

COURSE OUTCOMES (B PHARM)

FIRST SEMESTER		
BP 101T	HUMAN ANATOMY AND PHYSIOLOGY I	
	CO1	To understand the structure and functions of tissues and organs.
	CO2	To understand the structure and functions of skeletal system
	CO3	To understand the homeostatic mechanisms and systems integration.
	CO4	To understand the nervous and their regulation.
	CO5	To understand cardiovascular their coordination.
BP102T	PHARMACEUTICAL ANALYSIS	
	CO1	To understand the fundamental concepts of analytical chemistry, including types of errors, standard solutions, acid-base theories, normality, molarity, significant figures, impurities, limit test.
	CO2	To be skilled with standard laboratory techniques for the preparation, standardization, and utilization of primary and secondary standard solutions in titrimetric and gravimetric analyses.
	CO3	To gain knowledge about various types of titrations (acid-base, redox, precipitation, complexometric, non-aqueous) and their indicators, including the interpretation of titration curves
	CO4	Familiarize the selection and use of appropriate indicators, electrodes, and solvents in electrochemical methods such as conductometry, potentiometry, and polarography
	CO5	To design and perform analytical procedures for the quantitative estimation of pharmaceutical compounds using suitable classical and instrumental techniques.
BP 103T	PHARMACEUTICS I	
	CO1	Outline the historical development of pharmacy education, industry, and pharmacopoeias (IP, BP, USP) in India.
	CO2	Perform pharmaceutical calculations, dosage adjustments, and pediatric dose determinations based on age, weight, and surface area.
	CO3	Interpret prescription components, handle prescription errors, and identify physical, chemical, and therapeutic incompatibilities.
	CO4	Explain the principles, methods of preparation, and stability issues of monophasic and biphasic liquid dosage forms.
	CO5	Formulate and evaluate solid and semisolid dosage forms including powders, suppositories, ointments, pastes, creams, and gels.
BP 104T	PHARMACEUTICAL INORGANIC CHEMISTRY	
	CO 1	To recall about the sources of impurities and methods to determine impurities in inorganic chemistry and explain the principles of limit tests to limit impurities in drug sample.
	CO 2	Understand and learn the definition, methods of preparation, properties and medicinal uses of various pharmaceutical inorganic agents (gastrointestinal and miscellaneous)
	CO 3	Acquire and utilize knowledge about the assay of pharmaceutical inorganic compounds.
	CO 4	Understand the pharmaceutical importance of radioactive compounds
	CO 5	Understand about acids, bases, buffers and electrolytes in pharmaceutical systems, methods to measure, calculate and adjust the tonicity
BP 105T	COMMUNICATION SKILLS	
	CO1	Understand the behavioural needs for a Pharmacist to function effectively in the areas of pharmaceutical operation

	CO2	Apply appropriate verbal and non-verbal communication techniques, including through structured oral presentations, group discussions, and role plays relevant to pharmacy practice. body language, facial expressions, and active listening, to enhance patient counselling and professional interactions.
	CO3	To Effectively manage the team as a team player
	CO4	To Develop interview skills
	CO5	To Develop Leadership qualities and essentials
BP106RBT	REMEDIAL BIOLOGY	
	CO1	Explain the characteristics of living organisms, diversity in the living world, binomial nomenclature, and the basis and salient features of the five kingdoms of life.
	CO2	Describe the morphology of flowering plants and the general anatomy of roots, stems and leaves of monocotyledons and dicotyledons.
	CO3	Explain the structure and functions of the human circulatory, digestive, respiratory, excretory, nervous, endocrine and reproductive systems.
	CO4	Describe essential mineral and nitrogen nutrition in plants and explain the basic process of photosynthesis and factors affecting photosynthesis.
	CO5	Explain plant respiration, fermentation, plant growth and development, and the structure and functions of cells, cell organelles and tissues.
BP107P	HUMAN ANATOMY AND PHYSIOLOGY I-PRACTICAL	
	CO1	To analyze demonstration experiments
	CO2	To evaluate blood based experiments
	CO3	Enumeration of total blood cell count and evaluate the normal cell count.
	CO4	To evaluate the data obtained from experiments and apply these values on normal biological system
BP108P	PHARMACEUTICAL ANALYSIS -PRACTICAL	
	CO1	Perform Limit test to determine the impurities present in drugs and pharmaceuticals
	CO2	Perform the quantitative analysis of samples and standardize the various chemical solutions by various volumetric methods
	CO3	Perform the electrochemical analysis to determine the normalilty of drugs and pharmaceuticals
	CO4	Perform various operations in laboratory like weighing, transferring, titrations, preparations, recording and interpretation of results
	CO5	Communications of results of work in oral, written formats
BP109P	PHARMACEUTICS I-PRACTICAL	
	CO1	Prepare various pharmaceutical formulations such as syrups, elixirs, linctus, and solutions.
	CO2	Demonstrate the formulation and evaluation of suspensions and emulsions.
	CO3	Prepare powders, granules, suppositories and semisolids with proper techniques and standards.
	CO4	Formulate mouthwashes and gargles to treat common oral conditions. Understand the theoretical principles involved in each preparation and their therapeutic uses
BP 110P	PHARMACEUTICAL INORGANIC CHEMISTRY-PRACTICAL	
	CO 1	Perform and demonstrate limit tests as per Indian Pharmacopoeia standards.
	CO 2	Prepare official pharmaceutical inorganic compounds like boric acid, chalk, Al(OH) ₃ , FeSO ₄ , and potash alum using standard laboratory procedures

	CO 3	Conduct identification tests for inorganic substances such as NaHCO ₃ , FeSO ₄ , CuSO ₄ , CaCl ₂ , and interpret the results accurately.
	CO 4	Operate laboratory glassware, analytical instruments, and handle reagents safely following good laboratory practices.
BP111P	COMMUNICATION SKILLS-PRACTICAL	
	CO1	Demonstrate effective verbal and non-verbal communication in various settings.
	CO2	Exhibit active listening and presentation skills.
	CO3	Draft error-free letters, emails, and official documents.
	CO4	Practice and participate in group discussions, debates, and role plays.
	CO5	Adapt communication for different audiences
BP112RBP	REMEDIAL BIOLOGY -PRACTICAL	
	CO1	To analyze demonstration experiments
	CO2	To evaluate blood based experiments
	CO3	Enumeration of total blood cell count and evaluate the normal cell count.
	CO4	To evaluate the data obtained from experiments and apply these values on normal biological system
SECOND SEMESTER		
BP201T	HUMAN ANATOMY AND PHYSIOLOGY II	
	CO1	Understand and recall anatomical structures and physiology of digestive system. Explain the disorders of digestive system.
	CO2	Describe homeostatic mechanisms and physiology of urinary system and respiratory system and related disorders. Interpret basic laboratory data of spirometry to understand normal and abnormal physiological functions.
	CO3	Understand the homeostatic mechanisms, anatomy and physiology of nervous system and its function
	CO4	explain the anatomy and homeostatic mechanisms of endocrine system and its function and disorders
	CO5	Studied in detail about male and female reproductive systems
BP202T	PHARMACEUTICAL ORGANIC CHEMISTRY I	
	CO1	To understand the basics of organic chemistry. To classify organic compounds and to understand the nomenclature of alkanes, alkenes, alkynes, alcohols, carbonyl groups, acids, amines, ethers, phenols, aromatic compounds and their derivatives using IUPAC system.
	CO2	To identify and differentiate various types of structural isomerism in organic compounds through structural analysis. To understand the hybridization concept.
	CO3	Analyze reaction mechanisms including halogenation, electrophilic and free radical addition, elimination reactions (E1/E2), nucleophilic substitution reaction (SN1/SN2), ozonolysis, and Diels-Alder reaction
	CO4	Analyze nucleophilic addition reactions, condensation reactions (aldol, Cannizzaro, Perkin, Benzoin), and propose synthetic applications
	CO5	To understand acidity and basicity trends based on electronic effects, carry out qualitative tests, and evaluate the structure and uses of important alkyl halides, alcohols, aldehydes, ketones, carboxylic acids, esters, and aliphatic amines
BP 203T	BIOCHEMISTRY	
	CO 1	Explain the classification, properties, and kinetics of enzymes; apply knowledge of enzyme regulation and inhibition in clinical and therapeutic contexts.
	CO 2	Identify and describe the structure and biological roles of carbohydrates, lipids, proteins, nucleic acids, and energy-rich molecules; understand bioenergetics
	CO 3	Analyze carbohydrate metabolic pathways and their regulation; apply this understanding to explain clinical conditions like G6PD deficiency and diabetes, glycogen storage diseases.

	CO 4	Discuss the metabolism & biological significance of lipids and amino acids; evaluate the biochemical basis of related disorders such as ketoacidosis, fatty liver, and metabolic diseases.
	CO 5	Describe DNA replication, transcription, and translation; create conceptual links between nucleotide metabolism and genetic disorders such as gout.
BP 204T	PATHOPHYSIOLOGY	
	CO 1	Understand the basic principles and mechanisms of cell injury, cellular adaptation, inflammation and tissue repair.
	CO 2	Explain the pathophysiology and progression of major cardiovascular, respiratory and renal disorders.
	CO 3	Explain the pathophysiology of major haematological, endocrine, nervous and gastrointestinal disorders.
	CO 4	Analyse the pathophysiology and disease mechanisms of hepatic, gastrointestinal, skeletal and joint disorders and cancer.
	CO 5	Explain the pathophysiology and clinical features of major infectious and sexually transmitted diseases.
BP 206T	ENVIRONMENTAL SCIENCES	
	CO1	To understand the basic concepts of environmental science and natural resources
	CO2	To study ecosystem structure and functions
	CO3	To evaluate environmental pollution and its impact
	CO4	To understand biomedical waste management practices
BP207P	HUMAN ANATOMY AND PHYSIOLOGY II (PRACTICAL)	
	CO1	Demonstrate the structure and functions of the nervous system and sensory organs using models and charts.
	CO2	Perform and interpret basic clinical tests like neurological examination, visual acuity, taste identification.
	CO3	Assess lung functions through spirometry and interpret respiratory data including tidal volume and vital capacity.
	CO4	Demonstrate understanding of reproductive, respiratory and urinary systems using anatomical models and identify different family planning methods.
	CO5	Record physiological parameters such as body temperature and BMI, and correlate with clinical conditions.
BP208P	PHARMACEUTICAL ORGANIC CHEMISTRY I -PRACTICALS	
	CO1	Students will be able to identify unknown organic compound in a systematic way and summarize findings in a clear and concise manner
	CO2	Students will be able to synthesis organic drugs involving one step reaction in convenient method and to report their percentage yield
	CO3	Students will be able to depict and explain detailed mechanism for all chemical reactions related to synthesis
	CO4	Students will be able to make stereo models of simple organic molecules
	CO5	Students will obtain proper procedures and knowledge for safe handling and use of chemicals and follow proper procedures and regulation for safe handling when dealing with chemicals
BP 209P	BIOCHEMISTRY PRACTICAL	
	CO 1	Demonstrate the ability to analyze body fluids for the presence of essential biomolecules like sugars and proteins.
	CO 2	Use laboratory skills and apparatus for biochemical methods to quantify reducing sugars and proteins
	CO 3	Analyze biological samples (urine, blood) for key diagnostic constituents such as abnormal urine components, creatinine, glucose, and cholesterol.

