NATIONAL COLLEGE OF PHARMACY

Approved by Pharmacy Council of India, AICTE, DME & Govt of Kerala
Affiliated to Kerala University of Health Sciences, Accredited by NBA

TO WHOMSOVER IT MAY CONCERN

This is to certify that the information given in the attached documents are verified by me and is true to the best of my knowledge.

Dr.Sujith Varma.K
Principal
National College of Pharmacy
Manassery,Mukkam,Kozhikode

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Manassery, Kozhikode

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KOZHIKODE
673602
MANASSERY

CRITERIA 2: TEACHING LEARNING AND EVALUATION

2.6.1: PROGRAMME OUTCOMES (PO) AND COURSE OUTCOME (COs) FOR ALL PROGRAMMES OFFERED BY THE INSTITUTION ARE STATED AND DISPLAYED ON WEBSITE

SL NO	PARTICULARS
1.	GRADUATE ATTRIBUTES
2.	PROGRAM EDUCATIONAL OBJECTIVES
3.	PROGRAM OUTCOME OF B.PHARM
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7.	PROGRAM SPECIFIC OUTCOMES OF B.PHARM
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GRADUATE ATTRIBUTES

NO	DESCRIPTION	EXPLANATION
GA1	DEEP DISCIPLINE KNOWLEDGE	Graduates have comprehensive knowledge and understanding of their domain area, the ability to engage with different traditions of thought, and the ability to apply their knowledge in practice including in multi-disciplinary or multi-professional contexts.
GA2	ANALYSE, DESIGN/ DEVELOPMENT OF SOLUTIONS TO PROBLEMS	Graduates are effective problems-solvers, able to apply critical, creative and evidence-based thinking to conceive innovative responses to future challenges
GA3	PROFESSIONALISM AND LEADER SHIP	Graduates engage in professional behaviour and have the potential to be entrepreneurial and take leadership roles in their chosen occupations or careers and communities.
GA4	COMMUNICATION SKILLS AND TEAM WORK	Graduates convey ideas and information effectively to a range of audiences for a variety of purposes and contribute in a positive and collaborative manner to achieving common goals.
GA5	ENVIRONMENT AND SUSTAINABILITY	Understand the impact of professional solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.

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GA6	RESPONSE TO ETHICS IN LIFE AND SOCIAL ISSUES	Graduates are responsible and effective global citizens whose personal values and practices are consistent with their roles as responsible members of society.
GA7	EFFICIENT PROJECT MANAGEMENT AND FINANCE	Demonstrate knowledge and understanding of management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
GA8	SELF-AWARENESS AND EMOTIONAL INTELLIGENCE	Graduates are self-aware and reflective; they are flexible and resilient and have the capacity to accept and give constructive feedback; they act with integrity and take responsibility for their actions.
GA9	MOTIVATION FOR LIFE LONG LEARNING	Recognize the need for and have the preparation and ability to Engage in independent and life- long learning
GA10	DIGITAL CAPABILITIES	Graduates are well prepared for living, learning and working in a digital society.

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PROGRAM EDUCATIONAL OBJECTIVES

1. Pharmacy graduates will have high technical and professional expertise in various fields of pharmaceutical sciences to solve complex problems in the area of Pharmaceutical Sciences.
2. Pharmacy graduates will have ethical attitude, human values, team spirit, strong communication skills and attitude of lifelong learning to serve the needs of society.
3. Pharmacy graduates will have an attitude for patient-centered and community-based research to improve patient healthcare outcomes.

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B PHARM PROGRAM OUTCOME

PO1 Pharmacy Knowledge: Possess knowledge and comprehension of the core and basic associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

PO2 Planning Abilities: Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

PO3 Problem analysis: Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

PO4 Modern tool usage: Learn, select, and apply appropriate methods and procedures resources, and modern pharmacy-related computing tools with an understanding of the limitations.

PO5 Leadership skills: Understand and consider the human reaction to change, motivation issues, leadership and teambuilding when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

PO6 Professional Identity: Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

PO7 Pharmaceutical Ethics: Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical

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principles while making decisions and take responsibility for the outcomes associated with the decisions.

PO8 Communication: Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

PO9 The Pharmacist and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

PO10 Environment and sustainability: Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO11 Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

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PHARM D PROGRAM OUTCOME

PO1: The Pharmacy program aims to equip students with a strong foundation in Chemistry, Anatomy, Physiology, Biochemistry, Pathophysiology and Computer Technology, which are essential for the pharmacy profession.

PO2: The students are trained to develop skills in formulating and dispensing medications, considering patient needs and overcoming potential incompatibilities.

PO3: Applying critical thinking skills in pharmacy involves investigating, analyzing, evaluating, and creatively applying data and documents related to drugs, clinical investigations, pharmaceutical care, and practice.

PO4: Gain the ability to demonstrate and communicate ethical values and a commitment to societal welfare. Also must ensure that patient privacy and confidentiality are protected.

PO5: To enhance entrepreneurial capabilities and develop a sense of professional responsibility.

PO6: To develop a strong sense of professional responsibility to use medications safely and effectively.

PO7: The students learn to regulate and utilize marketed drugs in patient care and use evidence-based practices in healthcare teams.

PO8: The students are able to use the evidence effectively in the health care team including optimizing patient care and outcomes from their documenting experiences.

PO9: The students are in an ideal position to provide a link between prescriber and patient and to communicate information on health and medicines to the public.

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PHARM D (PB) PROGRAM OUTCOME

PO1: The Pharmacy program aims to equip students to understand the fundamental principles in pharmaceutical sciences and practice which are essential for the pharmacy profession.

PO2: The students are trained to develop skills in formulating and dispensing medications, considering patient needs and overcoming potential incompatibilities.

PO3: Applying critical thinking skills in pharmacy involves investigating, analyzing, evaluating, and creatively applying data and documents related to drugs, clinical investigations, pharmaceutical care, and practice.

PO4: Gain the ability to demonstrate and communicate ethical values and a commitment to societal welfare. Also must ensure that patient privacy and confidentiality are protected.

PO5: To enhance entrepreneurial capabilities and develop a sense of professional responsibility.

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PO9: The students are in an ideal position to provide a link between prescriber and patient and to communicate information on health and medicines to the public.

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M PHARM PROGRAM OUTCOME

PO1: To clarify and regulate drug discovery, drug development, care, and practice, use the fundamentals of pharmaceutical chemistry, pharmaceutical analysis, pharmaceutics, and pharmacy practice.

PO2: The capacity to create, carry out, analyze, and interpret data for the right pharmaceutical system or procedure.

PO3: The capacity to design, synthesize, or isolate a drug and drug formulation system, component, or drug use process to satisfy desired needs within actual constraints, including economic, environmental, social, political, ethical, health and safety, and manufacturability and sustainability.

PO4: The capacity to work in multidisciplinary groups across various organizational levels in academia, business, research, and healthcare.

PO5: The capacity to recognize, define, and address professional issues in pharmaceutical concerns.

PO6: Knowledge of professional pharmacy values and ethical responsibility in carrying out professional tasks from societal, governmental, and international viewpoints.

PO7: The capacity to successfully communicate verbally and in writing to be recognized in social and professional circles.

PO8: The capacity to comprehend how pharmacy practice affects society, the economy, the environment, and the environment in general.

PO9: Understanding the value of, and capacity for, lifelong learning in line with the most recent developments in the professional sector in order to better serve the community.

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PO10: Knowledge of current concerns relating to pharmaceutical product use in society and research, development, and manufacturing technologies.

PO11: The capacity to use the methods, abilities, and contemporary equipment required for professional practice research and development.

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B PHARM PROGRAM-SPECIFIC OUTCOME

PSO1: Equip a profound understanding of different subjects of pharmaceutical sciences and enable them to fulfill industry and healthcare standards.

PSO2: Provide high levels of professionalism, ethical conduct, and leadership qualities, ensuring responsible contributions to the healthcare community.

PSO3: Provide proficiency in problem-solving methodologies for designing innovative solutions for drug development, quality assurance, and patient care.

PSO4: Empower with strong communication skills to effectively convey pharmaceutical information to diverse audiences and cultivate an ability to excel in teamwork for collaborating seamlessly with healthcare teams to optimize patient care outcomes.

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PHARM D PROGRAM- SPECIFIC OUTCOME

PSO1: Acquire a thorough knowledge and solid foundation in different subjects of pharmaceutical sciences to fulfill industry and healthcare standards.

PSO2: Provide culturally and socially appropriate pharmaceutical care, fostering inclusion, diversity and advocating for health equity.

PSO3: Understand the significance of pharmaceutical care, medication management, pharmacoeconomics, and pharmacogenomics, as well as the fundamentals of hospital, community, and clinical pharmacy in providing for the needs of the community.

PSO4: Provide effective and empathic communication with members of the healthcare team, patients, and their care partners to enhance patient care through creative problem-solving.

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PHARM D (PB) PROGRAM- SPECIFIC OUTCOME

PSO1: Acquire a thorough knowledge and solid foundation in different subjects of pharmaceutical sciences to fulfill industry and healthcare standards.

PSO2: Provide culturally and socially appropriate pharmaceutical care, fostering inclusion, diversity and advocating for health equity.

PSO3: Understand the significance of pharmaceutical care, medication management, pharmacoeconomics, and pharmacogenomics, as well as the fundamentals of hospital, community, and clinical pharmacy in providing for the needs of the community.

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M PHARM PHARMACY PRACTICE

PROGRAM-SPECIFIC OUTCOME

PSO1: Impart quintessential skills and knowledge in pharmacy practice for improved therapeutic outcome and better patient compliance.

PSO2: Provide culturally appropriate and socially aware pharmaceutical care that promotes inclusion, embraces diversity and advocates for justice to advance health equity.

PSO3: Apply principles of public health using an evidence-based approach aimed at improving health, wellness, and disease prevention.

PSO4: Provide effective and empathic communication with members of the healthcare team, patients, and their care partners to provide creative problem-solving for advanced patient care.

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M PHARM PHARMACEUTICAL CHEMISTRY

PROGRAM-SPECIFIC OUTCOME

PSO1: Drug Discovery Proficiency

Graduates will demonstrate proficiency in applying foundational knowledge of pharmacy and pharmaceutical chemistry to actively contribute to the drug discovery and development process.

PSO2: Research Problem Analysis and Regulatory Compliance

Graduates will possess the skills to identify, formulate, and analyze research problems, culminating in substantiated conclusions that adhere to regulatory requirements within the drug discovery field.

PSO3: Pharmaceutical Chemistry Problem-Solving

Graduates will exhibit problem-solving capabilities in addressing challenges related to chemical entity synthesis, purification, pharmacokinetics, pharmacodynamics, and toxicity through the application of strategies in Pharmaceutical Chemistry.

PSO4: Computational and Analytical Proficiency

Graduates will be proficient in utilizing computational tools and analytical techniques to conceptualize and investigate issues pertaining to rational drug design, organic synthesis, process chemistry, and natural products chemistry.

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M PHARM PHARMACEUTICS

PROGRAM-SPECIFIC OUTCOME

PSO 1: Graduates will possess in-depth knowledge of both novel and conventional drug delivery systems.

PSO 2: Graduates will demonstrate the ability to identify, analyze, and resolve research problems by applying technical skills acquired through training and experimentation

PSO 3: Graduates will possess skills to work as integral members of professional teams in various endeavors.

PSO 4: Graduates will apply their knowledge and problem-solving skills to develop innovative solutions in drug delivery systems

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M PHARM PHARMACEUTICAL ANALYSIS

PROGRAM-SPECIFIC OUTCOME

PSO1: Graduates will acquire in-depth knowledge of analytical techniques and regulatory procedures applicable to pharmaceuticals, food, cosmetics, and herbal products.

