



Viswambhara Educational Society

VAAGDEVI PHARMACY COLLEGE

Approved by AICTE, PCI-New Delhi & Affiliated to JNTUH
P.O.BOLLIKUNTA, WARANGAL-506 005(Telangana State)

COURSE OUTCOMES (COs)

The learning objectives for the programmes and courses are spelled out in detail by the college. The institution uses the following approach to inform teachers and students about the learning outcomes. For the convenience of the teachers and students, hard copies of the syllabus and learning outcomes are available in the departments. The Program and Course Learning Outcomes are displayed on the walls outside of each Department. For reference, a soft copy of each program's curriculum and learning outcomes is also uploaded on the institution's website. Every IQAC meeting and College Committee meeting has discussed the importance of the learning outcomes with the teachers. Through tutorial meetings, the pupils are also made aware of the same.

PROGRAMME OUTCOMES (POs)

- 1. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the Profession of Pharmacy, including biomedical sciences; Pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.
- 2. 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.
- 3. 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.
- 4. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.
- 5. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well-being.



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6. **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).
7. **Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.
8. **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.
9. **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.
10. **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.
11. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in dependent and life-long learning in the broadest context of technological change




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YEAR: I

ACADEMIC YEAR 2022-23

SEMESTER: I

REGULATION: R22

Course Name: Human Anatomy and Physiology I

Course Code: PS101

CO-1	Identify common vocabulary, cell structure and function, and the histology of various tissues and organs of various human body systems.
CO-2	Understand the concepts and knowledge of gross anatomy, and physiology related to the integumentary, skeletal, muscular and its articulation.
CO-3	Apply concepts of nervous systems and its coordination.
CO-4	Analyze the sense organs mechanism and their disorders.
CO-5	Classify and identify principal hormones and their function.

Course Name: Pharmaceutical Analysis I

Course Code: PS102

CO-1	Develop the ideas with the fundamentals of analytical Chemistry.
CO-2	Construct the fundamental methodology to prepare different strength of solutions and can Predict the sources of Errors.
CO-3	Develop Knowledge on Principle, Classification and applications of different types of titrimetric methods.
CO-4	Develop basic knowledge in the principles of electrochemical analytical techniques.
CO-5	Develop interpretation Skills in terms of choice of analytical techniques to perform the estimation of different category drugs.

Course Name: Pharmaceutics I

Course Code: PS103

CO-1	Summarize the history of pharmacy and list the pharmacopeias along with their features.
CO-2	Utilize the pharmaceutical calculations for formulating and dispensing various dosage forms.
CO-3	Define various pharmaceutical dosage forms along with its formulations and methods of preparations.
CO-4	Inspect the physical, chemical and therapeutic incompatibilities for preparation and dispensing. List out code of ethics.
CO-5	Explain where pharmaceutical additives are used and classify them.



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Course Name: Pharmaceutical Inorganic Chemistry-I

Course Code: PS104

CO-1	DEFINE terminology related to pharmacopoeia and impurities.
CO-2	OUTLINE buffers, methods of tonicity, electrolytes and dental products.
CO-3	UTILIZE the knowledge of gastrointestinal agents
CO-4	EXAMINE the assay and medicinal uses of some miscellaneous compound.
CO-5	EVALUATE activity and properties of radiopharmaceuticals

Course Name: Communication skills

Course Code: HS105

CO-1	Develops language skills like listening, speaking, reading and writing
CO-2	Organize and deliver discussions, presentations effectively with proper syntax.
CO-3	Apply their skills in interviews or in Group Discussions
CO-4	Adapts good pronunciation, good communicative styles.
CO-5	Plan their presentations and seminars in an organized manner

Course Name: Remedial Biology

Course Code: BS106

CO-1	Explain the Cell biology (Basic Nature of Plant cell and Animal cell)
CO-2	Classify the System of both Plants & Animals
CO-3	Discuss various tissue system and organ system in plant and animals
CO-4	Explain the theory of evolution
CO-5	Demonstrate the Anatomy and Physiology of plants and animals



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Course Name: Remedial Mathematics

Course Code: BS107

CO-1	Apply the basic knowledge of algebra to apply in Pharmaceutical Sciences when they require in higher studies
CO-2	Apply the basics of trigonometry and co-ordinate geometry to solve simple problems and use the knowledge in pharmaceutical calculations
CO-3	Understand and apply basic differential equations to solve the problems errors and approximations which arises in Pharmaceutical Sciences
CO-4	Use the knowledge of integral calculus to find the areas and apply the knowledge in Pharmaceutical Sciences accurately.
CO-5	Identify the types of differential equation and use the right method to solve and also apply the knowledge in Pharmaceutical Sciences

Course Name: Human Anatomy and Physiology-I lab

Course Code: PS108

CO-1	Identify the major tissue types and locate examples of each in the body.
CO-2	Describe the different types of bones and provide an example of each type.
CO-3	Locate and identify anatomical structures that surround and protect the brain.
CO-4	Locate and identify anatomical structures of the special senses.
CO-5	Describe the somatic reflex arc.

Course Name: Pharmaceutical Analysis-I lab

Course Code: PS109

CO-1	Develop the Calculations of various standardized solutions.
CO-2	Construct the fundamental methodology to prepare different strength of solutions and can Predict the sources of Errors.
CO-3	Develop Knowledge on Principle and assay procedure of various titrimetric methods.
CO-4	Develop basic knowledge in the principles of electrochemical analytical techniques.
CO-5	Develop interpretation Skills in terms of choice of analytical techniques to perform the Qualitative and Quantitative estimation of different category drugs.



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Course Name: Pharmaceutics I lab

Course Code: PS108

CO-1	Demonstrating and practice preparation and dispensing of various dosage forms the dosage forms
CO-2	Identify the incompatibilities in dispensing a pharmaceutical dosage form
CO-3	Evaluate the prescription and estimate the accurate dose using various calculations.
CO-4	Demonstrating and practice preparation and dispensing of various dosage forms the semisolid dosage form
CO-5	Demonstrating and practice preparation and dispensing of various dosage forms the Mouthwashes

Course Name: Pharmaceutical Inorganic Chemistry-I lab

Course Code: PS108

CO-1	Perform Limit test for the various Inorganic compounds as per the procedure given in Indian pharmacopocia
CO-2	Calibrate weights, pipette and burette.
CO-3	Perform assay various inorganic compounds with the help of titrations
CO-4	Identify different inorganic compounds
CO-5	Prepare and purify different inorganic compounds




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Course Name: Communication skills lab

Course Code: HS112

CO-1	Adapts good pronunciation, identifying the correct speech sounds and excel to communicate well in the professional and personal contexts.
CO-2	Creates a consistent accent and builds confidence
CO-3	Identifies the errors in pronunciation and facilitates students in speaking Target language i.e. English without the influence of mother tongue.
CO-4	Demonstrates , public speaking skills with clarity and confidence through appropriate verbal and non verbal communication.
CO-5	Develop the comprehension skills and improves appropriate language for public speaking, group discussions and Interviews.

Course Name: Remedial Biology lab

Course Code: BS113

CO-1	Identify the Cell biology (Basic Nature of Plant cell and Animal cell)
CO-2	Classify the System of both Plants & Animals
CO-3	Isolate various tissue system and organ system in plant and animals
CO-4	Explain the theory of evolution
CO-5	Demonstrate the Anatomy and Physiology of plants and animals




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YEAR: I

SEMESTER: II

REGULATION: R17

Course Name: Human Anatomy and Physiology II

Course Code: PS201

CO-1	Identify the major components of the circulatory system and lymphatic system, describe their functions.
CO-2	Describe the flow of blood through the heart and the role of each atrium, ventricle, and valve in this process.
CO-3	Describe the components and functions of major digestive juices, and explain where they are produced
CO-4	Describe pulmonary ventilation and identify the structures and Identify the major components of the urinary system and describe their functions.
CO-5	Locate and identify the structures that make up the female and male reproductive system.

Course Name: Pharmaceutical Organic Chemistry I

Course Code: PS202

CO-1	Apply the principles of organic chemistry to classify and name organic compounds
CO-2	Identify and distinguish the structural isomers organic compounds
CO-3	Analyse and write the reactions and uses of various organic compounds
CO-4	Discuss the orientation, reactivity and stability of organic compounds
CO-5	Identify and confirm the organic compounds by qualitative tests

Course Name: Biochemistry

Course Code: BS203

CO-1	Define different definitions like enzymes, hemostasis, osmoregulation, carbohydrates, protein, vitamins, lipids, nucleic acids and compare the structure and functions of different organelles.
CO-2	Explain electron transport chain and oxidative phosphorylation, its importance and mechanism of actions.
CO-3	Determine the energetic of various metabolic pathways like glycolysis, ETC, Krebs cycle, β oxidation of fatty acids etc.
CO-4	Classify and explain the different types of enzymes and enzyme inhibitions. Demonstrate the factors effecting enzyme action.
CO-5	Outline the concepts and biological importance of biological macromolecules. Discuss and explain the various metabolisms of complex biochemical macromolecules like carbohydrates,



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Course Name: Pathophysiology

Course Code: BS204

CO-1	DEFINE basic principles of Cell injury and able to explain basic mechanism involved in the process of inflammation
CO-2	OUTLINE the diseases related to cardiovascular, respiratory and renal system.
CO-3	UTILIZE the knowledge in diagnosing the diseases related to haematological diseases and endocrine, nervous and gastrointestinal systems
CO-4	EXPLAIN the etiology of diseases related to bone, joints and pathogenesis of cancer
CO-5	ILLUSTRATE the etiology and pathogenesis of infectious diseases.

Course Name: Computer Applications in Pharmacy

Course Code: CS205

CO-1	Understand the concept of data collection and treatment
CO-2	Apply the knowledge of data collection to find statistical information
CO-3	Understand the concept CRD, RBD and LSD and evaluate to the Design concept.
CO-4	Demonstrate the basic concepts of MS Excel and MS Power Point
CO-5	Analyze benefits of Data base Management systems and Structured Query Languages

Course Name: Human Anatomy and Physiology II lab

Course Code: PS206

CO-1	Describe and Classify the different types of blood cells
CO-2	Review the major steps in blood coagulation.
CO-3	Describe a nephron and explain the functions of its major parts.
CO-4	List the major components of blood plasma and describe the functions of each
CO-5	Define pregnancy and describe the process of fertilization.




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Course Name: Pharmaceutical Organic Chemistry I lab

Course Code: PS207

CO-1	Apply the qualitative analysis principles to analyse organic compound having different functional groups.
CO-2	Identify the unknown organic compound having different functional groups.
CO-3	Explain and understand the principals of qualitative analysis.
CO-4	Demonstrate the laboratory skills to prepare organic compounds.
CO-5	Explain the organic chemistry concepts by constructing the molecular models.

Course Name: Biochemistry lab

Course Code: BS208

CO-1	Identify the Carbohydrates by performing their individual identification tests.
CO-2	Evaluate the Glucose content which is present in Urine.
CO-3	Calculate the percentage of creatinine present in Blood.
CO-4	Identify the proteins by performing their individual identification tests.
CO-5	Identify the Amino acids by performing their individual identification tests.

Course Name: Computer Applications in Pharmacy lab

Course Code: CS209

CO-1	Apply the concept of data collection and treatment
CO-2	Apply the knowledge of data collection to find statistical information
CO-3	Apply the concept CRD, RBD and LSD and evaluate to the Design concept.
CO-4	Demonstrate the basic concepts of MS Excel and MS Power Point
CO-5	Analyze benefits of Data base Management systems and Structured Query Languages

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ACADEMIC YEAR 2022-23

YEAR: II

SEMISTER: I

REGULATION: R17

Course Name: Pharmaceutical Organic chemistry-II

Course Code: PS301

CO-1	Analyse and write the structure, nomenclature, Aromaticity, reactivity and orientation of benzene and its derivatives
CO-2	Interpret and Explain the Acid –base properties of phenols and amines and its substituents
CO-3	Identify the nature and reactions of Fatty acids, Fats-oils and their estimation in analytical constants with significance.
CO-4	write the synthesis, reactions with mechanisms and uses of Polycyclic Aromatic Hydrocarbons
CO-5	Predict the stabilities of cycloalkanes and their reactivity.

