**Programme Outcomes (POs) and Course Outcomes (COs) for all Programmes offered for the B pharmacy programme by the Institution are Stated and displayed on website and attainment of Pos and Cos are evaluated**

**PO 1 Pharmacy Knowledge**: Have sound knowledge of fundamental principles and their applications in the area of Pharmaceutical Sciences and Technology.

**PO 2 Practical Skill**: Develop an ability to use lab equipment and different kinds of simulation software with an in depth knowledge to design synthetic and analytical processes to perform experiments on synthesis, design, pharmaceutical analysis, pharmacological evaluation and formulation problem.

**PO 3 Professional Identity:** Develop ability for in-depth analytical and critical thinking in order to identify, formulate and solve the issues related to Pharmaceutical Industry, Regulatory Agencies, and Hospital Pharmacy & Community Pharmacy.

**PO 4 Problem Solving:** Develop an ability to solve, analyze and interpret data generated from Formulation Development, Quality Control & Quality Assurance.

**PO 5 Communication:** Develop written and oral communication skills in order to communicate effectively the outcomes of the Pharmaceutical problems.

**PO 6 Planning Ability:** Have an ability to acquire sound knowledge in order to execute the responsibilities successfully towards developing expertise as per the needs of industry and academia.

**PO 7 Leadership Skills & Team Work :** Develop team spirit, apart from responding to the social needs and professional ethics

**PO 8 Life Long Learning:** Develop an aptitude for lifelong learning and continuous professional development.

**PO 09 The Pharmacist & Society**: Develop an understanding for the need of pharmaceutical sciences and technology towards giving quality life to people in society.

**PO 10 Environment & Sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development**.**

**PSO1:** Able to apply the knowledge gained during the course of the program in drug discovery and development, their safety and efficacy and current technologies in Pharmaceutical industry

**PSO 2:** Able to apply the knowledge of ethical and management principles required to work in a team as well as to lead a team.

## BPHARMACY I&II SEM COURSE OUTCOMES

| S.NO | YEAR/SEM | COURSE NAME | COURSE OUTOMES |
|---|---|---|---|
| 1 | I-I | HUMAN ANATOMY AND PHYSIOLOGY-I | **CO1:** students would have studied about the gross morphology, structure and functions of cell, skeletal, muscular, cardiovascular system of the human body. |
| | | | **CO2:** They would have understood the various homeostatic mechanisms and their imbalances. |
| | | | **CO3:** Students would able to identify the different types of bones in human body. |
| | | | **CO4:** Students would be able to identify the various tissues of different systems of human body. |
| 2 | I-I | PHARMACEUTICAL ANALYSIS | **CO1:** Explain and classify the methods, errors and techniques of volumetric analysis. |
| | | | **CO2:** Discuss theoretical considerations of aqueous and non-aqueous acid base titrations. |
| | | | **CO3:** Explain different methods & principles of precipitation, complexometric titrations and gravimetric analysis. |
| | | | **CO4:** Describe and classify different electrodes used in electrochemical methods of analysis and refractometry. |
| 3 | I-I | PHARMACEUTICS I | **CO1:** Illustrate the history of profession of pharmacy, basic introduction of different dosage form, identification and analyzing the professional way of handling the prescription and posology concept to determine the dose of drug based on different factors for to understand the pharmacy. |
| | | | **CO2:** Select learning different concept of weighing and measuring pharmaceuticals calculation, pharmaceuticals powders or mixtures and liquid dosage form intended to used internally & externally, Make use of preparation of monophasic and biphasic liquid formulation preparation. |
| | | | **CO3:** Inspect Semisolid Suppositories preparation, evaluation and learn associated various pharmaceutical incompability in formulation. |
| | | | **CO4:** Recommend different excipient used in semisolid formulation and understand mechanisms associated influencing factors for penetration of drug and develop different semisolid dosage form. |
| 4 | I-I | PHARMACEUTICAL INORGANIC CHEMISTRY | **CO1:** Know about pharmacopoeias and learn impurity identification. |
| | | | **CO2:** Describe buffers for analytical and pharmaceutical purposes , explain major extra and intracellular electrolytes and dental products. |
| | | | **CO3:** Explain buffers for analytical &pharmaceutical purposes using the knowledge of dissociation constant, buffer capacity, NaCl equivalence and freezing point depression and pharmacopeia. |

