

## Course Outcomes

**Class & Sem. :** I Year I Sem.

**Branch :** B. Pharmacy

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
<p>Subject: <b>Human Anatomy and Physiology-I</b> (Theory) Subject Code : <b>BP101T</b></p>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To demonstrate a comprehensive understanding of human anatomy and physiology, including the levels of organization, body systems, basic life processes, and anatomical terminology.</li><li>2. <b>CO-2:</b> To apply knowledge of the integumentary system, skeletal system, and joints to analyze and explain the structure and functions of the skin, bones, and joints in the human body.</li><li>3. <b>CO-3:</b> To evaluate the composition and functions of blood, hemopoiesis, and the lymphatic system, and demonstrate an understanding of related disorders.</li><li>4. <b>CO-4:</b> To categorize the peripheral nervous system and special senses, explaining the functions of sympathetic and parasympathetic systems and analyzing disorders related to the special senses.</li><li>5. <b>CO-5:</b> To analyze the anatomy and functions of the cardiovascular system, including the heart, blood vessels, and conduction system, and demonstrate an understanding of blood pressure regulation, pulse, electrocardiogram, and common heart disorders.</li></ol>
<p>Subject: <b>Human Anatomy and Physiology-I</b> (Practical) Subject Code : <b>BP107P</b></p>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To understand about the importance of Microscope, Tissues and Identification of bones.</li><li>2. <b>CO-2:</b> To understand the enumeration of WBC &amp; RBC count, determination of Bleeding and Clotting Time.</li><li>3. <b>CO-3:</b> To understand determination of haemoglobin count, ESR, heartrate, pulse rate and Blood Pressure.</li></ol>

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Subject: <b>Pharmaceutical Analysis-I (Theory)</b> Subject Code : <b>BP102T</b>	<ol style="list-style-type: none"><li><b>CO-1:</b> To understand concept of Pharmaceutical Analysis, Errors, Pharmacopoeia and Sources of Impurities.</li><li><b>CO-2:</b> To understand the concepts of Acid base titration and Non-Aqueous Titration.</li><li><b>CO-3:</b> To understand the concept of Precipitation, Complexometric titrations and Gravimetry.</li><li><b>CO-4:</b> To understand the concept of Redox Titrations.</li><li><b>CO-5:</b> To understand the concept of Electrochemical methods of Analysis.</li></ol>
Subject: <b>Pharmaceutical Analysis-I (Practical)</b> Subject Code : <b>BP108P</b>	<ol style="list-style-type: none"><li><b>CO-1:</b> To understand about the practical concept Limit Tests.</li><li><b>CO-2:</b> To understand the preparation and Standardization, Assay of Compounds.</li><li><b>CO-3:</b> To understand determination of Normality by electro-analytical methods</li></ol>

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Subject: <b>Pharmaceutics-I (Theory)</b> Subject Code : <b>BP103T</b>	<ol style="list-style-type: none"><li><b>CO-1:</b> To understand about the historical background and development of profession of Pharmacy, Dosage forms, Prescription and Posology.</li><li><b>CO-2:</b> To understand the concepts of Pharmaceutical Calculations, Powders, Liquid dosage forms.</li><li><b>CO-3:</b> To understand the concept of Monophasic and Biphasic liquids, Suspensions and emulsions.</li><li><b>CO-4:</b> To understand about suppositories and Pharmaceutical Incompatibilities.</li><li><b>CO-5:</b> To understand about Semisolid Dosage Forms.</li></ol>
Subject: <b>Pharmaceutics-I (Practical)</b> Subject Code : <b>BP109P</b>	<ol style="list-style-type: none"><li><b>CO-1:</b> To understand the formulations of syrups, elixirs and Linctus.</li><li><b>CO-2:</b> To understand the preparation of formulations of Solutions, Suspensions and Emulsions.</li><li><b>CO-3:</b> To understand the preparation of formulations of Powders, Granules, Suppositories, Semisolids and Gargles and Mouthwashes.</li></ol>

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Subject: <b>Pharmaceutical Inorganic Chemistry (Theory)</b> Subject Code : <b>BP104T</b>	<ol style="list-style-type: none"><li><b>CO-1:</b> To understand about the impurities in pharmaceutical substances and general methods of preparation.</li><li><b>CO-2:</b> To understand about Acids, bases and Buffers, Major Extra and intracellular electrolytes and Dental products.</li><li><b>CO-3:</b> To understand about Gastrointestinal Agents.</li><li><b>CO-4:</b> To understand about expectorants, emetics, haematinics, poison and antidote and Astringents.</li><li><b>CO-5:</b> To understand about Radiopharmaceuticals.</li></ol>
Subject: <b>Pharmaceutical Inorganic Chemistry (Practical)</b> Subject Code : <b>BP110P</b>	<ol style="list-style-type: none"><li><b>CO-1:</b> To understand the practical concepts of ions.</li><li><b>CO-2:</b> To analyze the compounds by identification test.</li><li><b>CO-3:</b> To know about the importances of test for purity and preparation of Inorganic Pharmaceuticals.</li></ol>

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Subject: <b>Communication Skills (Theory)</b> Subject Code : <b>BP105T</b>	<ol style="list-style-type: none"><li><b>CO-1:</b> To understand about the importance, barriers and perspectives of communication.</li><li><b>CO-2:</b> To understand the elements, styles of communication.</li><li><b>CO-3:</b> To learn about basic listening skills, effective written skills.</li><li><b>CO-4:</b> To learn to face interview and presentations.</li><li><b>CO-5:</b> To understand about Radiopharmaceuticals.</li></ol>
Subject: <b>Communications Skills (Practical)</b> Subject Code : <b>BP111P</b>	<ol style="list-style-type: none"><li><b>CO-1:</b> To understand the basic communication.</li><li><b>CO-2:</b> To understand the vocabulary and pronunciations.</li><li><b>CO-3:</b> To understand concepts of Advanced Learning.</li></ol>

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<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
<p>Subject: <b>Remedial Biology (Theory)</b> Subject Code : <b>BP106RBT</b></p>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To demonstrate a comprehensive understanding of living organisms, their diversity, classification, and the structure-function relationships of various biological systems.</li><li>2. <b>CO-2:</b> To exhibit proficiency in explaining and analyzing physiological processes, including circulation, digestion, respiration, excretion, neural control, and chemical coordination in both plants and animals.</li><li>3. <b>CO-3:</b> To analyze and describe the morphology of flowering plants, understanding the structures and functions of different plant parts, as well as the intricacies of cell structure and tissues.</li><li>4. <b>CO-4:</b> To apply biological principles to explain complex phenomena such as photosynthesis, plant respiration, mineral nutrition, and the growth and development of organisms.</li><li>5. <b>CO-5:</b> To possess an integrated understanding of human reproduction, encompassing the anatomy and physiology of the male and female reproductive systems, gametogenesis, and hormonal regulation.</li></ol>
<p>Subject: <b>Remedial Biology (Practical)</b> Subject Code : <b>BP112RBP</b></p>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To develop practical laboratory skills, including microscope operation, section cutting, staining, and the preparation of permanent slides, enabling them to conduct experiments independently.</li><li>2. <b>CO-2:</b> To gain a comprehensive understanding of biological structures, including cells, tissues, and organs of both plants and animals, through microscopic studies and computer models.</li><li>3. <b>CO-3:</b> To apply physiological techniques such as blood group determination, blood pressure measurement, and tidal volume determination, showcasing their ability to integrate theoretical knowledge with practical experimentation in the field of biology.</li></ol>

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Subject: <b>Remedial Mathematics</b> (Theory) Subject Code : <b>BP106RMT</b>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To demonstrate proficiency in mathematical concepts including partial fractions, logarithms, matrices, determinants, limits, continuity, differentiation, and integration.</li><li>2. <b>CO-2:</b> To develop advanced problem-solving skills by applying mathematical techniques to pharmaceutical, chemical kinetics, and pharmacokinetics problems, fostering critical thinking and analytical abilities.</li><li>3. <b>CO-3:</b> To apply mathematical tools, such as matrices, determinants, and differential equations, to model and solve problems in the fields of pharmacokinetics, chemical kinetics, and pharmaceutical analysis.</li><li>4. <b>CO-4:</b> To apply analytical geometry concepts and integration techniques to solve real-world problems, emphasizing connections between mathematical principles and practical applications.</li><li>5. <b>CO-5:</b> To gain a deep understanding of the application of mathematical tools and concepts in biological and chemical sciences, enhancing their ability to analyze and solve complex problems in these domains.</li></ol>

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<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
<p>Subject: <b>Human Anatomy and Physiology-II (Theory)</b> Subject Code : <b>BP201T</b></p>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To acquire a thorough understanding of the nervous, digestive, respiratory, urinary, endocrine, and reproductive systems, encompassing their anatomy, functions, and associated disorders.</li><li>2. <b>CO-2:</b> To integrate knowledge of neurophysiology with the anatomy and functions of the central and peripheral nervous systems, linking concepts of nerve impulses, reflex activity, and neurotransmission.</li><li>3. <b>CO-3:</b> To master the anatomy and functions of the gastrointestinal tract, including acid regulation, digestion, absorption, and energetics principles such as ATP formation, Creatinine Phosphate, and Basal Metabolic Rate (BMR).</li><li>4. <b>CO-4:</b> To gain a comprehensive understanding of respiratory physiology, including lung anatomy, respiration regulation, gas transport, and artificial respiration, along with urinary system anatomy, kidney functions, and acid-base balance.</li><li>5. <b>CO-5:</b> To demonstrate proficiency in the classification and functions of hormones, the anatomy and disorders of endocrine glands, reproductive system functions, and a foundational understanding of genetics, including chromosomes, genes, DNA, and genetic patterns of inheritance.</li></ol>
<p>Subject: <b>Human Anatomy and Physiology-II (Practical)</b> Subject Code : <b>BP207P</b></p>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To integrate theoretical knowledge with practical applications, demonstrating a comprehensive understanding of the integumentary, nervous, endocrine, digestive, respiratory, cardiovascular, urinary, and reproductive systems.</li><li>2. <b>CO-2:</b> To exhibit proficiency in conducting clinical assessments, including general neurological examinations, sensory function demonstrations, physiological measurements, and the application of family planning and pregnancy diagnosis tests.</li><li>3. <b>CO-3:</b> To apply physiological concepts through hands-on activities such as recording body temperature, determining tidal volume and vital capacity, and conducting total blood count, fostering practical skills in the assessment of human physiological functions.</li></ol>

