VILASRAO DESHMUKH FOUNDATION,
SCHOOL OF PHARMACY, LATUR

New MIDC, Airport Road, Latur - 413 531

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Program Outcomes (POs) B. Pharmacy

PO Code	Program Outcome Description
PO1: Knowledge of Pharmaceutical Sciences	Demonstrate comprehensive understanding of core and fundamental knowledge in pharmacy, encompassing biomedical sciences, pharmaceutical sciences, social and administrative pharmacy, and manufacturing practices.
PO2: Strategic Planning and Execution	Exhibit effective planning capabilities, including time and resource management, delegation, and organizational skills. Formulate and execute plans to meet specific goals and deadlines efficiently.
PO3: Analytical and Problem-Solving Skills	Apply principles of scientific inquiry with analytical, critical, and creative thinking to identify, analyze, and solve problems. Interpret data effectively and apply theoretical knowledge to real-world pharmaceutical challenges.
PO4: Proficiency in Modern Tools and Technology	Select, adapt, and utilize modern tools, techniques, and resources relevant to pharmacy with awareness of their limitations and scope of applicability.
PO5: Leadership and Teamwork Abilities	Demonstrate understanding of human behavior, motivation, and change management. Apply leadership and team-building skills in professional, healthcare, and societal settings.
PO6: Development of Professional Identity	Recognize and articulate the significance of pharmacists' roles in healthcare, public health promotion, education, and management. Display a clear professional identity in diverse societal contexts.
PO7: Ethical Practice and Integrity	Uphold ethical principles and personal values in professional and societal interactions. Respect cultural diversity, apply ethical decision-making frameworks, and accept responsibility for outcomes.
PO8:	Communicate clearly and effectively within the pharmacy profession

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Effective Communication Skills	and with the public. Demonstrate proficiency in writing reports, delivering presentations, and engaging in two-way communication.
PO9: Social Responsibility and Public Health	Apply contextual knowledge to evaluate societal, legal, health, and safety issues. Understand the responsibilities of pharmacists in contributing to community and healthcare systems.
PO10: Environmental Awareness and Sustainability	Analyze the environmental and societal impacts of pharmacy practices. Promote sustainable development and demonstrate awareness of environmental responsibilities.
PO11: Commitment to Lifelong Learning	Embrace the importance of continuous learning. Develop the ability to independently pursue knowledge and adapt to technological and professional advancements throughout one's career.

Program Specific Outcomes (PSOs)

The Bachelor of Pharmacy Programme aims to prepare its graduates to:

1. Apply pharmaceutical knowledge to evaluate health, safety, and legal concerns while upholding ethical and professional responsibilities in pharmacy practice.
2. Recognize the importance of and demonstrate the ability to engage in independent, lifelong learning in the context of continuous technological advancement.
3. Assume active roles as responsible citizens and leaders, contributing to the enhancement of public health and overall well-being.
4. Identify and utilize appropriate procedures, resources, and modern pharmaceutical tools-including computing and analytical technologies-with a clear understanding of their underlying principles and applications.

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FIRST YEAR B. PHARMACY (SEMESTER-I)

BP 101T: Human Anatomy & Physiology-I

CO1. Illustrate the gross anatomy, structure, and functions of key physiological systems including the cardiovascular, hematopoietic, lymphatic, musculoskeletal, and peripheral nervous systems.

CO2. Explain the structure and function of cells and tissues, highlighting organelles and their specific roles.

CO3. Understand signal transduction mechanisms initiated by extracellular molecules.

CO4. Describe the anatomy and physiological functions of various organs within human body systems.

CO5. Differentiate organ types based on their physiological functions.

CO6. Apply anatomical knowledge to promote health awareness within the community.

BP 102T: Pharmaceutical Analysis-I

CO1. Understand fundamental principles and scope of pharmaceutical analysis.

CO2. Prepare standard volumetric solutions with specified strengths.

CO3. Identify sources and types of analytical errors and methods to minimize them.

CO4. Explain the principles of volumetric and electrochemical analytical techniques.

CO5. Apply various volumetric titration methods in pharmaceutical analysis.

CO6. Describe the working principles, types, and applications of electrodes and instrumentation in electrochemical analysis.

BP 103T: Pharmaceutics-I

CO1. Describe the historical evolution, scope, and key concepts of the pharmacy profession, including pharmacopoeias, prescriptions, and pharmaceutical calculations.

CO2. Differentiate between various dosage forms and explain the role of excipients in formulation development.

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CO3. Understand the formulation, advantages, and limitations of monophasic and biphasic liquid dosage forms.

CO4. Explain techniques and components used in the development of powder dosage forms.

CO5. Choose appropriate bases and formulate different semisolid dosage forms.

CO6. Identify and resolve pharmaceutical incompatibilities effectively.