Course Name: Physical Pharmaceutics -I

Course Code: PS302

CO-1	DEFINE terminology related to properties of matter.
CO-2	OUTLINE physicochemical properties, complexation and protein binding of drug molecules
CO-3	UTILIZE the knowledge of solubility of drugs in formulation
CO-4	EXAMINE the tonicity of parenteral and ophthalmic preparations.
CO-5	EVALUATE formulation based on its solid state properties

Course Name: Pharmaceutical Microbiology

Course Code: PS303

CO-1	Define pharmaceutical microbiology, pure culture, and able to choose nutrient media for isolation of different microorganisms by using different microscopes
CO-2	Understand staining, preservation and sterilization techniques accordingly they can compare and classify the microorganisms.
CO-3	Develop a new method for cultivation of virus and fungi, they got to know make use of disinfectants and testing of sterilizing agents.
CO-4	Classify clean areas and analyze antimicrobial activity of a new substance
CO-5	Evaluate microbial spoilage of pharmaceutical products and apply self-cultures in pharmaceutical industry



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Course Name: Pharmaceutical Engineering

Course Code: PS304

CO-1	Explain the concepts of fluid flow & describe the phenomenon of size reduction and size separation for effective practices sizing on pharmaceutical field.
CO-2	Outline the concepts of heat transfer mechanisms and summarize the importance of various unit operations used in pharmaceutical industries like evaporation and distillation.
CO-3	Demonstrate the principles and applications of unit operations like drying, mixing filtration and centrifugation.
CO-4	Discuss the various material handling systems, types of corrosion and their preventive methods in pharmaceutical industries.
CO-5	Emphasis on various factors affecting the materials selected for pharmaceutical plant construction.

Course Name: Pharmaceutical Organic chemistry-II Lab

Course Code: PS305

CO-1	apply the basic knowledge of organic chemistry in identification of functional groups and synthesis of organic compounds
CO-2	Analyse and predict the principles of chemical reactions
CO-3	Analyse and interpret the mechanism of chemical reactions
CO-4	apply the concept of moles in calculating theoretical yield
CO-5	calculate and estimate the percentage purity of the compounds synthesised

Course Name: Physical Pharmaceutics Lab

Course Code: PS306

CO-1	Determine the physicochemical properties of pharmaceutical substances
CO-2	Estimate the pH of the fluids
CO-3	Estimate the pH of the liquids
CO-4	Construct phase diagrams
CO-5	Calculate phase diagrams



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Course Name: Pharmaceutical Microbiology Lab

Course Code: BS307

CO-1	Understand various accessories for microbiology practicals.
CO-2	Develop basic skill in aseptic techniques.
CO-3	Perform various staining techniques.
CO-4	Isolate and identify microorganism from laboratory sample.
CO-5	Standard protocols in pharmaceutical industry – IP.

Course Name: Pharmaceutical Engineering Lab

Course Code: PC308

CO-1	Explain Size Analysis By Sieving , Size Reduction Using Ball Mill, Mixing, Distillation
CO-2	Determine Construction Working And Application Of Pharmaceutical Machinery
CO-3	Calculate The Efficiency Of Steam Distillation And Uniformity Index For Given Sample
CO-4	Evaluate Materials Used For Mixing, Drying, Filtration, Centrifugation
CO-5	Demonstration Of Colloid Mill, Planetary Mixer, Fluidized Bed Dryer, Freeze Dryer And Such Other Major Equipment




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YEAR: II

SEMISTER: II

REGULATION: R17

Course Name: Pharmaceutical Organic chemistry-III

Course Code: PS401

CO-1	Apply the concepts of stereochemistry in identifying the chiral and achiral molecules, Racemisation and Resolution of Racemic mixture.
CO-2	Determine the nomenclature and configuration of stereoisomer and conformation of saturated compounds and atropisomerism
CO-3	Interpret the nomenclature and classification of heterocyclic compounds and write the synthesis
CO-4	Compare the reactivity and properties of heterocyclic compounds with uses.
CO-5	Outline and discuss the reaction with its mechanism and Applications of Named reactions and Reagents

Course Name: Medicinal chemistry-I

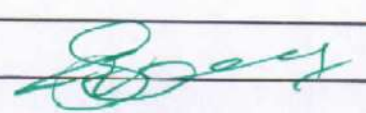
Course Code: PC402

CO-1	Apply the concept of physicochemical properties of drug molecule in relation to biological activity and their phases of metabolism, in the development of New drug
CO-2	Analyze and interpret the nomenclature of compounds of synthetic origin
CO-3	Explain the mechanism of action of various category of drugs
CO-4	Apply the knowledge of medicinal chemistry in the study of Structural activity relationship of drug molecules.
CO-5	Apply the concepts of organic chemistry in the synthesis and development of lead molecules for new drug discovery

Course Name: Physical Pharmaceutics -II

Course Code: PS403

CO-1	Apply mathematical models to determine the rate and order of reaction, shelf life and explain various factors influencing reaction rates
CO-2	Explain and determine interfacial properties of liquids. Explain types and properties of colloidal systems.
CO-3	Estimate the size, shape and surface area of powder
CO-4	Determine the nature of flow of liquids and their measurement
CO-5	Formulate and evaluate suspensions and emulsions.


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Course Name: Pharmacology-I

Course Code: PC404

CO-1	Outline the basic scientific concepts and principles that serve as the foundational underpinnings of the pharmacological sciences including pharmacokinetics, pharmacodynamics, drug metabolism
CO-2	Enumerates about autonomic nervous system and list out different types of drugs used to treat disorders of autonomic nervous system.
CO-3	List and discuss selected drugs used to treat disorders of central nervous system including their clinical uses and potential adverse effects.
CO-4	Explains the pharmacology of NSAIDS, Narcotic analgesics & antagonists, local anaesthetics and drugs acting on various CNS disorders.
CO-5	Understands pharmacology of anti-psychotics, anti-depressants, anti-maniacs, hallucinogens, anti-epileptic and anti-parkinsonian drugs.

Course Name: Pharmacognosy and Phytochemistry-I

Course Code: PC405

CO-1	Define pharmacognosy, classify the crude drugs and explain methods of drug evaluation.
CO-2	Explain the techniques and methods involved in cultivation and collection production of crude drug.
CO-3	Illustrate the plant tissue culture and its applications. brief note on edible vaccines.
CO-4	Explain role of pharmacognosy in traditional system of medicine
CO-5	Study of primary metabolites from natural sources

Course Name: Medicinal Chemistry-I Lab

Course Code: PC406

CO-1	Apply the basic knowledge of organic chemistry in synthesis of medicinal compounds
CO-2	Analyse and predict the principles of chemical reactions
CO-3	Apply and interpret the mechanism of chemical reactions
CO-4	apply the concept of moles in calculating theoretical yield
CO-5	calculate and estimate the percentage purity of the compounds synthesised




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Course Name: Physical Pharmaceutics-II Lab

Course Code: PC407

CO-1	Determine the order of a reaction
CO-2	Analyze the properties of powders
CO-3	Determine the surface phenomena and surfactant properties
CO-4	Construct adsorption isotherms
CO-5	calculation of adsorption isotherms

Course Name: Pharmacology-I Lab

Course Code: PC408

CO-1	Describes about basics of experimental pharmacology
CO-2	Demonstrates usage of animals in experimental pharmacology and gives knowledge about animal handling, routes of drug administration and bleeding techniques.
CO-3	To interpret various drug actions on experimental animals
CO-4	To distinguish <i>in-vitro</i> and <i>in-vivo</i> experiments
CO-5	Understands ethical considerations while housing and handling of experimental animals

Course Name: Pharmacognosy and Phytochemistry-I Lab

Course Code: PC409

CO-1	Describes about essential oil content in Eucalyptus by Clavengres apparatus
CO-2	Demonstrates about extraction procedure of crude drugs
CO-3	To interpret the Rf values of chemical constituents
CO-4	To distinguish about microscopical characters of leaf constituents
CO-5	Understands and differentiate spotting of crude drugs




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Program: Doctor of Pharmacy (Pharm D)

Duration: 6 years

Program Outcomes (PO):

PO Nos.	Program Objective	Program Outcome
PO1	Pharmacy Knowledge	Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.
PO2	Planning Abilities	Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
PO3	Problem analysis	Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information



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		systematically and shall make defensible decisions.
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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).
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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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VAAGDEVI PHARMACY COLLEGE

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COURSE OUTCOMES FIRST YEAR (I/VI)

Course Name: Human Anatomy and Physiology

Course Code: T1101

CO-1	Describe the anatomy and ANATOMY physiology of various organs of AND the human body
CO-2	Describe the various homeostatic mechanisms and their imbalances of various Systems
CO-3	Understand and differentiate various tissues and organs of the different systems of the human body
CO-4	Perform the hematological tests and also record blood pressure, heart rate, pulse and Respiratory volumes
CO-5	Understand coordinated K4 working pattern of different organs of each system
CO-6	Appreciate the interlinked K4 mechanisms in homeostasis of human body

Course Name: Pharmaceutics

Course Code: T1102

CO-1	Classify and define different types of dosage forms, Prescription, parts of prescription, illustrate posology factors
CO-2	Illustrate historical background and development of pharmaceutical industry, development of Indian pharmacopoeia and introduction to other pharmacopoeias, calculate calculations involved in weights and measures.
CO-3	Formulate and differentiate different types of powders, granules, monophasic and biphasic liquid dosage forms
CO-4	Demonstrate the methods of preparation and evaluation of suppositories and Pessaries.
CO-5	Correlate various extraction methods and equipments used in different extraction processes, and perform pharmaceutical calculations.
CO-6	Distinguish various methods to overcome the incompatibilities and Represent different types of surgical aids.

Course Name: Medicinal Biochemistry

Course Code: T1103

CO-1	Illustrate about the biochemical organization and bio energetics, respiratory chain and Oxidative phosphorylation of cell.
CO-2	Illustrate about biochemistry and metabolism of carbohydrates, lipids, proteins, amino acids, nucleic acids.
CO-3	Abstract about the Roll of the clinical chemistry laboratory.
CO-4	Demonstrate the tests for the liver function, kidney function and lipid profile
CO-5	Present the Immunochemical techniques for determination of hormone levels and protein levels in serum.



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CO-6	Illustrate about Body water, compartments, water
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Course Name: Pharmaceutical organic Chemistry

Course Code: T1104

CO-1	Explain the structure and physical properties of organic molecules.
CO-2	Understand the principles of free radical chain reactions of alkanes, nucleophilic aliphatic substitution, and dehydrohalogenation reactions of alkyl halides.
CO-3	Understand the principles of electrophilic aromatic and nucleophilic addition reactions.
CO-4	Appreciate the importance of oxidation, reduction, and named organic reactions.
CO-5	Know the analysis and uses of the official organic compounds
CO-6	Understand, and reproduce the mechanisms of organic reactions in alkenes, and allyl compounds.

Course Name: Pharmaceutical Inorganic Chemistry

Course Code: T1105

CO-1	Under stand the principles and procedures of analysis of drugs and also regarding the application of inorganic pharmaceuticals
CO-2	Know the analysis of the inorganic pharmaceuticals their applications
CO-3	Appreciate the importance of inorganic pharmaceuticals in preventing and curing the disease
CO-4	Enumerate the basics of radioactive compounds and pharmaceutical applications of radioactive substances.
CO-5	Know various gastrointestinal agents like acidifiers, antacids, cathartics, antimicrobials and preparation, assay, properties and medicinal uses of some inorganic compounds of these classes.

