal framework of the country.
3. **Community vs. Hospital Role:** A new graduate is torn between a role in a retail pharmacy and a clinical pharmacy department.
    - **Solution:** In retail, the focus is on business management and patient counseling; in clinical pharmacy, the focus is on ward rounds, monitoring drug interactions, and collaborating directly with physicians on patient care.

Problem-Based Learning (PBL)

1. **Monograph Analysis:** You are given an unknown substance and a copy of the IP. How do you confirm its identity?
    - **Solution:** Refer to the "Identification" section of the IP monograph, performing the specific chemical tests or physical constant checks (like melting point) listed there.
2. **Prescription Anatomy:** Identify the missing part: A prescription has the Superscription, Inscription, and Subscription, but the patient doesn't know how many times to take the pill.
    - **Solution:** The missing part is the **Signatura** (or Transcription), which contains instructions to the patient.
3. **The Professional Milestone:** Research the year the first Pharmacy Act was passed in India and its impact.
    - **Solution:** 1948. It regulated the profession and ensured only registered pharmacists could dispense medicines, elevating public safety.