BP 104T: Pharmaceutical Inorganic Chemistry-I

CO1. Understand the sources and methods of detecting impurities in pharmaceutical substances.

CO2. Explain acid-base concepts, buffer systems, and tonicity in pharmaceutical applications.

CO3. Discuss the physiological roles of essential ions and inorganic compounds in dental formulations and treatment.

CO4. Describe the use of inorganic compounds in gastrointestinal and antimicrobial applications.

CO5. Explain mechanisms of action for inorganic compounds such as expectorants, emetics, hematinic, antidotes, and astringents.

CO6. Understand the preparation, properties, storage, and applications of radioisotopes and radiopharmaceuticals.

BP 105T: Communication Skills

CO1. Recognize the behavioral and communication skills essential for pharmacists in professional settings.

CO2. Apply appropriate verbal, non-verbal, and visual communication techniques effectively.

CO3. Develop writing and listening skills for professional development.

CO4. Demonstrate confidence and clarity during interviews and group discussions.

CO5. Cultivate leadership and interpersonal communication skills.

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CO6. Deliver impactful messages using various communication formats and body language.

BP 106RBT: Remedial Biology

CO1. Understand the classification and unique characteristics of five biological kingdoms.

CO2. Describe basic anatomical and physiological features of plants.

CO3. Explain the anatomical and physiological features of animals, with an emphasis on humans.

BP 106RMT: Remedial Mathematics

CO1. Discuss and apply concepts like partial fractions, logarithms, and continuity in pharmaceutical calculations.

CO2. Solve systems of linear equations relevant to pharmacokinetics and drug modeling.

CO3. Apply calculus to solve pharmacy-related mathematical problems.

CO4. Explain the application of analytical geometry in pharmaceutical contexts.

CO5. Use integration techniques to analyze pharmaceutical processes.

CO6. Apply differential equations and Laplace transforms in solving pharmacy-based mathematical models.

BP 107P: Human Anatomy & Physiology-I (Practical)

CO1. Demonstrate the correct use of microscope components for studying the microscopic structure of various tissues.

CO2. Describe and identify different tissues and organs from major human body systems.

CO3. Accurately identify the bones of the human skeletal system, including axial and appendicular divisions.

CO4. Perform and interpret hematological tests to detect abnormalities in blood parameters by comparing with standard values.

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CO5. Apply knowledge of normal physiological functions to understand body mechanisms.

CO6. Recognize and relate clinical symptoms to underlying pathophysiological conditions.

BP 108P: Pharmaceutical Analysis-I (Practical)

CO1. Demonstrate proper handling, usage, and calibration of volumetric apparatus.

CO2. Prepare and standardize solutions of various concentrations accurately.

CO3. Understand and apply principles of volumetric analysis in pharmaceutical experiments.

CO4. Perform assays of pharmaceutical compounds using various titration techniques.

CO5. Develop skills in interpreting analytical data and performing necessary calculations.

CO6. Explain and apply electrochemical methods for pharmaceutical analysis.

BP 109P: Pharmaceutics-I (Practical)

CO1. Understand the roles and selection of excipients in pharmaceutical formulations.

CO2. Differentiate various dosage forms based on composition and application.

CO3. Calculate ingredient quantities for different pharmaceutical preparations.

CO4. Prepare various pharmaceutical dosage forms in the laboratory.

CO5. Select appropriate excipients for designing stable and effective formulations.

CO6. Integrate different formulation techniques to develop effective drug preparations.

BP 110P: Pharmaceutical Inorganic Chemistry-I (Practical)

CO1. Perform official pharmacopeial limit tests to assess the purity of pharmaceutical substances.

CO2. Identify and quantify inorganic impurities using pharmacopeial procedures.

CO3. Conduct qualitative analysis for identification of important inorganic pharmaceutical compounds.

CO4. Perform standard pharmacopoeial tests for confirming the identity of inorganic substances.

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CO5. Execute purity tests following standard pharmacopoeial protocols.

CO6. Synthesize and purify pharmaceutical-grade inorganic compounds.

BP 111P: Communication Skills (Practical)

CO1. Understand and apply techniques to enhance spoken English fluency and confidence in professional settings.

CO2. Improve pronunciation, intonation, and word stress for effective communication.

CO3. Apply critical components of oral and written communication for professional growth.

CO4. Experiment with diverse communication strategies to deliver high-impact messages.

CO5. Learn to structure and deliver content effectively using appropriate language, body language, and time management.

CO6. Prepare essential job search materials and practice communication skills for group discussions and interviews.

BP 112RBP: Remedial Biology (Practical)

CO1. Demonstrate understanding of the principles and operational mechanisms of various types of microscopes used in biological studies.

CO2. Explain the structure and function of cells and different types of tissues in the human body.