	CO 4	Demonstrate the preparation of buffer solutions and measure pH accurately for biochemical experiments.
	CO 5	Evaluate enzymatic activity (salivary amylase) by studying the effects of substrate concentration and temperature, and interpret the hydrolysis of starch.
THIRD SEMESTER		
BP301T		PHARMACEUTICAL ORGANIC CHEMISTRY-II
	CO1	Interpret the concept of aromaticity and predict the orientation and outcome of electrophilic substitution reactions in benzene and its substituted analogues.
	CO2	Distinguish between the chemical behavior of phenols, aromatic amines, emphasizing their pharmaceutical relevance.
	CO3	Correlate the structural features of fatty acids with their chemical reactivity and assess the quality of oils using standard analytical parameters
	CO4	Evaluate the structural and reactive characteristics of polynuclear hydrocarbons and explain their transformation pathways and therapeutic applications
	CO5	Apply strain theories to explain the stability and reactivity of cycloalkane ring systems and relate these concepts to pharmaceutical compound design.
BP302T		PHYSICAL PHARMACEUTICS I
	CO1	Understand Solubility Concepts. Apply Solubility Parameters. Evaluate Factors Influencing Solubility, Interpret Real vs. Ideal Solution, Apply Distribution Law. Understand, applying, analyzing the principles of pH, buffer system and isotonic solutions.
	CO2	Understanding phase transitions, Describing physical properties, Applying thermodynamic principles, Analyzing phase diagrams, Understanding intermolecular forces. Describing, Applying, Analyzing the principles, concepts and impact of complexation and protein binding
	CO3	Understand and apply concepts related to various physicochemical properties including refractive index, dielectric constant, optical rotation, dipole moment, dissociation constant etc. Analyze and interpret data related to these properties, Apply this knowledge to understand the behaviour of molecules and their interactions.
	CO4	Understand the fundamental principles of particle size, shape and surface area. Apply micromeritic properties to evaluate powder flow, porosity and particle size distribution. Analyze data from various techniques to determine particle size and distribution.
BP 303T		PHARMACEUTICAL MICROBIOLOGY
	CO1	Growth factors and nutritional requirements for growth of microbes, Scope and applications, different types of Microscopy
	CO2	The staining techniques and biochemical test, isolation and preservation of microorganisms, measurement of bacteria
	CO3	sterilization and disinfection technique, cultivation of microorganism-Bacteria, fungus and virus, Design of Aseptic area
	CO4	Sterility testing and microbial assay of antibiotics
	CO5	Microbial spoilage, preservatives, animal cell culture
BP304T		PHARMACEUTICAL ENGINEERING
	CO1	Students will learn how raw materials are processed through steps such as size reduction, mixing, filtration, drying, evaporation, distillation, heat transfer and crystallization. Emphasis is placed on the purpose, sequence, and interdependence of these operations within a pharmaceutical production environment.
	CO2	developing students' ability to understand the working principles, operational theory, construction, and applications of various types of equipment and machinery used in the pharmaceutical industry.

	CO3	Information regarding various types of materials handled in pharmaceutical operations, as well as their physical properties that influence processing. students also explore material handling systems such as belt conveyors, screw conveyors and pneumatic conveyors
	CO4	This outcome helps students understand the causes and types of corrosion that affect pharmaceutical machinery and infrastructure, and the strategies used to prevent or control corrosion.
BP305P	PHARMACEUTICAL ORGANIC CHEMISTRY-II PRACTICAL	
	CO1	Demonstrate laboratory skills in organic purification techniques
	CO2	Determine analytical oil values using titrimetric methods
	CO3	Synthesize organic compounds using classical reactions
	CO4	Interpret the results of organic reactions and purification processes
BP302P	PHYSICAL PHARMACEUTICS I-PRACTICAL	
	CO1	Determine the particle size and size distribution by using sieving method. Determine the angle of repose of powders and interpret flow properties for pharmaceutical processing Calculate porosity of powders and evaluate its effect on packing, flow, and tablet formulation.
	CO2	Determine the particle size and size distribution by using optical microscopic method.
	CO3	Determine the partition coefficient and relate it to drug absorption and distribution. Determination of stability constant and donor acceptor ratio of PABA -caffeine complex by solubility method. Determination of stability constant and donor acceptor ratio of cupric glycine complex by pH titration method.
	CO4	Effect of temperature on solubility of drug. Determination of %composition of sodium chloride in a solution using phenol water system by CST method. Prepare buffer solutions and determine pH; relate it to drug stability.
BP 307P	PHARMACEUTICAL MICROBIOLOGY-PRACTICAL	
	CO1	Describe the working principles and applications of essential microbiology laboratory equipment (e.g., autoclave, laminar flow hood, incubator, microscope).
	CO2	Perform proper sterilization techniques and prepare culture media and glassware for microbiological experiments.
	CO3	Demonstrate culturing and staining techniques including sub-culturing, Gram staining, acid-fast staining, and preparation of slants and stabs.
	CO4	Isolate, identify, and analyze microorganisms using techniques such as streak plate method, motility testing, biochemical tests (IMViC), and water analysis.
	CO5	Conduct microbiological assays and sterility testing of pharmaceutical products following standard protocols. Aseptic transfer technique
BP308P	PHARMACEUTICAL ENGINEERING-PRACTICAL	
	CO1	Students will be able to operate various pharmaceutical equipments.
	CO2	Students will be able to analyze and interpret the data obtained from equipment
	CO3	Students will be able to analyze various parameters involved in pharmaceutical operation
	CO4	Students will be able to solve unforeseen events happening in pharmaceutical process
FOURTH SEMESTER		
BP 401T	PHARMACEUTICAL ORGANIC CHEMISTRY III	
	CO1	Describe the principles of stereoisomerism including optical and geometrical isomerism, and explain their relevance to drug action and design.
	CO2	Interpret the configuration of stereoisomers using RS, DL, and EZ nomenclature systems and identify chiral centers in drug molecules
	CO3	Analyze stereochemical aspects of reactions including stereoselective and stereospecific processes, and apply them in asymmetric synthesis

	CO4	Classify heterocyclic compounds and explain their synthesis, chemical behavior, and medicinal importance
	CO5	Compare aromaticity, reactivity, and basicity of five- and six-membered heterocycles and evaluate their role in medicinal chemistry.
	CO6	Describe the mechanisms and synthetic applications of named organic reactions and rearrangements important in drug synthesis.
	CO7	Design synthetic pathways for heterocyclic and chiral drug molecules using knowledge of organic reactions and stereochemistry.
BP 402T	MEDICINAL CHEMISTRY I	
	CO 1	To understand the concept of medicinal chemistry, influence of various physiochemical properties of drugs on biological activity and metabolism of drugs.
	CO 2	To understand the chemistry of drugs with respect to their biological activity. Acquire knowledge on classification, structures, MOA, and uses of Drugs acting on ANS
	CO 3	To understand the role of antipsychotics, sedatives and anticonvulsants in the management of neurological and psychiatric disorders
	CO 4	To understand the classification, structures, MOA and uses of Drugs for pain, inflammation and anaesthesia
	CO 5	Demonstrate the synthesis and SAR of different class of drugs.
BP403T	PHYSICAL PHARMACEUTICS II	
	CO1	Understand and apply principles of drug stability, reaction kinetics, and degradation factors to ensure safe, effective pharmaceutical formulation, storage & assigning expiry date for formulation
	CO2	Analyze and apply rheological and deformation principles to characterize pharmaceutical materials, ensuring optimal formulation, processing, and product performance.
	CO3	Understand principles of coarse dispersions to formulate stable suspensions and emulsions with desired interfacial and rheological properties.
	CO4	Understand and apply surface and interfacial phenomena to optimize pharmaceutical formulations involving solubilization, adsorption, and surface-active agents.
	CO5	Understand and analyze colloidal dispersions, their classification, properties, and behaviour to enhance stability and functionality in pharmaceutical systems.
BP 404 T	PHARMACOLOGY I	
	CO1	Understand the basic concepts of general pharmacology, routes of drug administration, and pharmacokinetics.
	CO2	Explain drug action mechanisms, receptor theories, adverse drug reactions, drug interactions, and toxicology principles.
	CO3	Describe autonomic nervous system structure and analyze the pharmacological actions of peripheral nervous system drugs.
	CO4	Explain the neurotransmitters in the CNS and pharmacological actions of CNS acting drugs including anesthetics and sedatives.
	CO5	Evaluate psychopharmacological agents, CNS stimulants, opioids, and management of addiction and poisoning.
BP 405 T	PHARMACOGNOSY AND PHYTOCHEMISTRY I	
	CO1	To learn the basics of pharmacognosy and crude drugs and analyze crude drugs through fundamental quality control methods.
	CO2	To explore and implement diverse methodologies for the cultivation and production of crude drugs & also various conservation methods.
	CO3	To understand plant tissue culture and explore its various applications in biotechnology and agriculture.
	CO4	To understand and recall the role of pharmacognosy in various systems of medicine, along with various secondary metabolites.
	CO5	To study and evaluate drugs of natural origin & primary metabolites, focusing on their biological source, chemical properties & therapeutic uses.