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<p>Subject: <b>Pharmaceutical Organic Chemistry-I (Theory)</b> Subject Code : <b>BP202T</b></p>	<ol style="list-style-type: none"><li><b>CO-1:</b> To demonstrate a deep understanding of the classification, nomenclature, and structural isomerism in organic compounds, applying both common and IUPAC systems for compounds with up to 10 carbons.</li><li><b>CO-2:</b> To master the sp<sup>3</sup> hybridization in alkanes, reactions involving alkenes and conjugated dienes, including halogenation, electrophilic addition, ozonolysis, and free radical additions, with an understanding of the factors influencing E1 and E2 reactions.</li><li><b>CO-3:</b> To gain comprehensive knowledge of alkyl halides, including SN1 and SN2 reactions, and qualitative tests for alcohols.</li><li><b>CO-4:</b> To demonstrate expertise in the chemistry of carbonyl compounds, understanding nucleophilic addition, electromeric effect, and reactions such as aldol condensation,</li><li><b>CO-5:</b> To acquire proficient knowledge of carboxylic acids, including acidity, inductive effects, and qualitative tests.</li></ol>
<p>Subject: <b>Pharmaceutical Organic Chemistry-I (Practical)</b> Subject Code : <b>BP208P</b></p>	<ol style="list-style-type: none"><li><b>CO-1:</b> To develop systematic qualitative analysis skills, conducting preliminary tests for color, odor, aliphatic/aromatic nature, and saturation/unsaturation. It employ Lassaigne's test for the detection of nitrogen, sulfur, and halogen elements, demonstrating competence in identifying unknown organic compounds.</li><li><b>CO-2:</b> To gain expertise in recognizing various functional groups through solubility tests and specific functional group tests for phenols, amides, urea, carbohydrates, amines, carboxylic acids, aldehydes, ketones, alcohols, esters, aromatic and halogenated hydrocarbons, nitro compounds, and anilides. It includes the preparation of derivatives for confirmation.</li><li><b>CO-3:</b> To apply literature data to identify unknown compounds based on their melting point or boiling point. It is suitable solid derivatives, confirming the identity of the unknown compound through melting point or boiling point analysis.</li></ol>

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<p>Subject: <b>Biochemistry (Theory)</b> Subject Code : <b>BP203T</b></p>	<ol style="list-style-type: none"><li><b>CO-1:</b> To acquire a comprehensive understanding of biomolecules, encompassing the classification, chemical nature, and biological roles of carbohydrates, lipids, nucleic acids, amino acids, and proteins.</li><li><b>CO-2:</b> To master the concepts of bioenergetics, including free energy, endergonic/exergonic reactions, and redox potential. They will also delve into carbohydrate metabolism, lipid metabolism, amino acid metabolism, and nucleic acid metabolism, comprehending the pathways, energetics, and significance of each.</li><li><b>CO-3:</b> To demonstrate proficiency in understanding metabolic disorders associated with lipid and amino acid metabolism, such as hypercholesterolemia, atherosclerosis, and phenylketonuria. They will also grasp the hormonal regulation of blood glucose levels and its connection to diabetes mellitus.</li><li><b>CO-4:</b> To gain expertise in nucleic acid metabolism, genetic information transfer, and molecular genetics, including the biosynthesis and catabolism of nucleotides, DNA and RNA structure, DNA replication, transcription, translation, and the genetic code.</li><li><b>CO-5:</b> To apply metabolic concepts to clinical scenarios, understanding disorders such as ketoacidosis, G6PD deficiency, and hyperuricemia, fostering a practical understanding of the biochemical basis of diseases.</li></ol>
<p>Subject: <b>Biochemistry (Practical)</b> Subject Code : <b>BP209P</b></p>	<ol style="list-style-type: none"><li><b>CO-1:</b> To develop practical skills in qualitative and quantitative analysis of carbohydrates, proteins, urine constituents, blood creatinine, blood sugar, serum total cholesterol, and enzymatic hydrolysis of starch, fostering competence in biochemical laboratory techniques.</li><li><b>CO-2:</b> To apply their knowledge to clinically relevant scenarios, demonstrating the ability to qualitatively analyze urine for abnormal constituents and quantitatively analyze reducing sugars and proteins in biological samples using DNSA and Biuret methods, respectively.</li><li><b>CO-3:</b> To comprehend the principles of enzymatic reactions by studying the enzymatic hydrolysis of starch and investigating the effects of temperature and substrate concentration on salivary amylase activity, enhancing their understanding of enzyme kinetics in biochemical processes.</li></ol>



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<p>Subject: <b>Pathophysiology (Theory)</b> Subject Code : <b>BP204T</b></p>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To acquire a thorough understanding of the basic principles of cell injury, adaptation, inflammation, and repair, with a focus on the causes and mechanisms of cellular damage, adaptive changes, and the pathophysiology of inflammation.</li><li>2. <b>CO-2:</b> To acquire a thorough understanding of the basic principles of cell injury, adaptation, inflammation, and repair, with a focus on the causes and mechanisms of cellular damage, adaptive changes, and the pathophysiology of inflammation.</li><li>3. <b>CO-3:</b> To demonstrate knowledge of cardiovascular diseases (hypertension, congestive heart failure, ischemic heart disease), respiratory diseases (asthma, chronic obstructive airways diseases), and renal diseases (acute and chronic renal failure), including their pathogenesis, clinical signs, and management.</li><li>4. <b>CO-4:</b> To gain expertise in hematological diseases (iron deficiency, megaloblastic anemia, sickle cell anemia, thalassemia, hemophilia) and endocrine disorders (diabetes, thyroid diseases, sex hormone disorders), understanding their etiology, clinical manifestations, and therapeutic approaches.</li><li>5. <b>CO-5:</b> To develop a comprehensive understanding of neurological disorders (epilepsy, Parkinson's disease, stroke, psychiatric disorders) and gastrointestinal disorders (peptic ulcer, inflammatory bowel diseases, jaundice, hepatitis, alcoholic liver disease), focusing on etiology, clinical features, and diagnostic approaches.</li></ol>

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<p>Subject: <b>Computer Applications in Pharmacy (Theory)</b> Subject Code : <b>BP205T</b></p>	<ol style="list-style-type: none"><li><b>CO-1:</b> To demonstrate proficiency in understanding and manipulating various number systems, including binary, decimal, octal, and hexadecimal. They will apply binary addition, subtraction, multiplication, and division using one's complement and two's complement methods.</li><li><b>CO-2:</b> To acquire competence in information system concepts, software development life cycle, and project management. They will be adept at information gathering, feasibility analysis, data flow diagrams, process specifications, and input/output design.</li><li><b>CO-3:</b> To gain a comprehensive understanding of web technologies, including HTML, XML, CSS, and programming languages. They will also be familiar with web servers, server products, and databases such as MySQL and MS Access, with a specific focus on pharmacy drug databases.</li><li><b>CO-4:</b> To understand the diverse applications of computers in pharmacy, including drug information storage and retrieval, pharmacokinetics, mathematical modeling in drug design, electronic prescribing systems, barcode medicine identification, automated drug dispensing, and mobile technology for adherence monitoring.</li><li><b>CO-5:</b> To comprehend the fundamentals of bioinformatics, its objectives, databases, and its significant impact on vaccine discovery. They will understand the role of bioinformatics in managing biological data and its applications in pharmaceutical research.</li></ol>
<p>Subject: <b>Computer Applications in Pharmacy (Practical)</b> Subject Code : <b>BP210P</b></p>	<ol style="list-style-type: none"><li><b>CO-1:</b> To demonstrate proficiency in designing and implementing databases using MS Access, including creating tables, forms, and queries.</li><li><b>CO-2:</b> To integrate information technology tools into healthcare practices, showcasing the ability to design a questionnaire, create a personal information web page using HTML, retrieve drug information online, and use MS Word Label Wizard for mailing labels.</li><li><b>CO-3:</b> To develop skills in data analysis and presentation using MS Access, including the creation of an invoice table, designing forms for viewing, adding, deleting, and modifying patient records, and exporting tables, queries, forms, and reports to web pages and XML.</li></ol>

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<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
Subject: <b>Environmental Sciences</b> (Theory) Subject Code : <b>BP206T</b>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To develop an understanding of the multidisciplinary nature of environmental studies and the significance of natural resources and to recognize the role of individuals in the conservation of various resources, fostering a sense of environmental responsibility.</li><li>2. <b>CO-2:</b> To grasp the concept of ecosystems, their structures, and functions. They will differentiate between various types of ecosystems such as forest, grassland, desert, and aquatic ecosystems. The knowledge will enable them to appreciate the diversity and interdependence within ecosystems.</li><li>3. <b>CO-3:</b> To acquire comprehensive knowledge of different forms of environmental pollution, including air, water, and soil pollution. They will understand the sources, impacts, and potential solutions to address pollution issues, contributing to their ability to critically analyze and propose measures for environmental sustainability.</li></ol>

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<p>Subject: <b>Pharmaceutical Organic Chemistry-II (Theory)</b> Subject Code : <b>BP301T</b></p>	<ol style="list-style-type: none"><li><b>CO-1:</b> To demonstrate a comprehensive understanding of benzene and its derivatives, including analytical, synthetic, and orbital aspects. They will grasp the resonance in benzene, aromatic characters, and the application of Huckel's rule. This knowledge will enable them to analyze reactions of benzene, such as nitration, sulphonation, halogenation, Friedel-Crafts alkylation, and acylation.</li><li><b>CO-2:</b> To comprehend the acidity of phenols, the basicity of aromatic amines, and the acidity of aromatic acids. They will understand the effects of substituents on reactivity and orientation in mono-substituted benzene compounds during electrophilic substitution reactions.</li><li><b>CO-3:</b> To gain proficiency in analyzing fatty acids, understanding the reactions of fats and oils, and performing analytical tests such as acid value, saponification value, ester value, iodine value, and Reichert Meissl value. This knowledge is essential for understanding the chemical properties and applications of these compounds.</li><li><b>CO-4:</b> To acquire knowledge about the synthesis, reactions, structure, and medicinal uses of polynuclear hydrocarbons, including naphthalene, phenanthrene, anthracene, diphenylmethane, and triphenylmethane.</li><li><b>CO-5:</b> To grasp the stabilities of cycloalkanes, understanding Baeyer's strain theory, its limitations, and alternative theories such as Coulson and Moffitt's modification and Sachse Mohr's theory. They will also analyze the reactions of cyclopropane and cyclobutane, demonstrating a comprehensive understanding of strain in cyclic hydrocarbons.</li></ol>
<p>Subject: <b>Pharmaceutical Organic Chemistry-II (Practical)</b> Subject Code : <b>BP305P</b></p>	<ol style="list-style-type: none"><li><b>CO-1:</b> To demonstrate proficiency in laboratory techniques through experiments such as recrystallization and steam distillation.</li><li><b>CO-2:</b> To acquire the ability to determine key oil values, including acid value, saponification value, and iodine value.</li><li><b>CO-3:</b> To demonstrate competence in organic synthesis by preparing various compounds and enhance their understanding of reaction mechanisms and chemical transformations.</li></ol>