CO3. Describe the purpose and application of commonly used instruments and diagnostic techniques employed to assess the functioning of different organs and systems of the body.

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FIRST YEAR B. PHARMACY (SEMESTER-II)

BP 201T: Anatomy & Physiology-II

CO1. Analyze the structure and functions of the nervous, respiratory, and urinary systems.

CO2. Explain the mechanisms of digestion and metabolism, including the roles of digestive secretions.

CO3. Classify endocrine hormones, their actions, and mechanisms of regulation.

CO4. Describe the structure and functions of male and female reproductive systems and associated hormonal regulation.

CO5. Identify organs based on their physiological functions.

CO6. Apply anatomical and physiological knowledge to educate healthcare and allied professionals

BP 202T: Pharmaceutical Organic Chemistry-I

CO1. Determine the structure and nomenclature of organic compounds and describe their pharmaceutical applications.

CO2. Understand and differentiate types of isomerism.

CO3. Explain hybridization and bonding in organic molecules.

CO4. Interpret named organic reactions and reaction orientation principles.

CO5. Describe the preparation, reactions, and reactivity of functional groups like alkanes, alkenes, alcohols, aldehydes, and amines.

CO6. Illustrate mechanisms of nucleophilic substitution, addition, and elimination reactions.

BP 203T: Biochemistry

CO1. Explain classifications and functions of carbohydrates, lipids, amino acids, proteins, and nucleic acids.

CO2. Describe carbohydrate metabolism and its physiological and pathological implications.

CO3. Analyze lipid metabolism, amino acid catabolism, and their disorders.

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CO4. Understand the biosynthesis and degradation of nucleotides and related genetic processes.

CO5. Discuss enzyme kinetics, classification, regulation, and clinical relevance.

CO6. Interpret organ function tests and fundamentals of nutrition and basal metabolic rate.

BP 204T: Pathophysiology

CO1. Define the pathogenesis of common human diseases.

CO2. Identify etiologies and risk factors for various diseases.

CO3. Understand laboratory and diagnostic methods relevant to disease states.

CO4. Correlate pathophysiological knowledge with social health awareness.

CO5. Relate systemic interactions and promote holistic disease understanding and treatment.

CO6. Recognize and interpret signs and symptoms of common diseases.

BP 205T: Computer Applications in Pharmacy

CO1. Understand computer fundamentals, number systems, and pharmacy-specific databases.

CO2. Use web technologies like HTML, XML, CSS for pharmaceutical data.

CO3. Apply computer applications in pharmacokinetics, drug design, hospital and clinical pharmacy.

CO4. Explain bioinformatics and its applications in pharmaceutical development.

CO5. Analyze preclinical data using various computational tools.

CO6. Stay updated on recent technological trends in healthcare.

BP 206T: Environmental Sciences

CO1. Develop awareness of environmental issues and climate change.

CO2. Understand types and importance of natural resources.

CO3. Describe components of the environment and ecosystems.

CO4. Identify sources and effects of environmental pollution.

CO5. Explain ecological principles and interactions.

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CO6. Recognize human impact on environmental sustainability.

BP 207P: Human Anatomy & Physiology-II

CO1. Perform experiments on healthy human volunteers to verify and understand fundamental physiological processes.

CO2. Examine and interpret the structure and function of various human body systems using specimens, models, charts, and other educational tools.

BP 208P: Pharmaceutical Organic Chemistry (Practical)

CO1. Identify organic compounds by determining their melting point, boiling point, and performing derivatization techniques.

CO2. Conduct qualitative analysis to distinguish and classify different organic compound groups based on their chemical characteristics.

CO3. Detect fundamental elements (e.g., nitrogen, sulfur, halogens) in organic compounds and relate the results to synthetic organic chemistry.

CO4. Perform solubility tests to understand principles of saturation, polarity, and unsaturation, and identify corresponding organic classes.

CO5. Apply theoretical concepts of organic chemistry in practical qualitative analysis to develop synthesis strategies.

CO6. Build and visualize molecular models using physical tools and software to enhance understanding of stereochemistry and molecular geometry.

BP 209P: Biochemistry (Practical)

CO1. Perform qualitative tests to identify carbohydrates and proteins in biological samples.

CO2. Calculate required quantities, prepare buffer solutions, and accurately measure their pH.

CO3. Quantify reducing sugars and proteins, and estimate total cholesterol, creatinine, and glucose levels in blood or serum.

CO4. Detect abnormal constituents in urine through qualitative analysis.

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CO5. Investigate enzyme activity and evaluate the effects of pH, temperature, hydrolysis, and substrate concentration on enzymatic reactions.

CO6. Assess the quality of oils and fats by determining their saponification, iodine, and acid values; and demonstrate the use of a polarimeter.

BP 210P: Computer Applications in Pharmacy (Practical)

CO1. Design health-related questionnaires using word processing software to collect disease-specific information.