PSO2: Graduates will possess core knowledge of bioanalytical techniques, regulatory procedures, and a deep understanding of the responsibilities associated with Quality Control and Quality Assurance departments

PSO3: Graduates will demonstrate expertise in advanced pharmaceutical analytical techniques, showcasing competence in handling instruments used in spectroscopy and chromatography

PSO4: Graduates will develop, integrate, and apply their knowledge to critically evaluate scientific literature and conduct research projects related to product development, analytical method development, and validation.

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COURSE OUTCOME OF B.PHARM

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COURSE OUTCOMES		
BACHELOR OF PHARMACY		
FIRST SEMESTER		
BP101T	**HUMAN ANATOMY AND PHYSIOLOGY – I**	
	CO1	To understand and explain the gross morphology, structure and functions of cell, tissues, skeletal, muscular, nervous, cardiovascular system of the human body
	CO2	To understand the various homeostatic mechanisms and their imbalances.
	CO3	To understand and identify different types of bones in human body.
	CO4	To understand, analyse and appreciate about various body fluids and its physiology
BP102T	**PHARMACEUTICAL ANALYSIS – I**	
	CO1	To understand the fundamentals of analytical chemistry and principles of electrochemical analysis of drugs
	CO2	To understand principles of volumetric and electrochemical analysis.
	CO3	To analyse various volumetric and electrochemical titrations.
	CO4	To create analytical skills
BP103T	**PHARMACEUTICS - I**	
	CO1	To understand the history of profession of pharmacy
	CO2	To analyze and apply the basics of different dosage forms and calculations
	CO3	To understand and remember the various drug incompatibilities
	CO4	To create and evaluate the preparation of biphasic dosage form
BP104T	**PHARMACEUTICAL INORGANIC CHEMISTRY**	
	CO1	To understand about sources of impurities and methods to determine impurities in inorganic chemistry and apply the principles of limit test to limit the impurities in a drug sample.
	CO2	Understand the medicinal importance of radioactive compounds
	CO3	Understand and remember the medicinal and pharmaceutical importance of inorganic compounds.
	CO4	To understand about acids, bases, and buffers in pharmaceutical systems and measurement, calculation and adjustment of tonicity. Functions of major physiological ions and electrolytes.
BP105T	**COMMUNICATION SKILLS**	
	CO1	Understand the behavioural needs for a pharmacist to function effectively in the areas of pharmaceutical operation
	CO2	Analyze communication effectively and effectively manage the team as a team player
	CO3	Create interview skills
	CO4	Create Leadership qualities and essentials
BP107P	**HUMAN ANATOMY AND PHYSIOLOGY-PRACTICAL**	
	CO1	To understand and identify the various tissues
	CO2	To understand and analyse various haematological experiments like WBC count, RBC count etc
	CO3	To understand and analyse experiments like BP monitoring, pulse rate monitoring etc
	CO4	To understand and identify different bones in human body

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BP108P	**PHARMACEUTICAL ANALYSIS I –PRACTICAL**	
	CO1	To understand the fundamentals of analytical chemistry and principles of electrochemical analysis of drugs
	CO2	To understand principles of volumetric and electrochemical analysis.
	CO3	To apply various volumetric and electrochemical titrations.
	CO4	To create analytical skills
BP109P	**PHARMACEUTICS I-PRACTICAL**	
	CO1	To analyse and evaluate formulation and dispensing of different pharmaceutical dosage forms
	CO2	To remember calculations of pharmaceutical dosage forms
	CO3	To understand and evaluate prescription and solving errors.
	CO4	To apply interpretation of latin terms and metric conversions
BP110P	**PHARMACEUTICAL INORGANIC CHEMISTRY-PRACTICAL**	
	CO1	To evaluate the level of specific impurities in the given inorganic compounds by performing different limit tests.
	CO2	To apply different chemical methods to prepare inorganic compounds.
	CO3	To analyze identification tests as per pharmacopoeia
	CO4	To evaluate impurities qualitatively by performing test for purity.
BP111P	**COMMUNICATION SKILLS-PRACTICAL**	
	CO1	Understand effective pronunciation of consonant sounds and Vowel sounds
	CO2	To create comprehension listening
	CO3	To apply speech effective communication writing skill
	CO4	Create effective writing, interview handling skills, E-mail etiquette presentation skill
	SECOND SEMESTER	
BP201T	**HUMAN ANATOMY AND PHYSIOLOGY – II**	
	CO1	To understand and explain the gross morphology, structure and functions of nervous, respiratory, urinary, endocrine and reproductive system in human body.
	CO2	To understand about the principles of energy and metabolism
	CO3	To analyse about the coordinated working pattern of different organs of each system
	CO4	To understand and analyse the interlinked mechanisms in the maintenance of normal functioning(Homeostasis) of human body.
BP202T	**PHARMACEUTICAL ORGANIC CHEMISTRY – I**	
	CO1	Remember the basic concept of structure, name and the type of isomerism of the organic compound.
	CO2	Understand to write the reaction, mechanism and orientation
	CO3	Understand reactivity/stability of compounds.
	CO4	Explain the ideas of the identification of organic compound
BP203T	**BIOCHEMISTRY**	
	CO1	To understand the importance of metabolism of substrates
	CO2	To understand the chemistry and biological importance of biological macromolecules.
	CO3	Apply the knowledge in qualitative and quantitative estimation of the biological macromolecules.

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	CO4	To understand the basic principles of protein and polysaccharide structure
BP204T	**PATHOPHYSIOLOGY**	
	CO1	To understand the basic principles involved in cell injury and adaptation.
	CO2	To understand the pathogenesis of inflammation and wound healing
	CO3	To understand the pathogenesis, clinical manifestations and complications of common non-communicable diseases
	CO4	To understand the pathogenesis, clinical manifestations and mode of transmission of communicable diseases.
	C05	To understand the etio-pathogenesis and diagnosis of cancer
BP205T	**COMPUTER APPLICATION IN PHARMACY**	
	CO1	To known the various types of application of computer in pharmacy
	CO2	To understand different types of databases
	CO3	To know the application of databases in pharmacy
	CO4	To understand the concept of bioinformatics
BP206T	**ENVIRONMENTAL SCIENCE**	
	CO1	To create the awareness about environmental problems among learners
	CO2	To analyze basic knowledge about the environment audits allied problems
	CO3	Create learnership quality to participate in environment protection and environment improvement.
	CO4	Create skills to help the concerned individuals in identifying and solving environmental problems.
BP207P	**HUMAN ANATOMY AND PHYSIOLOGY II-PRACTICAL**	
	CO1	To understand about the integumentary and special senses, nervous system, endocrine system using specimen, models and diagnosis kit etc
	CO2	To analyse and perform various experiments on visual activity, taste, sensation etc
	CO3	To analyse and perform to record temperature, reflex action, BMI and other neurological examination
	CO4	To analyse the function of olfactory nerve, lung function tests
BP208P	**PHARMACEUTICAL ORGANIC CHEMISTRY I-PRACTICAL**	
	CO1	Remember the basic concept for writing the structure, name and the type of isomerism of the organic compound.
	CO2	Understand how to write the reaction, name the reaction and orientation of reactions. .
	CO3	Understand reactivity/stability of compounds.
	CO4	Explain ideas to identify and confirm the identification of organic compound
BP209P	**BIOCHEMISTRY- PRACTICAL**	
	CO1	To analyze proteins, amino acids and carbohydrates by various qualitative as well as quantitative tests
	CO2	To analyze the biomolecules from different biological samples
	CO3	To understand the action of salivary amylase on starch.
	CO4	To understand the preparation of buffer solution and determination of pH

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BP210P	**COMPUTER APPLICATIONS IN PHARMACY-PRACTICAL**	
	CO1	To apply the principles to retrieve the information of a drug and its adverse effects using online tools
	CO2	To create patient record in databases and to generate report
	CO3	To create HTML web page to show personal information
	CO4	To understand drug information storage and retrieval using MS Access
	THIRD SEMESTER	
BP301T	**PHARMACEUTICAL ORGANIC CHEMISTRY II-THEORY**	
	CO1	To understand the structure, name and type of isomerism of the organic compounds
	CO2	To understand the preparation, reaction mechanism, and orientation of aromatic organic compounds
	CO3	To understand the chemistry, application and analysis of fats and oils
	CO4	To understand the reactivity/stability of organic compounds
BP302T	**PHYSICAL PHARMACEUTICS – I**	
	CO1	To understand the various principles of states of matter and solubility of drugs and factors affecting solubility and application of these principles in the development of dosage forms
	CO2	To understand the various physicochemical properties of drugs and apply these principles in formulation and quality assurance of dosage forms
	CO3	Create an idea about the principles of micromeritics and its importance in drug action and apply the same in the development of solid dosage forms
	CO4	To apply the principles of complexation in the enhancement of bioavailability and stability of drugs
	CO5	To understand and apply the principles of pH, buffers and isotonicity in the formulation of dosage forms with better safety, stability and effectiveness
BP303T	**PHARMACEUTICAL MICROBIOLOGY – I**	
	CO1	To understand methods of identification, cultivation and preservation of various micro organisms.
	CO2	To understand the importance and implementation of sterilization in pharmaceutical processing and industry.
	CO3	To demonstrate sterility testing of pharmaceutical products.
	CO4	To demonstrate microbiological standardization of pharmaceuticals.
	C05	To understand cell culture technology and its applications in pharmaceutical industries.
BP304T	**PHARMACEUTICAL ENGINEERING**	
	CO1	To understand various unit operations used in pharmaceutical industries
	CO2	To understand the material handling techniques
	CO3	To apply various processes involved in pharmaceutical manufacturing processes
	CO4	To understand the various preventive methods used for corrosion control in pharmaceutical industries

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BP305P	**PHARMACEUTICAL ORGANIC CHEMISTRY II-PRACTICAL**	
	CO1	To understand the structure, name and the type of isomerism of the organic compound.
	CO2	To understand about how to write the reaction, name the reaction and analyze orientation of reactions.
	CO3	To understand the account for reactivity/stability of compounds.
	CO4	To understand about preparation of organic compounds.
BP306P	**PHYSICAL PHARMACEUTICS I-PRACTICAL**	
	CO1	To understand the knowledge about solubility parameters
	CO2	To understand the partition co efficient of solute in immiscible liquid
	CO3	To understand and identify the various micromeritic parameters
	CO4	To understand the complexation process and its parameters
BP307P	**PHARMACEUTICAL MICROBIOLOGY-PRACTICAL**	
	CO1	To understand the different methods of preparation of culture media and sub culturing.
	CO2	To understand knowledge about aseptic transfer and different methods of isolation of pure culture.
	CO3	To identify the microorganism by using staining, microscopy, various chemical tests and apply this knowledge in microbiology lab and ability to identify bacterial motility by hanging drop method.
	CO4	To understand procedure for standardization of antibiotics
	CO5	To apply the sterility testing procedure in pharmaceutical preparations.
BP308P	**PHARMACEUTICAL ENGINEERING- PRACTICAL**	
	CO1	To understand and perform various unit operations used in pharmaceutical industries
	CO2	To understand and perform the material handling techniques
	CO3	To evaluate various processes involved in pharmaceutical manufacturing processes
	CO4	To evaluate the various preventive methods used for corrosion control in pharmaceutical industries
FOURTH SEMESTER		
BP401T	**PHARMACEUTICAL ORGANIC CHEMISTRY – III**	
	CO1	To understand the stereo chemical aspects of organic compounds and stereo chemical reactions
	CO2	To understand the medicinal uses and other applications of some organic compounds
	CO3	To understand the chemistry of important heterocyclic compounds
	CO4	To understand reactions of synthetic importance
BP402T	**MEDICINAL CHEMISTRY – I**	
	CO1	To understand about medicinal chemistry, history and development of medicinal chemistry,physicochemical properties in relation to biological action (ionization, solubility, partition coefficient, hydrogen bonding, protein binding, chelation, bioisosterism, optical and geometrical isomerism) and drug metabolism, factors affecting drug metabolism including stereo chemical aspects
	CO2	To understand the chemistry of drugs with respect to their biological activity. Know the classification, structures, synthesis and uses of cholinergic, anticholinergic, adrenergic and antiadrenergic agents.

