



IET COLLEGE OF PHARMACY

Near Inkel City, Panakkad PO, Malappuram, 676519, Kerala

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PROGRAM OUTCOMES		
PO1	Pharmacy Knowledge	Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.
PO2	Planning Abilities	Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
PO3	Problem analysis	Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.
PO4	Modern tool usage	Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.
PO5	Leadership skills	Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well-being.
PO6	Professional Identity	Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).
PO7	Pharmaceutical Ethics	Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.
PO8	Communication	Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.
PO9	The Pharmacist and society	Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.
PO10	Environment and sustainability	Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO11	Life-long learning	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

PROGRAM SPECIFIC OUTCOMES (PSOS): B. PHARM.

Upon completion of course, our graduates will be able to

PSO1	Leverage expertise in the successful product development for both large scale & commercial production and analytical techniques ensuring adherence to regulatory standards, product safety and efficacy
PSO2	Acquire adequate knowledge & necessary skills to practice effectively the profession of pharmacy, patient counselling and professional information exchange with physician & other paramedics and strive for better healthcare.

COURSE OUTCOMES: B. PHARM.

Sl. No	Course Program	Course Outcome
I Semester		
BP101T	Human Anatomy and Physiology I – Theory	<p>The students shall be able to</p> <p>CO1-Describe anatomical location and structure of Osseous system, CVS, Sense organs.</p> <p>CO2-Discuss the anatomical location and structure of Skeletal muscles, Lymphatic system & Haemopoietic system.</p> <p>CO3-Interpret cell and Tissues. Explain the anatomy of peripheral nervous system</p> <p>CO4-Analyze the physiology Osseous system, CVS, Sense organs, Skeletal muscles, Lymphatic system & Haemopoietic system.</p> <p>CO5-Differentiate the disorders and diseases associated with Osseous system, CVS, Sense organs, Skeletal muscles, Lymphatic system & Haemopoietic system</p>
BP102T	Pharmaceutical Analysis I – Theory	<p>The students shall be able to</p> <p>CO1-Apply the basic principles of analysis in Standardization of compounds</p> <p>CO2-Recognise the possible sources of impurities in medicinal agents and errors in analytical methods</p> <p>CO3-Analyze the pharmaceuticals by different volumetric methods</p> <p>CO4-Discuss the principles of Electro analytical methods in analyzing various compounds.</p>

<p>BP103T</p>	<p>Pharmaceutics I - Theory</p>	<p>The students shall be able to</p> <p>CO1-State the history of the profession of pharmacy and significance of various pharmacopeias.</p> <p>CO2-Explain the basics of different dosage forms and various excipients used in formulation of dosage forms.</p> <p>CO3-Discuss the professional way of handling the prescription, pharmaceutical incompatibilities and different solubility enhancement techniques.</p> <p>CO4-Describe the factors affecting dose selection and different pharmaceutical calculations</p> <p>CO5-Explain the preparation, evaluation and instability concerns of various conventional dosage forms.</p>
<p>BP104T</p>	<p>Pharmaceutical Inorganic Chemistry – Theory</p>	<p>The students shall be able to</p> <p>CO1-Discuss the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals.</p> <p>CO2-Elaborate the importance of buffers, acids and bases.</p> <p>CO3-Discuss the composition of GIT agents, electrolytes and dental products.</p> <p>CO4-Identify the role of radiopharmaceuticals in pharmacy.</p> <p>CO5-State the medicinal and pharmaceutical importance of inorganic compounds.</p>
<p>BP105T</p>	<p>Communication skills – Theory *</p>	<p>The students shall be able to</p> <p>CO1-Define communication, enlist the importance of communication, summarize the process of communication, discuss the barriers of communication, factors affecting perspective</p> <p>CO2-Explain the elements of communication, various styles of communication</p> <p>CO3-Describe the basic listening skills, importance of written communication</p> <p>CO4-Evaluate the standardized techniques for Email communication, oral and written communication, Group discussion and presentation skills to ace interviews.</p>
<p>BP106R MT</p>	<p>Remedial Mathematics – Theory*</p>	<p>The students shall be able to</p> <p>CO1-Solve problems based on partial fractions used in Chemical kinetics and Pharmacokinetics, Logarithms used in pharmaceutical equations, limits.</p> <p>CO2-Solve problems based on matrices used in Pharmacokinetic equations.</p> <p>CO3-Solve problems based on differentiation and integration.</p> <p>CO4-Solve problems used to find out slope of line, discuss the conditions for parallelism and perpendicularity.</p> <p>CO5-Solve problems based on Differential equations and Laplace transform used in solving chemical kinetics and Pharmacokinetic equations.</p>