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| | | | **CO4:** Explain basic understanding of GIT disease formation and mechanism of action of gastro intestinal agents inorganic drugs. |
| **5** | **I-I** | **COMMUNICATION SKILLS** | **CO1:** Develop the behavioral needs for a Pharmacist to function effectively in the areas of pharmaceutical operation. |
| | | | **CO2:** Adapt communicating effectively Verbal as well Non Verbal. |
| | | | **CO3:** Build the qualities to effectively manage the team as a team player. |
| | | | **CO4:** Develop interview skills, Leadership qualities and essentials. |
| **6** | **I-I** | **REMEDIAL MATHEMATICS** | **CO1:** Demonstrate the theory and their application in Pharmacy. |
| | | | **CO2:** Solve the different types of problems by applying theory. |
| | | | **CO3:** Appraise the important application of mathematics in Pharmacy. |
| | | | **CO4:** Outline the Partial fraction, Logarithm, matrices and Determinant, Analytical geometry. |
| **S.NO** | **YEAR/SEM** | **COURSE NAME** | **COURSE OUTOMES** |
| **1** | **I-II** | **HUMAN ANATOMY AND PHYSIOLOGY-II** | **CO1:** Students would able to identify the various organs of different systems of human body. |
| | | | **CO2:** They would have performed and learnt about the experiments like neurological reflex, body temperature measurement. |
| | | | **CO3:** They would have studied elaborate on interlinked mechanisms in the maintenance of normal functioning of human body. |
| | | | **CO4:** They would have learnt and performed the experiments like Olfaction, gustation reflex and eye sight. |
| **2** | **I-II** | **PHARMACEUTICAL ORGANIC CHEMISTRY-I** | **CO1:** Understand and explain Basic Principles of Organic Chemistry. |
| | | | **CO2:** Classify of organic compounds, To understand and apply IUPAC nomenclature rules for naming organic compounds and to draw structure. |
| | | | **CO3:** Discuss Preparation methods of Alkanes, Alkenes and Conjugated dienes , To study reactions and uses of Alkanes, Alkenes and Conjugated dienes. |
| | | | **CO4:** Explain preparation methods, reactions, qualitative tests and uses of Alkyl halide and Alcohol compounds. |
| **3** | **I-II** | **BIOCHEMISTRY** | **CO1:** Describe the importance of nutrient molecules in physiological and pathological conditions along with the numerous metabolic cycles of carbohydrates. |
| | | | **CO2:** Elaborate and classify importance of biological oxidation and bioenergetics. |
| | | | **CO3:** Discuss and outline different metabolic pathways and its disorders of bio molecules viz., lipids, amino acids, proteins. |