Course Name: Remedial Mathematics

Course Code: T1106

CO-1	Solve problems related to matrices & determinants
CO-2	Understand the concepts of analytical geometry in problem solving
CO-3	Solve calculus and differentiation problems
CO-4	Explain rules of integration and apply it to solve given definite integrals
CO-5	Understand differential equation and apply in solving chemical kinetics and pharmacokinetics problems



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Course Name: Remedial Biology

Course Code: T1107

CO-1	Discuss the organization of plants , its inclusion and Plant tissues
CO-2	Explain the Plant kingdom,its classification and plant physiology.
CO-3	Explain the Morphology of plants, Root, Stem, Leaf, fruits, seeds and, Inflorescence and Pollination of flowers,
CO-4	Classify the taxonomy of Leguminosae, umbelliferae, Solanaceae, Lilliacae,Zinziheraceae, Rubiaceae
CO-5	Memorize the Study of Fungi, Yeast, Penicillin and Bacteria.
CO-6	Summarize the Study of Animal cell, animal tissues and frog.
CO-7	Describe the general organization of mammals, Pisces, Raptiles, Aves. and poisonous animals

Course Name: Human Anatomy and Physiology-I lab

Course Code: T1108(P)

CO-1	Identify the various tissues and organs of the different systems of the human body
CO-2	Describe the appliances used in hematological experiments
CO-3	Understand various systems with the help of charts, models& specimens
CO-4	Perform the hematological tests and also record blood pressure, heart rate, pulse and Respiratory volumes
CO-5	Understand the different family planning appliances
CO-6	Appreciate the experimental physiology

Course Name: Pharmaceutics lab

Course Code: T1109(P)

CO-1	Perform the preparation of monophasic liquid dosage forms
CO-2	Perform the preparation of suspensions and emulsions.
CO-3	Perform the preparation of powders.
CO-4	Perform the preparation of suppositories
CO-5	Perform the preparation containing liniments
CO-6	Perform preparation of the mixtures containing incompatibilities



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Course Name: Medicinal Biochemistry lab

Course Code: T1110(P)

CO-1	Perform the Qualitative analysis of normal, abnormal constituents of urine
CO-2	Perform the Quantitative estimation of sugar, chlorides, creatinine, and calcium in urine
CO-3	Perform the estimation of, cholesterol, SGOT, SGPT, Urea, Proteins in serum.
CO-4	Perform the Quantitative estimation of sugar, creatinine in blood.
CO-5	Perform the preparation and pH measurement of standard buffers. And study the effect of PH and Temperature on Enzyme activity
CO-6	Perform Determination of glucose, sodium, calcium and potassium in serum

Course Name: Pharmaceutical organic Chemistry-I lab

Course Code: T1111(P)

CO-1	Demonstrate atomic models
CO-2	Determine the melting, and boiling point of organic compounds
CO-3	Prepare acetanilide, aspirin, benzanilide, and p-bromo acetanilide
CO-4	Prepare salicylic acid, m-dinitro benzene, benzoic acid, and benzophenone oxime
CO-5	Identify the physical and chemical properties of commonorganic functional groups
CO-6	Perform qualitative organic analysis of organic compounds

Course Name: Pharmaceutical Inorganic Chemistry lab

Course Code: T1112(P)

CO-1	Carryout the limit test for chlorides, sulphates, heavy metals and Iron as per procedure given in IP 1996
CO-2	Identify magnesium hydroxide, ferrous sulphate and sodium bicarbonate by using suitable identification tests as per IP.
CO-3	Identify calcium gluconate and copper sulphate by using suitable identification tests as per IP.
CO-4	Report the purity of bentonite, aluminum hydroxide gel, potassium iodate and iodine in potassium iodide as per test procedures given in IP.
CO-5	Prepare boric acid, potash alum and ferrous sulphate.
CO-6	Carryout the limit test for chlorides, sulphates, heavy metals and Iron as per procedure given in IP 1996



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Course Code: T1113(P)

Course Name: Remedial Biology lab

CO-1	Summarize the experiments in biology, microscope, section cutting techniques and permanent slide preparation .
CO-2	Explain the cell and its inclusions and study of stem, root, leaf and its modifications , fruits and seeds
CO-3	Explain the plant physiological experiments and T.S. of Senna, Cassia, Ephedra, Podophyllum.
CO-4	List out the various animals.
CO-5	Outline the anatomy of frog by using computer models.

DOCTOR OF PHARMACY II/VI

Course Name: Pathophysiology

Course Code: T2101

CO-1	Outline the basic principles of cell injury, inflammation and cellular adaptations.
CO-2	Interpret the diseases of Immunity.
CO-3	Illustrate the basic principles,etiology and pathogenesis of cancer
CO-4	Elaborate the types of shock,its mechanism,stages and management.
CO-5	Discuss the Biological effects of Radiation.
CO-6	Represent in detail about environmental, nutritional and infectious diseases
CO-7	Summarize the pathophysiological basis of diseases affecting cardiovascular, respiratory, renal, endocrine, nervous and gastrointestinal systems

Course Name: Pharmaceutical Microbiology

Course Code: T2102

CO-1	Make use of various techniques to identify, isolate,cultivate, maintain and preserve microorganisms
CO-2	Execute sterilization techniques of equipment, action of disinfectants and sterility testing of pharmaceutical products.
CO-3	Illustrate antigen antibody reactions and immunization techniques
CO-4	Demonstrate microbiological assays of antibiotics, vitamins and standardization of vaccines
CO-5	Identify the diseases by performing the diagnostic tests, mode of transmission, symptoms and treatment of infectious diseases.



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Course Name: Pharmacognosy & Phytopharmaceuticals

Course Code: T2103

CO-1	Appraise the history and scope of Pharmacognosy and Classify the crude drugs
CO-2	Construct steps to cultivate, collect, process and store crude drugs according to pharmaceutical standards
CO-3	Illustrate the constituents present in Plant cell wall, cell, intact crude drugs and powdered crude drugs
CO-4	Employ natural pesticides and surgical dressings obtained from plant sources
CO-5	Summarize carbohydrates, Proteins and Lipids and Analyze Proteins and lipids
CO-6	Identify adulteration in crude drugs

Course Name: Pharmacology-I

Course Code: T2104

CO-1	Demonstrate about the general pharmacology, Introduction, definitions and scope of pharmacology
CO-2	Distinguish the Pharmacology of drugs acting on ANS and Central Nervous System.
CO-3	Distinguish the Pharmacology of drugs acting on cardiovascular system and respiratory tract.
CO-4	Examine the Pharmacology of various hormones and their antagonists.
CO-5	Recognize the Pharmacology of autotoxins and their antagonists.

Course Name: Community Pharmacy

Course Code: T2105

CO-1	Describing pharmaceutical care services
CO-2	Demonstrating the business and professional practice management skills in community pharmacies
CO-3	Demonstrating patient counselling & provide health screening services to public in community pharmacy
CO-4	Prioritize in Responding to minor ailments and provide appropriate medication
CO-5	Interpreting empathy and sympathy to patients
CO-6	Assess the concept of Rational drug therapy.



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Course Name: Pharmacotherapeutics-I

Course Code: T2106

CO-1	Describe the pathophysiology of selected disease states and the rationale for drug therapy of cardiovascular, respiratory and endocrine diseases
CO-2	Discover the therapeutic approach in management of various diseases
CO-3	Appreciate the controversies in drug therapy, guidelines of special population
CO-4	Analyze the importance of preparation of individualized therapeutic plans based on etiology & diagnosis
CO-5	Choose the latest available evidence to manage diseases and role of pharmacist in improving health care
CO-6	Identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy

Course Name: Pharmaceutical Microbiology lab

Course Code: T2107 (P)

CO-1	Show techniques of preparation, sterilization and aseptic transfer of pure cultures into various culture media
CO-2	Demonstrate pure culture isolation methods
CO-3	Differentiate bacteria using staining techniques.
CO-4	Make use of bio chemical tests to identify micro organisms
CO-5	Perform microbiological assays and evaluation tests of disinfectants

Course Name: Pharmacognosy & Phytopharmaceuticals lab

Course Code: T2108 (P)

CO-1	Appraise Pharmacognosy lab and equipments
CO-2	Analyze constituents present in plant cell wall and cell.
CO-3	Examine the microscopical characters of intact crude drugs and their Powdered forms.
CO-4	Estimate the analytical parameters of lipid drugs
CO-5	Differentiate carbohydrate drugs by chemical tests
CO-6	Test lipids and proteins using relevant chemical reagents




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Course Name: Pharmaco Therapeutics-I Lab

Course Code: T2109 (P)

CO-1	Explain the rationale for drug therapy and role of pharmacist in improving health care
CO-2	Apply the therapeutic approach to management of diseases including reference to the latest available evidence
CO-3	Identify the controversies in drug therapy in various diseases
CO-4	Recommend individualized therapeutic plans based on diagnosis
CO-5	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)

DOCTOR OF PHARMACY III/VI

Course Name: Pharmacology-II

Course Code: T3101

CO-1	Prioritize the pharmacological aspects of drugs acting on blood and renal system.
CO-2	Explain pharmacology of various chemotherapeutic agents.
CO-3	Illustrate the importance of immuno-suppressants, immuno-stimulants and animal toxicology.
CO-4	Outline the Cell and macromolecules, Chromosome structure, DNA replication, cell cycle, Cell signaling.
CO-5	Summarize Gene structure, Gene expression, Transcription, RNA processing.

Course Name: Pharmaceutical Analysis

Course Code: T3102

CO-1	Appreciate the importance of quality guidelines & validation procedures to formulate best quality pharmaceutical product
CO-2	Identify the various theoretical concepts of chromatographic techniques with instrumentation & applications
CO-3	Understand the principles of electrochemical analysis
CO-4	Know spectroscopy and their applications in pharmacy



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Course Name: Pharmacotherapeutics -II

Course Code: T3103

CO-1	Describe the pathophysiology of selected disease states and the rationale for drug therapy
CO-2	Discover the therapeutic approach to manage diseases
CO-3	Appreciate the controversies in drug therapy
CO-4	Analyze the importance of preparation of individualized therapeutic plans based on diagnosis
CO-5	Choose the latest available evidence to manage diseases
CO-6	Identify the patient -specific parameters relevant in initiating drug therapy, and monitoring therapy

Course Name: Pharmaceutical Jurisprudence

Course Code: T3104

CO-1	Elaborate the pharmaceutical legislations and its implications in the development of pharmaceuticals ethics drafted by PCI
CO-2	Outline the various laws governing the Sales, Import, labeling and packaging of drugs & cosmetics, constitution and function of DEAB, DCC, CDI, Pharmacy act - 1948
CO-3	Analyze potential fraud and abuse legal issues of narcotic & psychotropic substances - 1985, medicinal and toilet preparation act-1955
CO-4	Discuss Study of Salient Features of Drugs and magic remedies Act and its rules. Study of essential Commodities Act Relevant to drugs price control Order
CO-5	Functions Drug Price control Order & National Drug Policy (Current). Prevention Of Cruelty to animals Act-1960.
CO-6	Discuss the Patents & design Act 1970. study of prescription and Non-prescription Products

Course Name: Medicinal Chemistry

Course Code: T3105

CO-1	Illustrate about QSAR, Prodrug and CADD, Antisense molecules.
CO-2	Present about the classification, synthesis, m.o.a, s.a.r, uses and brand names of anti infectives, sulphonamides, anti-malarials
CO-3	Present about the classification, synthesis, m.o.a, s.a.r, uses and brand names of antibiotics, anti-neoplastic agents, cardiovascular agents.
CO-4	Present about the classification, synthesis, m.o.a, s.a.r, uses and brand names of Hypoglycemic agents, thyroid and Antithyroid agents, Diuretics.
CO-5	Chart the Diagnostic agents in different organ functions
CO-6	Present about the classification, synthesis, m.o.a, s.a.r, uses and brand names of steroidal hormones and adrenocorticoids



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Course Name: Pharmaceutical Formulations

Course Code: T3106

CO-1	Explain and classify various pharmaceutical dosage forms
CO-2	Classify tablets , capsules and explain formulation and evaluation of tablets and capsules
CO-3	Explain formulation and evaluation of liquid oral dosage forms
CO-4	Explain formulation and evaluation of parenterals
CO-5	Classify semisolid dosage forms and explain formulation and evaluation of semisolid dosage forms
CO-6	Explain the concept of controlled and novel drug delivery system

Course Name: Pharmacology-II Lab

Course Code: T3107(P)

CO-1	Study of commonly used instruments in experimental pharmacology. Introduction to CPCSEA guidelines and OECD guidelines.
CO-2	Know Introduction to animal physiology with their biochemical reference values in various animal species.
CO-3	Study of various routes of drug administration, anesthetics agents used to anesthetize laboratory animals and techniques of Euthanasia
CO-4	Study of physiological salt solutions, drug solution and use in various animal experiments
CO-5	Study of methods for collection of blood, body fluids and urine from experimental animals.

Course Name: Pharmaceutical Analysis lab

Course Code: T3108 (P)

CO-1	Perform separation and identification of amino acids by ascending paper chromatography and thin layer chromatography.
CO-2	Perform electrochemical analysis techniques using potentiometer and conductometer.
CO-3	Study quenching effect and estimation of riboflavin using fluorimetry.
CO-4	Perform an estimation of paracetamol and sulphamethoxazole using colorimetry
CO-5	Perform the determination of λ_{max} and isobestic point, estimation of paracetamol & simultaneous estimation of trimethoprim and sulphamethoxazole using UV spectroscopy.