<p>BP106RB T</p>	<p>Remedial Biology- Theory*</p>	<p>The students shall be able to</p> <p>CO1-Discuss five kingdom classification of life and explain morphology of flowering plants</p> <p>CO2-Describe about body fluids, circulation, digestion, absorption, breathing and respiration</p> <p>CO3-Explain modes, parts of excretion, urine formation and renin angiotensin system, define and classify nervous system, discuss the structure of neuron, brain and spinal cord, enlist the functions of parts of brain, summarize endocrine glands, their secretions and functions, outline parts of male and female reproductive system</p> <p>CO4-Enlist the function macronutrients and micronutrients essential for plants, explain nitrogen fixation and importance of nitrogen cycle, summarize photosynthesis and enlist the factors affecting photosynthesis.</p> <p>CO5-Discuss respiration, glycolysis and fermentation. Enlist plant growth regulators, outline cell and its organelles with functions, Explain tissue and its types.</p>
<p>BP107P</p>	<p>Human Anatomy and Physiology – Practical</p>	<p>The students shall be able to</p> <p>CO1-Discuss anatomical structure of Osseous system and Histology of tissues.</p> <p>CO2-Determine RBC count.</p> <p>CO3-Determine WBC count, Respiratory volumes & Blood groups</p> <p>CO4-Determine Hemoglobin, Bleeding time and clotting time.</p> <p>CO5-Identify Family planning devices.</p> <p>CO6-Discuss organ systems like digestive system, Urinary system, cardiovascular system.</p>
<p>BP108P</p>	<p>Pharmaceutic al Analysis I – Practical</p>	<p>The students shall be able to</p> <p>CO1-Perform the volumetric titrations.</p> <p>CO2-Prepare standard solutions and carry out the standardization of various standard solutions.</p> <p>CO3-Determine the normality by electro-analytical methods.</p>
<p>BP109P</p>	<p>Pharmaceutics I – Practical</p>	<p>The students shall be able to</p> <p>CO1-The importance of excipients, labeling and dispensing involved in the formulation of</p> <p>CO2-Monophasic dosage forms e.g. syrups, elixirs, gargles, mouthwashes etc.</p> <p>CO3-Biphasic dosage forms such as suspensions and emulsions.</p> <p>CO4-Solid dosage forms such as powders and granules.</p> <p>CO5-Semisolid dosage forms such as suppositories and ointments.</p>

BP110P	Pharmaceutical Inorganic Chemistry – Practical	<p>The students shall be able to:</p> <p>CO1-Identify the impurities in given inorganic compounds using limit test</p> <p>CO2-Determine the impurities by performing tests for purity</p> <p>CO3-Synthesize inorganic drugs of pharmaceutical importance</p> <p>CO4-Identify cations and anions in inorganic compounds by performing chemical tests.</p>
BP111P	Communication skills – Practical*	<p>The students shall be able to:</p> <p>CO1-Articulate the concept of basic greeting and communication etiquettes.</p> <p>CO2-Analyze good pronunciation and presentation techniques.</p> <p>CO3-Assess written communication with strong grammatical skills.</p> <p>CO4-Create and compose ideas for effective written and oral communication with socio ethical values for successful career.</p>
BP112RBP	Remedial Biology – Practical*	<p>The students shall be able to:</p> <p>CO1-Illustrate microscope, section cutting, mounting and staining techniques.</p> <p>CO2-Explain about cell and its inclusions.</p> <p>CO3-Evaluate the flowering plant parts by their morphology and Microscopical characters.</p> <p>CO4-Explain the frog by using computer models.</p> <p>CO5-Identify bones, determine blood group, blood pressure and tidal volume.</p>
II Semester		
BP201T	Human Anatomy and Physiology II- Theory	<p>The students shall be able to:</p> <p>CO1-Discuss the anatomical concepts of CNS, Digestive system, Respiratory system, Urinary system,</p> <p>CO2-Discuss the Reproductive system & Endocrine system, energetics and genetics.</p> <p>CO3-Describe the physiology of CNS, Digestive system, Respiratory system.</p> <p>CO4-Describe the physiology of Urinary system, Reproductive system & Endocrine system</p> <p>CO5-Differentiate the disorders and diseases associated with Digestive system, Respiratory system,</p> <p>CO6-Differentiate the disorders and diseases associated with Urinary system, Reproductive system & Endocrine system.</p>
BP202T	Pharmaceutical Organic Chemistry I- Theory	<p>The students shall be able to:</p> <p>CO1-Write the organic compounds' names, and structures.</p> <p>CO2-Illustrate the reaction's mechanism and orientation.</p>

		<p>CO3-Report the reactivity and stability of the reactions.</p> <p>CO4-Identify the organic compounds and state their uses.</p>
BP203T	Biochemistry – Theory	<p>The students shall be able to:</p> <p>CO1-Explain the biochemical role of carbohydrates, proteins, lipids and metabolic pathways of nutrients.</p> <p>CO2-Describe the bioenergetics reactions and their biological role</p> <p>CO3-Explain the metabolic pathways of carbohydrates, proteins and lipids</p> <p>CO4-Explain the DNA replication, transcription, and translation processes.</p> <p>CO5-Describe the catalytic role, therapeutic and diagnostic applications of enzymes and coenzymes.</p>
BP204T	Pathophysiology-Theory	<p>The students shall be able to:</p> <p>CO1-Explain the basic pathophysiology of cell injury cellular adaptations. Discuss the etiology of inflammation & wound healing.</p> <p>CO2-Discuss the pathophysiology of diseases of cardiovascular, respiratory & renal system.</p> <p>CO3-Explain and discuss hematological disorders</p> <p>CO4-Understand the pathophysiology of endocrine, nervous & gastrointestinal system diseases</p> <p>CO5-Explain the pathophysiology of disease of bones & joints, STD, Infectious diseases.</p> <p>CO6-Describe the principle, pathophysiology and discuss the detection methods of cancer.</p>
BP205T	Computer Applications in Pharmacy-Theory	<p>The students shall be able to:</p> <p>CO1-Describe the underlying ideas and concepts of the information system and number system software.</p> <p>CO2-Create pharmacy medication databases with the appropriate online technologies.</p> <p>CO3-Apply the knowledge of computers in community pharmacy</p> <p>CO4-Choose relevant bioinformatics database in vaccine discovery</p> <p>CO5-Select an appropriate computing tool for data analysis in preclinical development.</p>
BP206T	Environmental Sciences-Theory	<p>The students shall be able to:</p> <p>CO1-Recognize and cultivate a concern for different environmental components.</p> <p>CO2-Influence fundamental understanding of biodiversity, ecosystems, pollutants, and environmental resources.</p> <p>CO3-Apply the concept of environment in environment protection and environment improvement.</p> <p>CO4-Identify the problems related to the environment.</p>