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	CO3	To understand the metabolism, adverse effects and therapeutic value of drugs and the classification, structures, synthesis and uses ofsedatives and hypnotics, anti convulsants and antipsychotic agents
	CO4	To analyze the importance of SAR of drugs of general anaesthetics, narcotic and non-narcotic drugs
BP403T	**PHYSICAL PHARMACEUTICS II**	
	CO1	Understand various physicochemical properties of drug molecules and apply those in the designing of dosage form
	CO2	Understand the principles of chemical kinetics and apply the same in the stability of drugs
	CO3	To create an idea about assigning expiry date for formulation
	CO4	To apply the use of physicochemical properties in evaluation of dosage forms.
	CO5	To apply the physicochemical properties of drug molecules in formulation research and development
BP404T	**PHARMACOLOGY – I**	
	CO1	To understand the basics of pharmacology and apply the information about drugs absorption, distribution, metabolism and excretion (pharmacokinetics) in therapeutics.
	CO2	To understand the information about the drugs like mechanism of action, physiological and biochemical effects (pharmacodynamics)
	CO3	To understand the organization, functions, neurohumoral transmission, co-transmission and importance of various neurotransmitters of ANS and CNS.
	CO4	To understand and apply the knowledge about the pharmacology of peripheral nervous system and central nervous system.
BP405T	**PHARMACOGNOSY AND PHYTOCHEMISTRY – I**	
	CO1	To understand the fundamentals of pharmacognosy , crude drug and evaluate it with basic concepts in quality control techniques.
	CO2	To understand and apply different techniques in cultivation and production of crude drug and to create new aspects in the production of plants and phytochemicals through plant tissue culture.
	CO3	To understand and remember the role of pharmacognosy in various system of medicine.
	CO4	To understand and analyze primary and secondary metabolite of crude drugs , their uses , chemical nature and general test for evaluation.
BP406P	**MEDICINAL CHEMISTRY I-PRACTICAL**	
	CO1	To create medicinally important compounds or intermediates by conventional method.
	CO2	To evaluate the purity of the drug by using different assay methods.
	CO3	To evaluate partition co-efficient of medicinal compounds
	CO4	To create medicinally important compounds or intermediates by microwave irradiation techniques.
BP407P	**PHYSICAL PHARMACEUTICS II-PRACTICAL**	
	CO1	Critically evaluate various physicochemical properties of drug molecules in the designing the dosage form.
	CO2	Apply the principles of chemical kinetics & to use them in assigning expiry date for formulation of pharmaceuticals in research and

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		industrial perspective
	CO3	Analyze the knowledge of basic principle to determine effect of various parameters on formulations
	CO4	Evaluate the stability of various pharmaceutical dosage form
BP408P	**PHARMACOLOGY I-PRACTICAL**	
	CO1	To apply the knowledge about the common laboratory animals, instruments in experimental pharmacology, animal handling, physiological salt solutions, laboratory anesthetics.
	CO2	To demonstrate the various methods of dose calculation and drug administration by various routes in mice/rat.
	CO3	To evaluate the dose response curve of acetylcholine and effect of agonist, antagonist on chick ileum preparation.
	CO4	To understand the various concepts of simulated animal experiment
BP409P	**PHARMACOGNOSY AND PHYTOCHEMISTRY I-PRACTICAL**	
	CO1	To analyze different crude drug by means of qualitative chemical tests.
	CO2	To evaluate a crude drug by means of quantitative microscopy and to understand various leaf constants.
	CO3	To understand and evaluate adulteration in crude drug and to identify new cellular characteristics
	CO4	To evaluate crude drug by physical methods of evaluation
	FIFTH SEMESTER	
BP501T	**MEDICINAL CHEMISTRY – II**	
	CO1	To understand the chemistry of drugs with respect to their pharmacological activity
	CO2	To understand the drug metabolic pathways, adverse effect and therapeutic value of drugs
	CO3	To analyze the structural activity relationship of different class of drugs
	CO4	To understand the chemical synthesis of selected drugs
BP502 T	**FORMULATIVE PHARMACY**	
	CO1	To understand the preformulation consideration in pharmaceutical drug formulation
	CO2	To create and evaluate formulations and to perform the evaluation and packaging of tablets.
	CO3	To create and evaluate formulation and to perform the evaluation and packaging of capsule dosage forms
	CO4	To analyse, formulate and develop sterile products and perform their evaluation.
	CO5	To understand about the preparation and evaluation of packaging material.
BP503 T	**PHARMACOLOGY – II**	
	CO1	To understand and apply the knowledge on the classification, mechanism of action, therapeutic effects, clinical uses, side effects and contraindications of drugs acting on cardiovascular system and renal system.
	CO2	To understand and apply the knowledge about autocoids and related drugs
	CO3	To understand and apply the knowledge about all endocrine and

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		other hormones in our body and their analogues and inhibitors.
	CO4	To apply the knowledge about different bioassay (principles, applications and types) and analyze the drug sample.
BP504 T	**PHARMACOGNOSY AND PHYTOCHEMISTRY – II**	
	CO1	To understand about basic metabolic pathways which are involved in the formation of different secondary metabolites.
	CO2	To understand and analyze the source, phytochemistry, composition, therapeutic and commercial utilization of various medicinally important constituents present in crude drug.
	CO3	To create knowledge about industrial production, estimation and utilization of therapeutically useful phytoconstituents.
	CO4	To understand and apply knowledge about modern extraction techniques, characterization and identification/quality control of herbal drugs through spectroscopy.
BP 505 T	**PHARMACEUTICAL JURISPRUDENCE**	
	CO1	To understand the pharmaceutical legislations and their implications in the development and marketing
	CO2	To understand various Indian pharmaceutical Acts, Laws and schedule
	CO3	To understand the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals
	CO4	To understand code of ethics during the pharmaceutical practice
BP 506P	**FORMULATIVE PHARMACY-PRACTICAL**	
	CO1	To understand and analyze various pharmaceutical dosage forms and their manufacturing techniques.
	CO2	To create various considerations in development of pharmaceutical dosage forms.
	CO3	To analyse and evaluate various solid, liquid and semisolid dosage forms.
	CO4	To evaluate dosage forms for their quality.
BP 507P	**PHARMACOLOGY II-PRACTICAL**	
	CO1	To analyze and evaluate various drug actions on isolated tissue.
	CO2	To analyze and evaluate various drug actions on experimental animals.
	CO3	To apply the knowledge about different bioassays and analyze the drug sample.
	CO4	To interpret and analyze diuretic activity of drugs by simulated experiment method.
BP 508P	**PHARMACOGNOSY AND PHYTOCHEMISTRY II-PRACTICAL**	
	CO1	To evaluate macroscopic and microscopic diagnostic characters of crude drug.
	CO2	To understand and analyze the extraction and identification of therapeutically useful phytoconstituents.
	CO3	To understand and analyze separation and purification of phytoconstituents by chromatographic techniques.
	CO4	To understand and perform the chemical analysis and quality control of the unorganized crude drugs as per regulatory guidelines.

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SIXTH SEMESTER		
BP601T	**MEDICINAL CHEMISTRY- III**	
	CO1	To understand the importance of drug design and different techniques of drug design such as prodrugs, and Combinatorial Chemistry.
	CO2	To understand the chemistry of drugs with respect to their biological activity. Know the classification, structures, synthesis and uses of antibiotics, antimalarials, antitubercular agents, urinary tract anti-infective agents and anti-viral agents.
	CO3	To understand the metabolism, adverse effects and therapeutic value of drugs and the classification, structures, synthesis and uses of antifungal agents, anti-protozoal agents.
	CO4	To understand the importance of SAR of drugs of anthelmintics and sulphonamides and sulphones.
BP602 T	**PHARMACOLOGY-III**	
	CO1	To understand and apply knowledge about the classification, mechanism of action, therapeutic effects, clinical uses, side effects and contraindications of drugs acting on respiratory and gastrointestinal system.
	CO2	To understand and apply the knowledge about chemotherapeutic agents including principles, classification, microbial resistance, chemoprophylaxis.
	CO3	To understand the mechanism of drug action and its relevance in the treatment of different infectious disease.
	CO4	To understand the knowledge on immunopharmacology and in addition on the basic concepts of gene therapy.
BP 603 T	**HERBAL DRUG TECHNOLOGY**	
	CO1	To understand about selection of herbs from its sources, good agricultural practices, processing and development of herbal medicinal products. Also to understand about Indian systems of medicines, formulation and standardization of medicines. Understand GMP of Indian systems of medicines.
	CO2	Understand the importance and applications of nutraceuticals in healthcare and its market demand. Analyze herbal drug interactions and its importance in health care.
	CO3	To understand the sources and description of raw materials from herbs used in personal care products. Also learn about the use/application of herbal excipients in formulations and in novel dosage forms.
	CO4	To understand the evaluation and stability testing of herbal drugs as per WHO & ICH guidelines. Also to explain about the patenting aspects of natural products.
BP 604 T	**BIOPHARMACEUTICS AND PHARMACOKINETICS**	
	CO1	Understand and analyze the basic concepts in biopharmaceutics and pharmacokinetics and apply the concept of drug absorption to derive the pharmacokinetic parameters to describe the process of drug absorption. Understand the concept of drug distribution and gain knowledge about volume of drug distribution and plasma protein binding
	CO2	Understand the concept of drug elimination and apply the knowledge

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		to describe parameters like clearance and extraction ratio. Apply the basic knowledge about bioavailability and bio equivalency to design and analyze drug product equivalency studies.
	CO3	Understand the knowledge about the theory of compartmental pharmacokinetics and apply and analyze the plasma or urine data to derive and describe pharmacokinetic parameters
	CO4	Analyze the theory of multicompartment models multiple dosage regimens and concept of nonlinearity and apply it in the multiple dosage regimen.
BP605 T	**PHARMACEUTICAL BIOTECHNOLOGY**	
	CO1	To understand and apply various biotechnology techniques used for production of biologicals in pharmaceutical industry
	CO2	To apply the principles of genetic engineering and innovations by rDNA technology
	CO3	To understand and apply immunology and its all related disciplines
	CO4	To understand knowledge blood products, mutation, microbial genetics, microbial biotransformation and apply them to research and health care
BP606T	**QUALITY ASSURANCE**	
	CO1	To understand the importance of quality in pharmaceutical products
	CO2	To understand the importance of GMP,GLP etc
	CO3	To analyse the factors affecting quality of pharmaceuticals
	CO4	To apply the process involved in manufacturing of pharmaceuticals in different departments.
BP607P	**MEDICINAL CHEMISTRY III-PRACTICAL**	
	CO1	To create medicinally important compounds or intermediates by conventional method.
	CO2	To evaluate the purity of the drug by using different assay methods.
	CO3	To create medicinally important compounds or intermediates by microwave irradiation techniques.
	CO4	To analyze physiochemical properties such as LogP, MR, molecular weight, hydrogen bond acceptors and donors for the class of drugs using drug design software drug likeliness screening.
BP608P	**PHARMACOLOGY III-PRACTICAL**	
	CO1	To understand and execute the methods for determining different biochemical parameters.
	CO2	To understand and apply knowledge about various screening methods of drugs on central nervous system using Ex-pharm software.
	CO3	To understand and apply knowledge about various screening methods of drugs on peripheral nervous system using Ex-pharm software.
	CO4	To analyze and evaluate significance of data by using biostatistical methods in experimental pharmacology.
BP 609P	**HERBAL DRUG TECHNOLOGY-PRACTICAL**	
	CO1	To remember and understand to perform the preliminary phytochemical analysis of crude drugs.
	CO2	To analyze the phytochemicals quantitatively in crude drug extracts,