BP 406P	MEDICINAL CHEMISTRY I-PRACTICAL	
	CO 1	Apply the basic knowledge of organic chemistry in the synthesis of medicinal compounds.
	CO 2	Analyze and predict the principles of chemical reactions and the mechanism of chemical reactions. Application of techniques used for the checking of completion of reaction.
	CO 3	Apply the concept of moles in calculating theoretical yield and purification techniques.
	CO 4	Calculate and estimate the percentage purity of the drugs.
	CO 5	Determination of physiochemical parameter.
BP407P	PHYSICAL PHARMACEUTICS II -PRACTICAL	
	CO1	Demonstrate practical skills in evaluating surface tension, viscosity, HLB & CMC of pharmaceutical systems using standard techniques.
	CO2	Analyze the knowledge of basic principle to determine effect of various parameters on formulations
	CO3	Apply the principles of chemical kinetics to determine first & second-order reaction rate constants to understand drug stability and reaction mechanisms
	CO4	Evaluate the stability of various pharmaceutical dosage form
BP 408 P	PHARMACOLOGY I-PRACTICAL	
	CO1	To understand the basic concepts, tools, and techniques of experimental pharmacology.
	CO2	To perform dose-response and antagonist studies using isolated tissues.
	CO3	To evaluate pharmacological effects of drugs using in vivo models and interpret toxicological data.
	CO4	To understand drug administration methods and ethical handling of animals.
BP 409 P	PHARMACOGNOSY AND PHYTOCHEMISTRY I -PRACTICAL	
	CO1	To analyze various crude drugs through qualitative chemical tests.
	CO2	To evaluate crude drugs using quantitative microscopy techniques and to gain an in-depth understanding of various leaf constants.
	CO3	To identify & measure various cell characteristics like fibers, calcium oxalate crystals & starch grains.
	CO4	To evaluate crude drugs using physical methods of evaluation including moisture content, ash value & extractive value.
FIFTH SEMESTER		
BP501T	MEDICINAL CHEMISTRY	
	CO 1	To understand the chemistry and pharmacological activity of drugs
	CO 2	Acquire knowledge about the relationship between structure, biological activity and physicochemical properties of therapeutic agents
	CO 3	Understand the mechanism of action and clinical relevance of drugs and demonstrate the synthesis of some important drugs
	CO 4	Utilize the knowledge of the mechanism pathways, understand the structure activity relationship and pharmacological activity of major classes of drugs.
	CO 5	Demonstrate the synthesis, SAR, uses and chemical properties of different class of drugs.
BP502T	FORMULATIVE PHARMACY	
	CO1	To understand physical and chemical properties of drugs to guide formulation development and ensure stability of various dosage forms.
	CO2	To Evaluate & Analyze the basics of tablet formulation, coating techniques, processing, and quality control to develop effective, high-quality solid oral dosage forms.

	CO3	To Evaluate & Analyze the formulation, manufacturing, quality control, and stability of hard and soft gelatin capsules and pellet dosage forms.
	CO4	To analyze the formulation, production, quality control, and packaging of parenteral and ophthalmic products ensuring safety and efficacy.
	CO5	To Understand formulation, manufacturing, evaluation, and packaging of cosmetics, aerosols, and pharmaceutical products ensuring quality and regulatory compliance.
BP503T	PHARMACOLOGY II	
	CO1	Explain the pharmacology of drugs acting on the cardiovascular system.
	CO2	Classify and describe drugs acting on blood, blood-forming organs, and the urinary system.
	CO3	Analyze the pharmacological actions and therapeutic uses of autacoids and NSAIDs.
	CO4	Interpret the role of endocrine drugs in the regulation of hormonal balance.
	CO5	Summarize drugs affecting reproductive hormones and apply principles of bioassay.
BP504T	PHARMACOGNOSY & PHYTOCHEMISTRY II	
	CO1	To understand the basic metabolic pathways involved in the formation of various secondary metabolites and the use of radioisotopes in biogenetic studies.
	CO2	To comprehensively understand and critically analyze the biological source, phytochemical profiles, composition, therapeutic efficacy, and commercial applications of secondary metabolites present in crude drugs.
	CO3	To advance comprehensive knowledge regarding the industrial production, accurate estimation, and effective utilization of therapeutically significant phytoconstituents.
	CO4	To acquire and apply advanced knowledge of modern extraction techniques along with chromatography, spectroscopy & electrophoresis.
BP505T	PHARMACEUTICAL JURISPRUDENCE	
	CO1	To understand the drug and cosmetic act and manufacture of drugs
	CO2	To understand the schedules, sales of drug and various administration act and rule
	CO3	To understand various act and rules under the law
	CO4	To understand Ethics to be followed in pharmacy profession
BP506P	FORMULATIVE PHARMACY-PRACTICAL	
	CO1	To understand and analyze pre formulation, formulation, and evaluation of solid, liquid, and parenteral dosage forms.
	CO2	To Analyze and evaluate tablets, injections, syrups, and creams for quality and efficacy
	CO3	Understand packaging evaluation, focusing on container suitability and stability
	CO4	Apply pharmaceutical principles to ensure safe, effective, and stable drug products.
BP507P	PHARMACOLOGY II-PRACTICAL	
	CO1	Students will learn to handle isolated preparations (e.g., ileum, heart) and interpret DRCs and autonomic drug actions.
	CO2	To evaluate and interpret drug effects using in vivo animal models.
	CO3	To perform and interpret different bioassay methods for quantifying drug potency.
	CO4	To analyze the pharmacodynamic and pharmacokinetic effects of drugs using experimental models.
BP508P	PHARMACOGNOSY & PHYTOCHEMISTRY II-PRACTICAL	

	CO1	To systematically evaluate the macroscopy, histology & powder characteristics of crude drugs.
	CO2	To perform isolation of active principles from crude drugs.
	CO3	To acquire a comprehensive understanding & perform critical analysis of the separation and purification of phytoconstituents through chromatographic techniques.
	CO4	To analyse various crude drugs through qualitative chemical tests.
SIXTH SEMESTER		
BP 601T	MEDICINAL CHEMISTRY III	
	CO 1	To understand the chemistry of drugs and pharmacological activity of drugs.
	CO 2	Acquire knowledge about the relationship between structure, biological activity and physicochemical properties of therapeutic agents and metabolism of drugs
	CO 3	Understand the mechanism of action and clinical relevance of drugs and demonstrate the synthesis of some important drugs.
	CO 4	Utilize the knowledge of the mechanism pathways, understand the structure activity relationship and pharmacological activity of major classes of drugs.
	CO 5	Understand the importance of drug design and different techniques of drug design.
BP 602T	PHARMACOLOGY III	
	CO1	Explain the mechanism of drug action and its relevance in the pharmacological treatment of-infectious diseases of respiratory and gastrointestinal system.
	CO2	Explain the significance of chemotherapeutic agents and study of chemotherapy of drugs acting on folic acid metabolism, cell wall synthesis and protein synthesis.
	CO3	To explain and compare the mechanism of anti-mycobacterial, antiviral, anthelmintics, antimalarial and anti-amoebic agents
	CO4	To analyze the chemotherapy of UTI's, STD's, anti-cancer drugs and to categorize the immunopharmacology
	CO5	Explain about toxicological studies and chrono pharmacology
BP 603 T	HERBAL DRUG TECHNOLOGY	
	CO1	To comprehensively understand the selection of herbs from their sources, the implementation of Good Agricultural Practices (GAP) including organic farming, pest management & bio pesticides.
	CO2	To understand the principles of various systems of medicine, along with preparation & standardization of Ayurveda formulations.
	CO3	To understand the significance and diverse applications of nutraceuticals in healthcare & their market demand. Also to critically evaluate herbal drug interactions and their implications for healthcare practices.
	CO4	To acquire in-depth knowledge of the botanical sources and physicochemical characterization of herbal raw materials, along with herbal excipients & herbal formulations.
	CO5	To understand WHO & ICH guidelines & stability testing methods, along with patenting aspects of natural products & GMP of Indian systems of medicine.
BP 604T	BIOPHARMACEUTICS AND PHARMACOKINETICS	
	CO1	To Understand basic concepts of biopharmaceutics and pharmacokinetics in absorption, distribution and protein binding of Drugs.
	CO2	Use Plasma data and derive pharmacokinetic parameters to describe the process of drug ADME.
	CO3	Evaluate dosage regimens of drugs using pharmacokinetic parameters.

	CO4	Analyze the processes of drug metabolism, elimination, and bioavailability to identify influencing factors and evaluate improvement strategies.
	CO5	Detect potential clinical pharmacokinetic problems in multiple dosage regimens and apply principles to solve them.
BP 604T	PHARMACEUTICAL BIOTECHNOLOGY	
	CO1	Explain enzyme biotechnology and microbial applications in pharma industry
	CO2	Analyze and apply genetic engineering techniques for therapeutic product development
	CO3	Students will be able to understand and Analyze the roles of immune system components and examine the processes involved in hybridoma and vaccine production technologies.
	CO4	Apply molecular biology tools in pharmaceutical biotech including rDNA, PCR and vectors
	CO5	Analyze mutation types, industrial production processes by examining the steps involved in fermentation and evaluating the production methods of antibiotics and vitamins.
BP 606T-	QUALITY ASSURANCE	
	CO1	GMP, TQM-Principle and Philosophies, QMS, ICH guidelines Q guidelines, ISO registration
	CO2	The regulatory approval processes and Quality by design, Stability testing.
	CO3	GMP- Personal management, Equipment and raw material specification, Good ware housing Practices, Contamination control
	CO4	GLP, Quality control of packing materials, Complaints, Return goods
	CO5	Process of clinical trial protocol development, ethical committee roles, informed consent, and GCP responsibilities key reference documents such as Orange Book, Federal Register, and Purple Book
BP 607P	MEDICINAL CHEMISTRY III- PRACTICAL	
	CO 1	Apply the basic knowledge of organic chemistry in the synthesis of medicinal compounds.
	CO 2	Analyse and predict the principles of chemical reactions and the mechanism of chemical reactions. Application of techniques used for the checking of completion of reaction.
	CO 3	Apply the concept of moles in calculating theoretical yield and purification techniques.
	CO 4	Calculate and estimate the percentage purity of the drugs.
	CO 5	Determination of physiochemical parameter.
BP 608P	PHARMACOLOGY III- PRACTICAL	
	CO1	To understand the practical aspects of evaluation of various pharmacological activities in animal model by simulated experiments by software and videos.
	CO2	Apply biostatistical methods to assess the significance of experimental results and draw meaningful conclusions.
	CO3	To understand practical aspects of determination of various important parameters in blood and urine.
BP 609 P	HERBAL DRUG TECHNOLOGY- PRACTICAL	
	CO1	To perform preliminary phytochemical screening of crude drugs.
	CO2	To evaluate crude drugs using physical methods of evaluation including moisture content, ash value & extractive value.