CO2. Create basic personal information web pages using HTML.

CO3. Generate customized mailing labels using the Label Wizard in MS Word.

CO4. Demonstrate proficiency in MS Office tools including Word, Excel, PowerPoint, and Access for pharmaceutical applications.

CO5. Understand and apply database management concepts such as form design, query building, and report generation in MS Access.

CO6. Summarize and print patient data reports generated from pharmacy databases.

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SECOND YEAR B. PHARMACY (SEMESTER-III)

BP 301T: Pharmaceutical Organic Chemistry-II

CO1. Explain aromaticity and reactivity of aromatic compounds like benzene.

CO2. Compare acidity and basicity of aromatic compounds and understand their preparation.

CO3. Understand lipid chemistry and evaluate lipid quality.

CO4. Analyze cycloalkane stability and reactivity.

CO5. Illustrate structures of heterocyclic compounds.

CO6. Link structural features with medicinal uses in advanced medicinal chemistry.

BP 302T: Physical Pharmaceutics-I

CO1. Compare states of matter and their pharmaceutical relevance.

CO2. Select suitable excipients based on physicochemical properties.

CO3. Apply solubility principles in drug formulation.

CO4. Relate interfacial phenomena to pharmaceutical applications.

CO5. Explain the role of complexation and protein binding.

CO6. Understand pH, buffers, and isotonicity in drug formulations.

BP 303T: Pharmaceutical Microbiology

CO1. Understand microbial isolation, growth, and culture techniques.

CO2. Compare sterilization methods and sterility testing procedures.

CO3. Conduct antimicrobial assays for sensitivity/resistance evaluation.

CO4. Apply aseptic techniques in pharmaceutical environments.

CO5. Recognize microbial spoilage and preservation strategies.

CO6. Understand fungal morphology and pharmaceutical implications.

BP 304T: Pharmaceutical Engineering

CO1. Describe fluid dynamics and size reduction in manufacturing.

CO2. Apply heat transfer in pharmaceutical processes like evaporation and distillation.

CO3. Analyze laboratory and industrial-scale unit operations.

CO4. Understand drying, mixing, and related equipment.

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CO5. Correlate filtration, centrifugation, and crystallization with pharma processes.

CO6. Select plant materials and control corrosion in pharma systems.

BP 305P: Pharmaceutical Organic Chemistry-II (Practical)

CO1. Apply recrystallization and steam distillation techniques to purify aromatic compounds, highlighting the importance of separation and purification in organic chemistry.

CO2. Interpret lipid profile data and differentiate between edible and non-edible fats and oils based on their chemical composition and health implications.

CO3. Assemble and troubleshoot chemical reactions to deduce mechanistic pathways, building a foundation for advanced studies in medicinal chemistry.

CO4. Perform essential calculations, reagent preparation, and energy estimations through practical reactions, enhancing accuracy and precision in lab work.

CO5. Explore and conduct named organic reactions to validate theoretical knowledge and identify practical outcomes.

CO6. Demonstrate readiness for research-oriented tasks by synthesizing compounds relevant to drug discovery and pharmaceutical applications.

BP 306P: Physical Pharmaceutics-I (Practical)

CO1. Acquire practical skills in determining drug solubility and estimating partition and distribution coefficients.

CO2. Examine the behavior of multi-component systems, including assessments of partial miscibility and phase separation.

CO3. Understand the principles of surface tension and develop the ability to measure it accurately.

CO4. Investigate complexation phenomena and apply the knowledge to enhance pharmaceutical formulation strategies.

CO5. Calculate and evaluate the Hydrophilic-Lipophilic Balance (HLB) of surfactants used in drug delivery systems.

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CO6. Analyze adsorption isotherms and estimate adsorption properties of materials relevant to pharmaceutical science.

BP 307P: Pharmaceutical Microbiology (Practical)

CO1. Perform isolation and identification of microorganisms using standard microbiological techniques.

CO2. Understand the critical role of sterilization methods in both small- and large-scale pharmaceutical production.

CO3. Conduct sterility testing to ensure microbiological safety of pharmaceutical products.

CO4. Apply various staining techniques to differentiate and study microbial morphology.

CO5. Perform biochemical tests for bacterial identification and characterization.

CO6. Develop familiarity with laboratory instruments and their applications in microbiological analysis.

BP 308P: Pharmaceutical Engineering (Practical)

CO1. Study heat-based unit operations such as steam distillation, drying, and crystallization used in pharmaceutical manufacturing.

CO2. Measure parameters such as moisture content, loss on drying, and air humidity and explain their impact on formulation and processing.

CO3. Understand the working principles and applications of industrial equipment including rotary tablet press, dehumidifiers, fluidized bed coaters, colloid mills, and freeze dryers.