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		ayurvedic formulations etc.
	CO3	To formulate and standardize herbal preparations for external/internal applications as per regulatory guidelines.
	CO4	To understand and perform monograph analysis of herbal drugs and fixed oils as per pharmacopoeia.
SEVENTH SEMESTER		
BP701T	**INSTRUMENTAL METHODS OF ANALYSIS**	
	CO1	To understand on analytical techniques in the context of qualitative and quantitative analysis of drugs
	CO2	To apply the common methods of pharmaceutical analysis in research, academic and industry
	CO3	To apply the principles of chromatography in qualitative and quantitative analysis of pharmaceuticals in research and industrial perspective
	CO4	To execute the knowledge on spectroscopy in the elucidation of molecular structure and the interpretation of the result.
BP 702 T	**INDUSTRIAL PHARMACY**	
	CO1	To understand the techniques and guidelines in pilot plant and scale up of different pharmaceutical dosage forms
	CO2	To apply the process and guideline on technology development and transfer, their documentation from lab to commercial scale,agencies in India
	CO3	To understand the approval process involved in drug development, regulatory authority in India and internationally.
	CO4	To understand industrial safety and accident records
BP 703T	**PHARMACY PRACTICE**	
	CO1	To apply Knowledge on various drug distribution methods, pharmacy stores management and inventory control in a hospital.
	CO2	To understand how to Monitor drug therapy, assess adverse drug reactions and interpret laboratory results
	CO3	To evaluate medication history interview and counsel the patients and Identify drug related problems.
	CO4	To evaluate pharmaceutical care services and to appreciate the concept of rational drug therapy.
BP 704T	**NOVEL DRUG DELIVERY SYSTEMS**	
	CO1	To understand the concepts, terminologies of controlled drug release and apply these in the design of various controlled drug delivery systems
	CO2	To understand the significance of polymers in controlled drug delivery and evaluate their potential in the design of various drug delivery systems
	CO3	Analyze the principles of microencapsulation and can apply the knowledge in manufacture of controlled drug delivery systems
	CO4	Apply the principles of formulation and evaluation of various controlled drug delivery systems and apply this in the manufacture of novel drug delivery systems
	CO5	Understand the principles of nanotechnology and delivery and apply this in the development of targeted drug delivery systems

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BP705P	**INSTRUMENTAL METHODS OF ANALYSIS-PRACTICAL**	
	CO1	To acquire knowledge on how to do colorimetry.
	CO2	To understand the concept how to operate HPLC and GC.
	CO3	To understand the working principle of thin layer chromatography and paper chromatography
	CO4	To acquire knowledge on how to determine absorption maxima on UV spectroscopy
	EIGHTH SEMESTER	
BP801T	**BIOSTATISTICS AND RESEARCH METHODOLOGY**	
	CO1	To understand to select a research topic in his/her areas of interest
	CO2	To understand fundamentals of collecting, analyzing and interpreting the relevant data
	CO3	To evaluate different computational methods and software's facilitating research
	CO4	To demonstrate about various parametric test
BP802T	**SOCIAL AND PREVENTIVE PHARMACY**	
	CO1	To remember consciousness/realization of current issues related to health and pharmaceutical problems within the country and worldwide.
	CO2	To understand a critical way of thinking based on current health-care development.
	CO3	Evaluate alternative ways of solving problems related to health and pharmaceutical issues
	CO4	To evaluate good knowledge about various health programs in our countries
BP805 ET	**PHARMACOVIGILANCE**	
	CO1	To understand History and development of pharmacovigilance, Pharmacovigilance. To apply Program of India (PvPI).National and international scenario of pharmacovigilance in evaluating ADR
	CO2	To apply the methods of Detection ,assessment in reporting of adverse drug reactions and to apply communication in pharmacovigilance. To create case narratives of adverse events and their quality.
	CO3	To create methods to generate safety data during pre-clinical, clinical and post approval phases of drugs' life cycle.Drug safety evaluation in paediatrics, geriatrics, pregnancy and lactation.
	CO4	To understand International standards for classification of diseases and drugs. ICH guidelines for ICSR, PSUR, expedited reporting, pharmacovigilance planning,CIOMS requirements for ADR reporting. Dictionaries, coding and terminologies used in pharmacovigilance
BP 806 ET	**QUALITY CONTROL AND STANDARDIZATION OF HERBS**	
	CO1	To understand WHO guidelines for quality control of herbal drugs
	CO2	To understand and apply Quality assurance in herbal drug industry
	CO3	To understand the regulatory approval process and their registration in Indian and international markets
	CO4	To understand and appreciate EU and ICH guidelines for quality control of herbal drugs
BP808ET	**CELL AND MOLECULAR BIOLOGY**	

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	CO1	Understand about the basics, history, structure and functions, types, reproduction, chemical composition and application of cell
	CO2	To analyze the knowledge regarding DNA, RNA, transcription and translation.
	CO3	Understand about protein (structure, pathways, synthesis etc.)
	CO4	To create the knowledge on genetics, transgenic and genomic analysis Knowledge on receptors and different pathways.
BP809ET	**COSMETIC SCIENCE**	
	CO1	To analyze cosmetic principle to address the needs of cosmetic industry
	CO2	To understand formulation science and analytical techniques required to scientifically design and develop cosmetic products
	CO3	To remember scientific and technical aspects
	CO4	To understand high standards of practice and professional ethics within the cosmetic and toiletries industry
BP 811 ET	**ADVANCED INSTRUMENTATION TECHNIQUES**	
	CO1	To apply the in-depth knowledge on NMR, Mass spectroscopy and Hyphenated technique
	CO2	To apply and study different methods like Thermal method and – X Ray diffraction methods
	CO3	To understand Study on calibration and validation of instruments as per ICH and USFDA
	CO4	To apply and Study on RIA and various extraction technique

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COURSE OUTCOME OF PHARM D

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	COURSE OUTCOMES	
	PHARM D	
	FIRST YEAR	
1.1	**HUMAN ANATOMY AND PHYSIOLOGY –THEORY**	
	CO1	To apply concepts and knowledge of the general terminology, cell structure and function, histology, gross anatomy, and physiology related to the integumentary, skeletal, muscular and nervous systems to novel technical and/or clinical scenarios
	CO2	Understand and critically evaluate various sources of information related to these systems to discern reliable scientific information from unsourced information.
	CO3	Remember and communicate information related to these systems through written, verbal, or multimedia formats in order to assess current knowledge, answer investigative questions, and explore new questions for additional research.
	CO4	Evaluate information on human health and medical research as to its social, environmental, and ethical implications as part of responsible citizenship.
	CO5	To understand the use scientific laboratory equipment in order to gather and analyze data on human anatomy and physiology. Use an understanding of how these human organ systems are interrelated to apply a holistic approach to human health
	CO6	To create awareness on sports physiology
	HUMAN ANATOMY AND PHYSIOLOGY-PRACTICAL	
	CO1	To understand various parts and use of microscope.
	CO2	Analyse the measurement of physiological parameters such as BP, PR, HR, Body Temperature.
	CO3	To understand and analyze haematological tests such as WBC count, RBC count, Bleeding time, Clotting time etc
	CO4	Understand and identify various bones and joints of human skeleton
	CO5	To analyse various organ systems in human body
	CO6	Apply scientific laboratory equipment in order to gather and analyze data on human anatomy and physiology. Use an understanding of how these human organ systems are interrelated to apply a holistic approach to human health
1.2	**PHARMACEUTICS-THEORY**	
	CO1	To understand and create the formulation aspects of different dosage forms
	CO2	To apply the different pharmaceutical calculations involved in formulation
	CO3	To Evaluate and analyse different types of dosage forms
	CO4	To remember the importance of good formulation for effectiveness
	CO5	To understand and remember various drug incompatibilities
	CO6	To understand and apply the professional way of handling preparation
	PHARMACEUTICS-PRACTICAL	
	CO1	To create and evaluate different types of dosage forms
	CO2	To understand the formulation aspects of different dosage forms
	CO3	To understand and remember various drug incompatibilities
	CO4	To apply the professional way of handling preparation
	CO5	To remember different labelling techniques of various dosage forms
	CO6	To analyse the formulation aspects of different dosage forms
1.3	**MEDICINAL BIOCHEMISTRY-THEORY**	
	CO1	To understand the importance of metabolism of substrates.
	CO2	To understand the chemistry and biological importance of biological

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		macromolecules.
	CO3	To apply the knowledge in qualitative and quantitative estimation of the biological macromolecules
	CO4	To analyze and interpret the data emanating from a clinical test lab.
	CO5	To understand how physiological conditions influence the structures and reactivity's of biomolecules.
	CO6	To understand the basic principles of protein and polysaccharide structure.
	MEDICINAL BIOCHEMISTRY-PRACTICAL	
	CO1	To analyze proteins, amino acids and carbohydrates by various qualitative as well as quantitative tests
	CO2	To analyze biomolecules from different biological samples
	CO3	To analyze and interpret the metabolic disorders based on laboratory values
	CO4	To understand various electrolytes in serum
	CO5	To understand operation and handling of appropriate standard instruments
	CO6	To analyze and interpret the lipid profile and liver function tests
1.4	**PHARMACEUTICAL ORGANIC CHEMISTRY-THEORY**	
	CO1	To remember the IUPAC/Common system of nomenclature of simple organic compounds belonging to different classes of organic compounds;
	CO2	To understand important physical properties of organic compounds;
	CO3	Explain ideas for free radical/ nucleophilic [alkyl/ acyl/ aryl] /electrophilic substitution, free radical/ nucleophilic / electrophilic addition, elimination, oxidation and reduction reactions with mechanism, orientation of the reaction, order of reactivity, stability of compounds;
	CO4	Understand some named organic reactions with mechanism
	CO5	Understand the methods of preparation, test for purity, principle involved in the assay, important medicinal uses of some important organic compounds
	PHARMACEUTICAL ORGANIC CHEMISTRY-PRACTICAL	
	CO1	Remember the basic concept for nomenclature of simple organic compounds in different classes and make 3D stereomodels to learn easily.
	CO2	Understand the determination of some important physical properties like melting point, boiling point, solubility etc
	CO3	Understand principles involved in purification of Organic compounds
	CO4	To understand about various ideas for the synthesis of organic compounds and study about principles, reactions and mechanism.
	CO5	Remember the basic concept for synthesis of organic compounds with named reactions and study about mechanisms
	CO6	To understand about various ideas and concept for systemic qualitative analysis of some unknown organic compound
1.5	**PHARMACEUTICAL INORGANIC CHEMISTRY-THEORY**	
	CO1	To understand the possible source of impurities and their limits
	CO2	To analyse the percentage purity of the inorganic pharmaceuticals by various assay methods.
	CO3	To understand the preparation methods, purity testing and application of various inorganic pharmaceuticals.
	CO4	To evaluate the pharmacopeial monographs and to perform the various analytical techniques involved in it.
	CO5	To understand the preparation, storage and safety measures for radio