	CO3	To develop and standardize herbal formulations like syrups, mixtures & to develop herbal cosmetics like creams, lotions in compliance with quality assurance protocols.
	CO4	To perform monograph analysis of herbal drugs & analysis of fixed oils.
		SEVENTH SEMESTER
BP 701 T	INSTRUMENTAL METHODS OF ANALYSIS	
	CO1	Critically evaluate various analytical techniques in the context of qualitative and quantitative analysis of drugs
	CO2	Demonstrate an understanding of theory and application of most common methods of pharmaceutical analysis in research, academic and industry.
	CO3	Apply the principles of chromatography in qualitative and quantitative analysis of pharmaceuticals in research and industrial perspective
	CO4	Utilize the knowledge of spectroscopy in the elucidation of molecular structure and the interpretation of the result.
	CO5	Demonstrate the scope of various analytical technique for the reliable analytical testing and documentation
BP 702T	INDUSTRIAL PHARMACY	
	CO1	Utilize pilot plant scale-up techniques by selecting appropriate formulation strategies, equipment, documentation practices, and regulatory guidelines to facilitate the transition from laboratory scale to commercial manufacturing
	CO2	To analyze WHO guidelines and practical aspects of technology transfer, including process validation, documentation, regulatory requirements, and the role of Indian TT agencies in pharmaceutical commercialization.
	CO3	Evaluate the role of regulatory affairs in drug development, regulatory authority functions, and the requirements for IND, NDA, and FDA submissions to ensure drug approval and compliance.
	CO4	Analyze Indian regulatory requirements, including CDSCO and State Licensing Authority roles, CTD format, COPP, and approval procedures for new drug development and marketing authorization.
	CO5	To understand industrial safety and accident records
BP703T	PHARMACY PRACTICE	
	CO1	Describe the classification and organizational structure of hospitals and hospital pharmacies; explain the various drug distribution systems and hospital formulary management.
	CO2	Explain the role and functions of the Pharmacy and Therapeutic Committee (PTC); apply the principles of clinical pharmacy including therapeutic drug monitoring, medication history interviews, and promoting medication adherence.
	CO3	Identify and analyze drug-related problems such as adverse drug reactions and interactions; provide appropriate drug information and conduct effective patient counselling and communication.
	CO4	Interpret clinical laboratory tests and evaluate rational drug use and drug therapy management in common diseases
	CO5	Understand the organization and legal requirements of community pharmacy and drug stores; apply drug store management and inventory control
BP704T	NOVEL DRUG DELIVERY SYSTEM	
	CO1	To Understand various approaches for development of novel drug delivery systems. Understand criteria for the selection of drug and polymer for the development of novel drug delivery systems
	CO2	Evaluate ocular and transdermal delivery systems and their applications.
	CO3	Explain the drug release from various Controlled drug delivery system such as, implantable and nasopulmonary drug delivery systems

	CO4	Analyze targeted and novel drug delivery systems using nanotechnology. Understand the concept of GRDDS
BP 705 P	INSTRUMENTAL METHODS OF ANALYSIS-PRACTICAL	
	CO1	Illustrate the practical applications of instruments used in pharmaceutical research activities.
	CO2	Design the analytical methods and evaluate the drug substance and formulation as per pharmacopoeia guidelines.
	CO3	Utilize the theoretical skill in interpreting the qualitative and quantitative data in an effective way.
	CO4	Apply the knowledge and subject specific skill to progress in academic as well as industrial research field.
	CO5	Utilize various analytical method for accessing the purity of formulations.
EIGHTH SEMESTER		
BP801T	RESEARCH METHODOLOGY AND BIOSTATISTICS	
	CO 1	Describe the fundamentals of research including types, characteristics, process, and ethics; explain the significance of Institutional Review Boards and the importance of research in pharmaceutical sciences.
	CO 2	Classify different types of data and study designs; apply suitable methods for data collection, coding, tabulation, and graphical representation in pharmaceutical research.
	CO 3	Analyse various epidemiological study designs, differentiate between measures of disease frequency and association, and identify potential biases, errors, and confounding factors.
	CO 4	Evaluate statistical methods for data analysis using descriptive and inferential tools; choose appropriate sampling techniques and justify sample size based on research needs.
	CO 5	Formulate a research hypothesis, design a suitable testing procedure using parametric and nonparametric tests, and develop a plagiarism-free thesis with proper referencing and publication ethics.
BP802T	SOCIAL AND PREVENTIVE PHARMACY	
	CO 1	Explain the basic concepts of health, disease, prevention and control of diseases, and describe the relationship between social, cultural, economic and environmental factors and health.
	CO 2	Explain the principles of nutrition, personal hygiene and health education, and identify common nutritional deficiencies and unhealthy habits affecting health.
	CO 3	Describe the general principles of prevention and control of communicable and non-communicable diseases prevalent in the community.
	CO 4	Describe the objectives, functioning and outcomes of major national health programmes implemented for the prevention and control of communicable and non-communicable diseases.
	CO 5	Explain national health intervention programmes related to maternal and child health, family welfare, tobacco control, malaria, elderly care and social health, and discuss the role of WHO in national health programmes.
	CO 6	Describe the organization and functions of community health services in rural, urban and school settings, including the role of PHCs, sanitation, urban health missions and school health promotion.
BP 803T	PHARMACEUTICAL MARKETING	
	CO 1	To understand marketing and Pharmaceutical marketing all over the world
	CO 2	To understand Product Decision
	CO 3	To understand and apply Promotion techniques in pharmaceutical marketing
	CO 4	To analyze Pharmaceutical marketing channel , and evaluate Pricing techniques

BP 804T	PHARMACEUTICAL REGULATORY SCIENCE	
	CO1	The stages involved in new drug discovery and development including generics and preclinical to clinical studies
	CO2	The regulatory approval processes and timelines for IND, NDA, and ANDA in the United States.
	CO3	The role and structure of key global regulatory authorities (US, EU, Australia, Japan, Canada).
	CO4	The registration process of Indian drug products in the overseas market and the necessary technical documentation (CTD, eCTD, DMF, ACTD)
	CO5	Outline the process of clinical trial protocol development, ethical committee roles, informed consent, and GCP responsibilities of stakeholders. Interpret basic regulatory concepts, terminologies, and key reference documents such as Orange Book, Federal Register, and Purple Book
BP 805T	PHARMACOVIGILANCE	
	CO1	Explain the historical development, scope including global and Indian programs, and classify adverse drug reactions based on detection, causality, and management.
	CO2	Various drug and disease classification systems and apply standard coding terminologies and dictionaries used in pharmacovigilance practice
	CO3	Apply statistical tools and ICH guidelines in assessing medication safety data, and evaluate safety reports and practices throughout drug development and post-marketing stages.
	CO4	Analyze vaccine safety surveillance, pharmacovigilance methods, and evaluate effective communication strategies for handling drug safety issues and crisis situations.
	CO5	Evaluate the role of pharmacogenomics and regulatory frameworks in monitoring ADRs in special populations, and design strategies to comply with national and international pharmacovigilance requirements.
BP 806T	QUALITY CONTROL AND STANDARDISATION OF HERBS	
	CO1	To acquire comprehensive understanding of WHO guidelines pertaining to the quality control, standardization & evaluation of herbal medicinal products.
	CO2	To understand and implement quality assurance principles and practices within the herbal drug industry.
	CO3	To understand EU, ICH & research guidelines for quality control of herbal drugs
	CO4	To understand various stability testing & chromatographic techniques, along with documentation for NDA & export registration.
	CO5	To evaluate WHO guidelines on pharmacovigilance & to conduct a comparative analysis of various herbal pharmacopoeias & to investigate the role of biological and chemical markers in the standardization of herbal products.
BP 807 ET	CADD	
	CO 1	Explain the process of drug discovery and development
	CO 2	Describe QSAR techniques and physicochemical parameters
	CO 3	Explain pharmacophore modelling and screening techniques
	CO 4	Apply molecular modelling and docking techniques
	CO 5	Utilize informatics tools in drug design

BP808ET	CELL AND MOLECULAR BIOLOGY	
	CO1	To understand the basics of cell
	CO2	To explain the fundamental knowledge on the structure and functions of cellular components
	CO3	Interaction of the components with drugs. Helps to apply in drug discovery process
	CO4	To explain the molecular pathways affected by the drugs
	CO5	Basic understanding on human genetics and hereditary
BP 809ET	COSMETIC SCIENCES	
	CO1	To understand the cosmetic principles and practice of professional ethics within the cosmetic industry
	CO2	To understand the formulation and analytical techniques for designing cosmetic products
	CO3	To understand the importance of herbs in cosmetics
	CO4	To analyze awareness regarding the usage of cosmetics for the overall health management

COURSE OUTCOMES (PHARM D)