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<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
<p>Subject: <b>Physical Pharmaceutics-I</b> <b>(Theory)</b> Subject Code : <b>BP302T</b></p>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To comprehend the principles governing drug solubility, including solubility expressions, mechanisms of solute-solvent interactions, and the quantitative factors influencing drug solubility. To grasp diffusion principles in biological systems and the application of distribution laws.</li><li>2. <b>CO-2:</b> To demonstrate knowledge of different states of matter, latent heats, vapour pressure, critical points, and eutectic mixtures. To understand the physicochemical properties of drug molecules, such as refractive index, optical rotation, dielectric constant, and dipole moment.</li><li>3. <b>CO-3:</b> To master concepts related to liquid interfaces, surface tensions, interfacial tensions, spreading coefficients, adsorption at liquid interfaces, and the role of surface-active agents.</li><li>4. <b>CO-4:</b> To gain knowledge about complexation, its classification, applications, and methods of analysis.</li><li>5. <b>CO-5:</b> To apply their understanding of pH, buffers, and isotonic solutions. This knowledge will enable them to address practical challenges in pharmaceutical formulations.</li></ol>
<p>Subject: <b>Physical Pharmaceutics-I</b> <b>(Practical)</b> Subject Code : <b>BP306P</b></p>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To develop proficiency in determining the solubility of drugs at room temperature, employing quantitative techniques. This includes understanding the factors influencing solubility and applying appropriate methods for accurate measurements.</li><li>2. <b>CO-2:</b> To master the determination of pKa values using the Half Neutralization method and applying the Henderson Hasselbalch equation. This knowledge will deepen their understanding of acid-base equilibria and their practical implications.</li><li>3. <b>CO-3:</b> To gain expertise in determining partition coefficients for various substances, such as benzoic acid and iodine, in different solvent systems. This includes understanding the principles of distribution between immiscible phases and its relevance in pharmaceutical and environmental contexts.</li></ol>

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Subject: <b>Pharmaceutical Microbiology (Theory)</b> Subject Code : <b>BP303T</b>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To gain a comprehensive understanding of the history, branches, and scope of microbiology, distinguishing between prokaryotic and eukaryotic organisms.</li><li>2. <b>CO-2:</b> To develop proficiency in microbiological techniques, including staining methods (simple, Gram's, Acid-fast staining), biochemical tests for identification, and various methods of sterilization.</li><li>3. <b>CO-3:</b> To learn the principles of designing aseptic areas, preventing contamination, and classifying clean areas..</li><li>4. <b>CO-4:</b> To be able to assess microbial contamination and spoilage factors in pharmaceutical products, exploring sources and types of contaminants.</li><li>5. <b>CO-5:</b> To gain insights into the growth of animal cells in culture, learning general procedures for cell culture and distinguishing between primary, established, and transformed cell cultures.</li></ol>
Subject: <b>Pharmaceutical Microbiology (Practical)</b> Subject Code : <b>BP307P</b>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To gain proficiency in handling and understanding the operation of essential microbiological equipment.</li><li>2. <b>CO-2:</b> To master fundamental microbiological techniques to emphasize hands-on skills in microbiological procedures.</li><li>3. <b>CO-3:</b> To apply their knowledge and skills in microbiological methods to perform assays as this outcome focuses on the practical application of microbiological techniques in diverse contexts.</li></ol>

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Subject: <b>Pharmaceutical Engineering (Theory)</b> Subject Code : <b>BP304T</b>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To demonstrate a deep understanding of fluid mechanics, including the types of manometers, Reynolds number, Bernoulli's theorem, and its applications.</li><li>2. <b>CO-2:</b> To master the principles and mechanisms of heat transfer, including conduction, convection, and radiation.</li><li>3. <b>CO-3:</b> To showcase expertise in drying processes, including equilibrium moisture content and various drying methods such as tray drying and freeze drying.</li><li>4. <b>CO-4:</b> To exhibit a comprehensive understanding of filtration processes, filter aids, and media, along with the principles and applications of centrifugation.</li><li>5. <b>CO-5:</b> To acquire knowledge of materials used in pharmaceutical plant construction, understand corrosion theories and preventive measures.</li></ol>
Subject: <b>Pharmaceutical Engineering (Practical)</b> Subject Code : <b>BP308P</b>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To develop experimental skills in determining radiation constants, calculating steam distillation efficiency, and evaluating overall heat transfer coefficients.</li><li>2. <b>CO-2:</b> To gain operational knowledge of pharmaceutical machinery such as rotary tablet machines, fluidized bed coaters, and fluid energy mills.</li><li>3. <b>CO-3:</b> To comprehend and apply the laws of size reduction, including Kicks, Rittinger's, and Bond's coefficients, critical speed of ball mills, and power requirements.</li></ol>

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Subject: <b>Pharmaceutical Organic Chemistry-III (Theory)</b> Subject Code : <b>BP401T</b>	<ol style="list-style-type: none"><li>1. CO-1: To achieve a comprehensive understanding of stereoisomerism, including optical isomerism, geometric isomerism, and conformational isomerism.</li><li>2. CO-2: To acquire proficiency in the nomenclature, classification, synthesis, reactions, and medicinal uses of various heterocyclic compounds.</li><li>3. CO-3: To comprehend the relative aromaticity and reactivity of heterocyclic compounds like pyrrole, furan, and thiophene.</li><li>4. proficiency in crucial organic reactions, including metal hydride reductions (<math>\text{NaBH}_4</math> and <math>\text{LiAlH}_4</math>), Clemmensen reduction, Birch reduction, Wolff Kishner reduction, Oppenauer-oxidation, Dakin reaction, Beckmann rearrangement, Schmidt rearrangement, and Claisen-Schmidt condensation.</li><li>5. CO-5: To apply stereospecific and stereoselective reactions in organic synthesis.</li></ol>



## Course Outcomes

**Class & Sem. :** II Year II Sem.

**Branch :** B. Pharmacy

Details of Subject	<u>Course Outcomes</u>
Subject: <b>Medicinal Chemistry-I</b> (Theory) Subject Code : <b>BP402T</b>	<ol style="list-style-type: none"><li><b>CO-1:</b> To be able to differentiate between stereoisomerism types and understand their significance in medicinal chemistry.</li><li><b>CO-2:</b> To gain proficiency in the nomenclature of geometrical isomers, such as cis-trans, EZ, and syn-anti systems.</li><li><b>CO-3:</b> To acquire knowledge of the nomenclature, classification, synthesis, reactions, and medicinal uses of heterocyclic compounds.</li><li><b>CO-4:</b> To apply size analysis techniques by sieving and construct various size frequency curves. They will verify the laws of size reduction using a ball mill and determine Kicks, Rittinger's, and Bond's coefficients, as well as the critical speed of the ball mill.</li><li><b>CO-5:</b> To be familiarized with the construction, working principles, and applications of pharmaceutical machinery.</li></ol>
Subject: <b>Medicinal Chemistry-I</b> (Practical) Subject Code : <b>BP406P</b>	<ol style="list-style-type: none"><li><b>CO-1:</b> To demonstrate practical skills in the synthesis of medicinal compounds, including 1,3-pyrazole, 1,3-oxazole, benzimidazole, benzotriazole, 2,3-diphenyl quinoxaline, benzocaine, phenytoin, and phenothiazine.</li><li><b>CO-2:</b> To conduct assays for drugs like chlorpromazine, phenobarbitone, atropine, ibuprofen, aspirin, and furosemide, gaining hands-on experience in quantitative analysis techniques.</li><li><b>CO-3:</b> To demonstrate proficiency in determining the partition coefficient for two drugs, applying the relevant experimental techniques and understanding the significance of partition coefficient in drug design and formulation.</li></ol>

## Course Outcomes

**Class & Sem. :** II Year II Sem.

**Branch :** B. Pharmacy

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
Subject: <b>Physical Pharmaceutics-II</b> (Theory) Subject Code : <b>BP403T</b>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To be able to classify dispersed systems, describe the characteristics of colloidal particles, and compare the general properties of colloids.</li><li>2. <b>CO-2:</b> To demonstrate a thorough understanding of rheology, distinguishing Newtonian and non-Newtonian systems.</li><li>3. <b>CO-3:</b> To learn the interfacial properties of suspended particles in coarse dispersions, the settling phenomena in suspensions, and the formulation of flocculated and deflocculated suspensions and Theories of emulsification.</li><li>4. <b>CO-4:</b> To acquire a deep understanding of particle size and distribution, mean particle size, number and weight distribution, and methods for determining particle size.</li><li>5. <b>CO-5:</b> To analyze the units of basic rate constants and factors influencing the chemical degradation of pharmaceutical products.</li></ol>
Subject: <b>Physical Pharmaceutics-II</b> (Practical) Subject Code : <b>BP407P</b>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To be proficient in determining particle size and distribution using both sieving and microscopic methods, enabling them to characterize the physical attributes of pharmaceutical materials.</li><li>2. <b>CO-2:</b> To demonstrate the ability to determine bulk density, true density, and porosity, providing insights into the packing arrangement and physical properties of powders.</li><li>3. <b>CO-3:</b> To master the measurement of viscosity using Ostwald's viscometer and Brookfield viscometer for liquids and semisolids.</li></ol>

## Course Outcomes

**Class & Sem. :** II Year II Sem.

**Branch :** B. Pharmacy

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
Subject: <b>Pharmacology-I (Theory)</b> Subject Code : <b>BP404T</b>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To gain a comprehensive understanding of pharmacology, including its definition, historical landmarks, and scope.</li><li>2. <b>CO-2:</b> To gain a comprehensive understanding of pharmacology, including its definition, historical landmarks, and scope.</li><li>3. <b>CO-3:</b> To be well-versed in the organization and function of the autonomic nervous system (ANS), neurohumoral transmission, co-transmission, and the classification of neurotransmitters. To gain insights into drugs acting on the peripheral nervous system.</li><li>4. <b>CO-4:</b> To acquire in-depth knowledge of neurohumoral transmission in the CNS, with special emphasis on neurotransmitters.</li><li>5. <b>CO-5:</b> To learn about psychopharmacological agents, including antipsychotics, antidepressants, anti-anxiety agents, anti-manics, hallucinogens, and drugs used in diseases.</li></ol>
Subject: <b>Pharmacology-I (Practical)</b> Subject Code : <b>BP408P</b>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To gain practical exposure to experimental techniques and instruments commonly used in pharmacological studies.</li><li>2. <b>CO-2:</b> To adept at common laboratory techniques, including blood withdrawal, serum, and plasma separation, as well as anesthetics and euthanasia used in animal studies.</li><li>3. <b>CO-3:</b> To gain hands-on experience in studying different routes of drug administration in mice and rats, enhancing their practical skills in drug delivery methodologies.</li></ol>

