



PROGRAM : PHARM D (PG Course)

Program Outcomes (POs), and Program Specific Outcomes (PSOs) Program Educational Outcomes (PEOs), for PharmD (PG Course)

Program Outcomes (POs)

PO 1 Pharmacy Knowledge: Provide high quality, evidence-based, patient-centered care in cooperation with patients, prescribers and members of the inter professional health care team

PO 2 Practical Skill: Demonstrate mastery and application of core knowledge and skills in relation to the evolving biomedical, clinical, epidemiological and social-behavioral sciences.

PO 3 Professional Identity: Evaluate practice and care, and promote continuous improvement in one's own patient care and pharmacy services

PO 4 Problem Solving: Demonstrate self-calibration skills and a commitment to the lifelong learning needed to provide high quality care

PO 5 Communication: Effectively utilize information, informatics and technology to optimize learning and patient care

PO 6 Planning Ability: Demonstrate effective interpersonal written and verbal skills, adapt to socioeconomic and cultural factors as well as situational applications

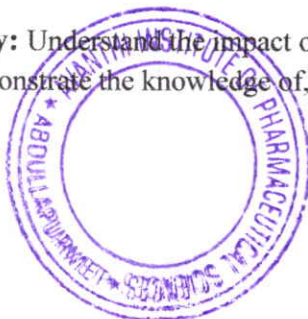
PO 7 Leadership Skills & Team Work : Demonstrate exemplary professional, ethical and legal behaviors, complying with all federal, state and local laws and regulations related to pharmacy practice

PO 8 Life Long Learning: Demonstrate awareness and responsiveness to the system of healthcare, effectively utilizing systems of care to provide cost-effective, optimal care

PO9 Pharmaceutical Ethics: Honour personal values and apply ethical principles in professional and social context. Demonstrate behavior that recognizes cultural and personal variability in values, communication and life styles.

PO10 Pharmacist and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the profession.

PO11 Environment and Society: Understand the impact of professional pharmacy solutions in societal and environmental context and demonstrate the knowledge of, and need for sustainable development.



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Program Specific Outcomes (PSOs)

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.

PSO 3: Able to do multidisciplinary jobs in the pharmaceutical industries and would be able to write effective project reports in multidisciplinary environment in the context of changing technologies.

Program Educational Objectives (PEOs)

PEO 1: Professionalism: Graduates will be able to inculcate leadership & entrepreneurship capabilities and practice ethics & values for providing services to society in promoting healthcare environment & social awareness. Graduates will be able to provide health care information for prevention or treatment of diseases and disorders and demonstrate technical skills in medicine compounding and dispensing of medicines.

PEO 2: Academic Excellence and Community wellness: Graduates should be capable of providing high quality pharmaceutical services and striving for excellence in pharmacy education in patent care research & community wellness.

PEO 3: Social Contribution: Graduates should contribute towards health care system by counseling for prophylaxis & prevention of diseases & creating awareness.

PEO 4: Self identify Awareness: Graduates should update their knowledge & able to analyze pros and cons by organizing or conducting or attending workshops seminars and conferences at national & International Level.



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PHARM D COURSE OUTCOMES FOR THE ACADEMIC YEAR 2022-23

S.NO	YEAR/SEM	COURSE NAME	COURSE OUTCOMES
1	I	HUMAN ANATOMY AND PHYSIOLOGY	CO1: They would have learnt the gross anatomy, histology and physiology of various organs of the human body.
CO2: They would identify the various tissues and organs associated with the different organ systems with help of charts and specimens.			
CO3: They would have studied the coordination in functioning of different organs of each system.			
CO4: They would have understood the several physiological homeostatic mechanisms and their imbalances in human body.			
2	I	PHARMACEUTICS	CO1: Upon completion of this program the student will know the formulation aspects of different dosage forms.
CO2: Do different pharmaceutical calculation involved in formulation			
CO3: Formulate different types of dosage forms			
CO4: Appreciate the importance of good formulation for effectiveness.			
3	I	MEDICINAL BIOCHEMISTRY	CO1: To understand the importance of metabolism of substrates.
CO2: Will acquire chemistry and biological importance of biological macromolecules.			
CO3: To acquire knowledge in qualitative and quantitative estimation of the biological macromolecules.			
CO4: To know the interpretation of data emanating from a Clinical Test Lab.			
4	I	PHARMACEUTICAL	CO1: To be able to give systematic names to



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		ORGANIC CHEMISTRY	<p>simple organic compounds and poly functional group.</p> <p>CO2: To achieve an understanding of the behavior of organic compounds and to establish a foundation for studies into natural and synthetic products of pharmaceutical interest.</p> <p>CO3: To acquire the knowledge and understanding of the basic experimental principles of pharmaceutical organic chemistry.</p> <p>CO4: To draw the structures and synthesize simple pharmaceutically active organic compounds.</p>
5		PHARMACEUTICAL INORGANIC CHEMISTRY	<p>CO1: Well acquainted with the principles of limit tests</p> <p>CO2: Understand the principles and procedures of analysis of drugs and also regarding the application of inorganic pharmaceutical</p> <p>CO3: Knowledge about the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals</p> <p>CO4: Appreciate the importance of inorganic pharmaceuticals in preventing and curing the disease.</p>
6		REMEDIAL MATHEMATICS	<p>CO1: Apply mathematical concepts and principles to perform computations for Pharmaceutical Sciences.</p> <p>CO2: Create, use and analyze mathematical representations and mathematical relationships</p> <p>CO3: Communicate mathematical knowledge and understanding to help in the field of Clinical Pharmacy</p> <p>CO4: Perform abstract mathematical reasoning</p>



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S.NO	YEAR/SEM	COURSE NAME	COURSE OUTCOMES
1.	II	PATHOPHYSIOLOGY	CO1: Describe the etiology of the selected disease states.
CO2: Describe the Pathogenesis of the selected diseased states			
CO3: Name the signs and symptoms of the diseases.			
CO4: Mention the complications of the diseases			
2.	II	MICROBIOLOGY	CO1: To study the apparatus used in microbiology & preparation, sterilization of glassware's and media
CO2: To study different staining techniques, motility characters, enumeration of microorganism, method of isolation of pure culture and biochemical testing for identification of microorganism			
CO3: To perform culture sensitivity testing, sterility testing for powder & liquid and determination of MIC			
CO4: To perform microbiological assay of antibiotics, vitamins and determination of RWC, Widal, Malaria parasite			
3.	II	PHARMACOLOGY-I	CO1: Understand the pharmacological aspects of drugs falling under the above mentioned chapters.
CO2: Handle and carry out the animal experiments. Correlate and apply the knowledge therapeutically.			
CO3: Appreciate the importance of pharmacology subject as basis of therapeutics.			
4.	II	PHARMACOTHERAPEUTICS-I	CO1: The Pathophysiology of selected disease states and the rationale for drug therapy. And therapeutic approach to management of these diseases
CO2: . Describe the Pathophysiology of selected disease states and explain the rationale for drug therapy			
CO3: The controversies in drug therapy; The			



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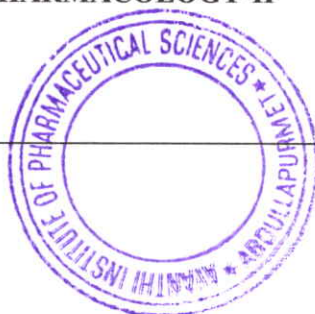
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			importance of preparation of individualised therapeutic plans based on diagnosis; Needs to identify the patient-specific parameters relevant in initiating drug therapy and monitoring therapy
			CO4: Summarise the therapeutic approach to management of these diseases including reference to the latest available evidence; discuss the controversies in drug therapy.
5.		PHARMACOGNOSY	CO1: To understand cell wall constituents and cell inclusion
			CO2: To understand morphology, microscopy and powder characteristics of crude drugs.
			CO3: To be able to determine the quality of lipids
			CO4: To be able to identify unorganized drugs by chemical methods
6.		COMMUNITY PHARMACY	CO1: To be able to understand the disease status.
			CO2: Able to dispense the medication.
			CO3: Able to understand the drug therapy
			CO4: Able to give patient counseling.