FIRST YEAR		
1.1	HUMAN ANATOMY AND PHYSIOLOGY-THEORY	
	CO1	Explain the basic structural organization of the human body at cellular, tissue and musculoskeletal levels.
	CO2	Explain the composition, structure and physiological functions of the blood, lymphatic and cardiovascular systems and their associated disorders.
	CO3	Explain the anatomy and physiological functions of the respiratory and digestive systems and their associated disorders.
	CO4	Explain the structure and functions of the nervous, urinary and endocrine systems in maintaining body homeostasis.
	CO5	Describe the anatomy and physiology of the reproductive and sensory systems and their major physiological processes.
	CO6	Explain the physiological responses and adaptations of the muscular, cardiovascular, respiratory and thermoregulatory systems during exercise.
	HUMAN ANATOMY AND PHYSIOLOGY-PRACTICAL	
	CO 1	Identify and describe the microscopic characteristics of epithelial, connective, muscular and nervous tissues using appropriate charts, slides or specimens.
	CO 2	Perform and interpret basic haematological investigations including WBC count, RBC count, differential count, ESR, haemoglobin estimation, bleeding time, clotting time and blood grouping.
	CO 3	Demonstrate and identify the anatomical structures of the skeletal, cardiovascular, respiratory, digestive, urinary, nervous, reproductive and special sensory systems using charts, models and specimens.
	CO 4	Demonstrate and explain the principles and uses of basic instruments and appliances employed in haematological and experimental physiology investigations.
	CO 5	Perform and interpret basic physiological experiments involving muscle contraction, summation, effects of temperature and load, and muscle fatigue using an appropriate experimental preparation.
	CO 6	Demonstrate and explain the basic principles and applications of blood pressure measurement, family planning appliances and pregnancy diagnostic testing, and correlate the findings with normal physiological functions.
1.2	PHARMACEUTICS I-THEORY	
	CO1	To understand the fundamentals of pharmaceuticals including dosage forms, prescription handling, posology, and the historical development of pharmacy and pharmacopoeias.

	CO2	To apply pharmaceutical calculations and measurement principles required for accurate preparation and dispensing of pharmaceutical formulations.
	CO3	To understand and evaluate the formulation, preparation, and evaluation of solid and liquid pharmaceutical dosage forms.
	CO4	To analyze special pharmaceutical preparations, galenicals, surgical aids, and incompatibilities to ensure product safety, stability, and therapeutic efficacy.
	PHARMACEUTICS I-PRACTICAL	
	CO1	Students will learn to prepare and compound a range of pharmaceutical dosage forms.
	CO2	Ability to apply accurate calculations and select suitable excipients for formulation.
	CO3	Students will be able to evaluate prepared formulations and identify incompatibilities.
	CO4	To demonstrate Good Laboratory Practices (GLP) in compounding and documentation.
1.3	MEDICINAL BIOCHEMISTRY-THEORY	
	CO1	Explain the biochemical organization of the cell, transport mechanisms across cell membranes, energy-rich compounds, ATP and cyclic AMP.
	CO2	Explain the classification, nomenclature, mechanism of action, factors affecting enzyme activity and enzyme inhibition, and describe isoenzymes and coenzymes with their clinical significance.
	CO3	Describe the major pathways of carbohydrate metabolism and explain their regulation and associated metabolic disorders.
	CO4	Explain lipid metabolism, including β -oxidation, ketogenesis, fatty acid and cholesterol synthesis, hormonal regulation and disorders of lipid metabolism.
	CO5	Explain biological oxidation, electron transport chain, oxidative phosphorylation, energy capture, regulation, inhibition and uncoupling mechanisms.
	CO6	Describe protein and amino acid metabolism, urea cycle, bile pigment metabolism and the biochemical basis of jaundice, porphyria and related metabolic disorders.
	CO7	Explain nucleic acid metabolism, DNA replication and repair, genetic code, protein synthesis, mutation and mechanisms of inhibition of protein synthesis
	CO8	Apply biochemical principles to clinical chemistry and laboratory investigations, including kidney function tests, liver function tests, lipid profile, immunochemical techniques, electrolyte analysis and biochemical estimations
	MEDICINAL BIOCHEMISTRY-PRACTICAL	
	CO1	Students will be able to demonstrate basic biochemical laboratory techniques used for the analysis of biological samples
	CO2	Students will be able to perform qualitative and quantitative biochemical tests for the identification and estimation of important biochemical constituents.
	CO3	Students will be able to perform qualitative and quantitative biochemical tests for the identification and estimation of important biochemical constituents.
	CO4	Students will be able to analyze and interpret biochemical test results obtained from biological samples
	CO5	Students will be able to demonstrate the application of biochemical investigations in the diagnosis of diseases.
1.4	PHARMACEUTICAL ORGANIC CHEMISTRY-THEORY	
	CO1	Students will gain knowledge of IUPAC/common nomenclature, polarity, intermolecular forces, melting point, boiling point, solubility, acids and bases, and isomerism
	CO2	Students will understand free-radical, nucleophilic and electrophilic substitution/addition, elimination, oxidation and reduction reactions with their mechanisms, orientation and reactivity.
	CO3	Students will explain important named reactions such as Aldol, Cannizzaro, Perkin, Claisen, Friedel–Crafts, Sandmeyer, Williamson, Kolbe and Reimer–Tiemann reactions..

	CO4	Students will apply organic chemistry concepts to the preparation, identification, purity testing, assay and medicinal applications of selected official organic compounds.
	PHARMACEUTICAL ORGANIC CHEMISTRY-PRACTICAL	
	CO1	Describe and explain principles of major organic laboratory techniques.
	CO2	Perform synthesis of selected organic compounds using standard procedures.
	CO3	Systematically identify unknown organic compounds through qualitative analysis and derivative preparation
	CO4	Demonstrate stereochemical concepts using molecular models
1.5	PHARMACEUTICAL INORGANIC CHEMISTRY -THEORY	
	CO1	Explain the principles of pharmaceutical analysis, including errors, volumetric analysis, acid–base titrations, redox titrations and limit tests, and apply them to pharmaceutical substances.
	CO2	Explain and apply non-aqueous, precipitation and complexometric titrations, including the theory and use of indicators in pharmaceutical analysis.
	CO3	Explain the principles, procedures and precautions of gravimetric analysis and relate them to accurate pharmaceutical analysis.
	CO4	Describe the chemistry, preparation, properties, storage, uses and pharmaceutical significance of medicinal gases, acidifiers, antacids, cathartics and electrolyte replenishers.
	CO5	Explain the pharmaceutical importance, uses and applications of essential trace elements, antimicrobials, pharmaceutical aids and dental products.
	CO6	Describe the pharmaceutical relevance and applications of miscellaneous inorganic compounds and radiopharmaceuticals, including their important uses.
	PHARMACEUTICAL INORGANIC CHEMISTRY -PRACTICAL	
	CO 1	Perform and interpret limit tests
	CO 2	Carry out various assay procedures to determine the strength and quality of inorganic pharmaceuticals. Estimate and analyse mixtures of inorganic ions using analytical techniques.
	CO 3	Identify inorganic pharmaceutical substances by performing tests for identity based on their chemical properties.
	CO 4	Evaluate the purity of pharmaceutical raw materials by determine swelling power, acid neutralising capacity and presence of impurities such as iodates etc.
	CO5	Prepare standard inorganic pharmaceutical compounds using laboratory techniques and verify their quality parameters.
SECOND YEAR		
2.1	PATHOPHYSIOLOGY	
	CO1	Explain the basic principles of cell injury and cellular adaptation, including their causes, mechanisms, morphological changes, and associated metabolic disorders.
	CO2	Describe the mechanisms of acute and chronic inflammation, chemical mediators involved, and the processes of tissue repair and wound healing, including factors affecting healing.
	CO3	Explain the principles of immunity, including T and B lymphocytes, MHC proteins, immune tolerance, hypersensitivity, autoimmunity, transplantation immunity, and acquired immune deficiency syndrome (AIDS).
	CO4	Describe the characteristics, classification, biology, etiology, pathogenesis, diagnosis, invasion, and metastasis of benign and malignant tumors.
	CO5	Explain the types, mechanisms, stages, pathophysiology, and management principles of shock and the biological effects of radiation.
	CO6	Discuss the pathophysiology of environmental and nutritional diseases, including air pollution, smoking, protein-calorie malnutrition, vitamin disorders, obesity, and starvation.

	CO7	Explain the pathophysiology, clinical manifestations, complications, and general management principles of common disorders affecting the nervous, cardiovascular, endocrine, gastrointestinal, hepatic, and renal systems.
	CO8	Describe the etiology, pathogenesis, clinical manifestations, complications, and prevention/management principles of common infectious diseases, including sexually transmitted infections, urinary tract infections, pneumonia, typhoid, tuberculosis, leprosy, malaria, dysentery, and hepatitis.
2.2	PHARMACEUTICAL MICROBIOLOGY -THEORY	
	CO1	Growth factors and nutritional requirements for growth of microbes, Scope and applications, different types of Microscope. Cultivation technique for fungus and virus
	CO2	The staining techniques and biochemical characteristics, isolation and preservation of microorganisms, measurement of bacteria. Sterility testing and microbial assay of antibiotics. Principles of aseptic transfer, sterilization
	CO3	Disinfection technique, cultivation of microorganism. Immunity -antigen antibody interaction, immunization program
	CO4	Diagnostic test, microbial assay, infectious disease
	PHARMACEUTICAL MICROBIOLOGY -PRACTICAL	
	CO1	Apply the basic knowledge of equipment and culture media preparation and sterilization
	CO2	Analyze the isolation of pure culture from a mixed culture and evaluate the number of microorganisms in the media.
	CO3	Analyze the concept of staining and differentiate different group of bacteria
	CO4	Evaluate the motility of microorganism by different methods
	CO 5	Determination of efficiency of antibiotics and sterility test
2.3	PHARMACOGNOSY AND PHYTOPHARMACEUTICALS -THEORY	
	CO1	Explain the fundamental concepts of Pharmacognosy and the principles involved in cultivation, collection, processing and storage of crude drugs.
	CO2	Describe the cell wall constituents, cell inclusions and microscopical characteristics of crude drugs.
	CO3	Analyze the importance of natural pesticides and carbohydrates in Pharmacognosy and identify carbohydrate-containing crude drugs.
	CO4	Explain the sources, extraction, chemistry and methods of analysis of lipids, oils and proteins.
	CO5	Apply the knowledge of crude drug identification to evaluate plant fibres and detect adulteration in crude drugs.
	PHARMACOGNOSY AND PHYTOPHARMACEUTICALS -PRACTICAL	
	CO1	To systematically study and evaluate crude drugs through macroscopical, microscopical, powder, physico-chemical, and phytochemical parameters in order to authenticate the drugs, assess their quality, and detect adulteration.
	CO2	To qualitatively analyze lipids and lipid-containing samples using specific chemical tests to detect the presence of fats, oils, and their characteristic functional groups
	CO3	To perform and interpret specific chemical tests for identification and differentiation of natural crude drugs and excipients based on their characteristic reactions
2.4	PHARMACOLOGY I	
	CO1	Explain the basic principles of pharmacology and pharmacokinetics, pharmacodynamics, drug toxicity, preclinical evaluation and drug interactions.