## Course Outcomes

**Class & Sem. :** II Year II Sem.

**Branch :** B. Pharmacy

Details of Subject	<u>Course Outcomes</u>
Subject: <b>Pharmacognosy &amp; Phytochemistry-I (Theory)</b> Subject Code : <b>BP405T</b>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To acquire knowledge about historical aspects in Pharmacognosy and to know about organized and unorganized drugs, classification of crude drugs, Adulteration and quantitative microscopy of crude drugs.</li><li>2. <b>CO-2:</b> To acquire knowledge about cultivation, collection, processing, storage of crude drugs and conservation of medicinal plants.</li><li>3. <b>CO-3:</b> To acquire the concepts in Plant Tissue Culture.</li><li>4. <b>CO-4:</b> To acquire the knowledge about various traditional systems of medicine.</li><li>5. <b>CO-5:</b> To acquire the knowledge about plant products, primary metabolites and marine drugs.</li></ol>
Subject: <b>Pharmacognosy &amp; Phytochemistry-I (Practical)</b> Subject Code : <b>BP409P</b>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To acquire knowledge about evaluation of chemical constituents present in the crude drugs and to evaluate the leaf constants.</li><li>2. <b>CO-2:</b> To acquire knowledge about cultivation, collection, processing, storage of crude drugs and conservation of medicinal plants.</li><li>3. <b>CO-3:</b> To acquire knowledge about evaluation methods for adulteration by physical evaluation, Moisture Content and Swelling Index.</li></ol>

## Course Outcomes

**Class & Sem. :** III Year I Sem.

**Branch :** B. Pharmacy

Details of Subject	<u>Course Outcomes</u>
Subject: <b>Medicinal Chemistry-II</b> (Theory) Subject Code : <b>BP501T</b>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To understand the development, Classification, mechanism of action, Structure activity relationship, uses and synthesis of drugs acting as anti-histaminics, Proton pump inhibitors, cytotoxic agents.</li><li>2. <b>CO-2:</b> To understand the development, Classification, mechanism of action, Structure activity relationship, uses and synthesis of drugs acting as anti-anginal, Diuretics, Anti-hypertensives.</li><li>3. <b>CO-3:</b> To understand the development, Classification, mechanism of action, Structure activity relationship, uses and synthesis of drugs acting as anti- arrhythmic, Anti-hyperlipidemic, Coagulants, Anti- coagulants and drugs used for the treatment of CHF.</li><li>4. <b>CO-4:</b> To understand the development, Classification, mechanism of action, Structure activity relationship, uses and synthesis of drugs acting on endocrine system.(Sex hormones, drugs for ED, Oral contraceptives, Corticosteroids, Anti-thyroid &amp; Thyroid drugs).</li><li>5. <b>CO-5:</b> To understand the development, Classification, mechanism of action, Structure activity relationship, uses and synthesis of drugs acting as anti-diabetics and Local anaesthetics.</li></ol>

## Course Outcomes

**Class & Sem. :** III Year I Sem.

**Branch :** B. Pharmacy

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
<p>Subject: <b>Industrial Pharmacy-I</b> <b>(Theory)</b> Subject Code : <b>BP502T</b></p>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To demonstrate a comprehensive understanding of preformulation studies and the study of physicochemical characteristics of drug substances.</li><li>2. <b>CO-2:</b> To Apply preformulation considerations effectively in the development of solid, liquid oral, and parenteral dosage forms to ensure optimal formulation outcomes.</li><li>3. <b>CO-3:</b> To Acquire expertise in formulating various dosage forms considering the ideal characteristics, classification, and formulation techniques.</li><li>4. <b>CO-4:</b> To Perform quality control tests on in-process and finished dosage forms, ensuring compliance with pharmacopeial standards and regulations.</li><li>5. <b>CO-5:</b> Develop problem-solving skills and critical thinking abilities to address formulation challenges, processing problems, defects in coating, manufacturing defects, and selection of containers and closures, thereby ensuring the safety, efficacy, and stability of pharmaceutical products.</li></ol>
<p>Subject: <b>Industrial Pharmacy-I</b> <b>(Practical)</b> Subject Code : <b>BP506P</b></p>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To enhance proficiency in Formulation and Evaluation, Students will demonstrate proficiency in formulating and evaluating various pharmaceutical dosage forms.</li><li>2. <b>CO-2:</b> To develop strong skills in conducting quality control tests for both in-process and finished pharmaceutical products, following Indian Pharmacopoeia (IP) standards, thereby ensuring the safety, efficacy, and quality.</li><li>3. <b>CO-3:</b> To gain a comprehensive understanding of the evaluation process for glass containers as per Indian Pharmacopoeia (IP) standards.</li></ol>

## Course Outcomes

**Class & Sem. :** III Year I Sem.

**Branch :** B. Pharmacy

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
<p>Subject: <b>Pharmacology-II (Theory)</b> Subject Code : <b>BP503T</b></p>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To acquire knowledge on CVS and its regulatory mechanisms, pathophysiology related to CVS diseases and disorders and Pharmacology of drugs used in the Cardio vascular diseases.</li><li>2. <b>CO-2:</b> Grasping knowledge on treatment of blood disorders, kidney disorders.</li><li>3. <b>CO-3:</b> To acquire knowledge on autocooids, synthesis, metabolism and their pharmacology. To have knowledge on the pathophysiology on analgesia, pyretics, inflammation, gout, rheumatoid arthritis and drugs used in their treatment.</li><li>4. <b>CO-4:</b> Grasping knowledge on Physiological role of Endocrine glands and its pathological conditions and the Pharmacology of drugs used.</li><li>5. <b>CO-5:</b> Acquaintance with steroidal structures, features, properties, uses, mode of action. To gain knowledge on bioassays and its applications, its importance and need in the present context. Principles and procedures involved in bioassays and their limitations.</li></ol>
<p>Subject: <b>Pharmacology-II (Practical)</b> Subject Code : <b>BP507P</b></p>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To develop a comprehensive understanding of in-vitro pharmacology techniques, including the preparation and use of physiological salt solutions.</li><li>2. <b>CO-2</b> Students will gain proficiency in conducting pharmacological experiments to evaluate the effects of drugs on different physiological systems.</li><li>3. <b>CO-3:</b> To learn to apply pharmacological concepts and principles to evaluate the pharmacological activities of drugs.</li></ol>

## Course Outcomes

**Class & Sem. :** III Year I Sem.

**Branch :** B. Pharmacy

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
<p>Subject: <b>Pharmacognosy &amp; Phytochemistry-II (Theory)</b> Subject Code : <b>BP504T</b></p>	<ol style="list-style-type: none"><li>1. <b>CO1:</b> To acquire knowledge about historical aspects in Pharmacognosy and to know about organized and unorganized drugs, classification of crude drugs, Adulteration and quantitative microscopy of crude drugs.</li><li>2. <b>CO2:</b> To acquire knowledge about cultivation, collection, processing, storage of crude drugs and conservation of medicinal plants.</li><li>3. <b>CO3:</b> To acquire the concepts in Plant Tissue Culture.</li><li>4. <b>CO4:</b> To acquire the knowledge about various traditional systems of medicine.</li><li>5. <b>CO5:</b> To acquire the knowledge about plant products, primary metabolites and marine drugs.</li></ol>
<p>Subject: <b>Pharmacognosy &amp; phytochemistry -II (Practical)</b> Subject Code : <b>BP508P</b></p>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To acquire knowledge about evaluation of chemical constituents present in the crude drugs and to evaluate the leaf constants.</li><li>2. <b>CO-2:</b> To acquire knowledge about evaluation methods for adulteration by microscopical method.</li><li>3. <b>CO-3:</b> To acquire knowledge about evaluation methods for adulteration by physical evaluation, determination of Moisture Content and Swelling Index.</li></ol>



## Course Outcomes

**Class & Sem. :** III Year I Sem.

**Branch :** B. Pharmacy

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
<p>Subject: <b>Pharmaceutical Jurisprudence (Theory)</b> Subject Code : <b>BP505T</b></p>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To Acquire a comprehensive understanding of the Drugs and Cosmetics Act, 1940, and its rules,</li><li>2. <b>CO-2:</b> To learn to adhere to pharmaceutical laws and regulations, including the Drugs and Cosmetics Act, 1940, the Pharmacy Act, 1948, the Medicinal and Toilet Preparation Act, 1955, the Narcotic Drugs and Psychotropic Substances Act, 1985, and other relevant legislation.</li><li>3. <b>CO-3:</b> To Understand the importance of professional ethics in pharmacy practice and adhere to the Code of Pharmaceutical Ethics.</li><li>4. <b>CO-4:</b> To Acquire knowledge of various healthcare legislations, including the Pharmacy Act, 1948, the Narcotic Drugs and Psychotropic Substances Act, 1985, the Prevention of Cruelty to Animals Act, 1960, the Medical Termination of Pregnancy Act, the Right to Information Act, and relevant committees' reports.</li><li>5. <b>CO-5:</b> To understand the importance of patents, trademarks, copyrights, and other forms of intellectual property protection in the development, manufacturing, and marketing of pharmaceutical products.</li></ol>

## Course Outcomes

**Class & Sem. :** III Year II Sem.

**Branch :** B. Pharmacy

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
<p>Subject: <b>Medicinal Chemistry-III</b> (Theory) Subject Code : <b>BP601T</b></p>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To understand the development, Classification, mechanism of action, SAR, uses and synthesis of drugs acting as <math>\beta</math>-lactam antibiotics, Amino glycosides, Tetracyclines.</li><li>2. <b>CO-2:</b> To understand the development, Classification, mechanism of action, SAR, uses and synthesis of drugs acting as anti-malarials, Macrolides. the concept and application of prodrugs.</li><li>3. <b>CO-3:</b> To understand the development, Classification, mechanism of action, SAR, uses and synthesis of drugs acting as anti-tubercular, anti-viral, urinary tract anti- infective agents.</li><li>4. <b>CO-4:</b> To understand the development, Classification, mechanism of action, SAR, uses and synthesis of drugs acting as anti-fungal, anti-protozoal, anti-helmintics, sulphonamides.</li><li>5. <b>CO-5:</b> To understand various approaches used in drug design, pharmacophore modeling and docking techniques. To understand the concept and applications of combinatorial chemistry.</li></ol>
<p>Subject: <b>Medicinal Chemistry-III</b> (Practical) Subject Code : <b>BP607P</b></p>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To Develop proficiency in the laboratory preparation of various drugs and intermediates.</li><li>2. <b>CO-2:</b> To Acquire accurate assay techniques for the quantitative analysis of drugs which develop skills in using analytical instruments, understanding calibration curves, and performing precise measurements for drug quantification</li><li>3. <b>CO-3:</b> To gain an understanding of the application of microwave irradiation in the synthesis of medicinally important compounds or intermediates.</li></ol>