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Course Name: Pharmacotherapeutics-II lab

Course Code: T3109 (P)

CO-1	Explain the rationale for drug therapy
CO-2	Apply the therapeutic approach to management of diseases including reference to the latest available evidence
CO-3	Identify the controversies in drug therapy
CO-4	Recommend individualized therapeutic plans based on diagnosis
CO-5	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)

Course Name: Medicinal Chemistry lab

Course Code: T3110(P)

CO-1	Perform the Assay of Boric acid, Furosemide, Metronidazole, Diethyl carbamazine citrate.
CO-2	Perform the preparation of 7-Hydroxy-4-methyl coumarin, Sulphadiazine.
CO-3	Perform the detailed analysis of Aspirin.
CO-4	Perform the Determination of partition coefficient of Methyldopa.
CO-5	Perform the Determination of dissociation constants and molar refractivity of Antifungal drugs.
CO-6	Perform the Determination of molar refractivity of drugs

Course Name: Pharmaceutical Formulations Lab

Course Code: T3111(P)

CO-1	Formulate and evaluate the Tablets
CO-2	Evaluate the given Capsules
CO-3	Formulate and evaluate the suspensions
CO-4	Formulate the parenterals
CO-5	Formulate and evaluate the creams
CO-6	Formulate and evaluate the tooth powder



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DOCTOR OF PHARMACY IV/VI

Course Name: Pharmacotherapeutics-Iii

Course Code: T4101

CO-1	Describe the pathophysiology of selected disease states and the rationale for drug therapy
CO-2	Discover the therapeutic approach to manage diseases
CO-3	Appreciate the controversies in drug therapy
CO-4	Analyze the importance of preparation of individualized therapeutic plans based on diagnosis
CO-5	Choose the latest available evidence to manage diseases
CO-6	Identify the patient -specific parameters relevant in initiating drug therapy, and monitoring therapy

Course Name: Hospital Pharmacy

Course Code: T4102

CO-1	Use professional practice management skills in hospital pharmacies
CO-2	Recommend unbiased drug information to the doctors
CO-3	Develop the manufacturing practices of various formulations in hospital set up
CO-4	Select the practice based research methods
CO-5	Adapt the stores management and inventory control skills

Course Name: Clinical Pharmacy

Course Code: T4103

CO-1	Monitor drug therapy of patient through medication chart review and clinical review
CO-2	Analyse medication history interview and counsel the patients
CO-3	Determine and resolve drug related problems
CO-4	Determine, assess and investigate adverse drug reaction
CO-5	Interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states
CO-6	Adapt, analyse, interpret and formulate drug or medicine information



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Course Name: Biostatistics & Research Methodology

Course Code: T4104

CO-1	Choose the appropriate research design and develop research hypothesis for a research project.
CO-2	Discuss the various steps involved in conducting research and describe the sample size calculation methods.
CO-3	Construct a frequency table, histogram, pie chart to represent a data set
CO-4	Identify the fundamentals of the most parametric and non parametric techniques for statistical inference
CO-5	Compute and interpret the Spearman correlation coefficient and test the significance
CO-6	Operate various softwares for statistical analysis of data and appreciate the importance of Computers in hospital and Community Pharmacy

Course Name: Biopharmaceutics & Pharmacokinetics

Course Code: T4105

CO-1	Discuss and broader understanding about the concepts of biopharmaceutics and pharmacokinetics
CO-2	Select the correct pharmacokinetic model based on plasma level or urinary excretion data that best describes the process of drug absorption, distribution, metabolism and elimination (ADME)
CO-3	Ability to calculate the various pharmacokinetic parameters by using various mathematical models.
CO-4	Carry out biopharmaceutical studies and use data so obtained in the development of new drugs or dosage forms
CO-5	Calculate various pharmacokinetic parameters from plasma and urinary excretion data applying compartment modeling and model independent methods
CO-6	Design dosage regimens for patients based on calculated pharmacokinetic parameters
CO-7	Design Bioavailability and Bioequivalence studies of new drugs or dosage form
CO-8	Evaluate drug-protein binding as a tool to predict pharmacokinetics of drugs

Course Name: Clinical Toxicology

Course Code: T4106

CO-1	Illustrate general principles and management practice of poisoning
CO-2	Differentiate the history, assessment, and therapy considerations associated with the management of a toxic exposure
CO-3	Demonstrating and understanding of the characteristics of and treatment guidelines for specific toxic substances
CO-4	Relationship of the pharmacist's function as contributing health care team in poison management
CO-5	Comparing symptoms and management of various types of toxic exposures



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CO-6	Proposing several preventive approaches to reduce unintentional drug, plant and animal poisonings
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Course Name: Pharmacotherapeutics-III lab

Course Code: T4107 (P)

CO-1	Explain the rationale for drug therapy
CO-2	Apply the therapeutic approach to management of diseases including reference to the latest available evidence
CO-3	Identify the controversies in drug therapy
CO-4	Recommend individualized therapeutic plans based on diagnosis
CO-5	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)

Course Name: Hospital Pharmacy Lab

Course Code: T4108 (P)

CO-1	Analyze prescriptions for drug interactions
CO-2	Illustrate, Formulate and prepare parenteral formulations and powders
CO-3	Perform inventory analysis
CO-4	Analyze and Answer drug information queries through literature search
CO-5	Conduct planned experiments and prepare laboratory report in a standard format

Course Name: Clinical Pharmacy Lab

Course Code: T4109 (P)

CO-1	Discuss Drug information questions and answering
CO-2	Discuss effective Patient medication counselling
CO-3	Discuss case studies related to laboratory investigations and examine laboratory values
CO-4	Discuss Patient medication history interview
CO-5	Find drug drug interactions in case studies



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Course Name: Biopharmaceutics & Pharmacokinetics Lab

Course Code: T4110 (P)

CO-1	Compare the invitro drug release profile of different marketed products
CO-2	Perform the solubility enhancement techniques for improvement of drug release of poorlywater soluble drug
CO-3	Estimate the bioavailability (absolute and relative) and bioequivalence from the given clinical data
CO-4	Calculate the drug content in blood sample using Area Under Curve approach
CO-5	Conduct planned experiments and prepare laboratory report ina standard format

DOCTOR OF PHARMACY V/VI

Course Name: Clinical Research

Course Code: T5101

CO-1	Outline the new drug development process as per regulatory and ethical requirements
CO-2	Explain the roles and responsibilities of various personnel involved in clinical trials as per ICH-GCP
CO-3	Demonstrate competencies in evaluating clinical research data and communicating results
CO-4	List out various clinical trial activity & its documentation asper regulatory and ethical requirements
CO-5	Distinguish about various regulatory submissions & its environment in India, USA & Europe

Course Name: Pharmaco Epidemiology and Pharmaco Economics

Course Code: T5102

CO-1	Explain about definition and scope of pharmaco epidemiology and discuss measurement of outcomes in pharmaco epidemiology.
CO-2	Measure concept of risk in pharmaco epidemiology
CO-3	Classify various methods of pharmaco epidemiology and Classify sources of data for pharmaco epidemiological studies
CO-4	Explain about selected special applications of pharmaco epidemiology
CO-5	Explain about role in formulary management decision
CO-6	Explain the methods used in pharmacoeconomic analysis and Discuss about applications of pharmacoeconomics



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Course Name: Clinical Pharmacokinetics & Pharmacotherapeutic Drug Monitoring

Course Code: T5103

CO-1	Describing Pharmacokinetic principles in drug monitoring
CO-2	Demonstrating the Conversion of dosage forms
CO-3	Interpretation of Pharmacokinetic druginteractions
CO-4	Make up the individualizationof dosage regimen as per demographic parameters
CO-5	Prioritize the dosage adjustments in Renal andl Iepatic diseases
CO-6	Assess the use of pharmacogenetics in Pk and pharmacodynamic principles




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M.Pharmacy Program Outcomes

Programme Outcomes (POs)	
PO1	Pharmaceutical Sciences knowledge: Apply the knowledge of mathematics, science, pharmaceutical physical properties of the different pharmaceutical ingredients and the factor influencing them is very valuable for pharmaceutical dosage form design. Enables the students to learn about different packaging materials used in pharmaceutical industry and the factors governing their use.
PO2	Unit Operations: Pharmaceutical engineering renders knowledge about the basic unit operations that are taking place in pharmaceutical industry and the different factors associated with it. This information is useful for both pharmaceutics and pharmaceutical engineering.
PO3	Entrepreneurship: The knowledge on different pharmaceutical dosage forms are imparted on students. This knowledge comes while handling a pharmacy or a manufacturing unit or in the further courses.
PO4	Design/Development of solutions: The information on solid dosage forms like tablets and capsules, their formulation and quality control serves as an important prerequisite for dosage form design.
PO5	Application oriented Knowledge: The knowledge of biopharmaceutics enables the students to visualize the effect of pharmacokinetic (ADMET) parameters on the biological effect of the drug. The correlation of pharmacokinetics and pharmacodynamics is thus introduced and is experimentally explained to them.
PO6	Conduct investigations of complex problems: To understand biopharmaceutical principles and pharmacokinetic principles through different compartment models, multiple dosage regimens, non-linear pharmacokinetics, and assessment of bioavailability and bioequivalence
PO7	Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
PO8	Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.
PO9	Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.
PO10	Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broader context of socio-technological changes.



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 Date: 10/05/2023



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VAAGDEVI PHARMACY COLLEGE

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P.O.BOLLIKUNTA, WARANGAL-506 005(Telangana State)

Program Specific Outcomes (PSOs) (M.PHARMACY)

- PSO1:** To develop new/ groundbreaking medications / bulk drug/pharmaceutical formulation requires latest methods, technologies and processes. In this, phase/topic wise is covered in the syllabus e.g., selection of drugs, dose calculations, dose adjustments by applying biopharmaceutics theories, pharmacokinetic and bioequivalence models, in-vitro and in-vivo studies using computer simulations, population modeling's, potential clinical pharmacokinetic and problem analysis, selection of polymers and various preformulation elements, pilot plant scale up techniques, industrial management, GMP considerations, stability testing, sterilization, formulation, evaluation and packaging of dosage forms.
- PSO2:** Professional Training to the students to work on drug compounds and develop new medications based on research. In this students learn test medications for efficiency and safety, oversee the production process to ensure medication are produced accurately, conducting clinical drug trials and evaluating the results of these trials to gauge a drugs's effectiveness and to determine potential risks or side effects.
- PSO3:** Students are trained to collaborate with various pharmaceutical companies and variety of health care professionals to ensure clinical drug trials are conducted safely as per regulatory guidelines for the testing of drugs.
- PSO4:** To develop a scientific innovation thought /innovation by assigning independent research projects to each students under specialized subjects supervisors. The findings/outcome of the research are promoted to be published in reputed national/international journals.




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M.PHARMACY COURSE OUTCOMES
ACADEMIC YEAR 2019-20
PHARMACEUTICAL ANALYSIS

YEAR: I

SEMESTER: I

REGULATION: R19

Course Name: Modern Pharmaceutical Analytical Techniques Course Code: MPH101T

CO-1	Differentiate samples using basic chromatographic techniques (PC, TLC etc.) and analyze samples based on its behavior.
CO-2	Relate the basic knowledge of liquid chromatography(GC,HP LC, etc.) and apply knowledge of liquid chromatography to analyze samples
CO-3	Experiment on samples using UV & IR spectroscopy, and analyze and interpret data.
CO-4	Interpret data of Mass spectrum.
CO-5	Evaluate evidence to identify organic samples using NMR spectroscopy

Course Name: Pharmaceutical And Food Analysis

Course Code: MPH102T

CO-1	Student shall be able to explain about the classification, general methods of analysis of carbohydrates and proteins
CO-2	Student shall be able to determine the adulteration in fats, oils and general methods of analysis of vitamins
CO-3	Students would able to learn about concept of probiotics
CO-4	To know the quantitative determination of drugs from different category of both API and dosage forms
CO-5	To know the general analytical methods of milk and fermentation products and have the knowledge on food regulations and legislations

Course Name: Drug Regulatory Affairs

Course Code: MPH103T

CO-1	Discuss the rationale behind regulatory requirements and ways and means of complying with them in India.
CO-2	Point out the important aspects of GMP.
CO-3	List various laws, legislation and guidance related to safety, efficacy ethical conduct and regulatory approval of drugs in USA & Brazil.
CO-4	Handle documentation and general principles involved in regulatory writing and submission to agencies.
CO-5	Organize the submission of Drug Master Files to regulatory authorities as per their specific requirements in USA, Europe and Canada.