	CO2	Classify and describe drugs acting on the autonomic nervous system and their therapeutic uses.
	CO3	Analyze the pharmacological actions and therapeutic uses of drugs acting on the cardiovascular, central nervous and respiratory systems.
	CO4	Interpret the role of hormones and hormone antagonists in the regulation of physiological functions and their therapeutic applications.
	CO5	Analyze the pharmacological actions and therapeutic uses of autacoids and their antagonists.
2.5	COMMUNITY PHARMACY	
	CO1	Explain the concept, scope, roles and responsibilities of community pharmacy and the principles of community pharmacy management, including site selection, layout, staffing, legal requirements, records and computerized systems.
	CO2	Interpret and evaluate prescriptions for completeness, legality and medication-related problems, including drug interactions, and apply appropriate measures to promote safe medication use.
	CO3	Apply inventory control techniques such as ABC, VED, EOQ, lead time and safety stock for effective management of medicines and pharmaceutical materials in community pharmacies.
	CO4	Demonstrate the principles of pharmaceutical care, patient counselling and medication adherence to identify and resolve drug-related problems and improve patient outcomes.
	CO5	Perform and interpret appropriate community health screening and health education activities, including screening for blood pressure, blood glucose, cholesterol and lung function, and provide appropriate advice on common diseases, nutrition and family health.
	CO6	Apply principles of rational drug therapy, essential medicines, OTC medication management, management of minor ailments and professional ethics to provide safe, effective and responsible community pharmacy services.
2.6	PHARMACOTHERAPEUTICS-I – THEORY	
	CO1	Explain the etiology, pathophysiology, clinical manifestations, diagnosis and complications of common cardiovascular, respiratory, endocrine and ophthalmic disorders.
	CO2	Analyse patient-specific clinical and laboratory information to develop appropriate pharmacotherapeutic strategies for common cardiovascular, respiratory, endocrine and ophthalmic disorders.
	CO3	Evaluate the efficacy, safety, adverse drug reactions, drug interactions and contraindications associated with commonly used pharmacotherapy.
	CO4	Apply appropriate prescribing principles for paediatric, geriatric, pregnant and breastfeeding patients, considering patient-specific therapeutic requirements and medication safety.
	CO5	Promote rational drug use by evaluating prescriptions, identifying medication-related problems and applying the principles of essential medicines and rational drug therapy.
	PHARMACOTHERAPEUTICS-I -PRACTICAL	
	CO1	Collect and document relevant patient history, clinical findings, investigations and medication history.
	CO2	Analyse patient cases by correlating clinical findings, investigations and prescribed pharmacotherapy.
	CO3	Evaluate prescribed medications for dose, frequency, interactions, adverse effects and therapeutic appropriateness .
	CO4	Present patient cases systematically and recommend appropriate pharmacotherapeutic interventions.
THIRD YEAR		
3.1	PHARMACOLOGY II – THEORY	

	CO1	Explain the pharmacology, mechanisms of action, therapeutic uses, adverse effects, and clinical applications of drugs acting on blood, blood-forming organs, and the renal system.
	CO2	Describe the pharmacological principles, mechanisms, therapeutic uses, adverse effects, and resistance mechanisms of major antimicrobial and chemotherapeutic agents
	CO3	Explain the principles of immunopharmacology and animal toxicology, including immunosuppressants, immunostimulants, and acute, sub-acute, and chronic toxicity studies.
	CO4	Describe the structure and function of cells, chromosomes, genes, and genomes, and explain DNA replication, cell cycle regulation, cell signaling, transcription, RNA processing, protein synthesis, and genetic abnormalities.
	CO5	Discuss the principles and applications of gene sequencing, mapping, cloning, gene therapy, gene targeting, and recombinant DNA technology in pharmaceutical and biomedical sciences.
	PHARMACOLOGY II - PRACTICAL	
	CO 1	To study various routes of drug administration, use of anesthetics in laboratory animals
	CO 2	To learn the composition of physiological salt solutions and basic instruments used in experimental pharmacology
	CO 3	To perform isolated experiments using various isolated preparation and the effect of different drugs on the concentration response curves
	CO 4	To study the preclinical screening of various drugs
3.2	PHARMACEUTICAL ANALYSIS - THEORY	
	CO 1	Explain the principles of quality assurance, quality control, validation, calibration, GLP, ISO standards and regulatory requirements in pharmaceutical analysis.
	CO 2	Explain the principles, instrumentation, techniques and pharmaceutical applications of various chromatographic methods.
	CO 3	Explain the principles, instrumentation and applications of electrometric methods including potentiometry, conductometry, polarography and amperometric titrations.
	CO 4	Explain the principles, instrumentation, interpretation and pharmaceutical applications of spectroscopic and optical analytical techniques.
	CO 5	Describe the principles, instrumentation and applications of X-ray diffraction and thermal analytical techniques including DSC and DTA
	PHARMACEUTICAL ANALYSIS -PRACTICAL	
	CO 1	Perform separation and identification of pharmaceutical compounds using chromatographic techniques.
	CO 2	Apply spectroscopic techniques for the qualitative and quantitative analysis of drugs.
	CO 3	Perform volumetric and electroanalytical methods for the analysis of pharmaceutical substances.
	CO 4	Estimate and assay drugs and pharmaceutical ingredients using colorimetric, fluorimetric, flame photometric and nepheloturbidimetric methods.
	CO 5	Demonstrate the basic operation and applications of advanced instrumental techniques such as HPLC, GC-MS, DSC and NMR in pharmaceutical analysis.
3.3	PHARMACOTHERAPEUTICS II – THEORY	
	CO1	Explain the pathophysiology, clinical manifestations and principles of pharmacotherapy of common infectious diseases and apply guidelines for rational antibiotic use and surgical prophylaxis.
	CO2	Analyze antimicrobial therapy for bacterial, viral, fungal and protozoal infections, including tuberculosis, HIV and opportunistic infections, and evaluate appropriate therapeutic approaches for sexually transmitted infections.
	CO3	Explain and evaluate the pathophysiology and pharmacological management of common musculoskeletal disorders including rheumatoid arthritis, osteoarthritis, gout, spondylitis and systemic lupus erythematosus.
	CO4	Apply pharmacotherapeutic principles in the management of acute and chronic

		renal disorders, including renal failure, dialysis and drug-induced renal disorders, with appropriate consideration of drug-related factors.
	CO5	Explain and apply the basic principles of cancer therapy and pharmacotherapy of common malignancies, including breast cancer and leukemia, and describe the management of chemotherapy-induced nausea and vomiting.
	CO6	Analyze the pharmacotherapy of common dermatological disorders such as psoriasis, scabies, eczema and impetigo and develop appropriate patient-centred therapeutic and counselling approaches.
	PHARACOTHERAPEUTICS II – PRACTICAL	
	CO 1	Apply the principles of pharmacotherapy in the management of common diseases through clinical case discussions and hospital postings.
	CO 2	Analyze patient cases, including clinical findings, laboratory investigations, and medication history, to identify appropriate drug therapy.
	CO 3	Evaluate the effectiveness and safety of drug therapy by monitoring patients during ward rounds and identifying changes or problems related to medication use.
	CO 4	Develop appropriate therapeutic plans based on patient-specific factors and demonstrate the ability to communicate clinical recommendations effectively.
	CO 5	Prepare, document, and present clinical cases and recent developments in drug therapy using appropriate scientific literature and references.
	CO 6	Demonstrate professional skills in clinical case presentation, patient follow-up, teamwork, and evidence-based decision-making in hospital practice.
3.4	PHARMACEUTICAL JURISPRUDENCE	
	CO1	Understanding of pharmaceutical jurisprudence, professional ethics, and the legal responsibilities of pharmacists in healthcare practice.
	CO2	Knowledge of the provisions of the Drugs and Cosmetics Act, 1940 and Rules, 1945, including schedules, drug regulation, labeling, packaging, import, sale, and regulatory authorities.
	CO3	Familiarity with the objectives, constitution, functions, and regulatory provisions of the Pharmacy Act, 1948, Medicinal and Toilet Preparations Act, 1955, and Narcotic Drugs and Psychotropic Substances Act, 1985.
	CO4	Awareness of the legal framework governing drug pricing, drug advertising, patent protection, animal welfare, and the regulation of prescription and non-prescription medicines.
	CO5	Competency in adhering to pharmaceutical laws, ethical standards, and regulatory requirements for ensuring safe and effective pharmacy practice.
3.5	MEDICINAL CHEMISTRY – THEORY	
	CO 1	To understand the principles of rational drug design and the relationship between chemical structure and biological activity of drugs.
	CO 2	To understand the chemistry, classification, SAR, mechanism of action and therapeutic applications of anti-infective agents.
	CO 3	To understand the chemistry, SAR, mechanism of action and therapeutic uses of sulphonamides, sulphones, antimalarials and antibiotics.
	CO 4	To understand the chemistry, SAR, mechanism of action and therapeutic applications of antineoplastic and cardiovascular agents.
	CO 5	To analyze the chemical structure, synthesis, SAR, mechanism of action and therapeutic applications of endocrine, hypoglycemic, thyroid, antithyroid, diuretic and diagnostic agents.
	MEDICINAL CHEMISTRY –PRACTICALS	
	CO 1	Apply the basic knowledge of organic chemistry in the synthesis of medicinal compounds.
	CO 2	Analyze and predict the principles of chemical reactions and the mechanism of chemical reactions. Application of techniques used for the checking of completion of reaction.
	CO 3	Apply the concept of moles in calculating theoretical yield and purification techniques.
	CO 4	Calculate and estimate the percentage purity of the drugs.
	CO 5	Determination of physiochemical parameter.