CO4. Evaluate the importance of particle size analysis and size reduction in optimizing formulation performance.

CO5. Investigate the process variables influencing filtration, evaporation, and crystallization techniques.

CO6. Assess the efficiency of mixing and centrifugation in determining the physical stability of emulsions and suspensions.

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SECOND YEAR B. PHARMACY (SEMESTER-IV)

BP 401T: Pharmaceutical Organic Chemistry-III

CO1. Explain stereochemistry concepts in organic chemistry.

CO2. Understand racemic mixtures and methods of resolution.

CO3. Determine configurations of stereoisomers.

CO4. Explore synthesis and reactions of stereo chemically active compounds.

CO5. Describe the synthesis and therapeutic use of heterocyclic compounds.

CO6. Apply named organic reactions in drug synthesis.

BP 402T: Medicinal Chemistry-I

CO1. Analyze how physicochemical and biotransformation properties affect drug action.

CO2. Design synthetic pathways and understand the mechanisms of pharmacodynamic agents.

CO3. Classify therapeutic agents based on chemical structure and SAR.

CO4. Relate drug structure to biological activity.

CO5. Describe adrenergic and cholinergic agents and their therapeutic uses.

CO6. Understand CNS drug classification, mechanism of action, SAR, and metabolism.

BP 403T: Physical Pharmaceutics-II

CO1. Understand properties and applications of colloidal systems.

CO2. Analyze rheology in Newtonian and non-Newtonian fluids.

CO3. Describe stability and formulation of suspensions and emulsions.

CO4. Apply physicochemical principles to dosage form development.

CO5. Use micromeritics in particle analysis and powder flow studies.

CO6. Apply chemical kinetics to determine drug stability and shelf life.

BP 404T: Pharmacology-I

CO1. Understand pharmacokinetics and pharmacodynamics in drug development.

CO2. Explain drug mechanisms and classification across systems.

CO3. Illustrate receptor-level drug actions.

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CO4. Describe drug interactions, ADRs, and the drug discovery process.

CO5. Recommend drugs for ANS-related disorders based on receptor actions.

CO6. Compare CNS drugs for various disorders and explain dependency issues.

BP 405T: Pharmacognosy & Phytochemistry-I

CO1. Classify and evaluate crude drugs and apply quality control methods.

CO2. Explain cultivation and storage of medicinal plants.

CO3. Differentiate between primary and secondary metabolites.

CO4. Recognize hallucinogens, allergens, teratogens, and plant-based fibers.

CO5. Understand the role of plant tissue culture.

CO6. Assess the relevance of pharmacognosy in traditional and modern medicine.

BP 406P: Medicinal Chemistry-I (Practical)

CO1. Identify appropriate reactants based on the given reaction scheme and assemble the setup for synthesizing therapeutic organic compounds and intermediates.

CO2. Monitor reaction progress through visual observation and analytical parameters such as color change, pH variation, and changes in physical state.

CO3. Isolate and purify the final product using suitable solvents and recrystallization techniques to obtain chemically pure compounds.

CO4. Estimate the percentage purity of Active Pharmaceutical Ingredients (APIs) and dosage forms using official pharmacopeial assay procedures.

CO5. Determine the partition coefficients of drugs and synthesized compounds to assess their lipophilicity.

CO6. Execute synthesis of medicinally active compounds using scalable and industry-relevant methodologies.

BP 407P: Physical Pharmaceutics-II (Practical)

CO1. Analyze particle size distribution and assess the flow properties of pharmaceutical powders.

CO2. Predict sedimentation behavior and evaluate the impact of suspending agents on the physical stability of suspensions.

CO3. Determine the order of chemical reactions and apply kinetic principles to assess the stability of pharmaceutical formulations.

CO4. Measure the viscosity of both Newtonian and Non-Newtonian systems, and prepare and evaluate colloidal dispersions.

CO5. Understand the properties and pharmaceutical significance of colloidal systems.

CO6. Develop and evaluate different types of emulsions based on formulation parameters.

BP 408P: Pharmacology-I (Practical)

CO1. Understand the technical operation of laboratory instruments and the handling of laboratory animals used in experimental pharmacology.

CO2. Demonstrate procedures for animal handling, drug administration, and sample collection techniques such as blood withdrawal.

CO3. Apply ethical principles and guidelines governing animal experimentation in pharmacological research.

CO4. Utilize pharmacological simulation software for virtual drug testing and experimentation.

CO5. Conduct preclinical experiments to study drug effects on microsomal enzymes, ciliary motility, skeletal muscle activity, pupil responses, and locomotor behavior.

CO6. Design and perform experiments to evaluate the pharmacological activity of drugs on the central nervous system and assess local anesthetic properties.

BP 409P: Pharmacognosy-I (Practical)

CO1. Evaluate primary plant metabolites using organoleptic, physical, and chemical tests.