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Course Name: Quality Control And Quality Assurance

Course Code: MPH104T

CO-1	Student shall be able to explain about the evolution and scopes of Quality Control and Quality Assurance
CO-2	Student shall be able to understand the GMP guidelines, organization and personnel responsibilities
CO-3	Students would able to learn about Analysis of raw materials, finished products and quality control tests of different dosage forms
CO-4	To know the Documentation procedures in pharmaceutical industries
CO-5	To know the concept of Manufacturing operations and controls

Course Name: Research Methodology & Intellectual Property Rights

Course Code: MPH105T

CO-1	Summarize Research problem, Sources of research problem
CO-2	Organize the effective literature studies approaches, analysis, Plagiarism, Research ethics
CO-3	Understand the effective technical writing, how to write report
CO-4	Determine the Patents, Designs, Trade and Copyright.
CO-5	Analyze the Licensing and transfer of technology

Course Name: Modern Pharmaceutical Analytical Techniques (Lab)

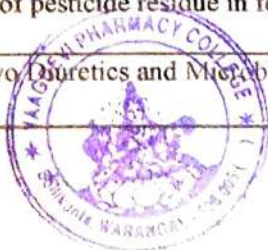
Course Code: MPH106P

CO-1	Analyze samples using UV -Visible spectroscopy
CO-2	Examine samples based on Rf values by paper chromatography, TLC & HPTLC techniques.
CO-3	Estimate samples using HPLC technique
CO-4	Determine samples by FTIR
CO-5	Evaluate various glassware and analytical instruments by calibration.

Course Name: Pharmaceutical And Food Analysis (Lab)

Course Code: MPH107P

CO-1	Student shall be able to determine the total reducing sugar and proteins
CO-2	Student shall be able to determine the saponification value, Iodine value, Peroxide value, Acid value in food products
CO-3	Students would able to determine rancidity in food products, preservatives in food and Analysis of natural and synthetic colors & food additives in food
CO-4	To know the determination of pesticide residue in food products and Assay of any two Analgesic & Antipyretic drugs
CO-5	To know the Assay of any two Diuretics and Microbiological assay of any two.



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Course Name: Audit Course-1 Value Education

Course Code: MPH108

CO-1	Understand human values, their significance and role in life.
CO-2	Promote self-reflection and critical inquiry that fosters critical thinking of one's value and the values of others.
CO-3	Practice respect for human rights and democratic principles.
CO-4	Emerge as responsible citizens with clear conviction to practice values and ethics in life.
CO-5	Develop the overall personality.

YEAR: I

SEMESTER: II

REGULATION: R19

Course Name: Advanced Instrumental Analysis-I

Course Code: MPH201T

CO-1	Students will come out with the thorough knowledge of various spectral aspects of X-Ray and different aspects regarding X-Ray diffraction methods.
CO-2	Students would be able to know Biochromatography and Super critical fluid chromatography their principles, Instrumentation and applications.
CO-3	To know about the Capillary Electrophoresis the concepts of CE in pharmaceutical analysis.
CO-4	Describe on DSC, DTA, TGA and brief discussion about these techniques.
CO-5	To know Scanning electron microscope and its principle, Instrumentation and applications..

Course Name: Modern Bio Analytical Techniques

Course Code: MPH202T

CO-1	Students would be able to know the Extraction of drugs from biological samples and principles, procedures.
CO-2	To know Biopharmaceutical factors affecting drug bioavailability in In-vitro and In-vivo studies
CO-3	Students would be able to learn about Bioanalysis and Bioanalytical method validation and its concepts.
CO-4	Students would be able to learn Pre-Formulation, Physical characteristics, Chemical Characteristics – Degradation
CO-5	To determine Automation and computer-aided analysis, LIMS concept of auto samplers and high throughput analysis and Drug Product performance, In Vivo. Bioavailability and Bioequivalence Studies.




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Course Name: Pharmaceutical validation

Course Code: MPH203T

CO-1	Students would have studied about the different types of validation procedures and how it can be applied to various instruments and equipments at different stages of usage.
CO-2	To know a complete procedures involved in qualification of various analytical instruments and Glass ware
CO-3	Students would able to learn about the steps involved in qualification of laboratory equipments and validation of utility systems
CO-4	Carryout validation of analytical method used in cleaning. Cleaning of equipments, facilities and cleaning in place.
CO-5	Apply the knowledge of validation of analytical method as per ICH guidelines and USP.

Course Name: Nano Based Drug Delivery systems

Course Code: MPH204T

CO-1	Determination and classification of various properties of nano materials with their role of size, its distribution and its properties.
CO-2	Summarize various physical, chemical, biological methods for the synthesis of different types of nano particles like gold, magnetic, polymeric, assembly structures.
CO-3	Elaborate about Biomedical applications of nano technology
CO-4	Designing of nano materials for drug delivery related to pulmonary, nasal, cancer therapy and cardio vascular diseases.
CO-5	Distinguish the principles of size reduction, analysis of nano particles, size, PDI, size separation and different methods of analysis for the release of drugs.

Course Name: Advanced Instrumental Analysis - I (Lab)

Course Code: MPH205P

CO-1	Students would be able to know about Determination of chlorides and sulphates by Nephelo – Turbidimetry.
CO-2	Students would be able to learn compounds of sodium, potassium and calcium by Flame photometry and Estimation of riboflavin/quinine sulphate by fluorimetry.
CO-3	Students would able to learn about assay of official compounds by potentiometric titrations and conductimetric titrations
CO-4	To know about Demonstration on ELISA, Quenching of fluorescence.
CO-5	Students would be able to study phosphate interference on absorption of calcium

Course Name: Modern Bio Analytical Techniques Lab

Course Code: MPH206P

CO-1	Analyze samples quantitatively using gel electrophoresis & isolate analgesics from biological fluids
CO-2	Analyze samples using HPLC technique & develop method for API using HPLC
CO-3	Determine antihistaminic drugs using TLC
CO-4	Estimate drugs from biological matrices by SPE/LLE technique
CO-5	Assess the drug from Dosage form formulation by HPLC technique



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Course Name: Audit Course -2 Disaster Management

Course Code: MPH207

CO-1	Understand key concepts of disasters and its relationships with development and disaster prone areas in India.
CO-2	Explain repercussions of disasters and hazards.
CO-3	Promote prevention and preparedness for disaster
CO-4	Understand the techniques of risk reduction
CO-5	Enhance awareness of disaster risk management and build skills to respond to disasters.

M. Pharmacy/ Second Year/ I Semester

Course Name: Scale up And Technology Transfer

Course Code: MPH301

CO-1	Design the pilot scale up technology
CO-2	Judge the documentation process
CO-3	Conclude in choosing of equipment for dosage form production
CO-4	Summarize the process validation
CO-5	Describe safety and hazards in industries

Course Name: Audits and Regulatory Compliance

Course Code: MPH302

CO-1	Discuss briefly about audit objectives and their management.
CO-2	Understand the role of quality systems and audits in pharmaceutical manufacturing environment
CO-3	Prepare checklist of auditing of vendors and production department.
CO-4	Organize the auditing of a microbiological laboratory
CO-5	List the basics of auditing various engineering systems in a manufacturing plant.




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M.PHARMACY COURSE OUTCOMES**ACADEMIC YEAR 2019-20****PHARMACEUTICS****YEAR: I****SEMESTER: I****REGULATION: R19****Course Name: Modern Pharmaceutics -I****Course Code: MPH101T**

CO-1	Analyze Goals of preformulation parameters, polymorph and amorphous form , selection of drugs
CO-2	Categorize the excipients for development of solid dosage form
CO-3	Prioritize and plan coating techniques and problem encountered in micro encapsulation
CO-4	Criticize and judge formulation development capsules
CO-5	Value the optimization techniques in pharmaceutical formulation and process

Course Name: Advanced Biopharmaceutics and Pharmacokinetics**Course Code: MPH102T**

CO-1	Summarize various biological and metabolic factors affecting bioavailability, describe the assessment of biological samples to determine bioavailability
CO-2	Determine various pharmacokinetic parameters by application of compartment models
CO-3	Calculate absorption rate for various order kinetics
CO-4	Summarize the concept of nonlinear pharmacokinetics
CO-5	Discuss the concept of time dependent pharmacokinetics and drug interactions.

Course Name: Drug Regulatory Affairs**Course Code: MPH103T**

CO-1	Discuss the rationale behind regulatory requirements and ways and means of complying with them in India.
CO-2	Point out the important aspects of GMP.
CO-3	List various laws, legislation and guidance related to safety, efficacy ethical conduct and regulatory approval of drugs in USA & Brazil.
CO-4	Handle documentation and general principles involved in regulatory writing and submission to agencies.
CO-5	Organize the submission of Drug Master Files to regulatory authorities as per their specific requirements in USA, Europe and Canada.




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CO-1	Judge and prioritize, and plan regarding hydrolysis, photolysis
CO-2	Define and describe about the physical stability
CO-3	Summarize the use of excipients and knowledge regarding extraction of drugs
CO-4	Design and modify raw materials used in cosmetic industry
CO-5	Solve the theory of hair and skin formulations

CO-1	Summarize Research problem, Sources of research problem
CO-2	Organize the effective literature studies approaches, analysis, Plagiarism, Research ethics
CO-3	Understand the effective technical writing, how to write report
CO-4	Determine the Patents, Designs, Trade and Copyright.
CO-5	Analyze the Licensing and transfer of technology

CO-1	Compare to carry out the preformulation studies of solid dosage forms effects of compressional force on tablet disintegration time
CO-2	List the study of micromeritic properties of powders and granules and effect of particle size on dissolution of tablets
CO-3	Evaluate the effects of binders on dissolution of tablet. Pharmacokinetic models ,to determine similarity factors
CO-4	Estimate Accelerated stability testing of different tablets ,determine of first second order rate constants by acid and alkaline
CO-5	Determine Preparation ns evaluation of beta cyclodextrin complexes of new drug preparation of paracetamol tablets and comparison with marketed products

CO-1	Analyze the dissolution by various data-kinetic modeling and Intrinsic dissolution.
CO-2	Evaluate the drug-protein binding analysis.
CO-3	Describe the K_a (absorption rate constant) absorption curve Wagner nelson method , LooRiegel method.
CO-4	Explain the Assignment of numerical problems, one compartment and two compartment disposition, method of residuals, AUC and evaluation of pharmacokinetic parameters
CO-5	Understand the drug release from semi solids by agar gel method of Franz diffusion cell.



Course Name: Audit Course-1 Value Education

Course Code: MPH108

CO-1	Understand human values, their significance and role in life.
CO-2	Promote self-reflection and critical inquiry that fosters critical thinking of one's value and the values of others.
CO-3	Practice respect for human rights and democratic principles.
CO-4	Emerge as responsible citizens with clear conviction to practice values and ethics in life.
CO-5	Develop the overall personality.

YEAR: I

SEMISTER: II

REGULATION: R19

Course Name: Modern pharmaceuticals-I

Course Code: MPH201T

CO-1	Describe the pilot plant scale up techniques used in pharmaceutical manufacturing
CO-2	Explain the formulation development of Parenteral dosage forms
CO-3	Evaluate the pharmaceutical aerosols and manufacturing process
CO-4	Discuss about manufacture of the cosmetics and nutraceuticals
CO-5	Analyse the aseptic processing operation

Course Name: Advanced Drug Delivery Systems

Course Code: MPH201T

CO-1	Understand the Controlled release oral drug delivery systems & Parenteral controlled release drug delivery systems
CO-2	Determining Implantable Therapeutic systems, Transdermal delivery systems, Ocular and Intrauterine delivery systems
CO-3	Summarize Bioadhesive drug delivery systems & Nasal drug delivery systems
CO-4	Elaborate Liposomes, Niosomes, Microspheres, Nanoparticles & Resealed erythrocytes
CO-5	Distinguish the Drug Delivery to lungs & Delivery to the brain



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CO-1	Distinguish the detailed study of machinery and theory of pharmaceutical operations like milling, mixing, filtration and drying
CO-2	Summarize various material of construction, equipment's, packaging materials involved in large scale production like monophasic and biphasic dosage forms.
CO-3	Elaborate about product organization, its objectives, and policies related to material management, handling, inventory management, planning control budget and total quality management.
CO-4	Discuss about effluent analysis and distinguish between its specifications, and preventive measures for the different pollutions like water, solid, air and sound.
CO-5	To criticize and judge the validation methods and processes involved in solids, liquids and sterile dosage forms.

CO-1	Determination and classification of various properties of nano materials with their role of size, its distribution and its properties.
CO-2	Summarize various physical, chemical, biological methods for the synthesis of different types of nano particles like gold, magnetic, polymeric, assembly structures.
CO-3	Elaborate about Biomedical applications of nano technology
CO-4	Designing of nano materials for drug delivery related to pulmonary, nasal, cancer therapy and cardiovascular diseases.
CO-5	Distinguish the principles of size reduction, analysis of nano particles, size, PDI, size separation and different methods of analysis for the release of drugs.