S.NO	YEAR/SEM	COURSE NAME	COURSE OUTCOMES
1.		PHARMACOLOGY-II	CO1: To study various routes of drug administration, use of anesthetics in laboratory animals and their handling
			CO2: To learn the composition of physiological salt solutions and basic instruments used in experimental pharmacology



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			<p>CO3: To perform isolated experiments using various isolated preparation and the effect of different drugs on the concentration response curves</p> <p>CO4: To study the preclinical screening of various drugs</p>
2.	III	PHARMACEUTICAL ANALYSIS	<p>CO1: To understand validation of analytical instruments & methods as per ICH/ USP guidelines, concept of quality assurance and quality control techniques.</p> <p>CO2: To understand principles, instrumentation and application of various chromatographic techniques employed for the analysis of APIs and formulation.</p> <p>CO3: To understand principle, instrumentation and application of various Electrometric methods</p> <p>CO4: To Understand principle, instrumentation and application of UV-Vis, Atomic Absorption and Emission Spectroscopy, Flame Photometry, NMR, Massspectroscopy, Flourimetry, Thermal, X ray diffraction techniques.</p>
3.		PHARMACOTHERAPEUTICS- II	<p>CO1: To understand therapeutic goals of the drugs used in different diseases</p> <p>CO2: To check & analyze drug interactions, adverse drug reactions</p> <p>CO3: To understand dose and frequency of the medications</p>
4.		PHARMACEUTICAL JURISPRUDENCE	<p>CO1:To appreciate study Pharmaceutical Legislation, relevance and significance of jurisprudence to Pharmaceutical Sciences.</p> <p>CO2: To know fundamentals of legislation to regulate import manufacture, distribution and sales of drug and cosmetics.</p>



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			<p>CO3: To know the various parameters in the Drug and Cosmetic Act and rules, Drug policy, Drug Price Control Order, Patent and Design act.</p>
			<p>CO4: To understand the concepts of Narcotic Drugs and Psychotropic substances, Pharmacy Act and Excise duties Act</p>
5.	MEDICINAL CHEMISTRY		<p>CO1: Understand modern concept of rational drug design.</p>
			<p>CO2: Learn development of the anti-infective drugs including structure activity relationship, mechanism of action, synthesis, chemical nomenclature, brand names and side effects of important compounds.</p>
			<p>CO3: Understand classification, mechanism of action, structure activity relationship, synthesis, nomenclature and side effects of the drugs acting as antineoplastic agents</p>
			<p>CO4: Understand classification, mechanism of action, structure activity relationship, synthesis, nomenclature and side effects of the drugs acting as Cardiovascular agents, Hypoglycemic agents, Diuretics, Steroidal Hormones and Adrenocorticoids etc</p>
6.	PHARMACEUTICAL FORMULATIONS		<p>CO1: To understand the principle involved in formulation of various pharmaceutical dosage forms</p>
			<p>CO2: To prepare various pharmaceutical formulation</p>
			<p>CO3: To perform evaluation of pharmaceutical dosage forms</p>
			<p>CO4: To understand and appreciate the concept of bioavailability and bioequivalence, their role in clinical</p>



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S.NO	YEAR/SEM	COURSE NAME	COURSE OUTCOMES
1.		PHARMACOTHERAPEUTICS -III	CO1: Initiate drug therapy and the anticipated therapeutic goals by therapeutic intervention
			CO2: Know the effective use of non-pharmacological therapeutic interventions in the treatment of specific diseases, conditions and symptoms.
			CO3: Demonstrate the ability to effectively communicate and work collaboratively together with others in the small group setting
			CO4: Have moral reasoning, ethical judgement and professionalism
2.	IV	HOSPITAL PHARMACY	CO1: To know various drug distribution methods
			CO2: Know the professional practice management skills in hospital pharmacies
			CO3: Provide unbiased drug information to the doctors
			CO4: Know The Manufacturing Practices Of Various Formulations In Hospital Set up.
3.		CLINICAL PHARMACY	CO1: Monitor drug therapy of patient through medication chart review and clinical review
			CO2: Obtain medication history interview and counsel the patients.
			CO3: Identify and resolve drug related problems
			CO4: Detect, assess and monitor adverse drug reaction.



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4.		BIOSTATISTICS & RESEARCH METHODOLOGY	<p>CO1: Know the various statistical Methodology methods to solve different types of problems</p> <p>CO2: Operate various statistical software packages</p> <p>CO3: Appreciate the importance of Computer in hospital and Community Pharmacy</p> <p>CO4: Appreciate the statistical technique in solving the pharmaceutical problems</p>
5.		BIOPHARMACEUTICS & PHARMACOKINETICS	<p>CO1: Broader understanding about the Pharmacokinetics concepts of biopharmaceutics pharmacokinetics.</p> <p>CO2: Ability to calculate various pharmacokinetic parameters by using various mathematical models</p> <p>CO3: Ability to design a basic protocol for the conduct of BA/BE study and the interpretation of the BA/BE data</p> <p>CO4: Preparedness to use the concepts of pharmacokinetic principles in the clinical contexts.</p>
6.		CLINICAL TOXICOLOGY	<p>CO1: Developing general working knowledge of the principles and practice of clinical toxicology</p> <p>CO2: Demonstrating an understanding the health implications of toxic exposures and commonly involved chemicals for toxicity</p> <p>CO3: Demonstrating and applying and understanding of general toxicology principles and clinical management practice</p> <p>CO4: Demonstrating and applying an understanding of the history, assessment, and therapy considerations associated with</p>



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		the management of a toxic exposure
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S.NO	YEAR/SEM	COURSE NAME	COURSE OUTCOMES
1.	V	CLINICAL RESEARCH	CO1: Know the new drug development process.
			CO2: Understand the regulatory and ethical requirements.
			CO3: Appreciate and conduct the clinical trials activities
			CO4: Know safety monitoring and reporting in clinical trials
2.	V	PHARMACOEPIDEMIOLOG Y & PHARMACOECONOMICS	CO1: Describe the methods used in Pharmacoepidemiology
			CO2: Demonstrate competency in the design, conduct and evaluation of Pharmacoepidemiology studies.
			CO3: Describe the methods used in Pharmacoeconomic analysis.
			CO4: Demonstrate competency in the design, conduct and evaluation of Pharmacoeconomic studies.
3.	V	CLINICAL PHARMACOKINETICS & PHARMACOTHERAPEUTIC DRUG MONITORING	CO1: Ability to design a dosage regimen of a drug based on its route of administration
			CO2: Ability to adjust the dosage regimen for patients with renal / hepatic impairments
			CO3: Ability to assess the drug interaction issues in the clinical settings



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PROGRAM: B PHARMACY (UG COURSE)

Program Outcomes (POs), and Program Specific Outcomes (PSOs) and Program Educational Outcomes (PEOs)

Program Outcomes (POs):

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.