CO2. Perform qualitative microscopic examination to determine diagnostic leaf constants.

CO3. Use quantitative microscopy to measure starch grain size, calcium oxalate crystals, and phloem fiber characteristics.

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CO4. Determine extractive values and ash content of crude drugs as per pharmacopeial standards.

CO5. Estimate the swelling index and foaming index of herbal materials.

CO6. Identify different types of stomata and trichomes in various medicinal plant leaves through microscopic observation.

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THIRD YEAR B. PHARMACY (SEMESTER-V)

BP 501T: Medicinal Chemistry-II

CO1. Classify drugs and explain structure–activity relationships.

CO2. Analyze drug chemistry and its impact on pharmacological activity.

CO3. Understand the role of physicochemical properties in ADME.

CO4. Evaluate adverse effects and therapeutic utility of drugs.

CO5. Correlate drug stereochemistry with pharmacological activity.

CO6. Design synthetic pathways for medicinal drugs.

BP 502T: Industrial Pharmacy-I

CO1. Conduct preformulation studies for dosage form development.

CO2. Correlate BCS classification with drug formulation strategies.

CO3. Design and evaluate solid oral dosage forms.

CO4. Formulate sterile dosage forms and evaluate packaging.

CO5. Prepare and assess liquid, semisolid, and aerosol preparations.

CO6. Develop and test cosmetic products like creams, lipsticks, and shampoos.

BP 503T: Pharmacology-II

CO1. Explain cardiovascular drug mechanisms and clinical use.

CO2. Recommend pharmacotherapy for urinary disorders.

CO3. Understand drugs affecting coagulation, hemoglobin, and pain.

CO4. Describe autacoids and treatment for inflammation and gout.

CO5. Explain hormonal therapies and endocrine pharmacology.

CO6. Differentiate bioassay techniques and their applications.

BP 504T: Pharmacognosy & Phytochemistry-II

CO1. Understand biosynthetic pathways of secondary metabolites.

CO2. Apply advanced extraction and identification methods to herbal drugs.

CO3. Assess the chemistry and applications of crude drug constituents.

CO4. Perform isolation and structural analysis of phytoconstituents.

CO5. Evaluate production and estimation of plant-based compounds.

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CO6. Use chromatography and spectroscopy in natural product analysis.

BP 505T: Pharmaceutical Jurisprudence

CO1. Interpret pharmaceutical legislation related to drug development.

CO2. Describe the structure and role of Indian pharmacy regulatory bodies.

CO3. Understand the Drug and Cosmetic Act and related schedules.

CO4. Apply legal principles to pharmacy practice.

CO5. Identify penalties and offenses under pharmaceutical laws.

CO6. Explain roles of regulatory committees under relevant acts.

BP 506P: Industrial Pharmacy-I (Practical)

CO1. Determine the key preformulation parameters of a given drug to assess its suitability for dosage form development.

CO2. Formulate and evaluate tablet and capsule dosage forms based on standard pharmaceutical guidelines.

CO3. Develop and assess small volume parenteral and ophthalmic formulations, including appropriate packaging techniques.

CO4. Prepare and evaluate large volume parenteral dosage forms while ensuring sterility and stability.

CO5. Perform quality evaluation of marketed tablets, capsules, and injectable products.

CO6. Formulate and test cosmetic preparations such as lipsticks and creams for aesthetic and functional attributes.

BP 507P: Pharmacology-II (Practical)

CO1. Apply and adapt in vitro experimental techniques to evaluate cardiovascular drug actions.

CO2. Assess the pharmacological effects of cholinergic drugs using isolated tissue preparations.

CO3. Analyze the dose-response relationship of acetylcholine with agonists and antagonists using isolated frog rectus abdominis muscle and rat ileum.

CO4. Estimate drug concentrations by performing various bioassay methods.

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CO5. Design and justify experimental procedures to evaluate spasmogenic, spasmolytic, analgesic, and anti-inflammatory activities using animal models.

CO6. Interpret experimental pharmacological data using software-based dose–response curves, bioassays, and calculations of PA_2 and PD_2 values.

BP 508P: Pharmacognosy & Phytochemistry-II (Practical)

CO1. Perform morphological and microscopic evaluations to accurately identify crude drugs by analyzing cell types, tissues, and inclusions.

CO2. Use advanced tools and techniques to extract, isolate, and evaluate bioactive principles from crude drugs, and assess natural excipients in pharmaceutical formulations.

CO3. Apply chromatographic and spectroscopic methods for the identification and quantification of phytoconstituents, enhancing analytical proficiency.

CO4. Analyze crude drugs using organoleptic, physical, and chemical properties to ensure comprehensive quality assessment.

CO5. Isolate and analyze volatile oils from crude drugs using Thin-Layer Chromatography (TLC), gaining practical experience in separation techniques.