		<p>CO5-Acquire skills to help the concerned individuals in identifying and solving environmental problems.</p>
BP207P	<p>Human anatomy and Physiology II- Practical</p>	<p>The students shall be able to:</p> <p>CO1-Discuss the integumentary, special senses, nervous system, endocrine system using specimens, models, etc.</p> <p>CO2-Describe general neurological examination, function of olfactory nerve and different types of taste.</p> <p>CO3-Determine the visual activity, reflex activity and body temperature.</p> <p>CO4-Recording of tidal volume, vital capacity and basal mass index.</p> <p>CO5-Determine the digestive, respiratory, cardiovascular systems, urinary and reproductive systems with the help of models, charts and specimens.</p> <p>CO6-Determination of total blood count by cell analyzer.</p> <p>CO7-Describe the family planning devices and pregnancy diagnosis test.</p> <p>CO8-Outline the permanent slides of vital organs and gonads</p>
BP208P	<p>Pharmaceutical Organic Chemistry I- Practical</p>	<p>The students shall be able to:</p> <p>CO1-Synthesize organic compounds of pharmaceutical importance</p> <p>CO2-Analyze the organic compounds belonging to Group I to VII</p>
BP209P	<p>Biochemistry – Practical</p>	<p>The students shall be able to:</p> <p>CO1-Explain qualitative analysis tests of carbohydrates, amino acids and proteins.</p> <p>CO2-Estimate qualitative analysis of urine for normal constituents and abnormal constituents</p> <p>CO3-Study the principle and procedure for determination of glucose and chlorides present in the urine</p> <p>CO4-Study principle and procedure for determination of serum total cholesterol, blood sugar and Blood creatinine.</p> <p>CO5-Explain the role of salivary amylase.</p>
BP210P	<p>Computer Applications in Pharmacy- Practical</p>	<p>The students shall be able to:</p> <p>CO1-Study the use of computing fundamentals in pharmaceutical sciences</p> <p>CO2-Apply online tools for effective Pharmaceutical research.</p> <p>CO3-Develop solutions for Pharmaceutical problems using computer applications</p> <p>CO4-Create HTML and XML web pages to export patient database.</p>

III Semester

BP301T	Pharmaceutical Organic Chemistry II- Theory	<p>The students shall be able to:</p> <p>CO1-Discuss the benzene structure, reactions, analysis and its application.</p> <p>CO2-Discuss about the phenols, aromatic amines and aromatic acids reactions, nature and application.</p> <p>CO3-Describe the reactions, analytical constants and application of fatty acids and oils.</p> <p>CO4-Discuss the synthesis, reactions, structures, and medicinal applications of Naphthalene, Phenanthrene, Anthracene, Diphenylmethane, Triphenylmethane, and their derivatives.</p> <p>CO5-Explain ring strain theories (Baeyer's, Coulson and Moffitt's modifications, Sachse Mohr's theory), and predict reactivity and stability in cyclopropane and cyclobutane.</p>
BP302T	Physical Pharmaceutics I- Theory	<p>The students shall be able to:</p> <p>CO1-Explain the concepts of solubility and diffusion.</p> <p>CO2-Discuss the different states of matter and its related physicochemical properties of drug molecules.</p> <p>CO3-Explain the use, method of determination and application of surface tension in the formulation development and evaluation of dosage forms.</p> <p>CO4-Describe various types of complexation & protein binding and their importance in Pharmacy.</p> <p>CO5-Discuss pH determination, application of buffers and importance of isotonicity.</p>
BP303T	Pharmaceutical Microbiology- Theory	<p>The students shall be able to:</p> <p>CO1-Compare and contrast Prokaryotes and Eukaryotes, assess the various nutritional requirements, raw materials needed for microbial growth, outline the bacterial growth curve, describe the ultrastructure of bacteria, various isolation and preservation techniques.</p> <p>CO2-Apply various staining and biochemical tests to identify bacteria, list out various methods of sterilizations used in pharmaceutical industry along with merits, demerits and applications, determine the efficiency of sterilization.</p> <p>CO3-Classify disinfectants summarize their MOA, describe the various factors affecting disinfection, evaluate bacteriostatic and bactericidal activity, select the sterility testing procedure for different pharmaceutical products according to IP, BP, USP and explain in detail about Fungi and Viruses.</p> <p>CO4-Draw aseptic area layout, describe the principles and methods of microbial assays and standardization of antibiotics, Vitamins and amino acids.</p> <p>CO5-Describe the sources of contaminations in pharmaceutical products and outline their method of prevention, list out various types of microbial spoilages along with their sources in pharmaceutical products.</p>