CO-1	Experimenting the Preparation of mouth wash
CO-2	Preparing the formulation and evaluation of vanishing cream and calamine lotion
CO-3	Estimating the preparation and evaluation of floating tablets and Fast dissolving tablets
CO-4	Determination the evaluation of Chewable tablets
CO-5	Experimenting the preparation of oral rehydration solution

CO-1	Determining the study on diffusion of drugs through various polymeric membranes
CO-2	Estimating the formulation and evaluation of sustained release oral matrix tablet
CO-3	Determining the formulation and evaluation of sustained release oral reservoir system.
CO-4	Experimenting the formulation and evaluation of microspheres / microencapsules
CO-5	Structuring the formulation and evaluation of transdermal films & Formulation and evaluation of mucoadhesive system



Course Name: Audit Course -2 Disaster Management

Course Code: MPH207

CO-1	Understand key concepts of disasters and its relationships with development and disaster prone areas in India.
CO-2	Explain repercussions of disasters and hazards.
CO-3	Promote prevention and preparedness for disaster
CO-4	Understand the techniques of risk reduction
CO-5	Enhance awareness of disaster risk management and build skills to respond to disasters.

M. Pharmacy/ Second Year/ I Semester

Course Name: Scale up And Technology Transfer

Course Code: MPH301T

CO-1	Design the pilot scale up technology
CO-2	Judge the documentation process
CO-3	Conclude in choosing of equipment for dosage form production
CO-4	Summarize the process validation
CO-5	Describe safety and hazards in industries

Course Name: Audits and Regulatory Compliance

Course Code: MPH302

CO-1	Discuss briefly about audit objectives and their management.
CO-2	Understand the role of quality systems and audits in pharmaceutical manufacturing environment
CO-3	Prepare checklist of auditing of vendors and production department.
CO-4	Organize the auditing of a microbiological laboratory
CO-5	List the basics of auditing various engineering systems in a manufacturing plant.




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M.PHARMACY COURSE OUTCOMES
ACADEMIC YEAR 2019-20
PHARMACEUTICAL REGULATORY AFFAIRS

YEAR: I

SEMESTER: I

REGULATION: R19

Course Name: Drug regulatory affairs

Course Code: MPH101T

CO-1	Discuss the rationale behind regulatory requirements and ways and means of complying with them in India.
CO-2	Point out the important aspects of GMP
CO-3	List various laws, legislation and guidance related to safety, efficacy ethical conduct and regulatory approval of drugs in USA & Brazil.
CO-4	Handle documentation and general principles involved in regulatory writing and submission to agencies.
CO-5	Organize the submission of Drug Master Files to regulatory authorities as per their specific requirements in USA, Europe and Canada.

Course Name: Intellectual property rights

Course Code: MPH102T

CO-1	Differentiate types of intellectual properties (IPs) and their roles in contributing to organizational competitiveness
CO-2	Identify activities and constitute IP infringements and the remedies available to the IP owner and describe the precautions steps to be taken to prevent infringement of proprietary rights in products and technology development.
CO-3	List the impact of International Treaties / Conventions related to IPR.
CO-4	Discuss the application procedure of patent in USA & EU.
CO-5	Identify the claims in a given document and draft it.

Course Name: Drug regulation and writing

Course Code: MPH103T

CO-1	Discuss the types of documents in pharmaceutical industry.
CO-2	Organize the modules of dossier preparation and CTD submission.
CO-3	List the basics of internal and external audits & focus on ISO standards and guidelines on audits.
CO-4	Structure the inspection systems in pharmaceutical companies and follow up actions.
CO-5	Prioritize the regulatory aspects of product life-cycle management and product recalls.




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Course Name: Good regulatory practice

Course Code: MPH104T

CO-1	Analyze Current good manufacturing practices introduction to cGMP part 210 and part 211 WHO c GMP guideline ,Global Harmonization Task Force Guidance docs
CO-2	Survey Introduction to USFDA good laboratory practice regulation inspection process documentation audits future regulations quality Council of India standards
CO-3	Award Good automated laboratory practice introduction principles requirements sop's training documentation checklist software evaluation checklist element ISO and QCI standards
CO-4	Determine Good distribution practice introduction requirements principles documentation process and equipments delivery to customer return self inspection stability testing elemental CDSCO guidance and ISO standards
CO-5	Evaluate Quality management system concept of quality, quality by design Six Sigma concept out of specification validations type of validation, validation master plan analytical method validation heat ventilation and air conditioning and cleaning validation ICH guidelines to establish the quality safety efficacy of drug substances on product and CDSCO regulatory guidance document

Course Name: Research Methodology & Intellectual Property Rights

Course Code: MPH105T

CO-1	Summarize Research problem, Sources of research problem
CO-2	Organize the effective literature studies approaches, analysis, Plagiarism, Research ethics
CO-3	Understand the effective technical writing, how to write report
CO-4	Determine the Patents, Designs, Trade and Copyright.
CO-5	Analyze the Licensing and transfer of technology

Course Name: Drug regulation and registration lab (Lab)

Course Code: MPH106P

CO-1	Motivate Case study on Change management change control deviation and corrective and preventive action. Import of drugs for research and development development activity .GMP audit requirement as per CDSCO
CO-2	Classify preparation of checklist for registration of IND as per ICH CTD formatPreparation of checklist for registration of NDA as per ICH CTD formatPreparation of checklist for registration of NDA as per ICH CTD format
CO-3	Comparative study of DMF system in US ,Europe and JapanPreparation of regulatory submission using e CTD software
CO-4	Estimate Documentation of raw materials analysis as per official monographs Preparation of audit checklist for various agencies
CO-5	Determine Preparation of the submission to FDA using e CTD softwarePreparation of submission to EMA using e CTD softwarePreparation of submission to MHRA using e CTD software




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CO-1	Categorize Introduction on Good Pharmaceutical Practices, Case study: Facilities and equipment system, Case study: Packaging and labeling system, Case study: Production system, Case study: Laboratory system.
CO-2	Analyze Regulatory Documentation in K4 Pharmaceutical industry, Documentation for in process and finished products Quality control tests for Solid, liquid, Semisolid and Sterile preparations.
CO-3	Criteria Preparation of Standard Operating Procedures, Preparation of analytical report, preparation of BMR MFR, DR labeling comparison between brand & generics, preparation of regulatory dossier as per Indian CTD format
CO-4	Influence Submission in Sugam system of CDSCO, USFDA Warning Letter Case study 1 and 2 on Response with scientific rationale to USFDA warning letter Preparation of submission checklist of IMPD for EU.
CO-5	Importance submission Study of marketing authorization procedures in EU, ISO:13485: -Medical devices - Quality management systems, ISO : 31000: - Quality Risk Management

CO-1	Understand human values, their significance and role in life.
CO-2	Promote self-reflection and critical inquiry that foster critical thinking of one's value and the values of others.
CO-3	Practice respect for human rights and democratic principles.
CO-4	Emerge as responsible citizens with clear conviction to practice values and ethics in life.
CO-5	Develop the overall personality.

CO-1	Explain the regulations & guidelines, principles for development of similar biologics & data requirements for preclinical studies, clinical trial application, market authorization application & pharmacovigilance, GMP & GDP
CO-2	Summarize the introduction to biologics; biologics, biological & biosimilars, different biological products, difference between generic drug & biosimilars, laws, regulations & guidance on biologics/biosimilars, development & approval of biologics, preclinical & clinical development considerations, advertising, labeling & packing of biologics
CO-3	illustrate the introduction to biologics; derivatives, scientific guidelines & guidance related to biologics in EU, comparability/ biosimilarity assessment, plasma master file, TSE/BSE evaluation, development & regulatory approval of biologics, preclinical & clinical development considerations; stability, safety, advertising, labeling & packing of biologics in EU
CO-4	Describe Vaccine regulations in India, US & European union: clinical evaluation, marketing authorization, registration or licensing, quality assessment, pharmacovigilance, additional requirements blood & blood products regulations in India, US & European union: regulatory requirements of blood or its components including blood products, label requirements, ISBT & IHN
CO-5	Summarize Quality, safety & legislation for herbal products in India, US & European union.



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CO-1	Group the basics of medical devices and IVDs, process of development, ethical and quality considerations
CO-2	Present the quality system regulations and quality risk management of medical devices
CO-3	Classify the medical devices and IVDs regulations in USA.
CO-4	Summarize the medical devices and IVDs directives in European Union
CO-5	Explain the regulatory approval process for medical devices and IVDs in China, Japan and ASEAN countries and Understand organizational structure, regulatory guidelines and functions of IMDRF/GHTF.

CO-1	Compare Nutraceuticals introduction history of food and nutraceuticals regulation meaning of nutraceuticals dietary supplements functional foods medical for scope and opportunities in nutraceutical market
CO-2	List Global aspects WHO K4 guidelines on nutrition and international its role in dietary supplements and nutraceuticals industries certification and Standards for food and dietary supplements good manufacturing practices for nutraceuticals
CO-3	Conclude India food safety and K5 Standards act and Standards Authority of India organisation and functions regulations for important manufacture and sale of nutraceutical products in India vitamin dietary allowance in India
CO-4	Determine USA food safety K5 modernization act dietary supplement health and Education Act US regulation for manufacture and sale of nutraceuticals and dietary supplements labelling requirements and label claims and dietary supplements recommended dietary allowance in USA
CO-5	Explain European Union European food safety authority organisation and functions you European directives and regulations for manufacturing and sale of nutraceuticals and dietary supplements nutrition labelling European regulation on novel food and normal food ingredients recommended dietary allowance in Europe

CO-1	Demonstrate biological license applications(BLA) & documents required for vaccine product approval
CO-2	Make use of clinical trial application requirements of US, EU, & INDIA of biologics
CO-3	Identify the checklist for registration of blood & blood products
CO-4	Analyze registration requirement comparison study in 5 emerging markets (WHO, BRICS, CHINA & SOUTH COREA, ASEAN & GCC) & preparing checklist for market authorization
CO-5	Construct document required for the approval of herbal products of diverse dosage forms (3 products) as per regulations requirements



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CO-1	GMP of medical devices and quality requirements
CO-2	Checklist for 510K and PMA for US market
CO-3	Clinical investigation of medical devices: regulations of investigational medical devices
CO-4	Check list for CE marking for various classes of devices for EU
CO-5	Audit checklist for medical device facility

CO-1	Analyse samples quantitatively using gel electrophoresis & isolate analgesics from biological fluids
CO-2	Analyse samples using HPLC technique & develop method for API using HPLC
CO-3	Determine antihistaminic drugs using TLC
CO-4	Estimate drugs from biological matrices by SPE/LLE technique
CO-5	Assess the drug from Diclofenac formulation by HPLC technique

CO-1	Understand key concepts of disasters and its relationships with development and disaster prone areas in India.
CO-2	Explain repercussions of disasters and hazards.
CO-3	Promote prevention and preparedness for disaster
CO-4	Understand the techniques of risk reduction
CO-5	Enhance awareness of disaster risk management and build skills to respond to disasters.



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M. Pharmacy/ Second Year/ I Semester

Course Name: Pharmaceutical production technology

Course Code: MPH301T

CO-1	Summarize Pilot plant scale-up techniques used in pharmaceutical manufacturing
CO-2	Elaborate formulation development of parenteral dosage forms.
CO-3	Elaborate about formulation, PO4 manufacture and quality control of pharmaceutical aerosols.
CO-4	Classify cosmetics and nutraceuticals based on preparation, manufacturing aspects, specific properties and prevention.
CO-5	Distinguish the principles of Aseptic processing operations.

Course Name: Audits and Regulatory Compliance

Course Code: MPH302T

CO-1	Discuss briefly about audit objectives and their management.
CO-2	Understand the role of quality systems and audits in pharmaceutical manufacturing environment
CO-3	Prepare checklist of auditing of vendors and production department.
CO-4	Organize the auditing of a microbiological laboratory
CO-5	List the basics of auditing various engineering systems in a manufacturing plant.




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P.O.BOLLIKUNTA, WARANGAL-506 005(Telangana State)

M.PHARMACY COURSE OUTCOMES

ACADEMIC YEAR 2022-23

PHARMACEUTICAL REGULATORY AFFAIRS

YEAR: I

SEMESTER: I

REGULATION: R22

Course Name: Drug regulatory affairs

Course Code: MPH101T

CO-1	Discuss the rationale behind regulatory requirements and ways and means of complying with them in India.
CO-2	Point out the important aspects of GMP
CO-3	List various laws, legislation and guidance related to safety, efficacy ethical conduct and regulatory approval of drugs in USA & Brazil.
CO-4	Handle documentation and general principles involved in regulatory writing and submission to agencies.
CO-5	Organize the submission of Drug Master Files to regulatory authorities as per their specific requirements in USA, Europe and Canada.