CO6. Separate sugars using Paper Chromatography to identify and evaluate their presence in natural drug sources.

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THIRD YEAR B. PHARMACY (SEMESTER-VI)

BP 601T: Medicinal Chemistry-III

CO1. Define and classify anti-infective agents along with their chemical structures.

CO2. Explain the structure–activity relationships and mechanisms of action of drugs used to treat infectious diseases.

CO3. Design synthetic pathways for important antimicrobial agents.

CO4. Describe the therapeutic uses and potential side effects of anti-infective drugs.

CO5. Apply drug design principles such as QSAR and pharmacophore modeling to improve therapeutic efficacy.

CO6. Correlate the stereochemistry of drugs with their pharmacological activities and outcomes.

BP 602T: Pharmacology-III

CO1. Explain the mechanism of action of drugs and their therapeutic applications.

CO2. Understand toxicology principles and management of poisoning.

CO3. Explore the applications of chrono pharmacology in clinical practice.

CO4. Classify chemotherapeutic agents and describe their use in managing infections.

CO5. Understand immunotherapy and its relevance to respiratory and gastrointestinal disorders.

CO6. Identify types of cancer and explain mechanisms and uses of anticancer drugs.

BP 603T: Herbal Drug Technology

CO1. Explain standardization of herbal materials, biodynamic agriculture, and systems of Indian medicine.

CO2. Understand the principles and formulations of Ayurveda, Siddha, and Unani systems.

CO3. Identify nutraceuticals, their regulations, and their role in managing metabolic disorders.

CO4. Utilize natural excipients in dosage form development and explain regulatory norms for ASU and herbal drugs.

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CO5. Apply quality control and standardization techniques to herbal products as per regulatory requirements.

CO6. Describe ethnopharmacological approaches in drug discovery and the role of herbal industries in healthcare.

BP 604T: Biopharmaceutics and Pharmacokinetics

CO1. Describe the processes of drug absorption, distribution, metabolism, and excretion (ADME).

CO2. Analyze physicochemical, pharmaceutical, and patient-related factors affecting drug bioavailability.

CO3. Differentiate between linear and nonlinear pharmacokinetics.

CO4. Understand protein binding and its influence on drug pharmacokinetics.

CO5. Use compartment models to compute pharmacokinetic parameters.

CO6. Design and interpret bioavailability and bioequivalence (BABE) studies.

BP 605T: Pharmaceutical Biotechnology

CO1. Understand the role of fermentation technology in producing microbial pharmaceutical products.

CO2. Gain insights into recombinant DNA technology and its applications in drug production.

CO3. Understand immune system components used in vaccines, monoclonal antibodies, and diagnostic kits.

CO4. Describe microbial genetics and their application in drug development.

CO5. Explain techniques such as ELISA, Western blotting, and Southern blotting in pharmaceutical analysis.

CO6. Understand gene amplification, mutations, and their implications in biotechnology.

BP 606T: Pharmaceutical Quality Assurance

CO1. Explain the principles of Quality Assurance (QA) and Quality Control (QC) in pharmaceutical manufacturing.

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CO2. Understand Total Quality Management (TQM), Quality by Design (QbD), NABL, and ISO standards.

CO3. Describe current Good Manufacturing Practices (cGMP) and Good Laboratory Practices (GLP).

CO4. Explain the quality control of packaging materials used in pharmaceuticals.

CO5. Highlight the importance of documentation in regulatory compliance.

CO6. Explain the principles and procedures of calibration and validation in the pharmaceutical industry.

BP 607P: Medicinal Chemistry-III (Practical)

CO1. Perform the synthesis of medicinal compounds using both conventional and microwave-assisted techniques.

CO2. Analyze and interpret the mechanisms involved in synthetic pathways of pharmaceutical drugs.

CO3. Recrystallize and purify synthesized compounds using suitable solvents and purification procedures.

CO4. Calculate theoretical and practical yields, determine percentage yield, and measure the melting point of synthesized drugs.

CO5. Utilize specialized software to draw chemical structures and reactions, and evaluate physicochemical parameters relevant to QSAR studies.

CO6. Conduct and interpret assay procedures to determine the potency and purity of active pharmaceutical ingredients (APIs).

BP 608P: Pharmacology-III (Practical)

CO1. Determine appropriate drug dosages and select optimal routes of administration for various drug classes.

CO2. Convert dosages between human and animal models for accurate pharmacological experimentation.

CO3. Design and execute preclinical experiments to evaluate antiallergic, anti-ulcer, gastrointestinal, and hypoglycemic drug activities, as well as test for pyrogens.

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CO4. Demonstrate the effects of agonists and antagonists on isolated tissues such as guinea pig ileum through laboratory experiments.