3.6	PHARMAEUTICAL FORMULATIONS –THEORY	
	CO1	Principles and classification of various pharmaceutical dosage forms
	CO2	Formulation and manufacturing principles in the preparation of different pharmaceutical dosage forms
	CO3	Quality control, evaluation and stability of pharmaceutical dosage forms
	CO4	Controlled and novel drug delivery system and their applications in drug therapy
	PHARMAEUTICAL FORMULATIONS –PRACTICAL	
	CO1	Understanding and applying the principle and procedure involved in different pharmaceutical formulation experiments
	CO2	Apply suitable excipients and formulate pharmaceutical dosage forms such as solid, liquid, semisolid and parenteral dosage forms.
	CO3	Apply suitable excipients and formulate various cosmetic preparations
	CO4	Evaluate stability of different pharmaceutical dosage forms and analyse the results obtained.
FOURTH YEAR		
4.1	PHARMACOTHERAPEUTICS III-THEORY	
	CO1	Explain the pathophysiology, clinical manifestations, diagnosis and pharmacotherapeutic management of major gastrointestinal and liver disorders, including peptic ulcer disease, GERD, inflammatory bowel disease, alcoholic liver disease, viral hepatitis and drug-induced liver disorders.
	CO2	Describe and evaluate the causes, clinical features, diagnosis and pharmacological management of common haematological disorders, including anaemias, venous thromboembolism and drug-induced blood disorders.
	CO3	Explain and apply appropriate pharmacotherapeutic approaches for major neurological disorders including epilepsy, Parkinsonism, stroke and Alzheimer's disease.
	CO4	Explain the pathophysiology and pharmacological management of common psychiatric disorders including schizophrenia, affective disorders, anxiety disorders, sleep disorders and obsessive-compulsive disorders.
	CO5	Describe and apply appropriate principles of pain management based on pain pathways, and discuss the pharmacotherapy of neuralgias and common headache disorders
	CO6	Explain and apply the principles of Evidence-Based Medicine (EBM) in evaluating clinical evidence and making rational, patient-centred pharmacotherapeutic decisions.
	PHARMACOTHERAPEUTICS III- PRACTICAL	
	CO 1	Demonstrate appropriate professional behaviour and communication skills during hospital postings and ward-round participation.
	CO 2	Collect, document and interpret relevant patient information, including medical history, diagnosis, investigations and current drug therapy, from observed clinical cases.
	CO 3	Evaluate the appropriateness of drug selection and therapeutic regimens in relation to the patient's clinical condition during clinical discussions.
	CO 4	Present and discuss clinical cases systematically, demonstrating the ability to identify drug-related problems and suggest appropriate therapeutic considerations.
	CO 5	Prepare and maintain accurate case records of patients observed during hospital postings and demonstrate appropriate documentation of clinical observations.
	CO 6	Research, analyse and communicate recent developments in drug therapy through structured written assignments based on reliable scientific and clinical evidence.
4.2	HOSPITAL PHARMACY-THEORY	
	CO1	Explain the organization, functions, infrastructure, staffing, workload, financial management and professional responsibilities of a hospital and hospital pharmacist.
	CO2	Apply principles of hospital drug policy, Pharmacy and Therapeutics Committee (PTC), hospital formulary, hospital committees and therapeutic guidelines for promoting rational and safe medication use.

	CO3	Demonstrate the principles of procurement, warehousing, inventory control and drug distribution systems, including ABC, VED, EOQ, lead time and safety stock.
	CO5	Describe and evaluate hospital pharmacy services, including controlled-substance distribution, Central Sterile Supply Services (CSSS) .
	CO4	Explain and apply principles of manufacturing and handling of pharmaceutical preparations, including sterile products, non-sterile preparations, total parenteral nutrition and radiopharmaceuticals.
	CO6	Demonstrate continuing professional development, education and training and professional communication, and professional relationships required for effective hospital pharmacy practice.
	HOSPITAL PHARMACY -PRACTICAL	
	CO1	Assess drug interactions in prescriptions and recommend appropriate management strategies to promote safe and rational drug therapy.
	CO2	Demonstrate basic principles of manufacture and handling of Parenteral formulations and powders with emphasis on appropriate pharmaceutical practices.
	CO3	Evaluate and communicate unbiased drug information using appropriate and reliable drug information resources.
	CO4	Apply inventory-control technique, ABC analysis for effective management of medicines in hospital pharmacy.
4.3	CLINICAL PHARMACY-THEORY	
	CO1	Explain the definitions, development, scope and principles of clinical pharmacy and pharmaceutical care.
	CO2	Demonstrate the roles and activities of a clinical pharmacist in patient care and drug therapy monitoring.
	CO3	Assess patient-specific clinical data and laboratory investigations to evaluate disease states and optimize drug therapy.
	CO4	Apply systematic methods to retrieve, evaluate and communicate drug and poison information for clinical decision-making.
	CO5	Explain and apply the principles of pharmacovigilance in the detection, assessment, prevention and management of adverse drug reactions.
	CO6	Demonstrate effective communication skills for patient counselling, medication history interviewing and clinical case presentation.
	CO7	Critically evaluate biomedical literature and apply evidence-based information in clinical pharmacy practice.
	CO8	Identify, assess and prevent medication errors and promote safe and rational use of medicines.
	CLINICAL PHARMACY-PRACTICAL	
	CO1	Perform and document a systematic patient medication history interview and collect relevant patient-specific medication information.
	CO2	Demonstrate appropriate patient medication counselling skills to promote safe and rational use of medicines.
	CO3	Retrieve, evaluate, and provide appropriate drug information using reliable and relevant information resources.
	CO4	Interpret relevant laboratory investigations and relate the findings to the patient's clinical condition and medication therapy.
	CO5	Integrate patient-specific clinical information, medication history, laboratory findings, and drug information to identify medication-related problems and support appropriate clinical decisions.
4.4	BIOSTATISTICS AND RESEARCH METHODOLOGY	
	CO1	Understand various clinical study designs, formulate methodologies, calculate appropriate sample sizes and study power, and effectively report research findings.
	CO2	Apply descriptive statistics, data distributions, and graphical data representations to analyze and summarize biomedical and pharmaceutical datasets.

	CO3	Formulate research hypotheses, conduct parametric and non-parametric significance testing, perform linear regression and correlation, and utilize statistical software packages.
	CO4	Calculate epidemiological measures of disease frequency and risk association to interpret clinical and public health data.
	CO5	Examine and implement computerized systems and software solutions for hospital and community pharmacy practice, inventory management, patient records, and drug information retrieval.
4.5	BIOPHARMCEUTICS AND PHARMACOKINETICS-THEORY	
	CO1	To Understand basic concepts of biopharmaceutics and Pharmacokinetics in ADME.
	CO2	Use Plasma data and derive pharmacokinetic parameters to describe the process of drug ADME.
	CO3	Evaluate dosage regimens of drugs using pharmacokinetic parameters.
	CO4	Evaluate biopharmaceutical studies involving drug product equivalency and assess reasons for poor bioavailability and methods to enhance it.
	CO5	Detect potential clinical pharmacokinetic problems in multiple dosage regimens and apply principles to solve them.
	BIOPHARMCEUTICS AND PHARMACOKINETICS-PRACTICAL	
	CO1	Evaluate and compare the dissolution behavior of slightly soluble drugs, marketed drug products, and different polymorphic forms.
	CO2	Determine the extent of plasma-protein binding of highly and poorly protein-bound drugs at different drug concentrations and contact times.
	CO3	Perform in vitro and animal-based drug absorption studies using suitable experimental models, including the inverted intestinal sac method.
	CO4	Calculate and interpret pharmacokinetic parameters such as Ka, Ke, t _{1/2} , C _{max} , T _{max} , AUC, AUMC, MRT, bioavailability, and renal clearance from plasma and urinary excretion data
	CO5	Conduct and evaluate bioavailability, bioequivalence, urinary excretion, and drug elimination studies of selected marketed drug products using appropriate statistical methods.
4.6	CLINICAL TOXICOLOGY	
	CO1	Explain the general principles of clinical toxicology, toxicokinetics, supportive care, gut decontamination, elimination enhancement and the clinical applications of antidotes in the management of poisoning.
	CO2	Analyze the clinical manifestations and apply appropriate management principles for acute poisoning caused by pesticides, drugs, alcohols, analgesics, NSAIDs, hydrocarbons, caustic substances and radiation.
	CO3	Evaluate the clinical manifestations and management of chronic poisoning due to heavy metals, including arsenic, lead, mercury, iron and copper.
	CO4	Describe and assess the clinical effects, complications, first-aid measures and management of venomous snake bites, plant and mushroom poisoning, mycotoxins, food poisoning and arthropod envenomations.
	CO5	Apply principles of emergency and supportive management in toxicological conditions to minimize complications and promote patient safety and recovery.
	CO6	Analyze the signs, symptoms and management approaches associated with substance abuse and dependence involving CNS stimulants, opioids, CNS depressants, hallucinogens, cannabis and tobacco.