Program Specific Outcomes (PSOs)

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.




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Program Educational Objectives (PEOs)


PEO 1: Professionalism: Graduates will be able to demonstrate technical skills in medicine compounding and dispensing, offering drug information services to enhance the health care team's drug therapy.

PEO 2: Interdisciplinary Collaboration: Graduates will be able to inculcate leadership and management skills through effective communications, expertise in problem solving related to drugs, formulations and continuous professional development.

PEO 3: Liaison: Graduates will be able to train in synchronization with the requirements of pharmaceutical industry and encouraged to participate in seminars, conferences, workshops group discussions, quizzes, and health care programs.

PEO 4: Preventive Medicine: Graduates will be qualified to take part in national health development initiatives and serve the community with the highest standards of professional ethics.




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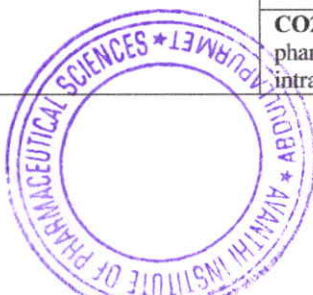


COURSE OUTCOMES

PROGRAM : B PHARMACY

REGULATION : R 17

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.
			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.



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



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			<p>CO3: Discuss and outline different metabolic pathways and its disorders of bio molecules viz., lipids, amino acids, proteins.</p> <p>CO4: Illustrate the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins with metabolic pathways.</p>
4	I-II	PATHOPHYSIOLOGY	<p>CO1: Outline Basic principles of Cell injury and Adaptation, mechanism involved in the process of inflammation and repair.</p> <p>CO2: Classify various cardiovascular, respiratory and renal diseases and interpret its pathophysiology.</p> <p>CO3: Illustrate pathophysiology of Haematological Diseases, Endocrine Diseases.</p> <p>CO4: Explain pathophysiology of Nervous system diseases and gastrointestinal diseases.</p>
5	I-II	COMPUTER APPLICATIONS IN PHARMACY	<p>CO1: Use the Appropriate method on Number system to solve the given problem.</p> <p>CO2: Apply the various tags in Web Technology to design a program.</p> <p>CO3: Use the appropriate system and application of computers in pharmacy.</p> <p>CO4: Apply the concepts of Bioinformatics in pharmacy.</p>
6	I-II	ENVIRONMENTAL SCIENCES	<p>CO1: Create the awareness about environmental problems among learners and impart basic knowledge about the environment and its allied problems.</p> <p>CO2: Develop an attitude of concern for the environment and motivate learner to participate in environment protection and environment improvement.</p> <p>CO3: Acquire skills to help the concerned individuals in identifying and solving environmental problems and strive to attain harmony with Nature</p>
S.NO	YEAR/SEM	COURSE NAME	COURSE OUTOMES
1	II-I	PHARMACEUTICAL ORGANIC CHEMISTRY – II	<p>CO1: Understand chemistry and reactivity of Benzene.</p> <p>CO2: Explain chemistry, synthesis and uses of phenols ,amines.</p> <p>CO3: Explain and apply concept of stereo chemistry.</p> <p>CO4: Describe reactivity, stability, uses of polynuclear compounds.</p>
2	II-I	PHYSICAL PHARMACEUTICS - I	<p>CO1: Elaborate factors affecting solubility of drugs.</p> <p>CO2: Study solid state and distinguish between amorphous and crystalline solids and elucidate physical properties of drugs.</p> <p>CO3: Explain significance of surface and interfacial phenomena.</p>



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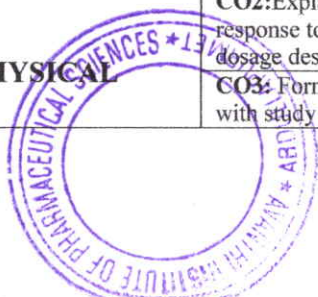
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			CO4: Describe complexes and their pharmaceutical applications.
3	II-I	PHARMACEUTICAL MICROBIOLOGY	CO1: To describe basic knowledge of bacteria, it's structure, cultivation, preservation and microscopy.
			CO2: To identify few bacteria and methods 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.
4	II-I	PHARMACEUTICAL ENGINEERING	CO1: Discuss Flow of fluids: Classify manometers, Explain Reynolds number and its significance, 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
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	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.
3	II-II	PHYSICAL	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



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		PHARMACEUTICS - II	preservation and apply the concept of HLB for formulation of emulsions. CO4: Evaluate properties of solids and apply to design of solid dosage forms.
4	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.
5	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 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.

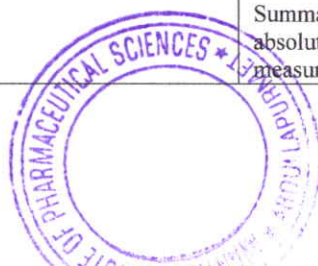
S.NO	YEAR/SEM	COURSE NAME	COURSE OUTOMES
1	III-I	MEDICINAL CHEMISTRY – II	CO1: Understand the chemistry of drugs with respect to their pharmacological activity. CO2: Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs. CO3: Know the Structural Activity Relationship of different class of drugs. CO4: Study the chemical synthesis of selected drugs.
2	III-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



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			<p>from the laboratory animals by simulated experiments.</p> <p>CO3: Demonstrate the various receptor actions using isolated tissue preparation.</p> <p>CO4: Appreciate correlation of pharmacology with related medical sciences.</p>
4	III-I	PHARMACOGNOSY AND PHYTOCHEMISTRY - II	<p>CO1: To know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents.</p> <p>CO2: To understand the preparation and development of herbal formulation.</p> <p>CO3: To understand the herbal drug interactions.</p> <p>CO4: To carryout isolation and identification of phytoconstituents.</p>
5	III-I	COSMETIC SCIENCE	<p>CO1: Formulate and evaluate various cosmeceutical products.</p> <p>CO2: Know the key components used in different cosmeceutical products.</p> <p>CO3: Recognize the role of ingredients and herbs used in cosmeceutical products.</p> <p>CO4: Know the advanced current technology used for manufacturing the cosmetics at lab scale and industry scale.</p>
1	III-II	MEDICINAL CHEMISTRY – III	<p>CO1: Relate chemistry of drugs to biological activity.</p> <p>CO2: Apply chemistry of agonists and antagonists to study their MOA.</p> <p>CO3: Identify and analyze drug metabolic pathways, adverse effect.</p> <p>CO4: Apply physicochemical parameters in QSAR studies.</p>
2	III-II	PHARMACOLOGY - III	<p>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.</p> <p>CO2: Classify drugs acting on GIT with respect to mechanism of action and its relevance in the treatment.</p> <p>CO3: Discuss in detail Chemotherapy in infectious diseases.</p> <p>CO4: Simplify the principles of toxicology .and treatment of various poisonings and appreciate correlation of pharmacology with related medical sciences</p>
3	III-II	HERBAL DRUG TECHNOLOGY	<p>CO1: Evaluate TSM formulation.</p> <p>CO2: Evaluation of excipients of natural origin.</p> <p>CO3: Develop cosmetic and herbal formulation using standardized extract.</p> <p>CO4: Perform Monograph analysis of herbal drugs from recent Pharmacopoeias.</p>
4	III-II	BIOPHARMACEUTICS AND PHARMACOKINETICS	<p>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.</p> <p>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.</p> <p>CO3: Define Bioavailability and bioequivalence Summarize Objectives of bioavailability, explain absolute and relative bioavailability, elaborate measurement of bioavailability, discuss in-vitro drug</p>