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		pharmaceuticals and other miscellaneous inorganic pharmaceuticals
	PHARMACEUTICAL INORGANIC CHEMISTRY-PRACTICAL	
	CO1	To analyse limit test for various impurities
	CO2	To apply and perform different types of assay.
	CO3	To understand estimation of mixtures.
	CO4	To understand the test for purity.
	CO5	To develop medicinally important compounds.
	SECOND YEAR	
2.1	**PATHOPHYSIOLOGY**	
	CO1	To understand the basic principles involved in cell injury and adaptation.
	CO2	Analyse the pathogenesis of inflammation and wound healing
	CO3	To understand the fundamental aspects of immunity and relate it to diseases of immunity
	CO4	To analyse the pathogenesis of cancer.
	CO5	To evaluate the pathogenesis, signs and symptoms and complications of common diseases and infections.
	CO6	To understand the pathogenesis and clinical manifestations of various nutritional and environmental diseases
2.2	**PHARMACEUTICAL MICROBIOLOGY-THEORY**	
	CO1	To understand various divisions of microbial world and relationship among them, different methods of classification of microbes and study of Bacteria, Fungi, Virus, Rickettsiae, Spirochetes .
	CO2	To understand growth, cultivation, isolation and identification of bacteria, virus and fungi, counting of bacteria.
	CO3	To understand detailed study of different methods of sterilization including their merits and demerits, their validation. Detailed study of sterility testing of different pharmaceutical preparations.
	CO4	To understand various diagnostic tests such as Schick's Test, Elisa test, Western Blot test, Southern Blot, PCR, Widal, QBC and Mantaux test and study of malarial parasite.
	CO5	To understand principles and methods of different microbiological assays
	CO6	To understand about various infectious diseases such as Typhoid, Tuberculosis, Malaria, Cholera, Hepatitis, Meningitis, Syphilis & Gonorrhea and HIV.
	PHARMACEUTICAL MICROBIOLOGY-PRACTICAL	
	CO1	To understand and apply different sterilization methods for sterilisation of glass ware's and preparation of media and their sterilisation, RW test for disinfectants.
	CO2	To identify different types of bacteria by various staining techniques and bio chemical tests.
	CO3	To understand and determine motility, counting and isolation of pure culture.
	CO4	Understand cultural sensitivity testing for micro-organisms and sterility testing for powders and liquids
	CO5	To analyse and determine minimum inhibitory concentration and microbiological assay of antibiotics and vitamins by various methods
	CO6	To understand and apply various diagnostic tests for some common diseases, Widal, malarial parasite
2.3	**PHARMACOGNOSY AND PHYTOPHARMACEUTICALS-THEORY**	
	CO1	To understand the source, classification, applications and role of herbs in drug

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		development.
	CO2	To understand the cultivation, collection, processing & storage, standard protocol for evaluation of crude drugs.
	CO3	To remember and understand about cell & its function, macro, micro and powder microscopy of crude drugs
	CO4	To understand the classification and mechanism of action of natural pesticides.
	CO5	To understand the preparation & application of plant fibres in pharmaceutical field.
	CO6	To understand various metabolites present in drugs, its classification, chemistry, method of extraction and analysis.
	PHARMACOGNOSY AND PHYTOPHARMACEUTICALS-PRACTICAL	
	CO1	To understand the morphological characters of crude drugs.
	CO2	To understand the microscopical characters of crude drug thereby able to differentiate genuine drug from adulterants.
	CO3	To apply the knowledge about powder microscopy in the evaluation of adulteration in powdered drug.
	CO4	To understand about analysis of fixed oils.
	CO5	To understand the analysis of crude drugs by chemical test
2.4	**PHARMACOLOGY-1**	
	CO1	To remember the general pharmacology (such as definitions, scope, routes of drug administration, pharmacokinetics, pharmacodynamics, factors modifying drug effects, drug toxicity, pre-clinical evaluations and drug interactions)
	CO2	Understand the entire pharmacology (such as definitions, classifications, pharmacokinetics, pharmacodynamics, mechanisms of actions, pharmacological actions, adverse drug reactions, drug interactions contraindications, doses and uses) acting on autonomic nervous system
	CO3	Apply the entire pharmacology (such as definitions, classifications, pharmacokinetics, pharmacodynamics, mechanisms of actions, pharmacological actions, adverse drug reactions, drug interactions contraindications, doses and uses) acting on cardio vascular system.
	CO4	Apply the entire pharmacology (such as definitions, classifications, pharmacokinetics, pharmacodynamics, mechanisms of actions, pharmacological actions, adverse drug reactions, drug interactions contraindications, doses and uses) acting on central nervous system
	CO5	Analyze the entire pharmacology (such as definitions, classifications, pharmacokinetics, pharmacodynamics, mechanisms of actions, pharmacological actions, adverse drug reactions, drug interactions contraindications, doses and uses) acting on respiratory system
	CO6	To understand the importance of hormones and hormone antagonist, autocoids and and their antagonist.
2.5	**COMMUNITY PHARMACY**	
	CO1	To understand the scope and responsibilities of community pharmacist, community pharmacy management and inventory control methods.
	CO2	To remember the parts of prescription and analyse prescription for medication related problems.
	CO3	To understand the various activities of pharmacist.
	CO4	To understand the methods of health education, health screening techniques and OTC medications.
	CO5	To understand communicable diseases, pathophysiology and methods of treatment

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		of minor ailments.
	CO6	To understand the importance of code of ethics, rational drug use and essential drug concept.
2.6	**PHARMACOTHERAPEUTICS-1-THEORY**	
	CO1	To remember and understand the etiopathogenesis, clinical presentation, pathophysiology of cardiovascular, respiratory, endocrine and opthalmological disorders
	CO2	Analyse and apply the quality use of medicines in the treatment of these diseases
	CO3	Understand and evaluate the stepwise management of these diseases including reference to the latest available evidences.
	CO4	To analyze controversies in drug therapy.
	CO5	To Understand the effective use of non-pharmacological therapeutics interventions in the management of specified diseases.
	CO6	To understand and apply the importance of rational drug therapy and prescribing guidelines for different age groups
	PHARMACOTHERAPEUTICS-1-PRACTICAL	
	CO1	Students will be develop patient case based assessment skills
	CO2	To apply and analyze SOAP format for case presentation
	CO3	To understand and apply clinical skills in the therapeutic management of diseases
	CO4	To develop communication skills
	CO5	To apply desired pharmacotherapeutics outcome for each drug and disease related problems.
	CO6	To justify the rationality of prescription
	THIRD YEAR	
3.1	**PHARMACOLOGY-II-THEORY**	
	CO1	Remember the entire pharmacology (such as definitions, classifications, pharmacokinetics, pharmacodynamics, mechanisms of actions, pharmacological actions, adverse drug reactions, drug interactions, contraindications, doses and uses) acting on blood and blood forming agents
	CO2	Understand the entire pharmacology (such as definitions, classifications, pharmacokinetics, pharmacodynamics, mechanisms of actions, pharmacological actions, adverse drug reactions, drug interactions contraindications, doses and uses) acting on renal system
	CO3	To apply the mechanism of action of antimicrobial drugs and chemotherapy of various infectious diseases. And executing how drugs act in our body at organ system, sub cellular and macromolecular levels.
	CO4	Analyze the knowledge gained through understanding of the immunopharmacology which relates to therapies of immunosuppressants and immunostimulants
	CO5	Evaluate the principles of animal toxicology about acute, sub-acute and chronic toxicity studies
	CO6	Create the importance of dynamic cell and genes structures and functions in detailed explanation
	PHARMACOLOGY-II-PRACTICAL	
	CO1	Demonstrating and remembering the common laboratory animal, animal handling, physiological salt solutions, laboratory anesthetics
	CO2	Understand the design, principles and working of the commonly used instruments in experimental pharmacology like actophotometer, eddy's hot plate, convulsiometer, rotarod apparatus, pole climbing apparatus, plethysmometer etc

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	CO3	Perform and apply the different types of bioassays using isolated tissues (including dose response curve, agonist, antagonist, matching, interpolation, three point bioassay) and learn more about the responses of various drugs.
	CO4	Analyze the technique and importance of biological screening methods like locomotor activity, analgesic activity, anticonvulsant activity, skeletal muscle relaxant activity and antiulcer activity etc.
	CO5	Evaluate the various routes of administration of drugs in animals (rats, mice and rabbits)
	CO6	Perform the common pharmacological experiments done by Expharm and Xcology softwares.
3.2	**PHARMACEUTICAL ANALYSIS-THEORY**	
	CO1	To evaluate various analytical techniques in the context of qualitative and quantitative analysis of drugs
	CO2	To understand theory and application of most common methods of pharmaceutical analysis in research, academic and industry.
	CO3	To apply the principles of chromatography in qualitative and quantitative analysis of pharmaceuticals in research and industrial perspective
	CO4	To apply the knowledge of spectroscopy in the elucidation of molecular structure and the interpretation of the result.
	CO5	To evaluate the scope of various quality assuring parameters for the reliable analytical testing and documentation
	CO6	Remember the concepts of total quality management, quality validation methods and quality review
	PHARMACEUTICAL ANALYSIS-PRACTICAL	
	CO1	Students aquire knowledge to operate and handle instruments such as UV-visible and IR spectrophotometer to obtain the spectra of a given sample
	CO2	Students can analyse spectra of UV-visible, IR, NMR and Mass to identity the given compound
	CO3	Students can evaluate the correlation of spectral data with chemical structure
	CO4	Analyse the quantity of a drug in a given mixture or solution
	CO5	Students can apply planned experiments and prepare laboratory report in a standard format
	CO6	Analyse compounds using electrochemical analytical methods
3.3	**PHARMACOTHERAPEUTICS-II-THEORY**	
	CO1	To understand the pathophysiology of selected disease states
	CO2	To evaluate the rationale for drug therapy
	CO3	To analyze the therapeutic approach to management of these diseases;
	CO4	To analyze the controversies in drug therapy;
	CO5	To understand the importance of preparation of individualised therapeutic plans based on diagnosis
	CO6	To evaluate the needs to identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time course of clinical and laboratory indices of therapeutic response and adverse effects).
	PHARMACOTHERAPEUTICS-II-PRACTICAL	
	CO1	To understand the efficacy of prescription
	CO2	To analyze your case presentation skills using the SOAP format
	CO3	To create clinical abilities in the therapeutic management of diseases

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	CO4	To create skills for communication
	CO5	To understand desired pharmacotherapeutics outcome for disease and drug related problems.
	CO6	To analyze patient case based assessment skills
3.4	**PHARMACEUTICAL JURISPRUDENCE**	
	CO1	To understand knowledge on practice of the professional ethics, pharmaceutical legislation existing in India
	CO2	To understand and apply knowledge in drug and cosmetic act and rules, including labelling guidelines and schedules from A to Z
	CO3	To understand fixing of drug price by DPCO, drug policy, essential commodities act and patent and design act.
	CO4	To understand knowledge of bonded and non-bonded laboratory and warehousing
	CO5	To understand the roles and responsibilities of various act under Indian penal code like Pharmacy act,NDPS act, Prevention of cruelty to animals act, Drugs and magic remedies act and its rules
	CO6	To understand and analyse about prescription and non-prescription products and different national funds
3.5	**MEDICINAL CHEMISTRY-THEORY**	
	CO1	To understand the concept of drug design ,QSAR.
	CO2	To analyse and apply combinatorial chemistry and CADD
	CO3	To understand the students to learn the concept of antisense molecule
	CO4	To understand the development of different classes of drugs including their SAR and mechanism of action.
	CO5	To evaluate the process involved in synthesis of important compounds with their chemical nomenclature
	CO6	To understand and anlayse the important marketed product and their side effects.
	MEDICINAL CHEMISTRY-PRACTICAL	
	CO1	To evaluate the students to perform assay of important drugs.
	CO2	To evaluate and synthesize medicinally important compound
	CO3	To understand monograph analysis of important drugs
	CO4	To evaluate the partition coefficient,dissociation constant and molar refractivity for QSAR analysis.
3.6	**PHARMACEUTICAL FORMULATIONS-THEORY**	
	CO1	Understand the concept of various dosage forms,
	CO2	Understand and evaluate formulation of solid dosage forms like tablets and capsules and liquid dosage forms and apply these principles in the manufacture of solid dosage forms.
	CO3	Understand and evaluate formulation and evaluation of parenteral and ophthalmic preparations and apply these principles in the manufacture of drugs in aseptic condition.
	CO4	Understand and evaluate the formulation and evaluation of semi solid dosage forms and apply these information in the manufacture of semisolids
	CO5	Apply the principles of controlled drug delivery in the design of novel drug delivery systems and to evaluate their effectiveness
	PHARMACEUTICAL FORMULATIONS-PRACTICAL	
	CO1	Apply the basic knowledge in the formulation of various types of tablets and hard gelatin capsules.
	CO2	Apply the basic knowledge in the formulation of parenterals