FIFTH YEAR

5.1	CLINICAL RESEARCH	
	CO1	Explain the drug discovery and development process, including pharmacological and toxicological approaches, IND application, drug characterization and dosage-form development.
	CO2	Describe and analyze the design, phases and conduct of clinical trials, including clinical study methodology and post-marketing surveillance.
	CO3	Apply Good Clinical Practice (GCP), ICH guidelines, CDSCO requirements and ethical principles in the planning and conduct of clinical research.
	CO4	Explain and evaluate the roles and responsibilities of sponsors, investigators, clinical research associates, auditors, contract research organizations/coordinators and regulatory authorities in clinical trials.
	CO5	Develop and evaluate essential clinical study documents, including protocols, Case Report Forms (CRFs), Informed Consent Forms (ICFs) and Patient Information/Consent documents, and apply appropriate informed-consent procedures.
	CO6	Apply principles of clinical-trial data management, safety monitoring, regulatory submissions and international regulatory requirements to ensure the quality, integrity and safety of clinical research.
5.2	PHARMACOEPIDEMOLOGY AND PHARMACOECONOMICS	
	CO1	Understand the foundational concepts, historical development, and clinical significance of pharmacoepidemiology.
	CO2	Compute, interpret, and evaluate drug utilization metrics, epidemiological rates, and patient adherence levels.
	CO3	Analyze various mathematical measures of risk and causal temporal relationships in drug safety investigations.
	CO4	Select, design, and assess appropriate pharmacoepidemiological study methods and data sources for evaluating drug safety.
	CO5	Examine specialized safety surveillance applications and risk minimization strategies in real-world clinical practice.
	CO6	Explain the core principles of pharmacoeconomics and its strategic application in healthcare resource allocation.
	CO7	Compare and contrast different pharmacoeconomic evaluation methods to appraise healthcare interventions.
	CO8	Evaluate complex healthcare scenarios and formulate recommendations using pharmacoeconomic modeling software and case evidence.
5.3	CLINICAL PHARMACOKINETICS & PHARMACOTHERAPEUTIC DRUG MONITORING	
	CO1	Understand the foundational principles of clinical pharmacokinetics and apply them to design safe, effective dosage regimens using nomograms, tabulations, and route conversions for special patient populations (pediatric, geriatric, and obese).
	CO2	Analyze the pharmacokinetic mechanisms of drug-drug interactions, including enzyme induction, inhibition, and altered biliary excretion, to predict clinical toxicity or therapeutic failure.
	CO3	Evaluate the indications and protocols for Therapeutic Drug Monitoring (TDM) and establish PK/PD correlations to individualize drug therapy in high-risk clinical conditions such as cardiovascular disease, epilepsy, psychiatric disorders, and organ transplantation.
	CO4	Calculate renal function parameters (GFR and creatinine clearance) and formulate precise dosage adjustments for patients with renal impairment, hepatic dysfunction, or those undergoing extracorporeal drug removal.
	CO5	Examine population pharmacokinetics principles, Bayesian theory, and feedback-based adaptive dosing methods for analyzing pharmacokinetic data.

	CO6	Correlate genetic polymorphisms in drug-metabolizing enzymes (CYP450), transporters, and targets with inter-individual variability in drug response through pharmacogenetic principles.
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COURSE OUTCOMES

M PHARM-PHARMACEUTICS

FIRST SEMESTER		
MPT101T	MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES	
	CO 1	Understand the principles, theory and instrumentation of various spectroscopic techniques used in pharmaceutical analysis.
	CO 2	Explain and interpret NMR and Mass spectroscopy data for the identification and characterization of pharmaceutical compounds.
	CO 3	Apply chromatographic techniques for separation, identification and quantification of drugs and pharmaceutical substances.
	CO 4	Analyse pharmaceutical substances using electrophoretic, X-ray and electroanalytical techniques.
	CO 5	Evaluate pharmaceutical materials using thermal and immunological analytical techniques.
MPH 102T	DRUG DELIVERY SYSTEMS	
	CO1	Select drugs as suitable candidates for various novel drug delivery systems based on their physic-chemical properties
	CO2	Select polymers, retardants and other additives based on the requirements and desired characteristics of the drug delivery system
	CO3	Formulate and design controlled release and sustained release drug delivery systems
	CO4	Evaluate drug delivery systems for physic-chemical characteristics, in vitro and in vivo drug release
	CO5	Conduct stability studies for dosage forms as per prescribed guidelines
	CO6	Describe the importance of personalized medicine in the optimization of therapy in patients
	CO7	Develop the concept of Telepharmacy to benefit hospitals and clinics without direct access to a pharmacist
	CO8	Apply knowledge of protein drugs and biological products such as vaccines in their development and evaluation
MPH 103T	MODERN PHARMACEUTICS	
	CO1	To understand basic concepts of preformulation, drug–excipient interactions, stability and pharmaceutical dispersions.
	CO2	To apply optimization techniques and statistical designs in pharmaceutical formulation and processing.
	CO3	To apply validation, calibration, cGMP and regulatory principles in pharmaceutical manufacturing.
	CO4	To analyze production management, quality management, compression and compaction processes.
	CO5	To evaluate dissolution, diffusion, pharmacokinetic and statistical parameters for pharmaceutical products.
MPH 104T	REGULATORY AFFAIRS	
	CO1	To understand drug development concepts and regulatory requirements for

		innovator and generic drugs, including IND, NDA and ANDA.
	CO2	To apply regulatory guidelines for preparation and submission of CMC documents, dossiers and CTD/eCTD submissions.
	CO3	To analyze regulatory requirements for clinical trials, ethics committees, informed consent and pharmacovigilance.
	CO4	To evaluate global and post-approval regulatory requirements for pharmaceutical products across major regulatory agencies.
MPH105P	PHARMACEUTICS PRACTICAL I	
	CO 1	To apply instrumental analytical techniques for the analysis of pharmaceutical compounds and formulations.
	CO 2	To perform and evaluate in-vitro dissolution studies of pharmaceutical formulations.
	CO 3	To formulate and evaluate modified and novel drug delivery systems.
	CO 4	To evaluate the effect of formulation and processing variables on pharmaceutical dosage forms.
	CO 5	To interpret drug release data using mathematical models and similarity factors.
SECOND SEMESTER		
MPH 201T	MOLECULAR PHARMACEUTICS (NANO TECH AND TARGETED DDS)	
	CO1	Design drug delivery systems for targeting drugs to tumours and to the brain
	CO2	Prepare and evaluate nanoparticles and liposomes as carriers for drug targeting
	CO3	Select drugs and polymers in the design of microspheres and microcapsules for various applications
	CO4	Formulate aquasomes, niosomes, phytosomes and electrosomes for various applications in drug targeting
	CO5	Develop strategies for improving nasal absorption in the design of nasal drug delivery systems
	CO6	Optimize pulmonary delivery by the design of suitable aerosols, nebulizers and dry powder inhalers
	CO7	Apply knowledge of antisense molecules and aptamers in the design of novel drug delivery systems
	CO8	Apply gene therapy in the treatment of cancer and inherited disease
MPH 202T	ADVANCED BIOPHARMACEUTICS & PHARMACOKINETICS	
	CO1	To understand the fundamental principles of biopharmaceutics and pharmacokinetics, including drug absorption from the gastrointestinal tract and factors affecting drug absorption.
	CO2	To apply biopharmaceutical principles and dissolution techniques in the design and evaluation of drug products and to assess factors affecting drug product performance.
	CO3	To analyze pharmacokinetic models and derive pharmacokinetic parameters using appropriate approaches for describing drug absorption, distribution, metabolism and elimination.
	CO4	To evaluate bioavailability and bioequivalence studies, dosage regimens and pharmacokinetic data for assessing drug product performance and therapeutic equivalence.
MPH 203T	COMPUTER AIDED DRUG DEVELOPMENT	
	CO1	To understand the applications of computers, statistical modeling and Quality-by-Design principles in pharmaceutical research and development.
	CO2	To apply computational modeling techniques to predict drug absorption, distribution, metabolism, excretion and transporter-mediated drug disposition.
	CO3	To apply computer-aided optimization and statistical design techniques in pharmaceutical formulation development.
	CO4	To analyze computer-aided biopharmaceutical characterization, gastrointestinal absorption, dissolution, IVIVC and pharmacokinetic/pharmacodynamic simulations.

	CO5	To evaluate the applications, advantages, limitations and future potential of artificial intelligence, robotics and computational fluid dynamics in pharmaceutical sciences..
MPH 204T	COSMETICS AND COSMECEUTICALS	
	CO1	To understand the regulatory provisions, labelling standards, import and manufacture requirements for cosmetic products as per Indian and global regulations.
	CO2	To understand the biological and physiological anatomy of skin and hair structures in correlation with common cosmetic dermatological problems.
	CO3	To apply the principles of raw material selection, surfactant, rheology modifiers and preservation mechanism to design stable cosmetic bases.
	CO4	To analyze the formulation and design cosmeceutical formulations addressing specific needs like sun protection, pigmentation, dandruff and oral hygiene.
	CO5	To evaluate commercial and herbal cosmetic products for their safety, toxicity, quality metrics and compliance with guidelines like COSMOS.
MPH205P	PHARMACEUTICS PRACTICAL II	
	CO1	Demonstrate the principles and techniques involved in the formulation and evaluation of novel drug delivery systems and pharmaceutical products.
	CO2	Apply biopharmaceutic and pharmacokinetic principles to evaluate drug dissolution, protein binding, bioavailability, permeability, metabolism and IVIVC.
	CO3	Analyze pharmaceutical formulation and research data using Design of Experiments, statistical tools and computational software.
	CO4	Evaluate drug disposition and pharmacological behavior using computational modeling, simulation and Quality-by-Design approaches.
	CO5	Develop and evaluate pharmaceutical and cosmetic products based on identified therapeutic, cosmetic and consumer needs using appropriate formulation strategies.
THIRD SEMESTER		
MRM 301T	RESEARCH METHODOLOGY AND BIOSTATISTICS	
	CO1	To understand the fundamental concepts of research methodology, study designs, literature review and scientific information retrieval.
	CO2	To apply appropriate data collection, processing and biostatistical methods for analysis and interpretation of research data.
	CO3	To analyze ethical issues in medical research and apply principles of informed consent, confidentiality, randomization and ethical research practices.
	CO4	To understand and apply CPCSEA guidelines for the ethical and scientific management of laboratory animal facilities.
	CO5	To develop and evaluate scientific research documents including theses, research reports, abstracts and references while maintaining academic integrity.
	CO6	To demonstrate effective research communication through posters, seminars and conferences and understand the principles of scientific publication and copyright.