<p>BP304T</p>	<p>Pharmaceutic al Engineering- Theory</p>	<p>The students shall be able to:</p> <p>CO1-Discuss various unit operations used in pharmaceutical industries</p> <p>CO2-Describe the concepts of Reynolds number, Bernoulli's theorem and its applications in the flow of fluids.</p> <p>CO3-Explain the principle, construction, working, uses, advantages and disadvantages of various pharmaceutical equipment used for different unit operations.</p> <p>CO4-Discuss in details the significance of plant layout design for optimum use of resources.</p> <p>CO5-Describe the various preventive methods used for corrosion control in pharmaceutical industries.</p> <p>CO6-Explain the various material handling systems.</p> <p>CO7-Describe the various concepts of the heat transfer process.</p>
<p>BP305P</p>	<p>Pharmaceutic al Organic Chemistry II- Practical</p>	<p>The student shall be able to</p> <p>CO1-Design and perform recrystallization experiments for salicylic acid and dibenzylidene acetone</p> <p>CO2-Determine acid and saponification value of oil samples and interpreting the results to assess their purity and quality.</p> <p>CO3-Synthesize and determine the yield of dibenzyl acetone, benzil, salicylic acid, phenyl benzoate, meta dinitrobenzene, acetanilide, 1-phenyl-azo-β-naphthol and cinnamic acid.</p>
<p>BP306P</p>	<p>Physical Pharmaceutics I- Practical</p>	<p>The students shall be able to:</p> <p>CO1-Determine the solubility and partition coefficient of benzoic acid & iodine.</p> <p>CO2-Determine % composition of NaCl in a solution using phenol-water system by CST method.</p> <p>CO3-Determine the surface tension by drop count & drop weight method and HLB number of a surfactant by saponification method.</p> <p>CO4-Determine the Freundlich and Langmuir constants.</p> <p>CO5-Determine critical micellar concentration of unknown surfactants.</p> <p>CO6-Determine the stability constant and donor acceptor ratio of Cupric-Glycine complex by pH titration method.</p>
<p>BP307P</p>	<p>Pharmaceutic al Microbiology- Practical</p>	<p>The students shall be able to:</p> <p>CO1-Select appropriate equipment used in Experimental microbiology. Apply suitable methods to sterilize glassware and culture media used in pharmaceutical microbiology.</p> <p>CO2-Apply staining techniques and identify bacteria.</p> <p>CO3-Isolate pure culture by streak plate and pour plate technique. Prepare Nutrient slants and slabs.</p> <p>CO4-Perform microbial assay and determine ZOI of antibiotics. Determine the motility by Hanging drop</p>

		<p>method.</p> <p>CO5-Discuss the sterility testing of selected pharmaceutical products.</p>
BP308P	Pharmaceutical Engineering- Practical	<p>The students shall be able to:</p> <p>CO1-Determine the radiation constant of brass, iron, unpainted & painted glass and heat transfer coefficient by heat exchanger.</p> <p>CO2-Determine the moisture content, loss on drying, drying curves, size reduction using ball mill, factors affecting rate of filtration and evaporation</p> <p>CO3-Determine humidity of air by using dew point method, effect of crystallization rate and uniformity Index.</p> <p>CO4-Illustrate the working and application of rotary tablet machine, fluidized bed coater, fluid energy mill, dehumidifier, colloid mill, planetary mixer, fluidized bed dryer, freeze dryer.</p> <p>CO5-Construct various size frequency curves to determine size range for granules with the help of arithmetic and logarithmic probability plots.</p>
IV Semester		
BP401T	Pharmaceutical Organic Chemistry III- Theory	<p>The students shall be able to:</p> <p>CO1-Explain the stereochemistry of organic compounds.</p> <p>CO2-Discuss the methods of synthesis and chemical properties of heterocyclic compounds.</p> <p>CO3-State the mechanism of commonly used synthetic reagents</p>
BP402T	Medicinal Chemistry I- Theory	<p>The students shall be able to:</p> <p>CO1-Recognize the history and development of medicinal chemistry.</p> <p>CO2-Elaborate the importance of physicochemical properties of the drugs in relation to their biological actions.</p> <p>CO3-Discuss the principles of drug metabolism.</p> <p>CO4-Identify the medicinal compounds and their therapeutic effects.</p> <p>CO5-Write the synthesis of drugs.</p> <p>CO6-Outline the Structure Activity Relationship of different classes of drug molecules.</p> <p>CO7-Draw the chemical structures of various medicinal compounds.</p>
BP403T	Physical Pharmaceutics II-Theory	<p>The students shall be able to:</p> <p>CO1-Explain the concept, classification and properties of colloids</p> <p>CO2-Summarize the concept and importance of rheology and deformation of solids.</p>

		<p>CO3-Describe the formulation, evaluation and stability concepts of coarse dispersions.</p> <p>CO4-Discuss the importance of properties and determination of particle size.</p> <p>CO5-Discuss the principles of chemical kinetics in stability testing and determination of shelf life of formulations.</p>
BP404T	Pharmacology I-Theory	<p>The students shall be able to:</p> <p>CO1-Recognise the basic concept of pharmacological scope, explain different routes of drug administration with examples and their advantages and disadvantages.</p> <p>CO2-Summarize the terminologies, pharmacokinetic and dynamic concepts in pharmacology.</p> <p>CO3-Explain the mechanism of drug action at organ system/sub cellular/ macromolecular levels. Discuss the factors modifying drug actions.</p> <p>CO4-Describe the various aspects of drugs adverse reactions, drug toxicity and drug interactions.</p> <p>CO5-Outline various aspects of drug discovery - preclinical studies and phases of Clinical trials</p> <p>CO6-Discuss various pharmacological effects of drugs on ANS and CNS.</p>
BP405T	Pharmacognosy and Phytochemistry I-Theory	<p>The students shall be able to:</p> <p>CO1-Define Pharmacognosy, summaries the history and scope of Pharmacognosy, enumerate in detail various sources of crude drugs, compare organized and unorganized drugs, classify crude drugs, determine the various sources of adulteration, describe the various evaluation techniques, explain the various leaf constants and Lycopodium spore technique.</p> <p>CO2-Enumerate cultivation, collection techniques and explain factors involved in medicinal plants cultivation, describe the role of Plant hormones in cultivation, define polyploidy, mutation and Hybridization</p> <p>CO3-Define Plant tissue culture, describe the various types, nutritional requirements and list the application of plant tissue culture, discuss edible vaccines.</p> <p>CO4-Justify the role of Pharmacognosy in Ayurveda, Siddha, Unani, Homeopathy and Chinese medicine. Classify and identify various secondary metabolites.</p> <p>CO5-Describe the plant fibers- Cotton, jute, Wool. Define teratogens, hallucinogens and natural allergens. Enlist various primary metabolites and describe the biological source, chemical constituents, method of preparation, evaluation, preservation and therapeutic utility of various primary metabolites. Describe marine drugs.</p>
BP406P	Medicinal Chemistry I- Practical	<p>The students shall be able to:</p> <p>CO1-Synthesize intermediates and final drug molecules.</p> <p>CO2-Study the role of chemicals or solvents in the synthesis.</p> <p>CO3-Analyze the standardization of secondary standards.</p>