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			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 BIOTECHNOLOGY	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. 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 OUTCOMES
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	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



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			route as Gastroprotective and pulmonary route as Nasopulmonary.
5	IV-I	QUALITY CONTROL AND STANDARDIZATION OF HERBALS	<p>CO1: To recall the WHO guidelines for the quality control of herbal drugs.</p> <p>CO2: To illustrate and outline the quality assurance in traditional system of medicine including cGMP, GAP, GMP and GLP.</p> <p>CO3: To compare the quality control parameters of drugs according to European union (EU) and ICH guidelines.</p> <p>CO4: To make use of research guidelines for evaluation of safety and efficiency of herbal medicine.</p>
1	IV-II	BIOSTATISTICS AND RESEARCH METHODOLOGY	<p>CO1: Solve basic statistical problems with respect to measures of central tendency, dispersion, correlation of data and regression equations.</p> <p>CO2: Describe concepts related to probability, sample, population, hypothesis and error.</p> <p>CO3: Explain the various statistical techniques to solve statistical problems (parametric and non parametric)</p> <p>CO4: Design experimental/research methodology from preparation of protocol to writing of report.</p>
2	IV-II	SOCIAL AND PREVENTIVE PHARMACY	<p>CO1: Asset high consciousness or realization of current issues related to health and prevent disease and socio problems related health and disease.</p> <p>CO2: How to prevent and control of disease.</p> <p>CO3: Apply National health programs, its objectives, functioning and outcome of the programs.</p> <p>CO4: Discuss different National health programs and current healthcare development.</p>
3	IV-II	PHARMACEUTICAL JURISPRUDENCE	<p>CO1: Acquire knowledge in practice the Professional ethics.</p> <p>CO2: Understand the various concepts of the pharmaceutical legislation in India.</p> <p>CO3: Learn the knowledge on schedules and functioning of various committees in the Drug and Cosmetic Act and rules.</p> <p>CO4: Understand the labelling requirements and packaging guidelines for drugs and cosmetics.</p>
4	IV-II	EXPERIMENTAL PHARMACOLOGY	<p>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.</p> <p>CO2: Recall basic parameters including haematological, biochemical and physiological parameters.</p> <p>CO3: Perform the biochemical assay for estimation of serum glucose, cholesterol etc using appropriate kits.</p> <p>CO4: Understand the basic mechanism involved in free radicals generation and scavenging processes and perform basic assays for free radical scavenging and peroxidation.</p>




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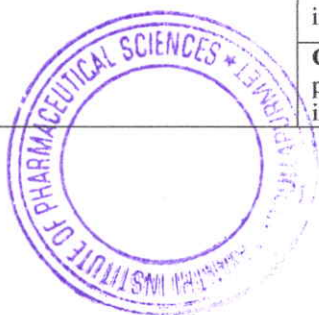


COURSE OUTCOMES

PROGRAM : B PHARMACY

REGULATION : R 22

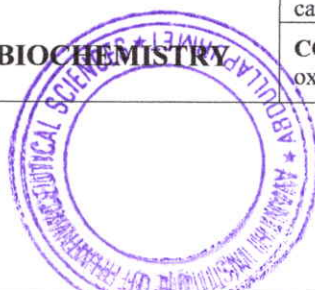
S.NO	YEAR/SEM	COURSE NAME	COURSE OUTOMES
1	I-I	HUMAN ANATOMY AND PHYSIOLOGY-I	CO1: students would have studied about the gross morphology, structure and functions of cell, skeletal, muscular, cardiovascular system of the human body.
			CO2: They would have understood the various homeostatic mechanisms 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 incompatibility 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.
			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.



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



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

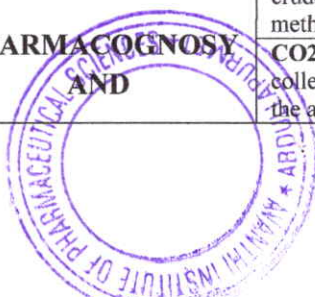


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		MICROBIOLOGY	CO4: To assess the antibiotics by invitro microbiological methods and to outline different sources of contamination in an aseptic area.
4	II-I	PHARMACEUTICAL ENGINEERING	CO1: Discuss Flow of fluids: Classify manometers, Explain Reynolds number and its significance, 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
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	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



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		PHYTOCHEMISTRY - I	<p>polyploidy, mutation and hybridization in medicinal plants.</p> <p>CO3: To elaborate the applications of plant tissue culture in medicinal plants.</p> <p>CO4: To remember different morphological and 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.</p>
5	II-II	PHARMACEUTICAL JURISPRUDENCE	<p>CO1: Knowledge about Pharmaceutical legislations and their implications in drug development and marketing.</p> <p>CO2: Understanding and implementation of code of Ethics in Pharmacy Practice.</p> <p>CO3: Knowing about regulatory authorities and agencies governing the manufacturing and sale of pharmaceuticals.</p> <p>CO4: Knowledge about various Indian Pharmaceutical Act and Laws including Schedules of drugs and its implications in pharmacy practice.</p>

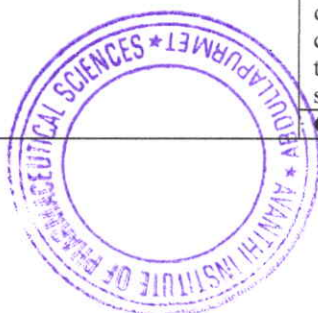
S.NO	YEAR/SEM	COURSE NAME	COURSE OUTOMES
1	III-I	MEDICINAL CHEMISTRY - I	<p>CO1: Identify Structure, IUPAC and stereochemistry of classes of drugs belonging to CNS, ANS and Analgesic Drugs.</p> <p>CO2: Describe the MOA of classes of drugs belonging to CNS, ANS and Analgesic Drugs.</p> <p>CO3: Discuss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



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S.NO	YEAR/SEM	COURSE NAME	COURSE OUTOMES
		AND PHYTOCHEMISTRY - II	<p>CO2: To understand the preparation and development of herbal formulation.</p> <p>CO3: To understand the herbal drug interactions.</p> <p>CO4: To carryout isolation and identification of phytoconstituents.</p>
5	III-I	COSMETIC SCIENCE	<p>CO1: Formulate and evaluate various cosmeceutical products.</p> <p>CO2: Know the key components used in different cosmeceutical products.</p> <p>CO3: Recognize the role of ingredients and herbs used in cosmeceutical products.</p> <p>CO4: Know the advanced current technology used for manufacturing the cosmetics at lab scale and industry scale.</p>
1	III-II	MEDICINAL CHEMISTRY – II	<p>CO1: Understand the chemistry of drugs with respect to their pharmacological activity.</p> <p>CO2: Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs.</p> <p>CO3: Know the Structural Activity Relationship of different class of drugs.</p> <p>CO4: Study the chemical synthesis of selected drugs.</p>
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4	III-II	BIOPHARMACEUTICS AND PHARMACOKINETICS	<p>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.</p> <p>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.</p> <p>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.</p> <p>CO4: Definition and introduction to Pharmacokinetics,</p>



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			Explain and classify Compartment models.
5	III-II	PHARMACEUTICAL BIOTECHNOLOGY	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.
			CO3: The students will be able to relate immunological response and outline the methods for production of vaccines and monoclonal antibodies.
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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.