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	CO3	Evaluate different dosage forms by performing various quality control tests
	CO4	Apply knowledge in the formulation of various liquid and semisolid dosage forms
	CO5	Apply their knowledge in the formulation of various cosmetics
	FOURTH YEAR	
4.1	**PHARMACOTHERAPEUTICS-III-THEORY**	
	CO1	Understand the disease conditions and drug therapy, and ability to apply the drug knowledge on preparation of patient specific pharmacotherapeutic plan for gastrointestinal system diseases.
	CO2	Understand the disease conditions and drug therapy, and ability to apply the drug knowledge on preparation of patient specific pharmacotherapeutic plan for haematological diseases.
	CO3	Understand the disease conditions and drug therapy, and ability to apply the drug knowledge on preparation of patient specific pharmacotherapeutic plan for pain and nervous system diseases.
	CO4	Understand the disease conditions and drug therapy, and ability to apply the drug knowledge on preparation of patient specific pharmacotherapeutic plan for psychiatric disorders.
	CO5	Understand the disease conditions and drug therapy, and ability to apply the drug knowledge on preparation of patient specific pharmacotherapeutic plan for various types of pain.
	CO6	To apply the ability to answer the drug queries based on best available evidence, clinical expertise on the preparation and process of EBM and decision making on patient management.
	PHARMACOTHERAPEUTICS-III-PRACTICAL	
	CO1	Understand the principles and practise involved in ward round participation
	CO2	To apply the knowledge on participating in clinical discussion for selection of best drug therapy
	CO3	To evaluate non pharmacological treatments available for disease conditions
	CO4	To apply the knowledge in patient counselling to particular disease condition
	CO5	Evaluation and Presentation of the observed medical cases
	CO6	Analyse and monitor the prescription for any errors and rectification of them
4.2	**HOSPITAL PHARMACY-THEORY**	
	CO1	Create a Knowledge on hospital pharmacy, drug committees &policies of hospital
	CO2	To understand the various inventory control techniques& drug distribution methods
	CO3	To create a knowledge on various hospital pharmacy services such as drug distribution ,handling of narcotics and CSSR
	CO4	To analyse the professional practice management skills of hospital pharmacists
	CO5	Understand role of pharmacist in education & training programs
	CO6	To apply the knowledge on manufacturing practices of pharmaceutical formulations in hospital set up and handling radiopharmaceuticals
	HOSPITAL PHARMACY-PRACTICAL	
	CO1	Understand and assess the drug interaction in prescriptions.
	CO2	Apply knowledge on manufacturing of parenteral preparations and powders
	CO3	Analyse and perform the inventory control in the hospital pharmacy
	CO4	Apply knowledge on answering drug information queries in a systematic unbiased manner
	CO5	Create and development of hospital formulary

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	CO6	Apply a design and management of hospital pharmacy department
4.3	**CLINICAL PHARMACY-THEORY**	
	CO1	To evaluate drug therapy of patient through medication chart review and clinical review
	CO2	To analyze medication history interview and counsel the patients
	CO3	Identify and resolve drug related problems
	CO4	Detect, assess and monitor adverse drug reaction
	CO5	Interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states
	CO6	Retrieve, analyse, interpret and formulate drug or medicine information
	CLINICAL PHARMACY-PRACTICAL	
	CO1	To understand the procedure involved in answering a drug information query.
	CO2	To understand and perform counselling related to disease and medication.
	CO3	To analyse and draw out conclusion from laboratory investigation.
	CO4	To execute patient medication history interview.
4.4	**BIOSTATISTICS AND RESEARCH METHODOLOGY**	
	CO1	To apply research designs appropriate to research aims and objectives along with the limitation of particular research methods
	CO2	Help students in framing useful research questions. Research designs, data collection, analysis
	CO3	To understand how to present research data and write the research report
	CO4	To understand how statistical techniques are incorporated in the analysis of medical research data
	CO5	To integrate and apply efficiently the different statistical software
	CO6	To understand the importance of computers in hospital and community pharmacy
4.5	**BIOPHARMACEUTICS AND PHARMACOKINETICS-THEORY**	
	CO1	Understand and apply the basic concepts in ADME and the mechanisms and factors affecting the processes of drug absorption and drug distribution to derive the pharmacokinetic parameters to describe the processes.
	CO2	Understand the concept of drug elimination and apply the knowledge to describe parameters like clearance and extraction ratio and to design dosage regimen in patients with renal impairment.
	CO3	Understand about the theory of compartmental pharmacokinetics and analyze the plasma or urine data to derive and describe pharmacokinetic parameters
	CO4	Understand about the theory of multicompartment models and multiple dosage regimens to analyze and describe pharmacokinetic parameters
	CO5	Understand the basic knowledge about bioavailability and bio equivalency to design and analyze drug product equivalency studies
	BIOPHARMACEUTICS AND PHARMACOKINETICS-PRACTICAL	
	CO1	Apply theoretical knowledge of partition coefficient of a drug in physiologic drug absorption to experimental performance.
	CO2	Evaluate *in-vitro* diffusion pattern of drugs through different membranes to provide deeper understanding about mechanism of physiologic drug absorption.
	CO3	Evaluate protein binding through parameters derived from in vitro protein binding studies.
	CO4	Evaluate *in-situ* drug absorption through animal models to have a deeper understanding of in-vivo drug absorption

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	CO5	Apply plasma and urine data in theoretical compartmental equations to analyze pharmacokinetic parameters
4.6	**CLINICAL TOXICOLOGY**	
	CO1	To understand the basic toxicological knowledge in the general principles involved in the management of poisoning, prevention and treatment of various poisoning
	CO2	To evaluate the normal pharmacological effects and toxicological effects of various drugs.
	CO3	To analyze the clinical symptoms of various poisoning and over dosage of drugs.
	CO4	To apply the case with basic first aids, and appropriate antidotes based upon the poisoning case.
	CO5	To understand the pharmacological actions, mechanism of various antidotes and its relevance in the treatment of different poisoning.
	CO6	To evaluate the toxicokinetic study
	FIFTH YEAR	
5.1	**CLINICAL RESEARCH**	
	CO1	To understand various approaches to drug discovery like pharmacological, toxicological, IND application drug characterisation and dosage forms.
	CO2	To remember different phases of clinical trials, post marketing surveillance, abbreviated new drug application and its submission.
	CO3	ICH, GCP and CDSCO guidelines and its implementation, ethics in clinical research, IRB/IEC committees and its function.
	CO4	To evaluate the roles and responsibilities of biomedical research persons.
	CO5	To analyze how to prepare informed consent, documentation of clinical study and safety monitoring.
5.2	**PHARMACOEPIDEMIOLOGY AND PHARMACOECONOMICS**	
	CO1	To understand pharmacoepidemiological models and their applications in health care research
	CO2	To compare outcomes of drug use and the risk in pharmacoepidemiology
	CO3	To understand the fundamental principles of pharmacoeconomics and its methods.
	CO4	To investigate pharmacoeconomics analysis of various pharmaceutical products.
5.3	**CLINICAL PHARMACOKINETICS AND PHARMACOTHERAPEUTIC DRUG MONITORING**	
	CO1	To apply the concepts of pharmacokinetics to individualize the drug dosage regimen in clinical settings
	CO2	To design a dosage regimen of a drug based on its route of administration
	CO3	To design and implement pharmacokinetic services such as intravenous to Oral conversion of dosage regimens and Therapeutic Drug Monitoring Services
	CO4	To understand about the significance of altered pharmacokinetics, pharmacogenetics and pharmacometrics.
	CO5	To apply the dosage regimen for patients with renal / hepatic impairments
	CO6	To understand the drug interaction issues in the clinical settings

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Approved by Pharmacy Council of India, AICTE, DME & Govt of Kerala
Affiliated to Kerala University of Health Sciences, Accredited by NBA

COURSE OUTCOME OF PHARM D PB

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KMCT Medical College Campus, Manassery, P.O, Mukkam Ph:-04952297440,Email:-pharmacy@kmct.edu.in,www.nationalcollegeofpharmacy.org

	COURSE OUTCOMES	
	PHARM D PB	
	FIRST YEAR	
1.1	**PHARMACOTHERAPEUTICS I & II-THEORY**	
	CO1	Understand the pathophysiology, clinical manifestations and management of common diseases associated with different systems of human body.
	CO2	Understand the therapeutic approach to the management of the diseases based on latest guidelines.
	CO3	Understand the guidelines for rational use of antibiotics.
	CO4	Understand the role of pharmacist in essential drug concept and rational drug use.
	CO5	Understand the basic principle of cancer and to know cancer chemotherapeutic agents.
	CO6	Understand the general prescribing guidelines for special population such as geriatrics, paediatrics, pregnancy and lactating women.
	PHARMACOTHERAPEUTICS I & II -PRACTICAL	
	CO1	To understand and develop patient case based assessment skill.
	CO2	Develop case presentation skill in SOAP format.
	CO3	Develop clinical skill in therapeutic management of diseases.
	CO4	To understand and justify the treatment plan.
	CO5	Understand the importance of ward round participation. Able to describe the quality use of medicines.
1.2	**PHARMACOTHERAPEUTICS-III-THEORY**	
	CO1	Understand the disease conditions and drug therapy, and ability to apply the drug knowledge on preparation of patient specific pharmacotherapeutic plan for gastrointestinal system diseases.
	CO2	Understand the disease conditions and drug therapy, and ability to apply the drug knowledge on preparation of patient specific pharmacotherapeutic plan for haematological diseases.
	CO3	Understand the disease conditions and drug therapy, and ability to apply the drug knowledge on preparation of patient specific pharmacotherapeutic plan for pain and nervous system diseases.
	CO4	Understand the disease conditions and drug therapy, and ability to apply the drug knowledge on preparation of patient specific pharmacotherapeutic plan for psychiatric disorders.
	CO5	Understand the disease conditions and drug therapy, and ability to apply the drug knowledge on preparation of patient specific pharmacotherapeutic plan for various types of pain.
	CO6	To apply the ability to answer the drug queries based on best available evidence, clinical expertise on the preparation and process of EBM and decision making on patient management.
	PHARMACOTHERAPEUTICS-III-PRACTICAL	
	CO1	Understand the principles and practise involved in ward round participation
	CO2	To apply the knowledge on participating in clinical discussion for selection of best drug therapy
	CO3	To evaluate non pharmacological treatments available for disease conditions
	CO4	To apply the knowledge in patient counselling to particular disease condition
	CO5	Evaluation and Presentation of the observed medical cases
	CO6	Analyse and monitor the prescription for any errors and rectification of them

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1.3	**HOSPITAL PHARMACY-THEORY**	
	CO1	Create a Knowledge on hospital pharmacy, drug committees &policies of hospital
	CO2	To understand the various inventory control techniques& drug distribution methods
	CO3	To create a knowledge on various hospital pharmacy services such as drug distribution ,handling of narcotics and CSSR
	CO4	To analyse the professional practice management skills of hospital pharmacists
	CO5	Understand role of pharmacist in education & training programs
	CO6	To apply the knowledge on manufacturing practices of pharmaceutical formulations in hospital set up and handling radiopharmaceuticals
	HOSPITAL PHARMACY-PRACTICAL	
	CO1	Understand and assess the drug interaction in prescriptions.
	CO2	Apply knowledge on manufacturing of parenteral preparations and powders
	CO3	Analyse and perform the inventory control in the hospital pharmacy
	CO4	Apply knowledge on answering drug information queries in a systematic unbiased manner
	CO5	Create and development of hospital formulary
	CO6	Apply a design and management of hospital pharmacy department
1.4	**CLINICAL PHARMACY-THEORY**	
	CO1	To evaluate drug therapy of patient through medication chart review and clinical review
	CO2	To analyze medication history interview and counsel the patients
	CO3	Identify and resolve drug related problems
	CO4	Detect, assess and monitor adverse drug reaction
	CO5	Interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states
	CO6	Retrieve, analyse, interpret and formulate drug or medicine information
	CLINICAL PHARMACY-PRACTICAL	
	CO1	To understand the procedure involved in answering a drug information query.
	CO2	To understand and perform counselling related to disease and medication.
	CO3	To analyse and draw out conclusion from laboratory investigation.
	CO4	To execute patient medication history interview.
1.5	**BIOSTATISTICS AND RESEARCH METHODOLOGY**	
	CO1	To apply research designs appropriate to research aims and objectives along with the limitation of particular research methods
	CO2	Help students in framing useful research questions. Research designs, data collection, analysis
	CO3	To understand how to present research data and write the research report
	CO4	To understand how statistical techniques are incorporated in the analysis of medical research data
	CO5	To integrate and apply efficiently the different statistical software
	CO6	To understand the importance of computers in hospital and community pharmacy
1.6	**BIOPHARMACEUTICS AND PHARMACOKINETICS-THEORY**	
	CO1	Understand and apply the basic concepts in ADME and the mechanisms and factors affecting the processes of drug absorption and drug distribution to derive the pharmacokinetic parameters to describe the processes.