## Course Outcomes

**Class & Sem. :** III Year II Sem.

**Branch :** B. Pharmacy

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
Subject: <b>Pharmacology-III (Theory)</b> Subject Code : <b>BP602T</b>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To acquire knowledge on respiratory and GIT system and its regulatory mechanisms, pathophysiology, disorders and pharmacology of drugs used in the respiratory and GIT system diseases.</li><li>2. <b>CO-2:</b> Grasping knowledge on basics about chemotherapy.</li><li>3. <b>CO-3:</b> To acquire knowledge on Antitubercular agents, Antileprotic agents, Antifungal agents, Antiviral drugs, Anthelmintics, Antimalarial drugs, Antiamoebic agents.</li><li>4. <b>CO-4:</b> Grasping knowledge Urinary tract infections and sexually transmitted diseases, Chemotherapy of malignancy, Immunostimulants, Immunosuppressant Protein drugs, monoclonal antibodies, target drugs to antigen, biosimilars.</li><li>5. <b>CO-5:</b> Acquaintance with Principles of toxicology and Chronopharmacology.</li></ol>
Subject: <b>Pharmacology-III (Theory)</b> Subject Code : <b>BP608 P</b>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To demonstrate proficiency in conducting various experimental pharmacology techniques</li><li>2. <b>CO-2:</b> To gain an understanding of pharmacokinetic parameters and their determination from experimental data, enhancing their ability to analyze drug absorption, distribution, metabolism, and excretion.</li><li>3. <b>CO-3:</b> To apply biostatistics methods such as student's t test, ANOVA, Chi-square test, and Wilcoxon Signed Rank test in analyzing experimental pharmacological data, enabling them to draw meaningful conclusions and make informed interpretations.</li></ol>

## Course Outcomes

**Class & Sem. :** III Year II Sem.

**Branch :** B. Pharmacy

Details of Subject	<u>Course Outcomes</u>
Subject: <b>Herbal Drug Technology</b> (Theory) Subject Code : <b>BP603T</b>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To understand herbal materials, Good agricultural practices, bio pesticides, basic principles of alternative systems of medicine, preparation and standardisation of ayurvedic formulations.</li><li>2. <b>CO-2:</b> To learn nutraceuticals and their role in treatment of diseases and about herbal- drug and herbal-food interactions.</li><li>3. <b>CO-3:</b> To understand raw materials of herbal origin, herbal excipients and about various herbal formulations.</li><li>4. <b>CO-4:</b> To know WHO and ICH guidelines for evaluation of herbal drugs, patenting and regulatory issues of natural products.</li><li>5. <b>CO-5:</b> To know about herbal drug industry scope and future and GMP of Indian system of medicine.</li></ol>
Subject: <b>Herbal Drug Technology</b> (Practical) Subject Code : <b>BP609P</b>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To understand phytochemical screening of crude drugs like senna and honey.</li><li>2. <b>CO-2:</b> To understand evaluation and monographic analysis of natural excipients like starch and acacia.</li><li>3. <b>CO-3:</b> To understand evaluation of herbal cosmetics like creams and shampoos, Determination of alcohol and aldehyde content.</li></ol>

### Course Outcomes

**Class & Sem. :** III Year II Sem.

**Branch :** B. Pharmacy

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
Subject: <b>Biopharmaceutics &amp; Pharmacokinetics (Theory)</b> Subject Code : <b>BP604T</b>	<ol style="list-style-type: none"><li><b>CO-1:</b> To understand Biopharmaceutics &amp; pharmacokinetics and their application – absorption mechanisms, factors, and their application with examples, drug distribution &amp; protein binding and its factors.</li><li><b>CO-2:</b> To understand drug metabolism &amp; excretion–factors, Bioavailability and bioequivalence objectives and measurement.</li><li><b>CO-3:</b> To understand the significance of plasma drug concentration, compartment models-kinetic parameters.</li><li><b>CO-4:</b> To understand the significance of multicompartment models- assessment of pharmacokinetic parameters.</li><li><b>CO-5:</b> To understand the pharmacokinetic models, Linear &amp; nonlinear pharmacokinetics, mechanism &amp; method of assessments.</li></ol>

### Course Outcomes

**Class & Sem. :** III Year II Sem.

**Branch :** B. Pharmacy

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
Subject: <b>Pharmaceutical Biotechnology (Theory)</b> Subject Code : <b>BP605T</b>	<ol style="list-style-type: none"><li><b>CO-1:</b> To understand various applications of biotechnology in field of Pharmaceutical sciences and the basics of enzyme technology.</li><li><b>CO-2:</b> To understand the basics of genetic engineering and its applications.</li><li><b>CO-3:</b> To understand the basics of Immunology and production of immunological preparations</li><li><b>CO-4:</b> To understand basics of microbial biotransformation and its applicability</li><li><b>CO-5:</b> To gain Knowledge of fermentation technology and its applicability producing various components. Acquiring basics in processing and storage of blood products.</li></ol>

## Course Outcomes

**Class & Sem. :** III Year II Sem.

**Branch :** B. Pharmacy

Details of Subject	<u>Course Outcomes</u>
Subject: <b>Pharmaceutical Quality Assurance (Theory)</b> Subject Code : <b>BP606T</b>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To understand Concept of Quality assurance, philosophy of GMP, CGMP and GLP,ISO,NABL,TQM, ICH guidelines</li><li>2. <b>CO-2:</b> To understand organization and personnel, responsibilities</li><li>3. <b>CO-3:</b> To understand responsibilities, good laboratory practices, audits of quality control facilities - Finished products release: quality review, quality audits, and batch release document.</li><li>4. <b>CO-4:</b> To understand handling of returned goods, recovered materials and reprocessing. Complaints and recalls, evaluation of complaints, recall procedures, related records and documents.</li><li>5. <b>CO-5:</b> To understand the principles of calibration and validation and validation of analytical instruments.</li></ol>

## Course Outcomes

**Class & Sem. :** IV Year I Sem.

**Branch :** B. Pharmacy

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
Subject: <b>Instrumental Methods of Analysis(Theory)</b> Subject Code : <b>BP701T</b>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To understand the Principle, Instrumentation and Applications of UV visible Spectroscopy and Fluorimetry.</li><li>2. <b>CO-2:</b> To learn about the Principle, Instrumentation and Applications of IR Spectroscopy, Flame Photometry, Atomic Absorption spectroscopy and Nepheloturbidimetry.</li><li>3. <b>CO-3:</b>To learn about the Principle, methodology applications of TLC, Paper Chromatography and Electrophoresis.</li><li>4. <b>CO-4:</b> To understand the Principle, Instrumentation and Applications of Gas Chromatography and High performance liquid chromatography.</li><li>5. <b>CO-5:</b>To know about the Principle, Instrumentation and Applications of Ion exchange Chromatography, Gel chromatography and Affinity chromatography.</li></ol>
Subject: <b>Instrumental Methods of Analysis(Practical)</b> Subject Code : <b>BP705P</b>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> Students will comprehend the principles behind absorption maxima and gain insights into the influence of different solvents on the absorption characteristics of organic compounds.</li><li>2. <b>CO-2:</b> Develop proficiency in quantitative analysis techniques as students estimate concentrations using colorimetry for substances like dextrose and sulfanilamide.</li><li>3. <b>CO-3:</b> Acquire practical knowledge in UV spectroscopy by successfully conducting simultaneous estimations of ibuprofen and paracetamol, as well as performing an assay of paracetamol using UV-Spectrophotometry.</li></ol>

## Course Outcomes

**Class & Sem. :** IV Year I Sem.

**Branch :** B. Pharmacy

Details of Subject	<u>Course Outcomes</u>
Subject: <b>Industrial Pharmacy-II</b> (Theory) Subject Code : <b>BP702T</b>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> Develop an understanding of pilot plant scale-up techniques, including considerations for personnel, space, and raw materials.</li><li>2. <b>CO-2:</b> Acquire skills in technology development and transfer by navigating through WHO guidelines.</li><li>3. <b>CO-3:</b> Comprehend the historical overview and significance of Regulatory Affairs. Gain insights into the role and responsibilities of Regulatory Affairs professionals.</li><li>4. <b>CO-4:</b> Develop proficiency in quality management systems, including concepts like Total Quality Management, Quality by Design (QbD), and Six Sigma. Explore ISO 9000 series standards, ISO 14000, NABL, GLP, and understand the principles of change control and handling Out of Specifications (OOS).</li><li>5. <b>CO-5:</b> Gain insights into the Indian regulatory environment, focusing on organizations like CDSCO and State Licensing Authority.</li></ol>

## Course Outcomes

**Class & Sem. :** IV Year I Sem.

**Branch :** B. Pharmacy

Details of Subject	<u>Course Outcomes</u>
Subject: <b>Pharmacy Practice (Theory)</b> Subject Code : <b>BP703T</b>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To understand the organisation of Hospital and Hospital Pharmacy, to detect and assess adverse drug reactions and to learn the way of patient counselling as a community pharmacist.</li><li>2. <b>CO-2:</b> To know various drug distribution methods in a hospital, to obtain medication history interview by counselling the patients and organization of community pharmacy management.</li><li>3. <b>CO-3:</b> To know the functions of PTC and DIC, aware of training program in hospitals and prescribed medication order interpretation.</li><li>4. <b>CO-4:</b> To know pharmaceutical care services and to monitor drug therapy of patient through medication chart review and clinical review and to learn the concept of rational drug therapy.</li><li>5. <b>CO-5:</b> To know the preparation of Budget, Purchase and Inventory Control and get the knowledge on interpretation of selected laboratory results (as monitoring parameters in therapeutics) of specific disease state.</li></ol>



### Course Outcomes

**Class & Sem. :** IV Year I Sem.

**Branch :** B. Pharmacy

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
Subject: <b>Novel Drug Delivery Systems</b> (Theory) Subject Code : <b>BP704T</b>	<ol style="list-style-type: none"><li><b>CO-1:</b> Develop a foundational understanding of controlled drug delivery systems, including terminology, advantages, and disadvantages.</li><li><b>CO-2:</b> Acquire knowledge about polymers in drug delivery, covering their introduction, classification, properties, and application in controlled release formulations.</li><li><b>CO-3:</b> To Explore the principles of mucosal drug delivery, understanding bioadhesion/mucoadhesion, transmucosal permeability, and formulation considerations for buccal delivery systems.</li><li><b>CO-4:</b> To Explore Transdermal drug delivery systems, delving into permeation through the skin, factors affecting permeation, and formulation approaches.</li><li><b>CO-5:</b> To gain insights into targeted drug delivery, including concepts, approaches, advantages, and disadvantages.</li></ol>