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S.NO	YEAR/SEM	COURSE NAME	COURSE OUTCOMES
1	IV-II	BIOSTATISTICS 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: Assess 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.




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PROGRAM: M PHARMACY ,(Pharmaceutics) (PG COURSE)

Program Outcomes (POs), and Program Specific Outcomes (PSOs) Program Educational Outcomes (PEOs).

Program Outcomes (POs)

PO 1: Scientific knowledge: Apply the scientific and technological principles to design, develop effective pharmaceutical dosage forms and drug delivery systems for better therapeutic results.

PO 2: Technological applications: utilize technical knowledge and identify any factors affecting the quality of pharmaceutical production.

PO 3: Modern tool usage: Learn, select, and apply appropriate methods, procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

PO 4: Entrepreneurship: Understand the basics of establishing and management of pharmaceutical enterprise.

PO 5: Practical Skills: Gain practical expertise in formulating and evaluating various novel drug release systems for minor ailments to major diseases.

PO 6: Applied science: Employ contemporary scientific knowledge viz., pharmacology, biotechnology for designing disease-centric pharmaceuticals.

PO 7: Computational and statistical methodologies: Applying and utilizing the statistical tools with the aid of computer software to optimize the formulations.

PO 8: Pharmaceutical ethics: Respect personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural, personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

PO 9: Environment and Sustainability: Understand, protect and cooperate environmental concerns for sustaining biodiversity.

PO 10: Life-Long Learning: Develop the habit of updating knowledge from time to time to meet industrial demands and social needs for having a fruitful career.

Program Specific Outcomes (PSOs)

PSO 1: Formulation Expertise: Able to gain theoretical and practical knowledge on design of pharmaceutical formulations and manufacturing techniques, enabling the creation of novel drug delivery systems.



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PSO 2: Computational Application: Able to utilize artificial intelligence, software applications which are useful in screening formulations, interpretation of experimental data and their validation.

Program Educational Outcomes (PEOs)


PEO 1: Comprehensive Expertise: Graduates should impart sound pharmaceutical knowledge in utilizing advanced laboratory techniques and instrumentation to make them ever-ready for producing them quality, safety and Effective pharmaceutical formulations.

PEO 2: Emerging Innovation Leaders: Graduates should become pioneers in the field of pharmaceutical innovation and research, constantly coming up with new and better techniques for drug development and assessment. Capable of making a substantial contribution towards the progress of pharmaceutical science and the creation of safer and more efficient pharmaceuticals.

PEO 3: Pharmaceutical regulations: Graduates should comprehend the goals, responsibilities, and duties of the several pharmaceutical regulatory agencies that oversee the effectiveness, safety, and quality of drugs from

PEO 4: Enterpreneurial Spirit: Graduates should produce skilled pharmaceutical professionals, leaders, policy makers and entrepreneurs for building healthy nation.




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COURSE OUTCOMES

PROGRAM: M PHARMACY (PHARMACEUTICS) REGULATION: R 19

S.NO	YEAR/SEM	COURSE NAME	COURSE OUTOMES
1.	I-I	ADVANCED PHYSICAL PHARMACEUTICS	CO1: The students will know particle size analysis method, solid dispersion, physics of tablets, polymer classification and its applications
			CO2: student will also know the stability calculations, shelf life calculations and accelerated stability studies.
			CO3: They also know the rheology, absorption related to liquids and semi-solid dosage forms.
			CO4: They also know the factors affecting the dissolution and solubility in related to invitro/invivo correlations
2.	I-I	MODERN PHARMACEUTICS-I	CO1: Knowledge on pre formulation concepts and optimization techniques
			CO2: Knowledge on pharmaceutical validation
			CO3: Knowledge on cGMP & Industrial Management
			CO4: Knowledge on compression and compaction Knowledge on compression and compaction
3.	I-I	PHARMACEUTICAL VALIDATION	CO1: Explain the aspect of validation
			CO2: Carryout validation of manufacturing processes
			CO3: Apply the knowledge of validation to instruments and equipments
			CO4: Validation of analytical method for estimation of drugs
			CO1: Biopharmaceutics and pharmacokinetics and their significance.



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4.	I-I	APPLIED BIOPHARMACEUTICS AND PHARMACOKINETICS	<p>CO2: Use plasma drug concentration-time data to calculate the pharmacokinetic parameters to describe the kinetics of drug absorption, distribution, metabolism, excretion, and elimination.</p> <p>CO3: To understand the bioavailability and bioequivalence of drug products and their significance.</p> <p>CO4: Develop entrepreneurship skills that support the growth of the Pharmaceutical Industry</p>
5.	I-I	RESEARCH METHODOLOGY AND IPR	<p>CO1: Understand research problem formulation.</p> <p>CO2: Analyze research related information.</p> <p>CO2: Follow research ethics</p> <p>CO4: Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.</p>

S.NO	YEAR/SEM	COURSE NAME	COURSE OUTOMES
1.	I-II	MODERN PHARMACEUTICS - II	<p>CO1: students will understand the planning of pilot plant techniques used for all pharmaceutical dosage forms such as tablets, capsules, parenterals, aerosols, cosmetics and nutraceuticals</p> <p>CO2: student will be able to understand The elements of optimization techniques.</p> <p>CO3: student will be able to understand The validation master plan requirements as per FDA.</p> <p>CO4: student will be able to understand Industrial management and GMP considerations.</p>
2.	I-II	ADVANCED DRUG DELIVERY SYSTEMS	<p>CO1: Students will select the drugs for CDDS design of the formulation fabrication of systems of above drug delivery systems with relevant applications.</p> <p>CO2: Recognize the principles of physical, clinical, social, behavioral, health and pharmaceutical sciences</p>



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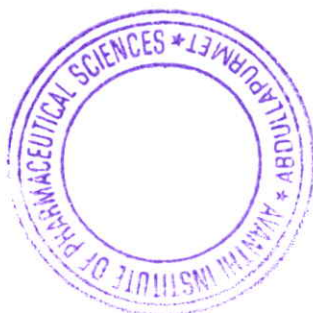
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			<p>CO3: Recognize the pharmaceutical dosage form design and the quality control of pharmaceutical formulations according to GMP and pharmacopeial requirements to support the pharmaceutical industries and research</p> <p>CO4: Define the different terminology as sustain, control, drug targeting, novel drug delivery.etc</p>
3.	I-II	HERBAL COSMETICS	<p>CO1: Students will learn about the raw materials used in herbal cosmetics and get exposed to various preparations of herbal cosmetics.</p> <p>CO2: Recognize the role of ingredients and herbs used in cosmeceutical products</p> <p>CO3: Elucidate the formulations in detail such that can innovate new products of similar health care objectives</p> <p>CO4: Description of several ingredients and their percentage involved in the production process will increase their ease of understanding of cosmetic product manufacturing.</p>
4.	I-II	NEUTRACEUTICALS	<p>CO1: Helps the student to understand the importance of Nutraceuticals in various common problems with the concept of free radicals</p> <p>CO2: To understand Functional foods and their effects on human health</p> <p>CO3: To understand the role of antioxidants, polyphenols, omega-3 fatty acids, to prevent different physiological disorders</p> <p>CO4: To Understand the importance of personalized food with respect to genetics</p>