Course Name: Intellectual property rights

Course Code: MPH102T

CO-1	Differentiate types of intellectual properties (IPs) and their roles in contributing to organizational competitiveness
CO-2	Identify activities and constitute IP infringements and the remedies available to the IP owner and describe the precautions steps to be taken to prevent infringement of proprietary rights in products and technology development.
CO-3	List the impact of International Treaties / Conventions related to IPR.
CO-4	Discuss the application procedure of patent in USA & EU.
CO-5	Identify the claims in a given document and draft it.

Course Name: Drug regulation and writing

Course Code: MPH103T

CO-1	Discuss the types of documents in pharmaceutical industry.
CO-2	Organize the modules of dossier preparation and CTD submission.
CO-3	List the basics of internal and external audits & focus on ISO standards and guidelines on audits.
CO-4	Structure the inspection systems in pharmaceutical companies and follow up actions.
CO-5	Prioritize the regulatory aspects of product life-cycle management and product recalls.

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Course Name: Good regulatory practice

Course Code: MPH104T

CO-1	Analyze Current good manufacturing practices introduction to cGMP part 210 and part 211 WHO c GMP guideline ,Global Harmonization Task Force Guidance docs
CO-2	Survey Introduction to USFDA good laboratory practice regulation inspection process documentation audits future regulations quality Council of India standards
CO-3	Award Good automated laboratory practice introduction principles requirements sop's training documentation checklist software evaluation checklist element ISO and QCI standards
CO-4	Determine Good distribution practice introduction requirements principles documentation process and equipments delivery to customer return self inspection stability testing elemental CDSCO guidance and ISO standards
CO-5	Evaluate Quality management system concept of quality, quality by design Six Sigma concept out of specification validations type of validation, validation master plan analytical method validation heat ventilation and air conditioning and cleaning validation ICH guidelines to establish the quality safety efficacy of drug substances on product and CDSCO regulatory guidance document

Course Name: Research Methodology & Intellectual Property Rights

Course Code: MPH105T

CO-1	Summarize Research problem, Sources of research problem
CO-2	Organize the effective literature studies approaches, analysis, Plagiarism, Research ethics
CO-3	Understand the effective technical writing, how to write report
CO-4	Determine the Patents, Designs, Trade and Copyright.
CO-5	Analyze the Licensing and transfer of technology

Course Name: Drug regulation and registration lab (Lab)

Course Code: MPH106P

CO-1	Motivate Case study on Change management change control deviation and corrective and preventive action. Import of drugs for research and development development activity .GMP audit requirement as per CDSCO
CO-2	Classify preparation of checklist for registration of IND as per ICH CTD formatPreparation of checklist for registration of NDA as per ICH CTD formatPreparation of checklist for registration of NDA as per ICH CTD format
CO-3	Comparative study of DMF system in US ,Europe and JapanPreparation of regulatory submission using e CTD software
CO-4	Estimate Documentation of raw materials analysis as per official monographs Preparation of audit checklist for various agencies
CO-5	Determine Preparation of the submission to FDA using e CTD softwarePreparation of submission to EMA using e CTD softwarePreparation of submission to MHRA using e CTD software

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Course Name: Regulatory practice and documentation (Lab)

Course Code: MPH107P

CO-1	Categorize Introduction on Good Pharmaceutical Practices, Case study: Facilities and equipment system, Case study: Packaging and labeling system ,Case study: Production system, Case study: Laboratory system.
CO-2	Analyze Regulatory Documentation in K4 Pharmaceutical industry, Documentation for in process and finished products Quality control tests for Solid, liquid, Semisolid and Sterile preparations.
CO-3	Criteria Preparation of Standard Operating Procedures , Preparation of analytical report ,preparation of BMR MFR ,DR labeling comparison between brand &generics, preparation of regulatory dossier as per Indian CTD format
CO-4	Influence Submission in Sugam system of CDSCO , USFDA Warning Letter Case study 1 and 2 on Response with scientific rationale to USFDA warning letter Preparation of submission checklist of IMPD for EU.
CO-5	Importance submission Study of marketing authorization procedures in EU ,ISO:13485: -Medical devices - Quality management systems ,ISO : 31000: - Quality Risk Management

Course Name: Audit Course-1 Value Education

Course Code: MPH108

CO-1	Understand human values, their significance and role in life.
CO-2	Promote self-reflection and critical inquiry that foster critical thinking of one's value and the values of others.
CO-3	Practice respect for human rights and democratic principles.
CO-4	Emerge as responsible citizens with clear conviction to practice values and ethics in life.
CO-5	Develop the overall personality.

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YEAR: I

SEMISTER: II

REGULATION: R22

Course Name: Regulatory aspects of herbals biologics

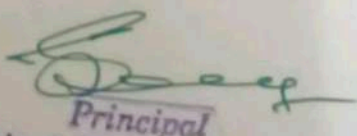
Course Code: MPH201T

CO-1	Explain the regulations & guidelines, principles for development of similar biologics & data requirements for preclinical studies, clinical trial application, market authorization application & pharmacovigilance, GMP & GDP
CO-2	Summarize the introduction to biologics; biologics, biological & biosimilars, different biological products, difference between generic drug & biosimilars, laws, regulations & guidance on biologics/biosimilars, development & approval of biologics, preclinical & clinical development considerations, advertising, labeling & packing of biologics
CO-3	illustrate the introduction to biologics; derivatives, scientific guidelines & guidance related to biologics in EU, comparability/ biosimilarity assessment, plasma master file, TSE/BSE evaluation, development & regulatory approval of biologics, preclinical & clinical development considerations; stability, safety, advertising, labeling & packing of biologics in EU
CO-4	Describe Vaccine regulations in India, US & European union: clinical evaluation, marketing authorization, registration or licensing, quality assessment, pharmacovigilance, additional requirements blood & blood products regulations in India, US & European union: regulatory requirements of blood or its components including blood products, label requirements, ISBT & IHN
CO-5	Summarize Quality, safety & legislation for herbal products in India, US & European union.

Course Name: Regulatory aspects of medical devices

Course Code: MPH202T

CO-1	Group the basics of medical devices and IVDs, process of development, ethical and quality considerations
CO-2	Present the quality system regulations and quality risk management of medical devices
CO-3	Classify the medical devices and IVDs regulations in USA.
CO-4	Summarize the medical devices and IVDs directives in European Union
CO-5	Explain the regulatory approval process for medical devices and IVDs in China, Japan and ASEAN countries and Understand organizational structure, regulatory guidelines and functions of IMDRF/GHTF.


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Course Name: Regulatory aspects of Nutraceuticals

Course Code: MPH203T

CO-1	Compare Nutraceuticals introduction history of food and nutraceuticals regulation meaning of nutraceuticals dietary supplements functional foods medical for scope and opportunities in nutraceutical market
CO-2	List Global aspects WHO K4 guidelines on nutrition and international its role in dietary supplements and nutraceuticals industries certification and Standards for food and dietary supplements good manufacturing practices for nutraceuticals
CO-3	Conclude India food safety and K5 Standards act and Standards Authority of India organisation and functions regulations for important manufacture and sale of nutraceutical products in India vitamin dietary allowance in India
CO-4	Determine USA food safety K5 modernization act dietary supplement health and Education Act US regulation for manufacture and sale of nutraceuticals and dietary supplements labelling requirements and label claims and dietary supplements recommended dietary allowance in USA
CO-5	Explain European Union European food safety authority organisation and functions you European directives and regulations for manufacturing and sale of nutraceuticals and dietary supplements nutrition labelling European regulationson novel food and normal foodingredients recommended dietary allowance in Europe

Course Name: Regulatory aspects of herbals biologics lab

Course Code: MPH204P

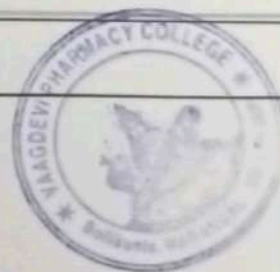
CO-1	Demonstrate biological license applications(BLA) & documents required for vaccine product approval
CO-2	Make use of clinical trial application requirements of US, EU, & INDIA of biologics
CO-3	Identify the checklist for registration of blood & blood products
CO-4	Analyze registration requirement comparison study in 5 emerging markets (WHO, BRICS, CHINA & SOUTH COREA, ASEAN & GCC) & preparing checklist for market authorization
CO-5	Construct document required for the approval of herbal products of diverse dosage forms (3 products) as per regulations requirements

Course Name: Regulatory aspects of medical devices (Lab)

Course Code: MPH205P

CO-1	GMP of medical devices and quality requirements
CO-2	Checklist for 510K and PMA for US market
CO-3	Clinical investigation of medical devices: regulations of investigational medical devices
CO-4	Check list for CE marking for various classes of devices forEU
CO-5	Audit checklist for medical device facility

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Course Name: MODERN BIO ANALYTICAL TECHNIQUES

Course Code: MPH206T

CO-1	Analyse samples quantitatively using gel electrophoresis & isolate analgesics from biological fluids
CO-2	Analyse samples using HPLC technique & develop method for API using HPLC
CO-3	Determine antihistaminic drugs using TLC
CO-4	Estimate drugs from biological matrices by SPE/LLE technique
CO-5	Assess the drug from Diclofenac formulation by HPLC technique

Course Name: Audit Course -2 Disaster Management

Course Code: MPH207

CO-1	Understand key concepts of disasters and its relationships with development and disaster prone areas in India.
CO-2	Explain repercussions of disasters and hazards.
CO-3	Promote prevention and preparedness for disaster
CO-4	Understand the techniques of risk reduction
CO-5	Enhance awareness of disaster risk management and build skills to respond to disasters.

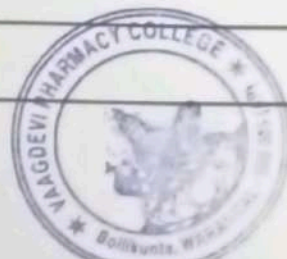
M. Pharmacy/ Second Year/ I Semester

Course Name: Pharmaceutical production technology

Course Code: MPH301T

CO-1	Summarize Pilot plant scale-up techniques used in pharmaceutical manufacturing
CO-2	Elaborate formulation development of parenteral dosage forms.
CO-3	Elaborate about formulation, PO4 manufacture and quality control of pharmaceutical aerosols.
CO-4	Classify cosmetics and nutraceuticals based on preparation, manufacturing aspects, specific properties and prevention.
CO-5	Distinguish the principles of Aseptic processing operations.

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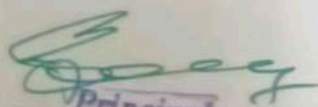
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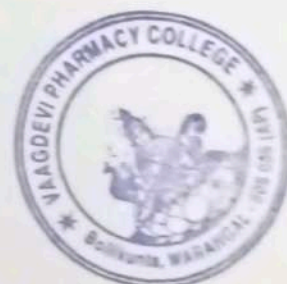
Course Name: Audits and Regulatory Compliance

Course Code: MPH302T

CO-1	Discuss briefly about audit objectives and their management.
CO-2	Understand the role of quality systems and audits in pharmaceutical manufacturing environment
CO-3	Prepare checklist of auditing of vendors and production department.
CO-4	Organize the auditing of a microbiological laboratory
CO-5	List the basics of auditing various engineering systems in a manufacturing plant.


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M.PHARMACY COURSE OUTCOMES

ACADEMIC YEAR 2022-23

PHARMACEUTICS

SEMESTER: I

YEAR: I

REGULATION: R22

Course Name: Modern Pharmaceutics -I

Course Code: MPH101T

CO-1	Students will know the preformulation studies, methodology, different excipients used in solid dosage forms and their evaluation with references to production technologies.
CO-2	Students also know the optimization techniques and their applications in pharmaceutical industries.
CO-3	Students also explain about formulation and development, use of excipients in tablets, powders, capsules, micro-encapsules and coating techniques.
CO-4	Students shall explain the preformulation parameters, apply ICH guidelines, and evaluate drug, drug excipients compatibility.
CO-5	They also learn and apply the statistical design in different formulations.