### Course Outcomes

**Class & Sem. :** IV Year II Sem.

**Branch :** B. Pharmacy

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
Subject: <b>Biostatistics and Research</b> <b>Methodology (Theory)</b> Subject Code : <b>BP801T</b>	<ol style="list-style-type: none"><li><b>CO-1:</b> To develop a foundational understanding of statistics and biostatistics. <b>CO-2:</b> Gain proficiency in regression analysis, including curve fitting and multiple regression.</li><li><b>CO-3:</b> Comprehend the essence of sampling, types of sampling, and the significance of errors in hypothesis testing. <b>CO-4:</b> Explore non-parametric tests like Wilcoxon Rank Sum Test, Mann-Whitney U test, Kruskal-Wallis test, and Friedman Test. Understand the need for research, design of experiments, and the basics of plagiarism.</li><li><b>CO-5:</b> Delve into experimental design, blocking, and confounding systems for two-level factorials. Gain practical skills in statistical analysis using tools like Excel, SPSS, MINITAB, and R for industrial and clinical trial approaches.</li></ol>

## Course Outcomes

**Class & Sem. :** IV Year II Sem.

**Branch :** B. Pharmacy

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
Subject: <b>Social and Preventive Pharmacy(Theory)</b> Subject Code : <b>BP802T</b>	<ol style="list-style-type: none"><li><b>1. CO-1:</b> It is designed to impart the knowledge on Concept of health and disease, Social and health education, Sociology and health, Hygiene and health.</li><li><b>2. CO-2:</b> It helps the student to understand the preventive medicine and general principles of prevention and control of diseases.</li><li><b>3. CO-3:</b> It is designed to impart the knowledge on National health programs, its objectives, functioning and outcome.</li><li><b>4. CO-4:</b> It is designed to impart the knowledge on National health programs, its objectives, functioning and outcome.</li><li><b>5. CO-5:</b> It is designed to impart the knowledge on Community services in rural, urban and school health.</li></ol>

## Course Outcomes

**Class & Sem. :** IV Year II Sem.

**Branch :** B. Pharmacy

Details of Subject	<u>Course Outcomes</u>
Subject: <b>Quality Control &amp; Standardisation of Herbals</b> (Theory) Subject Code : <b>BP806ET</b>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To understand about basic tests for the natural compounds and formulations along with that quality assessment of these compounds according to WHO.</li><li>2. <b>CO-2:</b> To understand about Quality Assurance, cGMP and GACP for Medicinal Plants.</li><li>3. <b>CO-3:</b> To understand about ICH and EU guidelines for quality assessment of natural products and knowledge gaining on research guidelines.</li><li>4. <b>CO-4:</b> To understand the stability testing and standardization of herbal medicines and documents preparation for New Drug Application.</li><li>5. <b>CO-5:</b> To understand regulatory requirements and WHO guidelines on safety monitoring of Herbal Medicines</li></ol>

## Course Outcomes

**Class & Sem. :** IV Year II Sem.

**Branch :** B. Pharmacy

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
Subject: <b>Cosmetic Science (Theory)</b> Subject Code : <b>BP809ET</b>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> Understand the classification of cosmetic and cosmeceutical products according to Indian and EU regulations. Explore the evolution of cosmeceuticals and their distinction from cosmetics. Examine the definition of cosmetics as quasi and over-the-counter drugs.</li><li>2. <b>CO-2:</b> Grasp the principles of formulation and building blocks for skincare, hair care, and oral care products. Analyze the advantages and disadvantages of formulations such as face wash, moisturizing cream, cold cream, vanishing cream, conditioning shampoo, hair conditioner, anti-dandruff shampoo, hair oils, and toothpaste.</li><li>3. <b>CO-3:</b> Explore the role of herbs in cosmetics, focusing on their contributions to skincare, hair care, and oral care. Understand the specific benefits of herbs such as Aloe, turmeric, Henna, amla, Neem, and clove in cosmetic formulations.</li><li>4. <b>CO-4:</b> Learn about analytical cosmetics, including BIS specifications and methods for shampoo, skin cream, and toothpaste. Understand the principles and application of cosmetic evaluation techniques, such as sebumeter, corneometer, TEWL measurement, and assessment of skin color, hair tensile strength, and hair combing properties.</li><li>5. <b>CO-5:</b> Identify and analyze common cosmetic problems associated with skin, hair, and oral care, such as blemishes, wrinkles, acne, dandruff, hair fall, and body odor. Explore solutions and actives used in antiperspirants and deodorants, understanding their mechanisms of action.</li></ol>

### Course Outcomes

**Class & Sem. :** IV Year II Sem.

**Branch :** B. Pharmacy

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
<p>Subject: <b>Advanced Instrumentation Techniques (Theory)</b> Subject Code : <b>BP811ET</b></p>	<ol style="list-style-type: none"><li><b>CO-1:</b> To demonstrate a deep understanding of advanced instrumental analysis techniques in the field of pharmacy and the ability to operate them proficiently for the analysis of pharmaceutical compounds..</li><li><b>CO-2:</b> To understand the theory behind these techniques, interpret spectral data accurately, and utilize this knowledge for the identification and characterization of drug compounds.</li><li><b>CO-3:</b> To be proficient in selecting appropriate stationary phases, optimizing conditions, and interpreting chromatograms..</li><li><b>CO-4:</b> To integrate data obtained from multiple advanced instrumental techniques and correlate results from spectroscopy, chromatography, and other analytical methods to provide a comprehensive understanding of the chemical composition, purity, and stability of pharmaceuticals.</li><li><b>CO-5:</b> To apply quality assurance principles to ensure the reliability and accuracy of analytical results.</li></ol>

### Course Outcomes

**Class & Sem. :** IV Year II Sem.

**Branch :** B. Pharmacy

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
<p>Subject: <b>Experimental Pharmacology (Theory)</b> Subject Code : <b>BP810ET</b></p>	<ol style="list-style-type: none"><li><b>CO-1:</b> This subject is designed to impart the knowledge on preclinical evaluation of drugs and recent experimental techniques in the drug discovery and development.</li><li><b>CO-2:</b> The subject content helps the student to understand the maintenance of laboratory animals as per the guidelines, basic knowledge of various in-vitro and in-vivo preclinical evaluation processes.</li><li><b>CO-3:</b> Appraise the regulations and ethical requirement for the usage of Objectives.</li><li><b>CO-4:</b> Good laboratory practices in maintenance and handling of experimental.</li><li><b>CO-5:</b> Describe the various newer screening methods involved in the drug animals. Appreciate and correlate the preclinical data to human's discovery process.</li></ol>

### Course Outcomes

**Class & Sem. :** I Year I Sem.

**Branch/Specialization:** M. Pharmacy/Pharmaceutical Analysis

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
Subject: <b>Modern Pharmaceutical Analytical Techniques (Theory)</b> Subject Code : <b>MPA101T</b>	<ol style="list-style-type: none"><li><b>CO-1:</b> To learn theoretical and instrumental aspects of different spectroscopic techniques.</li><li><b>CO-2:</b> To understand the principles and applications of NMR Spectroscopy.</li><li><b>CO-3:</b> To acquire knowledge on identification, quantification and characterization of drugs by Mass Spectroscopy.</li><li><b>CO-4:</b> To understand the principles, procedures and applications of different chromatographic techniques.</li><li><b>CO-5:</b> To know about the theoretical principles and working conditions of Electrophoresis and X-ray Crystallography and Thermal Analysis.</li></ol>

### Course Outcomes

**Class & Sem. :** I Year I Sem.

**Branch/Specialization:** M. Pharmacy/Pharmaceutical Analysis

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
Subject: <b>Advanced Pharmaceutical Analysis (Theory)</b> Subject Code : <b>MPA102T</b>	<ol style="list-style-type: none"><li><b>CO-1:</b> To understand the various aspects of impurities in drug substances, drug products and residual solvents</li><li><b>CO-2:</b> To obtain the information about elemental impurities and stability testing protocols.</li><li><b>CO-3:</b> To gain knowledge on impurity profiling, degradants characterisation and shelf life determination.</li><li><b>CO-4:</b> To know the regulatory requirements and stability testing guide lines of Phytopharmaceuticals.</li><li><b>CO-5:</b> To know the procedures for bio-assays of different vaccines and applications of Polymerase Chain Reaction and to understand the principles and procedures of different immunoassays.</li></ol>

### Course Outcomes

**Class & Sem. :** I Year I Sem.

**Branch/Specialization:** M. Pharmacy/Pharmaceutical Analysis

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
Subject: <b>Pharmaceutical Validation (Theory)</b> Subject Code : <b>MPA103T</b>	<ol style="list-style-type: none"><li><b>CO-1:</b> To identify different types of validation and differentiate them and describe the methodology of qualification.</li><li><b>CO-2:</b> To interpret the knowledge of validation to instruments and equipments.</li><li><b>CO-3:</b> To implement the validation principles in manufacturing process.</li><li><b>CO-4:</b> To know the application of validation principles in method development and computerized systems.</li><li><b>CO-5:</b> To know the different aspects of intellectual property rights.</li></ol>

### Course Outcomes

**Class & Sem. :** I Year I Sem.

**Branch/Specialization:** M. Pharmacy/Pharmaceutical Analysis

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
Subject: <b>Food Analysis (Theory)</b> Subject Code : <b>MPA104T</b>	<ol style="list-style-type: none"><li><b>CO-1:</b> To identify different types of validation and differentiate them and describe the methodology of qualification.</li><li><b>CO-2:</b> To interpret the knowledge of validation to instruments and equipments.</li><li><b>CO-3:</b> To implement the validation principles in manufacturing process.</li><li><b>CO-4:</b> To know the application of validation principles in method development and computerized systems.</li><li><b>CO-5:</b> To know the different aspects of intellectual property rights.</li></ol>

### Course Outcomes

**Class & Sem. :** I Year I Sem.

**Branch/Specialization:** M. Pharmacy/Pharmaceutical Analysis

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
Subject: <b>Pharmaceutical Analysis Practical I (Practical)</b> Subject Code : <b>MPA105PA</b>	<ol style="list-style-type: none"><li><b>CO-1:</b> To Perform the Calibration of Glassware and Instruments.</li><li><b>CO-2:</b> To estimate the samples present in dosage forms by different Instrumental</li><li>Techniques.</li><li><b>CO-3:</b> To determine the purity of drugs by using derivatizing agents.</li></ol>

### Course Outcomes

**Class & Sem. :** I Year I Sem.

**Branch/Specialization:** M. Pharmacy/Pharmaceutical Analysis

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
Subject: <b>Pharmaceutical Analysis Practical II (Practical)</b> Subject Code : <b>MPA105PB</b>	<ol style="list-style-type: none"><li><b>CO-1:</b> To understand the procedural principles of determination of reducing sugars, proteins &amp; food additives.</li><li><b>CO-2:</b> To understand the determination of saponification value, Iodine value, Peroxide value, Acid value, fat content and rancidity in food products.</li><li><b>CO-3:</b> To understand the determination of natural and synthetic colors, preservatives, pesticide residue, vitamin content, sp. Gravity and density of food materials.</li></ol>