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S.NO	YEAR/SEM	COURSE NAME	COURSE OUTCOMES
1.	II-I	SCALE UP AND TECHNOLOGY TRANSFER	CO1: Manage the scale up process in pharmaceutical industry.
			CO2: Assist in technology transfer.
			CO3: To establish safety guidelines, which prevent industrial hazards.
			CO4: Demonstrate importance of Design qualification, Installation qualification, Operational qualification, Performance qualification.
2.	II-I	COSMETIC SCIENCE	CO1: Formulate and evaluate various cosmeceutical product.
			CO2: Know the key components used in different cosmeceutical products.
			CO3: Know the advanced current technology used for manufacturing the cosmetics at lab scale and industry scale
			CO4: students will learn manufacturing of the cosmetic products




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COURSE OUTCOMES

**PROGRAM: M PHARMACY (PHARMACEUTICS)
REGULATION: R 22**

S.NO	YEAR/SEM	COURSE NAME	COURSE OUTOMES
1.	I-I	MODERN PHARMACEUTICS-I	CO1: Knowledge on pre formulation concepts and optimization techniques
			CO2: Knowledge on pharmaceutical validation
			CO3: Knowledge on cGMP & Industrial Management
			CO4: Knowledge on compression and compaction Knowledge on compression and compaction
2.	I-I	APPLIED BIOPHARMACEUTICS AND PHARMACOKINETICS	CO1: Biopharmaceutics and pharmacokinetics and their significance.
			CO2: Use plasma drug concentration-time data to calculate the pharmacokinetic parameters to describe the kinetics of drug absorption, distribution, metabolism, excretion, and elimination.
			CO3: To understand the bioavailability and bioequivalence of drug products and their significance.
			CO4: Develop entrepreneurship skills that support the growth of the Pharmaceutical Industry
3.	I-I	ADVANCED PHYSICAL PHARMACEUTICS	CO1: The students will know particle size analysis method, solid dispersion, physics of tablets, polymer classification and its applications
			CO2: student will also know the stability calculations, shelf life calculations and accelerated stability studies.
			CO3: They also know the rheology, absorption related to liquids and semi-solid dosage forms.

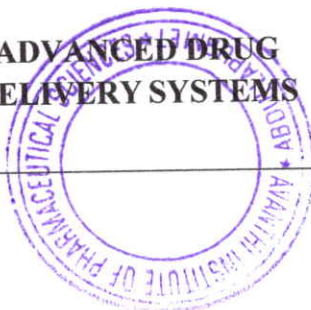


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			CO4: They also know the factors affecting the dissolution and solubility in related to invitro/invivo correlations
4.	I-I	PHARMACEUTICAL VALIDATION	CO1: Explain the aspect of validation
			CO2: Carryout validation of manufacturing processes
			CO3: Apply the knowledge of validation to instruments and equipments
			CO4: Validation of analytical method for estimation of drugs
5.	I-I	RESEARCH METHODOLOGY AND IPR	CO1: Understand research problem formulation.
			CO2: Analyze research related information.
			CO2: Follow research ethics
			CO4: Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.

S.NO	YEAR/SEM	COURSE NAME	COURSE OUTOMES
1.	I-II	MODERN PHARMACEUTICS - II	CO1: students will understand the planning of pilot plant techniques used for all pharmaceutical dosage forms such as tablets, capsules, parenterals, aerosols, cosmetics and nutraceuticals
			CO2: student will be able to understand The elements of optimization techniques.
			CO3: student will be able to understand The validation master plan requirements as per FDA.
			CO4: student will be able to understand Industrial management and GMP considerations.
2.	I-II	ADVANCED DRUG DELIVERY SYSTEMS	CO1: Students will select the drugs for CDDS design of the formulation fabrication of systems of above drug delivery systems with relevant applications.
			CO2: Recognize the principles of physical, clinical, social, behavioral, health and pharmaceutical sciences




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			<p>CO3: Recognize the pharmaceutical dosage form design and the quality control of pharmaceutical formulations according to GMP and pharmacopeial requirements to support the pharmaceutical industries and research</p> <p>CO4: Define the different terminology as sustain, control, drug targeting, novel drug delivery.etc</p>
3.	I-II	HERBAL COSMETICS	<p>CO1: Students will learn about the raw materials used in herbal cosmetics and get exposed to various preparations of herbal cosmetics.</p> <p>CO2: Recognize the role of ingredients and herbs used in cosmeceutical products</p> <p>CO3: Elucidate the formulations in detail such that can innovate new products of similar health care objectives</p> <p>CO4: Description of several ingredients and their percentage involved in the production process will increase their ease of understanding of cosmetic product manufacturing.</p>
4.	I-II	NEUTRACEUTICALS	<p>CO1: Helps the student to understand the importance of Nutraceuticals in various common problems with the concept of free radicals</p> <p>CO2: To understand Functional foods and their effects on human health</p> <p>CO3: To understand the role of antioxidants, polyphenols, omega-3 fatty acids, to prevent different physiological disorders</p> <p>CO4: To Understand the importance of personalized food with respect to genetics</p>




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S.NO	YEAR/SEM	COURSE NAME	COURSE OUTOMES
1.	II-I	SCALE UP AND TECHNOLOGY TRANSFER	CO1: Manage the scale up process in pharmaceutical industry.
			CO2: Assist in technology transfer.
			CO3: To establish safety guidelines, which prevent industrial hazards.
			CO4: Demonstrate importance of Design qualification, Installation qualification, Operational qualification, Performance qualification.
2.	II-I	COSMETIC SCIENCE	CO1: Formulate and evaluate various cosmeceutical product.
			CO2: Know the key components used in different cosmeceutical products.
			CO3: Know the advanced current technology used for manufacturing the cosmetics at lab scale and industry scale
			CO4: students will learn manufacturing of the cosmetic products



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PROGRAM: M PHARMACY ,(Pharmaceutical Analysis)

(PG COURSE)

Program Outcomes (POs), and Program Specific Outcomes (PSOs) Program Educational Outcomes (PEOs).

Program Outcomes (POs)

PO 1: Analytical Knowledge: Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including chromatographic and spectroscopic techniques and differentiate with volumetric analysis.

PO 2: Analytical Reasoning: Categorize assumptions and disclose the data according to guidelines.

PO 3: Problem Solving: Utilize the principles of analytical techniques with clear and critical thinking, while solving problems and making decisions. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

PO 4: Modern Techniques: Learn, choose and apply appropriate hyphenated methods and procedures and related computing tools with thoughtfulness of their applications.

PO 5: Experimental Ethics: Believe and follow ethics and guidelines specified by the regulatory authorities of various countries and Government of India for good laboratory practice.

PO 6: Interdisciplinary Commitment: Acquire skill oriented practical ability and utilize the needs of pharmacy in all other programmes to emerge as potent researcher.

PO 7: Professional Identity: Be committed and responsible person to play a proactive role with fidelity to community and empower society.

PO 8: Statistical Skills: Apply and evaluate quantitative metrics to gain method development, validation, safety data on dosage and also to compare the effectiveness among different marketed formulations.

PO 9: Rational Flexibility: Engage in critical and logical thinking and to gain an overall knowledge in developing newer methods, impurity profiling and validation protocols those are useful in laboratory purpose.