		<p>CO4-Analyze the assay methods for determining purity of compounds.</p> <p>CO5-Predict various physicochemical parameters of pharmaceutical compounds or intermediates.</p>
BP407P	Physical Pharmaceutics II-Practical	<p>The students shall be able to:</p> <p>CO1-Analyze the particle size & particle size distribution using sieving and microscopic method for the given samples.</p> <p>CO2-Determine bulk density, true density, porosity and angle of repose for the powder samples.</p> <p>CO3-Determine viscosity of liquids using Ostwald's viscometer.</p> <p>CO4-Compare and contrast the reaction rate constant of first order & Second order.</p> <p>CO5-Determine sedimentation volume to study the effect of different suspending agents.</p>
BP408P	Pharmacology I- Practical	<p>The students shall be able to:</p> <p>CO1-Study the various commonly used laboratory instruments, common laboratory animals and different types of routes of drug administration.</p> <p>CO2-Analyze various laboratory techniques, blood withdrawal, anesthetics and euthanasia used for animal studies.</p> <p>CO3-Record the effect of skeletal muscle relaxant and anxiolytics on animals by simulated experiments.</p> <p>CO4-Record the effect of various drugs on animals by simulated experiments.</p>
BP409P	Pharmacognosy and Phytochemistry I-Practical	<p>The students shall be able to:</p> <p>CO1-Identify crude drugs applying different chemical tests.</p> <p>CO2-Determine and report leaf constants- stomatal index, stomatal number, vein islet number, vein termination number and palisade ratio.</p> <p>CO3-Determine and report the diameter of starch grain, calcium oxalate crystals and fiber length and width using eyepiece micrometer</p> <p>CO4-Determine the number of starch grains by Lycopodium spore method.</p> <p>CO5-Evaluate the crude drugs by determining ash value, moisture content, extractive value, swelling index and foaming index.</p>
V Semester		
BP501T	Medicinal Chemistry II- Theory	<p>The students shall be able to:</p> <p>CO1-Identify the medicinal compounds and their therapeutic effects.</p> <p>CO2-Outline the synthesis of drugs.</p> <p>CO3-Enumerate the structure activity relationship & MOA of different classes of drug molecules.</p>

		<p>CO4-Draw the chemical structures of various medicinal compounds.</p> <p>CO5-Identify the adverse effects and metabolism of drug molecules.</p>
BP502T	Industrial Pharmacy-I	<p>The students shall be able to:</p> <p>CO1-Discuss the role of physicochemical properties of drug and excipients in formulation and development of different dosage forms.</p> <p>CO2-Explain the classifications, formulation, manufacture and evaluation of various pharmaceutical dosage forms (sterile and non-sterile) such as tablets, capsules, parenteral, ophthalmic, liquid orals, semisolids and aerosols.</p> <p>CO3-Describe the packaging considerations of different dosage forms.</p> <p>CO4-Discuss the formulation and evaluation of various cosmetic products.</p>
BP503T	Pharmacology II-Theory	<p>The students shall be able to:</p> <p>CO1-Apply the concept of pharmacological actions of drugs used in treating various cardiovascular diseases in therapeutic usages and adverse drug effects.</p> <p>CO2-Assess involvement of diuretics and antidiuretics used for the treatment of hypertension, diabetes mellitus and congestive heart failure</p> <p>CO3-Elucidate the approaches to the autacoids and related drugs with example</p> <p>CO4-Explain the pharmacology of cardiovascular drugs, anticoagulant drugs, antifibrinolytic drugs, antidiuretics, diuretics, antihistamine drugs, serotonin antagonist, leukotriene antagonist, Antigout, NSAID, Antirheumatic drug and hormonal drugs, Explain the pharmacotherapy of Endocrine system.</p> <p>CO5-Elaborate the concepts and types of bioassay.</p>
BP504T	Pharmacognosy and Phytochemistry II-Theory	<p>The students shall be able to:</p> <p>CO1-Describe the metabolic pathway involved in synthesis of secondary metabolites. Discuss Shikimic acid pathway, acetate pathway and amino acid pathway. Summarize the use of radioactive isotopes in investigation of biogenetic studies.</p> <p>CO2-Discuss the Biological source, chemical constituents, therapeutic and commercial uses of various secondary metabolites.</p> <p>CO3-Assess the different methods involved in isolation, analysis and identification of different Phytoconstituents- Terpenoids, Glycosides, alkaloids and resins.</p> <p>CO4-Explain the industrial production, estimation and utilization of different Phytoconstituents</p> <p>CO5-Explain the modern methods of extraction, investigate the crude drugs using modern techniques like spectroscopy, chromatography and electrophoresis.</p>