CO5. Assess acute toxicity of drugs on skin and eyes, and statistically analyze experimental biochemical data.

CO6. Perform simulated pharmacological experiments using virtual tools to assess drug actions and effects.

BP 609P: Herbal Drug Technology (Practical)

CO1. Design and formulate herbal cosmetics such as creams, lotions, and gels using plant-based ingredients.

CO2. Evaluate herbal excipients in compliance with standards set in pharmacopoeial monographs.

CO3. Estimate the concentration of key secondary metabolites present in herbal drugs.

CO4. Prepare, standardize, and evaluate herbal and Ayurvedic formulations as per official pharmacopoeial procedures.

CO5. Interpret and apply pharmacopoeial guidelines in the evaluation of herb monographs.

CO6. Conduct preliminary phytochemical screening to identify major constituents in herbal extracts.

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FINAL YEAR B. PHARMACY (SEMESTER-VII)

BP 701T: Instrumental Methods of Analysis

CO1. Understand interactions between matter and electromagnetic radiation for drug analysis.

CO2. Apply chromatographic techniques for qualitative and quantitative drug analysis.

CO3. Operate analytical instruments to assess drug purity and content.

BP 702T: Industrial Pharmacy-II

CO1. Recognize scale-up parameters and pilot plant design considerations for various dosage forms, adhering to SUPAC guidelines.

CO2. Understand technology transfer principles, including documentation and risk management, aligned with WHO guidelines.

CO3. Evaluate process, packaging, and analytical method transfer requirements.

CO4. Comprehend regulatory roles, drug development steps, and protocol design.

CO5. Implement quality systems like QbD, TQM, and Six Sigma in pharmaceutical production.

CO6. Understand Indian drug approval processes, regulatory bodies, and documentation like COPP.

BP 703T: Pharmacy Practice

CO1. Analyze roles of hospital and community pharmacies, formulary management, and therapeutic committees.

CO2. Design strategies for pharmacy administration, drug distribution, and inventory control.

CO3. Evaluate pharmacist responsibilities in hospital, community, and clinical settings.

CO4. Utilize communication and counseling skills for patient care and ADR monitoring.

CO5. Explain the investigational drug use process.

CO6. Interpret clinical laboratory reports to support therapeutic decisions.

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BP 704T: Novel Drug Delivery System

CO1. Understand different approaches and technologies in novel drug delivery.

CO2. Prepare and evaluate nanoparticle, ocusert, and transdermal systems.

CO3. Design mucosal drug delivery systems and assess their performance.

CO4. Develop floating tablets and study polymer effects on drug release.

CO5. Evaluate swelling and buoyancy in gastroretentive systems.

CO6. Explain the principles and strategies behind targeted drug delivery.

BP 705P: Instrumental Methods of Analysis

CO1. Understanding the principles of interaction between matter and electromagnetic radiation, and apply these concepts in pharmaceutical drug analysis.

CO2. Understand the principles and techniques of chromatographic methods for the separation and analysis of pharmaceutical compounds.

CO3. Conduct both qualitative and quantitative analysis of drugs using a variety of modern analytical instruments.

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FINAL YEAR B. PHARMACY (SEMESTER-VIII)

BP 801T: Biostatistics and Research Methodology

CO1. Apply descriptive statistics in pharmaceutical research.

CO2. Use regression, probability, and sampling theories in problem-solving.

CO3. Apply inferential statistics and non-parametric tests to pharmaceutical data.

CO4. Design research projects using statistical principles.

CO5. Evaluate clinical data using tools like Excel, SPSS, and R software.

CO6. Apply Design of Experiments (DOE) to optimize pharmaceutical research.

BP 802T: Social and Preventive Pharmacy

CO1. Understand social determinants of health and their impact on disease.

CO2. Design programs for disease prevention and health promotion.

CO3. Define the pharmacist's role in public health and national healthcare programs.

CO4. Apply preventive strategies for communicable and non-communicable diseases.

CO5. Participate in rural, urban, and school health initiatives.

CO6. Implement social pharmacy principles for better health outcomes.

BP 803ET: Pharmaceutical Marketing Management

CO1. Develop a clear understanding of core marketing concepts and strategies.

CO2. Apply marketing principles effectively within the context of the pharma industry.

CO3. Gain knowledge and practical insights into marketing management to prepare for dynamic roles in sales and product management.

BP 804ET: Pharmaceutical Regulatory Science

CO1. Analyze global regulatory processes for IND, NDA, and ANDA approvals.

CO2. Explain export registration procedures and CTD preparation.

CO3. Understand ethics, clinical trial protocols, and pharmacovigilance systems.

CO4. Interpret key regulatory terms, frameworks, and legal documents.

CO5. Integrate regulatory knowledge for compliant drug development.

CO6. Describe approval requirements for drugs, devices, and nutraceuticals across sectors.

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