PO 10: Life-Long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

Program Specific Outcomes (PSOs)

PSO 1: Advanced Analytical Proficiency: Achieve a deep and advanced understanding of analytical instrumentation and techniques in pharmaceutical analysis, enabling them to conduct



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precise chemical analyses of pharmaceutical products and contribute to the advancement of analytical sciences.

PSO 2: Entrepreneurship: Graduates should be able to develop entrepreneurial and administrative abilities to open community pharmacies, educational institutions, and training facilities for the long-term benefit of society.

Program Specific Outcomes (PSOs)

PSO 1: Formulation Expertise: Able to gain theoretical and practical knowledge on design of pharmaceutical formulations and manufacturing techniques, enabling the creation of novel drug delivery systems.

PSO 2: Computational Application: Able to utilize artificial intelligence, software applications which are useful in screening formulations, interpretation of experimental data and their validation.

Program Educational Objectives (PEOs)


PEO 1: Advanced Analytical Proficiency: Graduates should gain an in-depth knowledge of the advanced analytical tools and methods utilized in pharmaceutical analysis, enabling students to accurately determine the chemical composition of pharmaceutical dosage forms.

PEO 2: Innovative Analytical Science Research: Graduates will be proficient in pharmaceutical analysis research and innovation, with an emphasis on advanced instruments. develops new and enhanced techniques for the accurate assessment of medications, advancing the analytical sciences in the pharmaceutical industry.

PEO 3: Effective Communicators and Collaborators in Analytical Research: Graduates will excel in communication, conveying their research findings and analytical results effectively to their peers and the broader scientific community. They will also demonstrate strong collaborative skills, working effectively with healthcare professionals and researchers to enhance pharmaceutical analysis and research initiatives, fostering interdisciplinary teamwork.

PEO 4: Initiative and Entrepreneurialism: Individual's ability to turn ideas into practice. Like finding new opportunities to share information and concepts. Generating options and solutions to cope with changes involves imagination, novelty and risk-taking, as well as the ability to plan and manage projects in order to achieve objectives.




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COURSE OUTCOMES

PROGRAM: M PHARMACY (PHARMACEUTICAL ANALYSIS) REGULATION: R 19

S.NO	YEAR/SEM	COURSE NAME	COURSE OUTOMES
1.	I-I	MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES	CO1: The quantitative determination of various organic compounds is clearly understood..
			CO2: The spectral analysis, dissolution parameters and microbial assays are also learned.
			CO3: Understand the interaction of matter with electromagnetic radiations and its applications in drug analysis
			CO4: Perform quantitative & qualitative analysis of drugs using various analytical instruments.
2.	I-I	PHARMACEUTICAL FOOD ANALYSIS	CO1: Recall and recognize the key principles and characteristics of various food components, such as carbohydrates, proteins, lipids, vitamins, food additives, and pigments
			CO2: Understanding of the underlying chemistry and properties of food components.
			CO3: Understanding of refining fats and oils, detecting spoilage, and analyzing fermentation products.
			CO4: Analyze food samples and identify the presence of adulterants, contaminants, and pesticide residues.
3.	I-I	ADVANCED PHARMACEUTICAL ANALYSIS	CO1: Describe the instrumentation associated with UV-Visible spectroscopy, IR spectroscopy, spectrofluorimetric, flame emission spectroscopy, and atomic absorption spectroscopy, and choose appropriate solvents and conditions for these techniques and discuss the principles of potentiometry and ion-selective electrodes and their applications in pharmaceutical analysis.
			CO2: Explain the fundamental principles, laws, and theories underlying UV-Visible spectroscopy, IR spectroscopy, spectroflourimetry, flame emission spectroscopy, and atomic absorption spectroscopy.
			CO3: Apply the principles and instrumentation of various chromatographic techniques, such as thin-layer chromatography, high-performance



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			liquid chromatography, gas chromatography, and electrophoresis, and apply these methods to separate and analyze pharmaceutical compounds.
			CO4: Analyze and interpret UV-Visible, IR, and fluorescence spectra to identify and characterize different compounds and understand the factors affecting their spectral features.
4.	I-I	PHARMACEUTICAL QUALITY CONTROL AND QUALITY ASSURANCE	<p>CO1: Explain the concepts of quality control and quality assurance, providing an overview of ICH guidelines, and discussing the principles outlined in the QSEM guidelines.</p> <p>CO2: Analyze cGMP aspects within the pharmaceutical industry to understand their significance in ensuring product quality and regulatory compliance</p> <p>CO3: Evaluate the scope of quality certification applicable to the pharmaceutical industry to assess its impact on product quality, regulatory compliance, and overall business operations.</p> <p>CO4: Analyze manufacturing operations and controls within the pharmaceutical industry to understand their role in ensuring product quality, consistency, and compliance with regulatory standards.</p>
5.	I-I	RESEARCH METHODOLOGY AND IPR	<p>CO1: Explain how IPR would take such important place in growth of individuals & nation, to summarise the need of information about Intellectual Property Right to be promoted among student community in general & engineering in particular.</p> <p>CO2: Summarise the present day scenario controlled and monitored by Computer and Information Technology, where the future world will be ruled by dynamic ideas, concept, creativity and innovation.</p> <p>CO3: Analyse research related information and research ethics</p>



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			<p>CO4: Relate that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about economic growth and social benefits.</p>
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S.NO	YEAR/SEM	COURSE NAME	COURSE OUTOMES
1.	I-II	ADVANCED INSTRUMENTAL ANALYSIS-I	CO1: students will come out with the thorough knowledge of various spectral aspects of X-Ray, IR, SEM, ORD etc which help them in further projects works and also industrial opportunities.
			CO2: Design and conduct experiments in the field of pharmaceuticals using advanced instrumental analysis to develop analytical methods.
			CO3: Outline the principles and pharmaceutical applications of supercritical fluid chromatography and capillary electrophoresis.
			CO4: Analyze pharmaceutical applications and principles of size exclusion chromatography, ion exchange chromatography, ion pair chromatography, and affinity chromatography in bio chromatography.
2.	I-II	MODERN BIOANALYTICAL TECHNIQUES	CO1: study of this subject builds the confidence in the minds on the students to develop and formulate high quality pharmaceutical products
			CO2: To develop the skills to understand the theory and practice of bio analytical techniques.
			CO3: To provide scientific understanding of analytical techniques and detail interpretation of results.
			CO4: To bridge the gap between academics, research and industry.
3.	I-II	HERBAL COSMETICS	CO1: Students will learn about the raw materials used in herbal cosmetics and get exposed to various preparations of herbal cosmetics.
			CO2: Recognize the role of ingredients and herbs used in cosmeceutical products
			CO3: Elucidate the formulations in detail such that can innovate new products of similar health care objectives
			CO4: Description of several ingredients and their percentage involved in the production process will increase their ease of understanding of cosmetic product manufacturing.
4.	I-II	NEUTRACEUTICALS	CO1: Helps the student to understand the importance of Nutraceuticals in various common problems with the concept of free radicals