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| | | | **CO4:** Illustrate the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins with metabolic pathways. |
| **4** | **I-II** | **PATHOPHYSIOLOGY** | **CO1:** Outline Basic principles of Cell injury and Adaptation, mechanism involved in the process of inflammation and repair. |
| | | | **CO2:** Classify various cardiovascular, respiratory and renal diseases and interpret its pathophysiology. |
| | | | **CO3:** Illustrate pathophysiology of Haematological Diseases, Endocrine Diseases. |
| | | | **CO4:** Explain pathophysiology of Nervous system diseases and gastrointestinal diseases. |
| **5** | **I-II** | **COMPUTER APPLICATIONS IN PHARMACY** | **CO1:** Use the Appropriate method on Number system to solve the given problem. |
| | | | **CO2:** Apply the various tags in Web Technology to design a program. |
| | | | **CO3:** Use the appropriate system and application of computers in pharmacy. |
| | | | **CO4:** Apply the concepts of Bioinformatics in pharmacy. |
| **S.NO** | **YEAR/SEM** | **COURSE NAME** | **COURSE OUTOMES** |
| **1** | **II-I** | **PHARMACEUTICAL ORGANIC CHEMISTRY – II** | **CO1:** Understand chemistry and reactivity of Benzen**e.** |
| | | | **CO2:** Explain chemistry, synthesis and uses of phenols ,amines. |
| | | | **CO3:** Explain and apply concept of stereo chemistry. |
| | | | **CO4:** Describe reactivity, stability, uses of polynuclear compounds. |
| **2** | **II-I** | **PHYSICAL PHARMACEUTICS - I** | **CO1:** Elaborate factors affecting solubility of drugs. |
| | | | **CO2:** Study solid state and distinguish between amorphous and crystalline solids and elucidate physical properties of drugs. |
| | | | **CO3:**Explain significance of surface and interfacial phenomena. |
| | | | **CO4:** Describe complexes and their pharmaceutical applications. |
| **3** | **II-I** | **PHARMACEUTICAL MICROBIOLOGY** | **CO1:** To describe basic knowledge of bacteria, it's structure, cultivation, preservation and microscopy**.** |
| | | | **CO2:** To identify few bacteria and methods of microbial control. |
| | | | **CO3:** To explain the structure and method of replication of viruses and to analyse the methods of sterility testing. |
| | | | **CO4:** To assess the antibiotics by invitro microbiological methods and to outline different sources of contamination in an aseptic area. |
| | | | **CO1:** Discuss Flow of fluids: Classify manometers, Explain Reynolds number and its significance, |

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| **4** | **II-I** | **PHARMACEUTICAL ENGINEERING** | Bernoulli's theorem and its applications, Energy losses, Orifice meter, Venturimeter, Pilot tube and Rotameter. |
| | | | **CO2:** Classify size reduction mills with their construction, working and applications. Classify size separators with their construction, working and applications. |
| | | | **CO3:** Discuss the theory of heat transfer. Classify and explain heat exchangers with their construction, working and applications. Classify evaporators with their construction, working and applications. |
| | | | **CO4:** Discuss the theory of distillation. Classify and explain distillation equipments with their construction, working and applications. Construct McCabe Thiele's curve. Discuss the theory of drying. Classify and explain dryers with their construction, working and applications. |

| S.NO | YEAR/SEM | COURSE NAME | COURSE OUTOMES |
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| **1** | **II-II** | **PHARMACEUTICAL ORGANIC CHEMISTRY – III** | **CO1:** Discuss reactions of chiral molecules, racemic mixture modification and asymmetric synthesis. |
| | | | **CO2:** Apply conformational analysis and mechanism of stereochemical reactions. |
| | | | **CO3:** Understand and apply IUPAC rules to heterocyclic compounds. |
| | | | **CO4:** Discuss medicinal uses ,synthesis ,chemistry of heterocyclic compounds and their derivatives. |
| **2** | **II-II** | **PHYSICAL PHARMACEUTICS - II** | **CO1:** Understand properties and stability of colloids**.** |
| | | | **CO2:**Explain behaviour of liquids and semisolids in response to shear stress and apply knowledge to dosage design. |
| | | | **CO3:** Formulate suspensions and emulsions along with study of their stability, types, evaluation, and preservation and apply the concept of HLB for formulation of emulsions. |
| | | | **CO4:** Evaluate properties of solids and apply to design of solid dosage forms. |
| **3** | **II-II** | **PHARMACOLOGY - I** | **CO1:** Summarize basic Concept of Pharmacology. |
| | | | **CO2:** Analyze the pharmacological actions of different categories of drugs. |
| | | | **CO3:** Analyze mechanism of drug action, at organ system/sub cellular/macromolecular levels. |
| | | | **CO4:** Apply the basic pharmacological knowledge in the prevention and treatment of various diseases. |
| **4** | **II-II** | **PHARMACOGNOSY AND PHYTOCHEMISTRY - I** | **CO1:** To recall the history, scope and development of pharmacognosy with different sources of crude drugs and also classify them accordingly, also evaluate the crude drugs by quantitative and qualitative evaluation methods. |
| | | | **CO2:** To illustrate students about cultivation, collection, processing and storage of crude drugs and the applications of advanced technologies like polyploidy, mutation and hybridization in medicinal plants. |
| | | | **CO3:** To elaborate the applications of plant tissue culture in medicinal plants. |
| | | | **CO4:** To remember different morphological and |