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	CO2	Understand the concept of drug elimination and apply the knowledge to describe parameters like clearance and extraction ratio and to design dosage regimen in patients with renal impairment.
	CO3	Understand about the theory of compartmental pharmacokinetics and analyze the plasma or urine data to derive and describe pharmacokinetic parameters
	CO4	Understand about the theory of multicompartment models and multiple dosage regimens to analyze and describe pharmacokinetic parameters
	CO5	Understand the basic knowledge about bioavailability and bio equivaiency to design and analyze drug product equivalency studies
	BIOPHARMACEUTICS AND PHARMACOKINETICS-PRACTICAL	
	CO1	Apply theoretical knowledge of partition coefficient of a drug in physiologic drug absorption to experimental performance.
	CO2	Evaluate *in-vitro* diffusion pattern of drugs through different membranes to provide deeper understanding about mechanism of physiologic drug absorption.
	CO3	Evaluate protein binding through parameters derived from in vitro protein binding studies.
	CO4	Evaluate *in-situ* drug absorption through animal models to have a deeper understanding of in vivo drug absorption
	CO5	Apply plasma and urine data in theoretical compartmental equations to analyze pharmacokinetic parameters
1.7	**CLINICAL TOXICOLOGY**	
	CO1	To understand the basic toxicological knowledge in the general principles involved in the management of poisoning, prevention and treatment of various poisoning
	CO2	To evaluate the normal pharmacological effects and toxicological effects of various drugs.
	CO3	To analyze the clinical symptoms of various poisoning and over dosage of drugs.
	CO4	To apply the case with basic first aids, and appropriate antidotes based upon the poisoning case.
	CO5	To understand the pharmacological actions, mechanism of various antidotes and its relevance in the treatment of different poisoning.
	CO6	To evaluate the toxicokinetic study
	SECOND YEAR	
2.1	**CLINICAL RESEARCH**	
	CO1	To understand various approaches to drug discovery like pharmacological, toxicological, IND application drug characterisation and dosage forms.
	CO2	To remember different phases of clinical trials, post marketing surveillance, abbreviated new drug application and its submission.
	CO3	ICH, GCP and CDSCO guidelines and its implementation, ethics in clinical research, IRB/IEC committees and its function.
	CO4	To evaluate the roles and responsibilities of biomedical research persons.
	CO5	To analyze how to prepare informed consent, documentation of clinical study and safety monitoring.
2.2	**PHARMACOEPIDEMIOLOGY AND PHARMACOECONOMICS**	
	CO1	To understand pharmacoepidemiological models and their applications in health care research
	CO2	To compare outcomes of drug use and the risk in pharmacoepidemiology
	CO3	To understand the fundamental principles of pharmacoeconomics and its methods.
	CO4	To investigate pharmacoeconomics analysis of various pharmaceutical products.

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2.3	CLINICAL PHARMACOKINETICS AND PHARMACOTHERAPEUTIC DRUG MONITORING	
	CO1	To apply the concepts of pharmacokinetics to individualize the drug dosage regimen in clinical settings
	CO2	To design a dosage regimen of a drug based on its route of administration
	CO3	To design and implement pharmacokinetic services such as intravenous to Oral conversion of dosage regimens and Therapeutic Drug Monitoring Services
	CO4	To understand about the significance of altered pharmacokinetics, pharmacogenetics and pharmacometrics.
	CO5	To apply the dosage regimen for patients with renal / hepatic impairments
	CO6	To understand the drug interaction issues in the clinical settings

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COURSE OUTCOME OF M.PHARM

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COURSE OUTCOMES		
MASTER OF PHARMACY		
M. PHARM - PHARMACEUTICS		
FIRST SEMESTER		
MPT 101T	**MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES**	
	CO1	To understand the basic knowledge on assay of single and multiple component pharmaceuticals by using various analytical instruments. Skills in selecting the suitable techniques for analysis of drugs and pharmaceuticals. To expand the theoretical knowledge on various instrumental techniques available for analysis of organic substances
	CO2	To develop basic practical skills using instrumentation techniques
	CO3	To develop the skills in selecting suitable techniques for analysis of drugs and pharmaceuticals
	CO4	To execute the theoretical knowledge on various instrumental techniques available for analysis of organic substances
MPH 102T	**DRUG DELIVERY SYSTEM**	
	CO1	Understand the principles and fundamentals in development on novel drug delivery systems.
	CO2	Apply the various approaches for development of novel drug delivery systems.
	CO3	Analyze the criteria for selection of drugs and polymers for the development of drug delivery system.
	CO4	Understand the formulation and evaluation of novel drug delivery systems.
MPH 103T	**MODERN PHARMACEUTICS**	
	CO1	Understand the elements of preformulation studies.
	CO2	Understand the optimization techniques in pharmaceutical formulation and processing.
	CO3	Understand and implement the pharmaceutical validation, policies of current good manufacturing practices and concept of total quality management.
	CO4	Understand the physics of tablet compression, dissolution parameters and pharmacokinetic parameter and linearity concept of significance.
MPH 104T	**REGULATORY AFFAIRS**	
	CO1	Understand the concepts of innovator and generic drugs, drug development process, regulatory guidances and guidelines for filing and approval process and documentation in pharmaceutical industry.
	CO2	Apply the principles of preparation of dossiers and their submission to regulatory agencies in different countries.
	CO3	Understand about the post approval regulatory requirements for actives and drug products and submission of global documents in CTD/ eCTD formats.
	CO4	Identify the clinical trials requirements for approvals for conducting clinical trials, pharmacovigilance and process of monitoring in clinical trials.

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MPH 105P	**PHARMACEUTICS PRACTICAL- I**	
	CO1	Analysis of pharmacopoeial compounds and their formulations by UV Visible spectrophotometer/ HPLC/ Gas Chromatography
	CO2	Evaluation of sustained-release formulation
	CO3	Apply the principles of formulation and evaluation of transdermal patches
	CO4	Apply the knowledge in Pre-formulation studies of tablets, effect of compressional force and to plot Heckle plot, Higuchi and Peppa's factors
SECOND SEMESTER		
MPH 201T	**MOLECULAR PHARMACEUTICS (NANOTECH AND TARGETED DDS)**	
	CO1	Understand the basic concepts of targeting and Targeted Drug Delivery Systems.
	CO2	Understand the preparation and evaluation of Micro Capsules / Micro Spheres/ Niosomes, Aquasomes.
	CO3	Understand the preparation and evaluation of Pulmonary Drug Delivery Systems.
	CO4	Understand the preparation and evaluation of Veterinary Drug Delivery Systems.
MPH 202T	**ADVANCED BIOPHARMACEUTICS AND PHARMACOKINETICS**	
	CO1	Understand the basic concepts in biopharmaceutics and pharmacokinetics.
	CO2	Understand the use raw data and derive the pharmacokinetic models and parameters the best describe the process of drug absorption, distribution, metabolism and elimination.
	CO3	Evaluate biopharmaceutic studies involving drug product equivalency.
	CO4	Understand the design and evaluation of dosage regimens of the drugs using pharmacokinetic and biopharmaceutic parameterss and potential clinical pharmacokinetic problems and application of basics of pharmacokinetics.
MPH 203T	**COMPUTER AIDED DRUG DELIVERY SYSTEM**	
	CO1	Understand history of computers in pharmaceutical research and development, to understand the computational modeling of drug disposition.
	CO2	To demonstrate the importance of documentation and to know the importance of computers in preclinical development and optimization techniques in pharmaceutical formulation.
	CO3	Demonstrate the importance of computers in market analysis, clinical development.
	CO4	Understand the concept of Artificial Intelligence (AI) and Robotics, Computational Fluid Dynamics(CFD).
MPH204T	**COSMETICS AND COSMECEUTICALS**	
	CO1	Understand the key ingredients used in cosmetics and cosmeceuticals and building blocks for various formulations.
	CO2	Understand current technologies in the market.
	CO3	Apply the various aspects of cosmetic science for the design of

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		cosmetic products
	CO4	Apply scientific knowledge to ensure desired safety, stability, and efficacy in cosmetics and cosmeceuticals
MPH205P	**PHARMACEUTICS PRACTICAL- II**	
	CO1	Apply the principles of UV Visible spectrophotometry and HPLC in the analysis of pharmacopoeial compounds and their formulations
	CO2	Apply the basic knowledge in the formulation of sustained release tablets and transdermal patches
	CO3	Evaluate release characteristics of sustained-release matrix tablets and transdermal patches
	CO4	Apply the knowledge of pre-formulation studies of tablets, effect of compressional force and to plot Heckle plot, Higuchi and peppa's factors in formulation design.
THIRD SEMESTER		
MRM 301T	**RESEARCH METHODOLOGY AND BIOSTATISTICS**	
	CO1	To understand the overall process of designing a research study from its inception to its report
	CO2	Students will be familiar with conducting a literature review for a scholarly educational study.
	CO3	To understand how statistical techniques are incorporated in the analysis of medical research data and its presentation
	CO4	To understand the basic principles of medical research and ethical issues.
	CO5	To understand CPCSEA guidelines.
	CO6	To understand and apply skills/tools for research report writing, how to publish in journals and to conduct poster, seminar and conference presentation.
M PHARM- PHARMACEUTICAL CHEMISTRY		
FIRST SEMESTER		
MPT 101T	**MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES**	
	CO1	To understand the basic knowledge on assay of single and multiple component pharmaceuticals by using various analytical instruments Skills in selecting the suitable techniques for analysis of drugs and pharmaceuticals. To expand the theoretical knowledge on various instrumental techniques available for analysis of organic substances
	CO2	To develop basic practical skills using instrumentation techniques
	CO3	To develop the Skills in selecting suitable techniques for analysis of drugs and pharmaceuticals
	CO4	To execute the theoretical knowledge on various instrumental techniques available for analysis of organic substances
MPC 102T	**ADVANCED ORGANIC CHEMISTRY - I**	
	CO1	Understand the principles and applications of retrosynthesis
	CO2	Understand and apply the mechanism and applications of named reactions
	CO3	Understand the various catalysts used in organic reactions
	CO4	Understand and apply the chemistry of heterocyclic compounds
MPC 103T	**ADVANCED MEDICINAL CHEMISTRY**	
	CO1	Remember and understand different stages of drug