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			<p>CO2: To understand Functional foods and their effects on human health</p> <p>CO3: To understand the role of antioxidants, polyphenols, omega-3 fatty acids, to prevent different physiological disorders</p> <p>CO4: To Understand the importance of personalized food with respect to genetics</p>
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S.NO	YEAR/SEM	COURSE NAME	COURSE OUTOMES
1.	II-I	SCALE UP AND TECHNOLOGY TRANSFER	CO1: Manage the scale up process in pharmaceutical industry.
			CO2: Assist in technology transfer.
			CO3: To establish safety guidelines, which prevent industrial hazards.
			CO4: Demonstrate importance of Design qualification, Installation qualification, Operational qualification, Performance qualification.
2.	II-I	COSMETIC SCIENCE	CO1: Formulate and evaluate various cosmeceutical product.
			CO2: Know the key components used in different cosmeceutical products.
			CO3: Know the advanced current technology used for manufacturing the cosmetics at lab scale and industry scale
			CO4: students will learn manufacturing of the cosmetic products




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COURSE OUTCOMES

PROGRAM: M PHARMACY (PHARMACEUTICAL ANALYSIS) REGULATION: R 22

S.NO	YEAR/SEM	COURSE NAME	COURSE OUTCOMES
1.	I-I	MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES	CO1: The quantitative determination of various organic compounds is clearly understood..
			CO2: The spectral analysis, dissolution parameters and microbial assays are also learned.
			CO3: Understand the interaction of matter with electromagnetic radiations and its applications in drug analysis
			CO4: Perform quantitative & qualitative analysis of drugs using various analytical instruments.
2.	I-I	PHARMACEUTICAL FOOD ANALYSIS	CO1: Recall and recognize the key principles and characteristics of various food components, such as carbohydrates, proteins, lipids, vitamins, food additives, and pigments
			CO2: Understanding of the underlying chemistry and properties of food components.
			CO3: Understanding of refining fats and oils, detecting spoilage, and analyzing fermentation products.
			CO4: Analyze food samples and identify the presence of adulterants, contaminants, and pesticide residues.
3.	I-I	ADVANCED PHARMACEUTICAL ANALYSIS	CO1: Describe the instrumentation associated with UV-Visible spectroscopy, IR spectroscopy, spectrofluorimetric, flame emission spectroscopy, and atomic absorption spectroscopy, and choose appropriate solvents and conditions for these techniques and discuss the principles of potentiometry and ion-selective electrodes and their applications in pharmaceutical analysis.
			CO2: Explain the fundamental principles, laws, and theories underlying UV-Visible spectroscopy, IR spectroscopy, spectrofluorimetry, flame emission spectroscopy, and atomic absorption spectroscopy.
			CO3: Apply the principles and instrumentation of various chromatographic techniques, such as thin-



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			<p>layer chromatography, high-performance liquid chromatography, gas chromatography, and electrophoresis, and apply these methods to separate and analyze pharmaceutical compounds.</p> <p>CO4: Analyze and interpret UV-Visible, IR, and fluorescence spectra to identify and characterize different compounds and understand the factors affecting their spectral features.</p>
4	I-I	PHARMACEUTICAL VALIDATION	<p>CO1: Importance of patent and intellectual property rights.</p> <p>CO2: The students are trained on the qualification aspects of instruments.</p> <p>CO3: Cleaning validation of equipments employed in the manufacture of pharmaceuticals.</p> <p>CO4: Validation of analytical method for estimation of drugs.</p>
5.	I-I	RESEARCH METHODOLOGY AND IPR	<p>CO1: Explain how IPR would take such important place in growth of individuals & nation, to summarise the need of information about Intellectual Property Right to be promoted among student community in general & engineering in particular.</p> <p>CO2: Summarise the present day scenario controlled and monitored by Computer and Information Technology, where the future world will be ruled by dynamic ideas, concept, creativity and innovation.</p> <p>CO3: Analyse research related information and research ethics</p> <p>CO4: Relate that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about economic growth and social benefits.</p>
S.NO	YEAR/SEM	COURSE NAME	COURSE OUTOMES
1.	I-II	ADVANCED INSTRUMENTAL	<p>CO1: students will come out with the thorough knowledge of various spectral aspects of X-Ray, IR, SEM, ORD etc which help them in further projects works and also industrial opportunities.</p> <p>CO2: Design and conduct experiments in the field of pharmaceuticals using</p>



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		ANALYSIS-I	<p>advanced instrumental analysis to develop analytical methods.</p> <p>CO3: Outline the principles and pharmaceutical applications of supercritical fluid chromatography and capillary electrophoresis.</p> <p>CO4: Analyze pharmaceutical applications and principles of size exclusion chromatography, ion exchange chromatography, ion pair chromatography, and affinity chromatography in bio chromatography.</p>
2.	I-II	PHARMACEUTICAL QUALITY CONTROL AND QUALITY ASSURANCE	<p>CO1: Explain the concepts of quality control and quality assurance, providing an overview of ICH guidelines, and discussing the principles outlined in the QSEM guidelines.</p> <p>CO2: Analyze cGMP aspects within the pharmaceutical industry to understand their significance in ensuring product quality and regulatory compliance.</p> <p>CO3: Evaluate the scope of quality certification applicable to the pharmaceutical industry to assess its impact on product quality, regulatory compliance, and overall business operations.</p> <p>CO4: Analyze manufacturing operations and controls within the pharmaceutical industry to understand their role in ensuring product quality, consistency, and compliance with regulatory standards.</p>
3.	I-II	MODERN BIOANALYTICAL TECHNIQUES	<p>CO1: study of this subject builds the confidence in the minds on the students to develop and formulate high quality pharmaceutical products</p> <p>CO2: To develop the skills to understand the theory and practice of bio analytical techniques.</p> <p>CO3: To provide scientific understanding of analytical techniques and detail interpretation of results.</p> <p>CO4: To bridge the gap between academics, research and industry.</p>
4.	I-II	HERBAL COSMETICS	<p>CO1: Students will learn about the raw materials used in herbal cosmetics and get exposed to various preparations of herbal cosmetics.</p> <p>CO2: Recognize the role of ingredients and herbs used in cosmeceutical products</p> <p>CO3: Elucidate the formulations in detail such that can innovate new products of similar health care objectives</p> <p>CO4: Description of several ingredients and their percentage involved in the production</p>



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			process will increase their ease of understanding of cosmetic product manufacturing.
5.	I-II	NEUTRACEUTICALS	<p>CO1: Helps the student to understand the importance of Nutraceuticals in various common problems with the concept of free radicals</p> <p>CO2: To understand Functional foods and their effects on human health</p> <p>CO3: To understand the role of antioxidants, polyphenols, omega-3 fatty acids, to prevent different physiological disorders</p> <p>CO4: To Understand the importance of personalized food with respect to genetics</p>

S.NO	YEAR/SEM	COURSE NAME	COURSE OUTOMES
1.	II-I	SCALE UP AND TECHNOLOGY TRANSFER	<p>CO1: Manage the scale up process in pharmaceutical industry.</p> <p>CO2: Assist in technology transfer.</p> <p>CO3: To establish safety guidelines, which prevent industrial hazards.</p> <p>CO4: Demonstrate importance of Design qualification, Installation qualification, Operational qualification, Performance qualification.</p>
2.	II-I	COSMETIC SCIENCE	<p>CO1: Formulate and evaluate various cosmeceutical product.</p> <p>CO2: Know the key components used in different cosmeceutical products.</p> <p>CO3: Know the advanced current technology used for manufacturing the cosmetics at lab scale and industry scale</p> <p>CO4: students will learn manufacturing of the cosmetic products</p>



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