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| | | | microscopical characteristic features of crude drugs parts root, leaf, Stem, Flower, Fruits etc and their nature of chemical constituents and distinguish them by Chemical test for different category of crude drugs. |
| **5** | **II-II** | **PHARMACEUTICAL JURISPRUDENCE** | **CO1:** Knowledge about Pharmaceutical legislations and their implications in drug development and marketing. |
| | | | **CO2:** Understanding and implementation of code of Ethics in Pharmacy Practice. |
| | | | **CO3:** Knowing about regulatory authorities and agencies governing the manufacturing and sale of pharmaceuticals. |
| | | | **CO4:** Knowledge about various Indian Pharmaceutical Act and Laws including Schedules of drugs and its implications in pharmacy practice. |

| S.NO | YEAR/SEM | COURSE NAME | COURSE OUTOMES |
|---|---|---|---|
| **1** | **III-I** | **MEDICINAL CHEMISTRY – I** | **CO1:** Identify Structure, IUPAC and stereochemistry of classes of drugs belonging to CNS, ANS and Analgesic Drugs. |
| | | | **CO2:** Describe the MOA of classes of drugs belonging to CNS, ANS and Analgesic Drugs. |
| | | | **CO3:** Discuss the SAR of all the classes of CNS, ANS and Analgesic Drugs. |
| | | | **CO4:** Understand the schematic metabolic pathway for any given drug. |
| **2** | **III-I** | **INDUSTRIAL PHARMACY-I** | **CO1:** Asses the physicochemical properties of drugs as a tool in the optimization of solid and liquid dosage forms. |
| | | | **CO2:** Develop Solid dosage forms and liquid dosage forms using established procedures and machinery. |
| | | | **CO3:** To learn Awareness on the facilities and required standards necessary for the industrial production of sterile dosage forms. |
| | | | **CO4:** To Formulate and prepare different types of parenteral, ophthalmic dosage forms, cosmetics such as lipsticks, shampoos, cold cream and vanishing cream. |
| **3** | **III-I** | **PHARMACOLOGY - II** | **CO1:** Understand the mechanism of drug action and its relevance in the treatment of different diseases. |
| | | | **CO2:** Demonstrate isolation of different organs/tissues from the laboratory animals by simulated experiments. |
| | | | **CO3:** Demonstrate the various receptor actions using isolated tissue preparation. |
| | | | **CO4:** Appreciate correlation of pharmacology with related medical sciences. |
| **4** | **III-I** | **PHARMACOGNOSY AND PHYTOCHEMISTRY - II** | **CO1:** To know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents. |
| | | | **CO2:** To understand the preparation and development of herbal formulation. |
| | | | **CO3:** To understand the herbal drug interactions. |
| | | | **CO4:** To carryout isolation and identification of phytoconstituents. |