<p>BP505T</p>	<p>Pharmaceutical Jurisprudence</p>	<p>The students shall be able to:</p> <p>CO1-Describe the roles of different committees, rules, laws and regulations related to drugs and cosmetics.</p> <p>CO2-Discuss the pharmaceutical legislation, history, evolution and growth of pharmaceutical industry.</p> <p>CO3-Explain the ethical considerations inherent in pharmaceutical practice.</p> <p>CO4-Discuss various Indian pharmaceutical acts and laws.</p> <p>CO5-Explain Intellectual Property Rights (IPR), including patents, trademarks, and copyrights, and their application within the pharmaceutical industry.</p>
<p>BP506P</p>	<p>Industrial Pharmacy I- Practical</p>	<p>The students shall be able to:</p> <p>CO1-Perform preformulation studies on paracetamol/ aspirin/ or any other drug.</p> <p>CO2-Formulate and evaluate solid, liquid and semisolid dosage forms.</p> <p>CO3-Prepare and evaluate sterile dosage forms.</p> <p>CO4-Perform QC testing of marketed formulations and packaging materials.</p> <p>CO5-Prepare skin care cosmetics such as cold cream and vanishing cream.</p>
<p>BP507P</p>	<p>Pharmacology II-Practical</p>	<p>The students shall be able to:</p> <p>CO1-Explain the in-vitro pharmacology and physiological salt solution, drugs on isolated frog hearts by simulated experiment.</p> <p>CO2-Assess the Involvement of diuretic activity, autonomic drugs in understanding their actions on heart rate and blood pressure virtually in intact dog experiment.</p> <p>CO3-Determine the Bioassay of oxytocin, serotonin. by using three-point bioassay and four-point bioassay DRC for Acetylcholine.</p> <p>CO4-Estimate of PA2 value and PD2 value, spasmogens and analgesic activity, anti-inflammatory activity of drugs by using rats.</p>
<p>BP508P</p>	<p>Pharmacognosy and Phytochemistry II-Practical</p>	<p>The students shall be able to:</p> <p>CO1-Identify crude drugs applying Morphological & Microscopical methods of evaluation.</p> <p>CO2-Apply the process to separate and identify caffeine, diosgenin, sennosides and atropine from their sources.</p> <p>CO3-Apply chromatographic technique in separation and identification of sugars and volatile oils.</p> <p>CO4-Apply process and distill volatile oils and detect by TLC.</p> <p>CO5-Identify resin containing drugs using different chemical tests.</p>

VI Semester

BP601T	Medicinal Chemistry III-Theory	<p>The students shall be able to:</p> <p>CO1-Explain antibiotics, amino glycosides</p> <p>CO2-Explain macrolide, prodrugs, antimalarials.</p> <p>CO3-Explain anti-tubercular agents, anti-tubercular antibiotics, urinary tract anti-infective agents, antiviral agents.</p> <p>CO4-Explain antifungal, antiprotozoal, anthelmintics, sulphonamides, folate reductase inhibitor</p> <p>CO5-Explain various approaches used in drug design, QSAR, Pharmacophore modeling and docking techniques.</p> <p>CO6-Describe Combinatorial Chemistry.</p>
BP602T	Pharmacology III-Theory	<p>The students shall be able to:</p> <p>CO1-Apply current knowledge of Pharmacological and toxicological aspects of various disorders.</p> <p>CO2-Assess involvement of autocooids along with therapeutics of inflammatory processes.</p> <p>CO3-Elucidate the approaches to treatment of respiratory disorders.</p> <p>CO4-Explain the Pharmacotherapy of gastrointestinal and Chemotherapeutic agents.</p> <p>CO5-Elaborate the concepts of toxicity, immunopharmacology and chronopharmacology.</p>
BP603T	Herbal Drug Technology-Theory	<p>The students shall be able to:</p> <p>CO1-Describe the herb as a source of medicine along with the cultivation of the herbal drugs. Discuss the Good agricultural practices in cultivation of medicinal plants. Explain the principle involved in the Indian system of medicine. Outline preparation and standardization of Ayurvedic formulation.</p> <p>CO2-Explain importance of Nutraceuticals in the health care system, their possible side effects and interactions with drugs and food.</p> <p>CO3-Explain the various raw materials, excipients used in herbal cosmetics and summarize conventional herbal formulations.</p> <p>CO4-Outline the WHO and ICH guidelines for assessment of herbal drugs. Describe the stability testing of herbal drugs. Explain the patenting. Discuss the regulatory bodies for the evaluation, assessment of herbal and ASU drugs.</p> <p>CO5-Describe the importance and scope of Herbal Drug Industry & GMP. Summaries the components and objectives of Schedule T</p>
BP604T	Biopharmaceutics and Pharmacokinetics-Theory	<p>The students shall be able to:</p> <p>CO1-Explain the basic concepts of Biopharmaceutics & pharmacokinetics and its applications.</p> <p>CO2-Describe concept, mechanisms involved in and factors affecting drug absorption, distribution, metabolism and</p>