### Course Outcomes

**Class & Sem. :** I Year II Sem.

**Branch/Specialization:** M. Pharmacy/Pharmaceutical Analysis

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
Subject: <b>Advanced Instrumental Analysis</b> Subject Code : <b>MPA201T</b>	<ol style="list-style-type: none"><li><b>CO-1:</b> To understand the basic principles, types, instrumentation problems and solutions and novel methods of HPLC</li><li><b>CO-2:</b> To obtain the information on bio-chromatographic techniques.</li><li><b>CO-3:</b> To understand the concept of Super critical fluid Chromatography and Capillary Electrophoresis.</li><li><b>CO-4:</b> To gain in-depth knowledge on Mass Spectroscopy and its advanced techniques.</li><li><b>CO-5:</b> To learn how to identify, characterise and quantify pharmaceuticals using NMR spectroscopy.</li></ol>



## Course Outcomes

**Class & Sem. : I Year II Sem.**

**Branch/Specialization: M. Pharmacy/Pharmaceutical Analysis**

<u>Details of Subject</u>	<u>Course Outcomes</u>
Subject: <b>Modern Bio-Analytical Techniques</b> Subject Code : <b>MPA202T</b>	<ol style="list-style-type: none"><li><b>1. CO-1:</b> To understand the importance Extraction of drugs and metabolites from biological matrices: General need, principle and procedure involved in the Bioanalytical methods.</li><li><b>2. CO-2:</b> To understand the importance of Biopharmaceutical Consideration: Biopharmaceutical Factors Affecting Drug Bioavailability, In Vitro: Dissolution and DrugRelease Testing, Alternative Methods of Dissolution Testing Transport models, Biopharmaceutics Classification System. Solubility: Experimental methods. Permeability: In-vitro, in-situ and In-vivo methods.</li><li><b>3. CO-3:</b> To understand Pharmacokinetics andToxicokinetics: Basic consideration, Druginteraction (PK-PD interactions), The effect of proteinbinding interactions, The effect of tissue-binding interactions, Cytochrome P450- based drug interactions, Drug interactions linked to transporters. Microsomal assays Toxicokinetics-Toxicokinetic evaluation in preclinical studies, Importance and applications of toxicokinetic studies. LC- MS in bioactivityscreening and proteomics.</li><li><b>4. CO-4:</b> To understand general methods Cell culture techniques Basic equipments used in cell culture lab. Cell culture media, various types of cell culture, general procedure for cell cultures; isolation of cells, subculture, cryopreservation, characterization of cells and their applications. Principles and applications of cell viability assays (MTT assays), Principles and applications of flow Cytometry.</li><li><b>5. CO-5:</b> To understand Drug Product Performance, In Vivo: Bioavailability and Bioequivalence: Drug Product Performance, Purpose of Bioavailability Studies, Relative and Absolute Availability. Methods for Assessing Bioavailability, Bioequivalence Studies, Design and Evaluation of Bioequivalence Studies, Study Designs, Crossover Study Designs, Generic Biologics (Biosimilar Drug Products), Clinical Significance of Bioequivalence Studies.</li></ol>

## Course Outcomes

**Class & Sem. :** I Year II Sem.

**Branch/Specialization:** M. Pharmacy/Pharmaceutical Analysis

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
Subject: <b>Herbal Cosmetic Analysis</b> Subject Code : <b>MPA204T</b>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To understand the Herbal remedies- Toxicity and Regulations and their standardization as per WHO and AYUSH guidelines.</li><li>2. <b>CO-2:</b> To obtain the information about adulteration/substitution of herbal drugs .</li><li>3. <b>CO-3:</b> To gain knowledge on Regulatory requirements for setting herbal drug industry.</li><li>4. <b>CO-4:</b> To know the regulatory requirements for testing of natural products and drugs.</li><li>5. <b>CO-5:</b> To know the principles of Herbal drug-drug &amp; Herb-Food interaction and their reporting.</li><li>6. <b>CO-6:</b> To understand the principles and procedures for evaluation of cosmetic raw materials and finished products as per BIS.</li></ol>

## Course Outcomes

**Class & Sem. :** I Year II Sem.

**Branch/Specialization:** M. Pharmacy/Pharmaceutical Analysis

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
Subject: <b>Pharmaceutical Analysis</b> <b>Practical-III (Practical)</b> Subject Code : <b>MPA205PA</b>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To Interpret the organic compounds using UV Spectra, IR Spectra, NMR spectra and Mass Spectrum.</li><li>2. <b>CO-2:</b> To separate and identify the compounds using HPLC.</li><li>3. <b>CO-3:</b> To prepare the protocol for Bio-analytical method validation and Bio-equivalence studies.</li></ol>

## Course Outcomes

**Class & Sem. : I Year II Sem.**

**Branch/Specialization: M. Pharmacy/Pharmaceutical Analysis**

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
Subject: <b>Pharmaceutical Analysis</b> <b>Practical-IV (Practical)</b> Subject Code : <b>MPA205PB</b>	<ol style="list-style-type: none"><li><b>1. CO-1:</b> To study the In process &amp; finished product quality control tests for tablets, capsules, parenterals &amp; creams, WC tests for primary &amp; secondary packing materials, Assay of raw materials as per official monographs.</li><li><b>2. CO-2:</b> To understand the Testing of relates &amp; foregin substances in drugs &amp; raw materials, Preparation of Master Formula Record, Batch Manufacturing Record, QA of rancidity in lipsticks &amp; hair oil.</li><li><b>3. CO-3:</b> To understand the determination of aryl amine content &amp; developer in hair dye, determination of foam height &amp; SLS content of Shampoo, acid value &amp; saponification value, calcium thioglycolate in depilatories.</li></ol>

## Course Outcomes

**Class & Sem. : I Year II Sem.**

**Branch/Specialization: M. Pharmacy/Pharmaceutical Analysis**

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
<p>Subject: <b>Research Methodology and Biostatistics</b> Subject Code : <b>MRM301T</b></p>	<ol style="list-style-type: none"><li><b>1. CO-1:</b> To understand about introduction of statistics, Biostatistics, Frequency distribution, Measures of central tendency and dispersion, Correlation and their related pharmaceutical examples and problems.</li><li><b>2. CO-2:</b> To learn various types of Regression, Probability, various types of Parametric tests and their related pharmaceutical examples and problems.</li><li><b>3 CO-3:</b> To learn various types of Non parametric tests, introduction to Research, Graphs, Designing the methodology.</li><li><b>4 CO-4:</b>To learn Blocking and confounding system for Two-level factorials, regression modeling, introduction to practical components of industrial and clinical trails problems related to Statistical analysis using Excel, SPSS, MINITAB®, DESIGN OF EXPERIMENTS, R- online Statistical Software's to industrial and clinical approach.</li><li><b>5 CO-5:</b> To understand Design and Analysis of experiments, Factorial design, <math>2^2</math>, <math>2^3</math> design with advantages, Response surface methodology and their related techniques.</li></ol>

**Class & Sem. :** I Year I Sem.

**Branch/Specialization:** M. Pharmacy/Pharmaceutics

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
<p>Subject: <b>Drug Delivery Systems</b> (Theory) Subject Code : <b>MPH102T</b></p>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To gain a thorough understanding of the basic concepts, advantages, disadvantages, and factors influencing various drug delivery systems, including sustained-release/controlled-release (SR/CR) formulations. To gain the physicochemical and biological approaches used in SR/CR formulation and understand the mechanism of drug delivery from these formulations. Students will grasp the significance of polymers in drug delivery, including their classification, properties, and application in personalized medicine.</li><li>2. <b>CO-2:</b> To understand the principles and fundamentals of rate-controlled drug delivery systems, including different types and activation mechanisms. To understand modulated drug delivery systems such as mechanically, pH, enzyme, and osmotic activated systems, along with feedback-regulated drug delivery systems.</li><li>3. <b>CO-3:</b> To learn various approaches to modulate gastrointestinal transit time for extending drug release. understanding the principle of mucoadhesion in buccal drug delivery systems, along with the mechanism of drug permeation and methods of formulation and evaluation.</li><li>4. <b>CO-4:</b> To gain Knowledge of Ocular Drug Delivery Systems- Students will identify barriers to drug permeation in ocular drug delivery systems and explore methods to overcome these barriers effectively.</li><li>5. <b>CO-5:</b> To Competence in Transdermal Drug Delivery Systems - Students will comprehend the structure of the skin and its barriers to drug permeation.</li></ol>

**Class & Sem. :** I Year I Sem.

**Branch/Specialization:** M. Pharmacy/Pharmaceutics

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
<p>Subject: <b>Modern Pharmaceutics (Theory)</b></p> <p>Subject Code : <b>MPH103T</b></p>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To understand the various aspects of Preformation Concepts – Drug Excipient interactions - different methods, kinetics of stability, Stability testing. Theories of dispersion and pharmaceutical Dispersion (Emulsion and Suspension, SMEDDS) preparation and stability Large and small volume parental –physiological and formulation consideration, Manufacturing and evaluation, Concept and parameters of optimization, Optimization techniques in pharmaceutical formulation and processing. Statistical design, Response surface method, Contour designs, Factorial designs and application in formulation</li><li>2. <b>CO-2:</b> To understand the various aspects of Pharmaceutical Validation, Scope &amp; merits of Validation, Validation and calibration of Master plan, ICH &amp; WHO guidelines for calibration and validation of equipments, Validation of specific dosage form, Types of validation. Government regulation, Manufacturing Process Model, URS, DQ,IQ, OQ &amp; P.Q. of facilities.</li><li>3. <b>CO-3:</b> To gain knowledge on objectives and policies of current good manufacturing practices, layout of buildings, services, equipments and their maintenance Production management: Production organization, materials management, handling and transportation, inventory management and control, production and planning control, Sales forecasting, budget and cost control, industrial and personal relationship. Concept of Total Quality Management.</li><li>4. <b>CO-4:</b> To gain knowledge on Compression and compaction, Physics of tablet compression, consolidation, effect of friction, distribution of forces, compaction profiles.</li><li>5. <b>CO-5:</b> To Study process the consolidation parameters; Diffusion parameters, Dissolution parameters and Pharmacokinetic parameters, Heckel plots, Similarity factors – f2 and f1, Higuchi and Peppas plot, Linearity Concept of significance, Standard deviation , Chi square test, students T-test , ANOVA test.</li></ol>