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| **5** | **III-I** | **COSMETIC SCIENCE** | **CO1:** Formulate and evaluate various cosmeceutical products. |
| | | | **CO2:** Know the key components used in different cosmeceutical products. |
| | | | **CO3:** Recognize the role of ingredients and herbs used in cosmeceutical products. |
| | | | **CO4:** Know the advanced current technology used for manufacturing the cosmetics at lab scale and industry scale. |
| **S.NO** | **YEAR/SEM** | **COURSE NAME** | **COURSE OUTOMES** |
| **1** | **III-II** | **MEDICINAL CHEMISTRY – II** | **CO1:** Understand the chemistry of drugs with respect to their pharmacological activity. |
| | | | **CO2:** Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs. |
| | | | **CO3:** Know the Structural Activity Relationship of different class of drugs. |
| | | | **CO4:** Study the chemical synthesis of selected drugs. |
| **2** | **III-II** | **PHARMACOLOGY - III** | **CO1:** Classify drugs acting on Respiratory system and detail about the mechanism of action and its relevance in the treatment and to analyze the pharmacological actions of different categories of drugs. |
| | | | **CO2:**Classify drugs acting on GIT with respect to mechanism of action and its relevance in the treatment. |
| | | | **CO3:** Discuss in detail Chemotherapy in infectious diseases. |
| | | | **CO4:**Simplify the principles of toxicology .and treatment of various poisonings and appreciate correlation of pharmacology with related medical sciences |
| **3** | **III-II** | **HERBAL DRUG TECHNOLOGY** | **CO1:** Evaluate TSM formulation. |
| | | | **CO2:**Evaluation of excipients of natural origin. |
| | | | **CO3:** Develop cosmetic and herbal formulation using standardized extract. |
| | | | **CO4:**Perform Monograph analysis of herbal drugs from recent Pharmacopoeias**.** |
| **4** | **III-II** | **BIOPHARMACEUTICS AND PHARMACOKINETICS** | **CO1:** Explain the process of drug absorption. Explain factors affecting drug absorption. Discuss distribution, tissue permeability of drugs, binding of drugs, apparent, volume of drug distribution, plasma and tissue protein binding of drugs, factors affecting protein-drug binding. Kinetics of protein binding, Clinical significance of protein binding of drug. |
| | | | **CO2:**Explain Elimination. Describe drug metabolism. Classify metabolic pathways renal excretion of drugs, interpret and summarize factors affecting renal excretion of drugs, renal clearance, Non renal routes of drug excretion. |
| | | | **CO3:** Define Bioavailability and bioequivalence Summarize Objectives of bioavailability, explain absolute and relative bioavailability, elaborate measurement of bioavailability, discuss in-vitro drug dissolution models, in-vitro-in-vivo correlations, compare bioequivalence studies, methods to enhance the dissolution rates and bioavailability of poorly soluble drugs. |
| | | | **CO4:**Definition and introduction to Pharmacokinetics, Explain and classify Compartment models. |
| **5** | **III-II** | **PHARMACEUTICAL** | **CO1:** Summarize the methods of immobilization of enzymes and list the application. |
| | | | **CO2:**Interpret the tools and techniques in genetic engineering and compile the applications. |

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| | | **BIOTECHNOLOGY** | **CO3:** The students will be able to relate immunological response and outline the methods for production of vaccines and monoclonal antibodies. |
| | | | **CO4:** Illustrate the immunoblotting techniques and transfer of genetic material in biological species. |