		<p>excretion.</p> <p>CO3-Discuss the concepts and significance of bioavailability, bioequivalence and IVIVC in drug product development.</p> <p>CO4-Discuss the concept, significance & applications of different linear & nonlinear pharmacokinetic models and various pharmacokinetic parameters.</p> <p>CO5-Explain the kinetics of multiple dosing, steady state drug levels, calculation of loading and maintenance doses and their significance in clinical settings.</p>
	<p>Pharmaceutical Biotechnology -Theory</p>	<p>The students shall be able to:</p> <p>CO1-Explain different methods of enzyme immobilization with applications, describe the application and working of biosensor, enlist the uses of microbes in Pharmaceutical industry, discuss the production of selected enzymes, illustrate the basic principle of Genetic engineering.</p> <p>CO2-Explain recombinant DNA technology, enlist its applications, describe various tools used in rDNA technology, discuss the production of Interferon, Hepatitis B Vaccine and Insulin using rDNA technology, Describe the principle and application of PCR.</p> <p>CO3-Describe humoral and cellular immunity, structure of immunoglobulin's, structure and function of MHC, enlist the types of Hypersensitivity reactions, explain immune stimulation and suppression, Hybridoma technology Discuss the general method of preparation of bacterial vaccines, toxoids, viral vaccine, antitoxins, serum-immune blood derivatives.</p> <p>CO4-Explain the principle of selected Immunoblotting techniques, describe transformation, transduction, conjugation, explain biotransformation and enlist its applications, discuss mutation and enlist its types.</p> <p>CO5-explain fermentation, outline design of fermenter, discuss the production of penicillin, citric acid, Vitamin B12, Glutamic acid, Griseofulvin</p>
<p>BP606T</p>	<p>Quality Assurance-Theory</p>	<p>The students shall be able to:</p> <p>CO1-Explain the cGMP aspects in a pharmaceutical industry</p> <p>CO2-Outline the importance of documentation</p> <p>CO3-Describe the scope of quality certifications applicable to pharmaceutical industries</p> <p>CO4-Discuss the responsibilities of QA & QC department</p>
<p>BP607P</p>	<p>Medicinal Chemistry III-Practical</p>	<p>The students shall be able to:</p> <p>CO1-Synthesize sulphanilamide, 7-hydroxy, 4-methyl coumarin, chlorobutanol, triphenyl imidazole, tolbutamide, Hexamine.</p> <p>CO2-Estimate isonicotinic acid hydrazide, chloroquine, metronidazole, dapsone, Chlorpheniramine maleate, Benzyl penicillin.</p> <p>CO3-Synthesize medicinally important compounds or intermediates by microwave irradiation technique.</p>

		<p>CO4-Draw structures and reactions using chemdraw software</p> <p>CO5-Determine physicochemical properties.</p>
BP608P	Pharmacology III-Practical	<p>The students shall be able to:</p> <p>CO1-Summarize the dose calculation of different experiments.</p> <p>CO2-Describe the test for pyrogen.</p> <p>CO3-Interpret the effect of drugs on motility.</p> <p>CO4-Match the biochemical parameters.</p>
BP609P	Herbal Drug Technology-Practical	<p>The students shall be able to:</p> <p>CO1-Apply phytochemical screening methods and analyze crude drugs.</p> <p>CO2-Determine and report the alcohol content in Asava and Arista, aldehyde, phenol and total aldehyde content in extracts</p> <p>CO3-Evaluate the excipients of Natural origin</p> <p>CO4-Prepare cosmetics- cream, lotion, shampoos and formulations- syrups, mixtures and tablets incorporating standardized herbal extracts and evaluate as per standards.</p> <p>CO5-Apply pharmacopeial methods and analyze herbal drugs.</p>
VII Semester		
BP701T	Instrumental Methods of Analysis-Theory	<p>The students shall be able to:</p> <p>CO1-Discuss the interaction of matter with electromagnetic radiations and its applications in drug analysis</p> <p>CO2-Explain the chromatographic separation and analysis of drugs</p> <p>CO3-Describe quantitative and qualitative analysis of drugs using various analytical instruments.</p>
BP702T	Industrial Pharmacy-II Theory	<p>The students shall be able to:</p> <p>CO1-Describe the process of pilot plant and scale up of pharmaceutical dosage forms.</p> <p>CO2-Explain the process of technology transfers from lab scale to commercial batch.</p> <p>CO3-Discuss different guidelines that regulate the pharmaceutical industry.</p> <p>CO4-Describe the approval process and regulatory requirements for drug products.</p> <p>CO5-Explain different quality management systems ensuring the quality of the process and product.</p>
BP703T	Pharmacy Practice-Theory	<p>The students shall be able to:</p> <p>CO1-Explain the different ways of drug distribution methods in a hospital, clinical review of patient's medication charts ensure safety of the patients and perform patient counseling during discharge.</p>

		<p>CO2-Detect and assess adverse drug reactions, interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states.</p> <p>CO3-Discuss about pharmaceutical care services and understand the idea of rational drug therapy concept.</p> <p>CO4-Appreciate the pharmacy stores management and inventory control identify drug related problems; do patient counseling in community pharmacy.</p>
BP704T	Novel Drug Delivery System	<p>The students shall be able to:</p> <p>CO1-Describe rationale, criteria for selection of drugs, polymers and various approaches for design and development of novel drug delivery systems.</p> <p>CO2-Explain the principles, techniques, and mechanisms involved in microencapsulation.</p> <p>CO3-Describe the principles, approaches, theories and basic components involved in formulation & development of various novel drug delivery systems and their evaluation.</p> <p>CO4-Discuss the concept, types and criteria of targeted drug delivery and its applications.</p>
BP705P	Instrumental Methods of Analysis- Practical	<p>The students shall be able to:</p> <p>CO1-Perform quantitative and qualitative analysis of drug using various analytical instruments</p> <p>CO2-To carry out the chromatographic separation in analysis of drugs.</p>
BP706PS	Practice School	<p>The students shall be able to</p> <p>CO1-Acquire knowledge and hands on training experience on latest technologies and research domains beyond syllabus.</p> <p>CO2-Practically apply the knowledge and skills previously learned through conventional classroom teaching and laboratory experiments.</p> <p>CO3-Develop the ability to adapt to rapidly changing requirements and challenges of the professional workplace in the real world.</p> <p>CO4-Exhibit the acquired professional skills in open-ended real-life situations.</p> <p>CO5-Improve their employability and establish a professional network before graduation.</p>
VIII Semester		
BP801T	Biostatistics and Research Methodology	<p>The students shall be able to</p> <p>CO1-Explain operation of M.S. Excel, SPSS, R and MINITAB®, DoE (Design of Experiment).</p> <p>CO2-Apply the various statistical techniques to solve biostatistical problems.</p> <p>CO3-Discuss the different design of experiments and their applications.</p>