**Class & Sem. : I Year I Sem.**

**Branch/Specialization: M. Pharmacy/Pharmaceutics**

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
Subject: <b>Regulatory Affairs</b> <b>(Theory)</b> Subject Code : <b>MPH104T</b>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To gain Proficiency in Documentation in the Pharmaceutical Industry.</li><li>2. <b>CO-2:</b> To Understand Regulatory Requirements for Product Approval.</li><li>3. <b>CO-3:</b> To gain Knowledge of CMC and Post-Approval Regulatory Affair.</li><li>4. <b>CO-4:</b> To be Competence in Non-Clinical and Clinical Drug Development.</li><li>5. <b>CO-5:</b>To gain Knowledge of developing clinical trial protocols, institutional review board (IRB)/independent ethics committee formulation, informed consent process, HIPAA requirements, and pharmacovigilance safety monitoring in clinical trials.</li></ol>

**Class & Sem. : I Year I Sem.**

**Branch/Specialization: M. Pharmacy/Pharmaceutics**

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
Subject: <b>Pharmaceutics Practical- I</b> <b>(Practical)</b> Subject Code : <b>MPH105PA</b>	<p><b>CO-1:</b> To gain Proficiency in Spectrophotometric Analysis. Students will demonstrate proficiency in analyzing pharmacopoeial compounds and their formulations using UV-Vis spectrophotometry, understanding the principles and techniques involved.hey will be able to apply UV-Vis spectrophotometric methods to determine the concentration of specific compounds in pharmaceutical formulations accurately.</p> <p><b>CO-2:</b> To gain Ability to Perform Simultaneous Estimation. Students will gain the ability to simultaneously estimate multiple components in pharmaceutical formulations using UV spectrophotometry, demonstrating a comprehensive understanding of the principles and techniques involved.</p> <p><b>CO-3:</b> To gain Competence in HPLC and Gas Chromatography Experiments. Students will demonstrate practical competence in conducting experiments based on High-Performance Liquid Chromatography (HPLC) and Gas Chromatography (GC), including sample preparation, method optimization, and data analysis.They will understand the principles of chromatographic separation and apply them effectively in pharmaceutical analysis.</p>

**Class & Sem. :** I Year I Sem.

**Branch/Specialization:** M. Pharmacy/Pharmaceutics

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
<p>Subject: <b>Pharmaceutics Practical- II</b> <b>(Practical)</b> Subject Code : <b>MPH105PB</b></p>	<p><b>CO-1:</b> To gain Proficiency in Spectrophotometric Analysis. Students will demonstrate proficiency in analyzing pharmacopoeial compounds and their formulations using UV-Vis spectrophotometry, understanding the principles and techniques involved. To apply UV-Vis spectrophotometric methods to determine the concentration of specific compounds in pharmaceutical formulations accurately.</p> <p><b>CO-2:</b> To gain Ability to Perform Simultaneous Estimation. Students will gain the ability to simultaneously estimate multiple components in pharmaceutical formulations using UV spectrophotometry, demonstrating a comprehensive understanding of the principles and techniques involved.</p> <p><b>CO-3:</b> To gain Competence in HPLC and Gas Chromatography Experiments. Students will demonstrate practical competence in conducting experiments based on High-Performance Liquid Chromatography (HPLC) and Gas Chromatography (GC), including sample preparation, method optimization, and data analysis. To understand the principles of chromatographic separation and apply them effectively in pharmaceutical analysis.</p>

**Class & Sem. :** I Year II Sem.

**Branch/Specialization:** M. Pharmacy/Pharmaceutics

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
<p>Subject: <b>Molecular Pharmaceutics</b> <b>(Nano Tech and Targeted DDS) (Theory)</b> Subject Code : <b>MPH201T</b></p>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To gain a thorough understanding of molecular principles underlying nanotechnology and targeted drug delivery systems (DDS), including the interaction between nanoparticles and biological systems.</li><li>2. <b>CO-2:</b> To analyze and evaluate design strategies for nanocarriers and targeted DDS, considering physicochemical properties, surface modifications, and drug encapsulation techniques.</li><li>3. <b>CO-3:</b> To Apply knowledge to the design and development of nanotechnology-based drug delivery systems, demonstrating proficiency in incorporating molecular concepts into practical applications.</li><li>4. <b>CO-4:</b> To critically evaluate various targeting strategies for drug delivery, including ligand-receptor interactions, stimuli-responsive systems, and site-specific delivery approaches.</li><li>5. <b>CO-5:</b> To Understand regulatory and ethical considerations related to the implementation of nanotechnology in drug delivery, ensuring an awareness of safety, quality, and ethical issues associated with molecular pharmaceutics.</li></ol>



**Class & Sem. :** I Year II Sem.

**Branch/Specialization:** M. Pharmacy/Pharmaceutics

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
<p>Subject:</p> <p><b>Advanced Biopharmaceutics &amp; Pharmacokinetics (Theory)</b></p> <p>Subject Code : <b>MPH202T</b></p>	<ol style="list-style-type: none"><li><b>CO-1:</b> To understand the various aspects on Gastrointestinal tract, Mechanism of drug absorption, Factors affecting drug absorption, pH partition theory of drug absorption. Formulation and physicochemical factors: Dissolution rate, Dissolution process, Noyes–Whitney equation and drug dissolution, Factors affecting the dissolution rate. Gastrointestinal absorption: role of the dosage form: Solution (elixir, syrup and solution) as a dosage form, Suspension as a dosage form, Capsule as a dosage form, Tablet as a dosage form, Dissolution methods, Formulation and processing factors, Correlation of <i>in vivo</i> data with <i>in vitro</i> dissolution data. Transport model: Permeability Solubility-Charge State and the pH Partition Hypothesis, Properties of the Gastrointestinal Tract (GIT), pH Microclimate Intracellular pH Environment, Tight-Junction Complex.</li><li><b>CO-2:</b> To obtain knowledge on the Biopharmaceutical considerations in drug product design and <i>In Vitro</i> Drug Product Performance, <i>In vitro–in vivo</i> correlation, dissolution profile comparisons, drug product stability, considerations in the design of a drug product.</li><li><b>CO-3:</b> To gain knowledge on Basic considerations, pharmacokinetic models, compartment modelling. One, two &amp; Multi compartment models.</li><li><b>CO-4:</b> To gain the knowledge on Bioavailability &amp; Bioequivalence of drug products, biosimilars.</li><li><b>CO-5:</b> To know about Modified-Release Drug Products, Targeted Drug Delivery Systems and Biotechnological Products. Introduction to Pharmacokinetics and pharmacodynamic, drug interactions. Pharmacokinetics and pharmacodynamics of biotechnology drugs. Introduction, Proteins and peptides, Monoclonal antibodies, Oligonucleotides, Vaccines (immunotherapy), Genetherapies.</li></ol>

**Class & Sem. :** I Year II Sem.

**Branch/Specialization:** M. Pharmacy/Pharmaceutics

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
<p>Subject:</p> <p><b>Computer Aided Drug Delievery System (Theory)</b></p> <p>Subject Code : <b>MPH203T</b></p>	<ol style="list-style-type: none"><li><b>CO-1:</b> Develop a comprehensive understanding of the fundamental concepts and principles of Computer-Aided Drug Delivery Systems (CADDs), including computational methods and algorithms.</li><li><b>CO-2:</b> To apply computational techniques to model and simulate drug delivery processes, demonstrating proficiency in utilizing software tools for predicting drug behavior and optimizing delivery system parameters.</li><li><b>CO-3:</b> To evaluate molecular interactions between drugs and delivery systems using computational models, enabling the prediction of drug release profiles and understanding key factors influencing drug transport.</li><li><b>CO-4:</b> To utilize CADDs to optimize drug formulations by considering physicochemical properties, stability, and release kinetics, aiming for enhanced drug efficacy and reduced side effects.</li><li><b>CO-5:</b> To develop the ability to interpret and critically analyze computational results, linking theoretical knowledge to practical applications in drug design and delivery system development.</li></ol>

**Class & Sem. : I Year II Sem.**

**Branch/Specialization: M. Pharmacy/Pharmaceutics**

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
<p>Subject: <b>Formulation Development of Pharmaceutical and Cosmetic Products (Theory)</b> Subject Code : <b>MPH204T</b></p>	<ol style="list-style-type: none"><li><b>CO-1:</b> Acquire a deep understanding of the fundamental principles underlying the formulation development of pharmaceutical and cosmetic products, including knowledge of key excipients and their functions.</li><li><b>CO-2:</b> To apply scientific principles to develop formulations for pharmaceutical and cosmetic products, demonstrating proficiency in selecting suitable excipients, optimizing drug delivery systems, and ensuring stability.</li><li><b>CO-3:</b> To evaluate and understand regulatory requirements governing the formulation development of pharmaceutical and cosmetic products, ensuring adherence to quality standards and compliance with industry regulations.</li><li><b>CO-4:</b> To utilize formulation principles to optimize cosmetic product formulations, considering factors such as sensory attributes, stability, and compatibility to meet consumer expectations.</li><li><b>CO-5:</b> To integrate innovative technologies and advancements in formulation science into the development process, fostering the ability to adapt to emerging trends and contribute to the evolution of pharmaceutical and cosmetic formulations.</li></ol>

**Class & Sem. : I Year II Sem.**

**Branch/Specialization: M. Pharmacy/Pharmaceutics**

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
<p>Subject: <b>Pharmaceutics Practical-III</b> Subject Code : <b>MPH205PA</b></p>	<ol style="list-style-type: none"><li><b>CO-1:</b> To Develop practical skills in designing and formulating various drug delivery systems, gaining proficiency in their preparation and assessment.</li><li><b>CO-2:</b> To acquire hands-on experience with advanced analytical techniques used in pharmaceutical analysis, enhancing the ability to perform accurate and precise analyses of pharmaceutical formulations</li><li><b>CO-3:</b> To apply practical knowledge to optimize formulations and troubleshoot challenges in pharmaceutical development, developing problem-solving abilities crucial for successful formulation design.</li></ol>

**Class & Sem. :** I Year II Sem.

**Branch/Specialization:** M. Pharmacy/Pharmaceutics

<b>Details of Subject</b>	<b><u>Course Outcomes</u></b>
<p>Subject: <b>Pharmaceutics Practical-IV</b> Subject Code : <b>MPH205PA</b></p>	<ol style="list-style-type: none"><li>1. <b>CO-1:</b> To develop hands-on formulation skills through practical exercises, encompassing the preparation and evaluation of pharmaceutical formulations, to enhance proficiency in pharmaceutical product development.</li><li>2. <b>CO-2:</b> To develop hands-on formulation skills through practical exercises, encompassing the preparation and evaluation of pharmaceutical formulations, to enhance proficiency in pharmaceutical product development.</li><li>3. <b>CO-3:</b> To acquire practical knowledge of quality control techniques, including analytical methods and testing procedures, to ensure the formulation's compliance with quality standards and regulatory requirements.</li></ol>