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	CO2	Apply and analyse the role of medicinal chemistry in drug research
	CO3	Apply and evaluate different techniques for drug discovery
	CO4	Evaluate and create various strategies for design and development of drug like molecules
MPC 104T	**CHEMISTRY OF NATURAL PRODUCTS**	
	CO1	Understand and apply different types of natural compounds and their chemistry and the importance of natural compounds as lead molecules for new drugs
	CO2	Remember and understand general methods of structural elucidation of compounds
	CO3	Understand the concept of rDNA technology tool for new drug discovery
	CO4	Analyse and evaluate isolation, purification and characterization of simple chemical original constituents from natural source
MPC 105P	**PHARMACEUTICAL CHEMISTRY PRACTICAL-I**	
	CO1	Analyse and evaluate interpretation of the NMR, Mass and IR spectra of various organic compounds.
	CO2	Apply the theoretical and practical skills of the hyphenated instruments.
	CO3	To Analyse and evaluate organic compounds.
	CO4	To execute the reactions of synthetic importance
SECOND SEMESTER		
MPC 201T	**ADVANCED SPECTRAL ANALYSIS**	
	CO1	Analyse the interpretation of NMR, Mass and IR spectra of various organic compounds.
	CO2	To apply theoretical and practical skills of the hyphenated instruments.
	CO3	To analyse and evaluate organic compounds.
	CO4	To understand thermal methods of analysis.
MPC 202T	**ADVANCED ORGANIC CHEMISTRY – II**	
	CO1	Remember and understand the principles and applications of green chemistry.
	CO2	Understand and apply the concept of peptide chemistry.
	CO3	Remember and understand the various catalysts used in organic reactions.
	CO4	Remember and understand the concept of stereochemistry and asymmetric synthesis.
MPC 203T	**COMPUTER AIDED DRUG DESIGN**	
	CO1	Understand the role of CADD in drug discovery.
	CO2	Apply and analyse different CADD techniques and their applications.
	CO3	Evaluate and create various strategies to design and develop new drug like molecules.
	CO4	Evaluate and create new drug like molecules using molecular modeling software .
	CO5	Understand and apply the in-silico virtual screening protocols.
MPC 204T	**PHARMACEUTICAL PROCESS CHEMISTRY**	
	CO1	Understand the strategies of scale up process of API's and

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		intermediates.
	CO2	Understand and apply the various unit operations and various reactions in process chemistry.
	CO3	Understand industrial safety measures
	CO4	Understand reaction progress kinetic analysis
MPC 205P	**PHARMACEUTICAL CHEMISTRY PRACTICAL-II**	
	CO1	Create organic compounds by adapting different approaches involving reduction/hydrogenation/ nitration
	CO2	Understand regulatory requirements in API
	CO3	Apply and analyse interpretation of organic compounds by FT-IR/ NMR/MS
	CO4	Execute the preparation of organic compounds
THIRD SEMESTER		
MRM 301T	**RESEARCH METHEDOLOGY AND BIOSTATISTICS**	
	CO1	To understand the overall process of designing a research study from its inception to its report
	CO2	Students will be familiar with conducting a literature review for a scholarly educational study.
	CO3	To understand how statistical techniques are incorporated in the analysis of medical research data and its presentation
	CO4	To understand the basic principles of medical research and ethical issues.
	CO5	To understand CPCSEA guidelines.
	CO6	To understand and apply skills/tools for research report writing, how to publish in journals and to conduct poster, seminar and conference presentation.
M. PHARM- PHARMACEUTICAL ANALYSIS		
FIRST SEMESTER		
MPT 101T	**MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES**	
	CO1	To understand the basic knowledge on assay of single and multiple component pharmaceuticals by using various analytical instruments Skills in selecting the suitable techniques for analysis of drugs and pharmaceuticals. To expand the theoretical knowledge on various instrumental techniques available for analysis of organic substances
	CO2	To develop basic practical skills using instrumentation techniques
	CO3	To develop the Skills in selecting suitable techniques for analysis of drugs and pharmaceuticals
	CO4	To execute the theoretical knowledge on various instrumental techniques available for analysis of organic substances
MPA 102T	**ADVANCED PHARMACEUTICAL ANALYSIS**	
	CO1	To execute the knowledge in hyphenated instruments
	CO2	To apply the Knowledge of interpretation of the NMR,Mass and IR spectra
	CO3	To operate the analytical instruments
	CO4	To interpret and to identifiy the organic compounds
MPA 103T	**PHARMACEUTICAL VALIDATION**	
	CO1	To understand concepts of calibration, qualification and validation
	CO2	To examine the various manufacturing and laboratory equipment and

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		validation of utility systems
	CO3	To understand the different concepts, processes and documentation of process validation and ICH guidelines regarding analytical method development. To study about USFDA guidelines regarding process validation
	CO4	To understand the concept of cleaning validation and computerized system validation
MPA 104T	**FOOD ANALYSIS**	
	CO1	To understand various analytical techniques in the determination of food constituents.
	CO2	To execute the analytical techniques in the determination of food additives.
	CO3	To understand the analytical techniques in the determination of finished food products
	CO4	To select the various analytical techniques in the determination of pesticides in food
MPA 105P	**PHARMACEUTICAL ANALYSIS PRACTICAL-I**	
	CO1	To interpret the pharmacopeial compounds and their formulation by UV/HPLC
	CO2	To analyse the different constituents, additives and preservatives in food products
	CO3	To Analyse and perform assay of compounds by titration and instrumental techniques
	CO4	To understand the calibration of analytical instruments and glass wares
SECOND SEMESTER		
MPA 201T	**ADVANCED INSTRUMENTAL ANALYSIS**	
	CO1	To understand and to interpret pattern for the organic substances
	CO2	To understand the theoretical aspects of the HPLC and GC techniques
	CO3	To analyse the practical aspects and troubleshooting techniques for HPLC and GC techniques
	CO4	To apply the knowledge and skills in advanced instrumentation techniques for drug analysis
MPA 202T	**MODERN BIO-ANALYTICAL TECHNIQUES**	
	CO1	To undersstand and study on extraction of drugs and metabolites from biological matrices. Study on bioanalytical method validation.
	CO2	To evaluate the bioavailability, their dissolution study, biopharmaceutics classification and permeability
	CO3	To understand and to study on pharmacokinetics and knowledge in cell culture
	CO4	To understand on metabolite identification including RLM,HLM.In vitro and In vivo studies including bioavailability and bioequivalence studies
MPA 203T	**QUALITY CONTROL AND QUALITY ASSURANCE**	
	CO1	To understand the cGMP aspects in a pharmaceutical industry
	CO2	To execute the importance of documentation in Pharmaceutical industries
	CO3	To understand the scope of quality certifications applicable to

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		Pharmaceutical industries
	CO4	To understand the responsibilities of QA & QC departments
MPA 204T	**HERBAL AND COSMETIC ANALYSIS**	
	CO1	To understand the determination of herbal remedies
	CO2	To understand various analytical techniques in the determination of herbal products
	CO3	To understand various herbal regulations
	CO4	To understand the herbal monographs
MPA 205P	**PHARMACEUTICAL ANALYSIS PRACTICAL-II**	
	CO1	To Analysis of pharmacopoeial compounds and their formulation by UV/HPLC
	CO2	To analyse different constituents, addictives and preservatives in food products
	CO3	To understand highly sensitive analytical procedures using sophisticated instruments and interpret the data scientifically.
	CO4	To execute and perform calibration of analytical instruments and glass wares
THIRD SEMESTER		
MRM 301T	**RESEARCH METHODOLOGY AND BIOSTATISTICS**	
	CO1	To understand the overall process of designing a research study from its inception to its report
	CO2	Students will be familiar with conducting a literature review for a scholarly educational study.
	CO3	To understand how statistical techniques are incorporated in the analysis of medical research data and its presentation
	CO4	To understand the basic principles of medical research and ethical issues.
	C05	To understand CPCSEA guidelines.
	C06	To understand and apply skills/tools for research report writing, how to publish in journals and to conduct poster, seminar and conference presentation.
M.PHARM- PHARMACY PRACTICE		
FIRST SEMESTER		
MPP 101T	**CLINICAL PHARMACY PRACTICE**	
	CO1	To evaluate drug therapy of patient through medication chart review and clinical review
	CO2	To analyze medication history interview and counsel the patients
	CO3	Identify and resolve drug related problems
	CO4	Detect, assess and monitor adverse drug reaction
	CO5	Interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states
	CO6	Retrieve, analyse, interpret and formulate drug or medicine information
MPP 102T	**PHARMACOTHERAPEUTICS-I**	
	CO1	To describe and explain the rationale for drug therapy and summarize the therapeutic approach for management of various disease conditions including reference to the latest available

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		evidence.
	CO2	To discuss the clinical controversies in drug therapy and evidence based medicine.
	CO3	Prepare individualized therapeutic plans based on diagnosis.
	CO4	Identify the patient specific parameters relevant in initiating drug therapy, monitoring therapy (including alternatives,time course of clinical and laboratory indices of therapeutic response and adverse effect/s).
MPP 103T	**HOSPITAL AND COMMUNITY PHARMACY**	
	CO1	To understand the organizational structure of hospital pharmacy.
	CO2	To know about drug policy and drug committees.
	CO3	Know about drug procurement and drug distribution practices including radiopharmaceuticals.
	CO4	To understand the community pharmacy management and it's value added services.
MPP 104T	**CLINICAL RESEARCH**	
	CO1	To know the new drug development process.
	CO2	Understanding of the regulatory and ethical requirements.
	CO3	Appreciate and conduct the clinical trials activities
	CO4	To know safety monitoring and reporting in clinical trials and to manage the trial coordination process
MPP105 P	**PHARMACY PRACTICE PRACTICAL-I**	
	CO1	Understand the elements of pharmaceutical care and provide comprehensive patient care services.
	CO2	Understand and perform various activities of a clinical pharmacist.
	CO3	Identify the patient specific parameters relevant in initiating drug therapy and monitoring therapy.
	CO4	Understand concepts of clinical research and to design study protocol & informed consent form.
SECOND SEMESTER		
MPP 201T	**PRINCIPLES OF QUALITY USE OF MEDICINES**	
	CO1	To understand the principles of quality use of medicines and to know the benefits and risks associated with use of medicines
	CO2	To understand regulatory aspects of quality use of medicines
	CO3	To identify and resolve medication related problems
	CO4	To practice evidence-based medicines by promoting quality use of medicines
MPP 202T	**PHARMACOTHERAPEUTICS II**	
	CO1	To summarize the therapeutic approach for management of various disease conditions including reference to the latest available evidence
	CO2	To discuss the clinical controversies in drug therapy and evidence based medicine
	CO3	To prepare individualized therapeutic plans based on diagnosis
	CO4	To identify the patient specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effect/s)

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MPP 203T	**CLINICAL PHARMACOKINETICS AND THERAPEUTIC DRUG MONITORING**	
	CO1	Design the drug dosage regimen for individual patient.
	CO2	To interpret and correlate plasma drug concentration with therapeutic outcomes.
	CO3	Recommend dosage adjustment for renal and hepatic failure patients.
	CO4	To understand the genetic polymorphism of individuals on pharmacokinetics and pharmacodynamics of drugs.
MPP 204T	**PHARMACOEPIDEMIOLOGY & PHARMACOECONOMICS**	
	CO1	To understand pharmacoepidemiological models and their applications in health care research
	CO2	To compare outcomes of drug use and the risk in pharmacoepidemiology
	CO3	To understand the fundamental principles of pharmacoeconomics and its methods.
	CO4	To investigate pharmacoeconomics analysis of various pharmaceutical products.
MPP 205P	**PHARMACY PRACTICE PRACTICAL – II**	
	CO1	To understand and perform various activities of clinical pharmacist.
	CO2	To understand the elements of pharmaceutical care and provide comprehensive patient care services.
	CO3	To interpret and calculate various pharmacokinetic parameters.
	CO4	To understand and apply the concept of pharmacoeconomics in to practice.
	THIRD SEMESTER	
MRM 301T	**RESEARCH METHODOLOGY AND BIOSTATISTICS**	
	CO1	To understand the overall process of designing a research study from its inception to its report
	CO2	Students will be familiar with conducting a literature review for a scholarly educational study.
	CO3	To understand how statistical techniques are incorporated in the analysis of medical research data and its presentation
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	CO5	To understand CPCSEA guidelines.
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