		<p>CO4-Explain the need for research, experiential design techniques and plagiarism.</p> <p>CO5-Discuss the practical components of industrial and clinical trial problems.</p>
BP802T	Social and Preventive Pharmacy	<p>The students shall be able to</p> <p>CO1-Explain current health and pharmaceutical issues at both national and global levels.</p> <p>CO2-Develop a discerning approaches to analyze current advancements in healthcare.</p> <p>CO3-Assess different methods for addressing health and pharmaceutical problems.</p>
BP803T	Pharma Marketing Management	<p>The students shall be able to</p> <p>CO1-Describe marketing concepts & techniques and their applications in the pharmaceutical industry.</p> <p>CO2-Explain product life cycle and management in the pharmaceutical industry.</p> <p>CO3-Discuss the different methods of promotion of pharmaceuticals.</p> <p>CO4-Discuss the pharmaceutical marketing channels.</p> <p>CO5-Describe the pricing of pharmaceuticals and emerging concepts.</p>
BP804ET	Pharmaceutical Regulatory Science	<p>The students shall be able to:</p> <p>CO1-Describe the process of drug discovery and development.</p> <p>CO2-Discuss the regulatory authorities and dossier requirement for registration of pharmaceutical products across the globe.</p> <p>CO3-Explain the regulatory approval process and registration of new drug and generic drugs in Indian and international markets.</p> <p>CO4-Discuss clinical trials requirements for conducting clinical trials, safety monitoring and reporting in clinical trials.</p> <p>CO5-State various regulatory concepts.</p>
BP805ET	Pharmacovigilance	<p>The students shall be able to:</p> <p>CO1-Describe the importance, history & national and international development of drug safety monitoring.</p> <p>CO2-Discuss the use of dictionaries, coding & terminologies in Pharmacovigilance, the detection & assessment of new adverse drug reactions, international standards for disease and drug classification.</p> <p>CO3-Explain Pharmacovigilance systems for adverse drug reactions, safety data generation during drug life cycle phases, and drug safety evaluation in pediatrics, geriatrics, pregnancy, and lactation.</p> <p>CO4-Discuss Pharmacovigilance Program of India (PvPI) mandates ADR reporting in India, while ICH guidelines guide ICSR, PSUR, expedited reporting, and Pharmacovigilance planning.</p>

<p>BP806ET</p>	<p>Quality Control and Standardization of Herbals</p>	<p>The students shall be able to:</p> <p>CO1-Enlist basic tests and Quality control tests for evaluation of herbal medicines as per WHO.</p> <p>CO2-Explain cGMP, GLP, GAP, GACP for quality assurance in herbal industry, discuss WHO guidelines on cGMP and GACP.</p> <p>CO3-Outline research methods as per EU and ICH guidelines for assessing safety, efficacy and Quality control of Herbal medicines.</p> <p>CO4-Explain stability testing of herbals, apply the knowledge of chromatography in standardization of herbals, design documents for export and New drug application.</p> <p>CO5-Discuss the regulatory requirements for herbals, enlist the WHO guidelines for safety monitoring of herbal medicines, Compare various Herbal pharmacopeias, Illustrate the role of chemical and biological markers in herbal standardization.</p>
<p>BP807ET</p>	<p>Computer Aided Drug Design</p>	<p>The students shall be able to:</p> <p>CO1-Explain design and discovery of lead molecules</p> <p>CO2-Discuss the role of drug design in drug discovery process</p> <p>CO3-Describe the concept of QSAR and docking</p> <p>CO4-Enumerate various strategies to develop new drug-like molecules.</p> <p>CO5-Design of new drug molecules using molecular modeling software</p>
<p>BP810ET</p>	<p>Experimental Pharmacology</p>	<p>The students shall be able to:</p> <p>CO1-Infer the applications of various commonly used laboratory animals.</p> <p>CO2-Outline various screening methods used in preclinical research.</p> <p>CO3-Recognize the importance of biostatistics and research methodology.</p> <p>CO4-Summarize the Design and execute a research hypothesis independently.</p>
<p>BP811ET</p>	<p>Advanced Instrumentation Techniques</p>	<p>The students shall be able to:</p> <p>CO1-Discuss the advanced instruments used and its application in drug analysis</p> <p>CO2-Explain the chromatographic separation and analysis of drugs</p> <p>CO3-Describe the calibration of various analytical instruments</p> <p>CO4-Outline analysis of drug using various analytical instrument</p>
<p>BP813PW</p>	<p>Project Work</p>	<p>The students shall be able to:</p> <p>CO1-Outline the concept of project work, literature survey of various research and review articles.</p>

		<p>CO2-Explain aim, objectives and plan of work for envisaged research problem.</p> <p>CO3-Describe the materials and equipment used in project work.</p> <p>CO4-Perform the research and assemble the results and discussions related to it.</p> <p>CO5-Effectively present and communicate the obtained results for the envisaged research problem.</p>
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