| S.NO | YEAR/SEM | COURSE NAME | COURSE OUTOMES |
|---|---|---|---|
| **1** | **IV-I** | **INSTRUMENTAL METHOD OF ANALYSIS** | **CO1:** Illustrate the interaction of matter with electromagnetic radiations and justify its applications in drug analysis. |
| | | | **CO2:** Summarize IR spectroscopy & outline atomic spectroscopy. |
| | | | **CO3:** Classify the chromatographic separation methods and explain appropriate technique for analysis of drugs. |
| | | | **CO4:** Categorize column chromatographic techniques and interpret chromatographs. |
| **2** | **IV-I** | **INDUSTRIAL PHARMACY-II** | **CO1:** Outline Pilot plant scale up techniques. |
| | | | **CO2:** Outline Technology development and transfer. |
| | | | **CO3:** Explain Regulatory requirements for drug approval. |
| | | | **CO4:** Outline Indian Regulatory Requirements. |
| **3** | **IV-I** | **PHARMACY PRACTICE** | **CO1:** Discuss the role of the Hospital, Hospital pharmacy and Community Pharmacist. |
| | | | **CO2:** Assessment of Adverse drug reactions and drug interactions. |
| | | | **CO3:** explain the various drug distribution systems in Hospitals, understand vital aspects of medication adherence, medication history interview and therapeutic drug monitoring. |
| | | | **CO4:** Apply principles of good communication for patient counseling and prescription interpretation. |
| **4** | **IV-I** | **MEDICINAL CHEMISTRY – III** | **CO1:** Relate chemistry of drugs to biological activity. |
| | | | **CO2:** Apply chemistry of agonists and antagonists to study their MOA. |
| | | | **CO3:** Identify and analyze drug metabolic pathways, adverse effect. |
| | | | **CO4:** Apply physicochemical parameters in QSAR studies**.** |
| **5** | **IV-I** | **QUALITY CONTROL AND STANDARDIZATION OF HERBALS** | **CO1:** To recall the WHO guidelines for the quality control of herbal drugs. |
| | | | **CO2:** To illustrate and outline the quality assurance in traditional system of medicine including cGMP, GAP, GMP and GLP. |
| | | | **CO3:** To compare the quality control parameters of drugs according to European union (EU) and ICH guidelines. |
| | | | **CO4:** To make use of research guidelines for evaluation of safety and efficiency of herbal medicine. |

| S.NO | YEAR/SEM | COURSE NAME | COURSE OUTOMES |
|---|---|---|---|
| 1 | IV-II | BIOSTATICS AND RESEARCH METHODOLOGY | **CO1:** Solve basic statistical problems with respect to measures of central tendency, dispersion, correlation of data and regression equations. |
| | | | **CO2:** Describe concepts related to probability, sample, population, hypothesis and error. |
| | | | **CO3:** Explain the various statistical techniques to solve statistical problems (parametric and non parametric) |
| | | | **CO4:** Design experimental/research methodology from preparation of protocol to writing of report. |
| 2 | IV-II | SOCIAL AND PREVENTIVE PHARMACY | **CO1:** Asset high consciousness or realization of current issues related to health and prevent disease and socio problems related health and disease. |
| | | | **CO2:** How to prevent and control of disease. |
| | | | **CO3:** Apply National health programs, its objectives, functioning and outcome of the programs. |
| | | | **CO4:** Discuss different National health programs and current healthcare development. |
| 3 | IV-II | NOVEL DRUG DELIVERY SYSTEM | **CO1:** Explain the Fundamental Concept of controlled Drug delivery systems, Drug Release and Pre requisites of drug candidates, along with various approaches and classification and illustrate the Polymers classification, types, selection, application and examples to apply for development of novel drug delivery systems. |
| | | | **CO2:** Classify various technologies like concept of microencapsulation, merits, demerits and application, Types of Microencapsulation and Evaluation of microcapsules. |
| | | | **CO3:** Identify and develop novel drug delivery systems like Mucosal and implantable drug delivery. |
| | | | **CO4:** Identify and develop novel Systems for delivery by topical route as transdermal drug delivery, oral route as Gastroprotective and pulmonary route as Nasopulmonary. |
| 4 | IV-II | EXPERIMENTAL PHARMACOLOGY | **CO1:** Relate and interpret the regulations and ethical requirement for the usage of laboratory animals and their handling, drug administration, surgical, blood withdraw and euthanasia techniques. |
| | | | **CO2:** Recall basic parameters including haematological, biochemical and physiological parameters. |
| | | | **CO3:** Perform the biochemical assay for estimation of serum glucose, cholesterol etc using appropriate kits. |
| | | | **CO4:** Understand the basic mechanism involved in free radicals generation and scavenging processes and perform basic assays for free radical scavenging and peroxidation. |