Course Name: Advanced Biopharmaceutics and Pharmacokinetics

Course Code: MPH102T

CO-1	The student shall learn about bioavailability, bioequivalence, stability of dosage forms and factor affecting bioavailability.
CO-2	Learn the pharmacokinetic parameter like drug disposition, absorption, nonlinear and time dependant pharmacokinetics.
CO-3	Understand about the drug interactions & problems, practice associated in pharmacokinetic parameters calculations.
CO-4	Evaluate the parameters for the disposition, absorption and Michaelis-Menton constants for nonlinear kinetics.
CO-5	Learn the bioequivalence studies and protocols for bioequivalent studies.

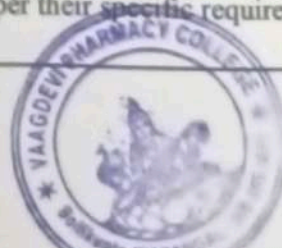
Course Name: Drug Regulatory Affairs

Course Code: MPH103T

CO-1	Discuss the rationale behind regulatory requirements and ways and means of complying with them in India.
CO-2	Point out the important aspects of GMP.
CO-3	List various laws, legislation and guidance related to safety, efficacy ethical conduct and regulatory approval of drugs in USA & Brazil.
CO-4	Handle documentation and general principles involved in regulatory writing and submission to agencies.
CO-5	Organize the submission of Drug Master Files to regulatory authorities as per their specific requirements in USA, Europe and Canada.

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Course Name: Stability of Drug and Dosage form

Course Code: MPH104T

CO-1	Judge and prioritize, and plan regarding hydrolysis, photolysis
CO-2	Define and describe about the physical stability
CO-3	Summarize the use of excipients and knowledge regarding extraction of drugs
CO-4	Design and modify raw materials used in cosmetic industry
CO-5	Solve the theory of hair and skin formulations

Course Name: Research Methodology & Intellectual Property Rights

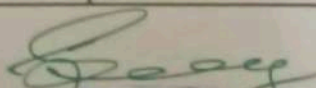
Course Code: MPH105T

CO-1	Summarize Research problem, Sources of research problem
CO-2	Organize the effective literature studies approaches, analysis, Plagiarism, Research ethics
CO-3	Understand the effective technical writing, how to write report
CO-4	Determine the Patents, Designs, Trade and Copyright.
CO-5	Analyze the Licensing and transfer of technology

Course Name: Modern Pharmaceutics -I (Lab)

Course Code: MPH106P

CO-1	Compare to carry out the preformulation studies of solid dosage forms effects of compressional force on tablet disintegration time
CO-2	List the study of micromeritic properties of powders and granules and effect of particle size on dissolution of tablets
CO-3	Evaluate the effects of binders on dissolution of tablet. Pharmacokinetic models ,to determine similarity factors
CO-4	Estimate Accelerated stability testing of different tablets ,determine of first second order rate constants by acid and alkaline
CO-5	Determine Preparation ns evaluation of beta cyclodextrin complexes of new drug preparation of paracetamol tablets and comparison with marketed products


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Course Name: Advanced Biopharmaceutics and Pharmacokinetics Lab

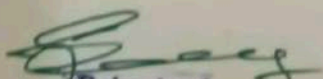
Course Code: MPH107P

CO-1	Analyze the dissolution by various data-kinetic modeling and Intrinsic dissolution.
CO-2	Evaluate the drug-protein binding analysis.
CO-3	Describe the K_a (absorption rate constant) absorption curve Wagner nelson method, LooRiegel method.
CO-4	Explain the Assignment of numerical problems, one compartment and two compartment disposition, method of residuals, AUC and evaluation of pharmacokinetic parameters
CO-5	Understand the drug release from semi solids by agar gel method of Franz diffusion cell.

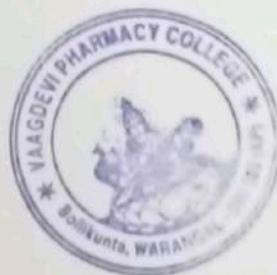
Course Name: Audit Course-1 Value Education

Course Code: MPH108

CO-1	Understand human values, their significance and role in life.
CO-2	Promote self-reflection and critical inquiry that foster critical thinking of one's value and the values of others.
CO-3	Practice respect for human rights and democratic principles.
CO-4	Emerge as responsible citizens with clear conviction to practice values and ethics in life.
CO-5	Develop the overall personality.


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YEAR: I

SEMISTER: II

REGULATION: R22

Course Name: Modern pharmaceutics-I

Course Code: MPH201T

CO-1	Describe the pilot plant scale up techniques used in pharmaceutical manufacturing
CO-2	Explain the formulation development of Parenteral dosage forms
CO-3	Evaluate the pharmaceutical aerosols and manufacturing process
CO-4	Discuss about manufacture of the cosmetics and nutraceuticals
CO-5	Analyse the aseptic processing operation

Course Name: Advanced Drug Delivery Systems

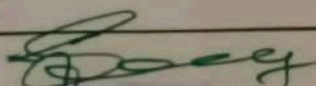
Course Code: MPH201T

CO-1	Understand the Controlled release oral drug delivery systems & Parenteral controlled release drug delivery systems
CO-2	Determining Implantable Therapeutic systems , Transdermal delivery systems , Ocular and Intrauterine delivery systems
CO-3	Summarize Bioadhesive drug delivery systems & Nasal drug delivery systems
CO-4	Elaborate Liposomes, Niosomes, Microspheres, Nanoparticles & Resealed erythrocytes
CO-5	Distinguish the Drug Delivery to lungs & Delivery to the brain

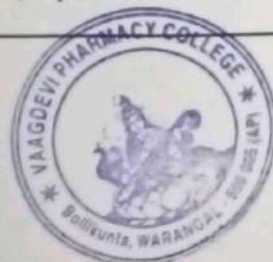
Course Name: Industrial Pharmacy

Course Code: MPH203T

CO-1	Distinguish the detailed study of machinery and theory of pharmaceutical operations like milling, mixing, filtration and drying
CO-2	Summarize various material of construction, equipment's, packaging materials involved in large scale production like monophasic and biphasic dosage forms.
CO-3	Elaborate about product organization, its objectives, and policies related to material management, handling, inventory management, planning control budget and total quality management.
CO-4	Discuss about effluent analysis and distinguish between its specifications, and preventive measures for the different pollutions like water, solid, air and sound.
CO-5	To criticize and judge the validation methods and processes involved in solids, liquids and sterile dosage forms.


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Course Name: Nano Based Drug Delivery systems

Course Code: MPH204T

CO-1	Determination and classification of various properties of nano materials with their role of size, its distribution and its properties.
CO-2	Summarize various physical, chemical, biological methods for the synthesis of different types of nano particles like gold, magnetic, polymeric, assembly structures.
CO-3	Elaborate about Biomedical applications of nano technology
CO-4	Designing of nano materials for drug delivery related to pulmonary, nasal, cancer therapy and cardiovascular diseases.
CO-5	Distinguish the principles of size reduction, analysis of nano particles, size, PDI, size separation and different methods of analysis for the release of drugs.

Course Name: Modern Pharmaceutics -II (Lab)

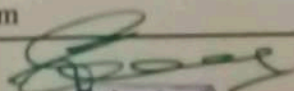
Course Code: MPH205P

CO-1	Experimenting the Preparation of mouth wash
CO-2	Preparing the formulation and evaluation of vanishing cream and calamine lotion
CO-3	Estimating the preparation and evaluation of floating tablets and Fast dissolving tablets
CO-4	Determination the evaluation of Chewable tablets
CO-5	Experimenting the preparation of oral rehydration solution

Course Name: Advanced Drug Delivery systems (Lab)

Course Code: MPH206P

CO-1	Determining the study on diffusion of drugs through various polymeric membranes
CO-2	Estimating the formulation and evaluation of sustained release oral matrix tablet
CO-3	Determining the formulation and evaluation of sustained release oral reservoir system.
CO-4	Experimenting the formulation and evaluation of microspheres / microencapsules
CO-5	Structuring the formulation and evaluation of transdermal films & Formulation and evaluation of mucoadhesive system


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Course Name: Audit Course -2 Disaster Management

Course Code: MPH207

CO-1	Understand key concepts of disasters and its relationships with development and disaster prone areas in India.
CO-2	Explain repercussions of disasters and hazards.
CO-3	Promote prevention and preparedness for disaster
CO-4	Understand the techniques of risk reduction
CO-5	Enhance awareness of disaster risk management and build skills to respond to disasters.

M. Pharmacy/ Second Year/ I Semester

Course Name: Scale up And Technology Transfer

Course Code: MPH301T

CO-1	Design the pilot scale up technology
CO-2	Judge the documentation process
CO-3	Conclude in choosing of equipment for dosage form production
CO-4	Summarize the process validation
CO-5	Describe safety and hazards in industries

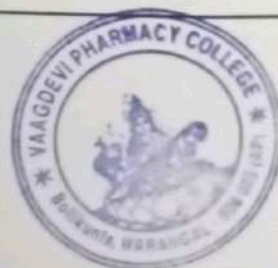
Course Name: Audits and Regulatory Compliance

Course Code: MPH302

CO-1	Discuss briefly about audit objectives and their management.
CO-2	Understand the role of quality systems and audits in pharmaceutical manufacturing environment
CO-3	Prepare checklist of auditing of vendors and production department.
CO-4	Organize the auditing of a microbiological laboratory
CO-5	List the basics of auditing various engineering systems in a manufacturing plant.

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M.PHARMACY COURSE OUTCOMES

ACADEMIC YEAR 2022-23

PHARMACEUTICAL ANALYSIS

YEAR: I

SEMESTER: I

REGULATION: R22

Course Name: Modern Pharmaceutical Analytical Techniques Course Code: MPH101T

CO-1	Knowledge will be gained by the students in the Modern Analytical Techniques and can apply the theories in the Analysis of various bulk drugs and their formulations.
CO-2	Students will also be in a position to apply their knowledge in developing the new methods for the determination and validate the procedures.
CO-3	Knowledge in the field of Pharmaceutical Analysis. The various modern analytical techniques like UV-Visible, IR, NMR, Mass, GC, HPLC, different chromatographic methods
CO-4	To enable the students to understand and apply the principles involved in the determination of different bulk drugs and their formulation.
CO-5	Basic practical knowledge relevant to the analysis is also imparted.

Course Name: Pharmaceutical And Food Analysis

Course Code: MPH102T

CO-1	To impart knowledge on analysis of food constituents and finished food products.
CO-2	Application of instrumental analysis in the determination of pesticides in variety of food products
CO-3	Student shall be able to understand various analytical techniques in the determination of Food constituents
CO-4	To know the quantitative determination of drugs from different category of both API and dosage forms
CO-5	Student shall have the knowledge on food regulations and legislations

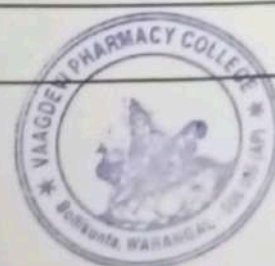
Course Name: Advanced Pharmaceutical Analysis

Course Code: MPH103T

CO-1	Perception on qualitative determination of various organic compounds
CO-2	Accomplished with spectral analysis, dissolution parameters and microbial assays.
CO-3	Knowledge on principles and procedures involved in determination of organic functional groups.
CO-4	Performing different tests on excipients such as bulk density, particle size distribution etc.
CO-5	Knowledge on drug dissolution testing of various dosage forms

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P.O.BOLLIKUNTA, WARANGAL-506 005(Telangana State)

Course Name: Drug Regulatory Affairs

Course Code: MPH104T

CO-1	Discuss the rationale behind regulatory requirements and ways and means of complying with them in India.
CO-2	Point out the important aspects of GMP.
CO-3	List various laws, legislation and guidance related to safety, efficacy ethical conduct and regulatory approval of drugs in USA & Brazil.
CO-4	Handle documentation and general principles involved in regulatory writing and submission to agencies.
CO-5	Organize the submission of Drug Master Files to regulatory authorities as per their specific requirements in USA, Europe and Canada.

Course Name: Stability of Drugs and Dosage Forms

Course Code: MPH105T

CO-1	Judge and prioritize, and plan regarding hydrolysis, photolysis
CO-2	Define and describe about the physical stability
CO-3	Summarize the use of excipients and knowledge regarding extraction of drugs
CO-4	Design and modify raw materials used in cosmetic industry
CO-5	Solve the theory of hair and skin formulations

Course Name: Research Methodology & Intellectual Property Rights

Course Code: MPH106T

CO-1	Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.
CO-2	Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasize the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
CO-3	Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
CO-4	Understand research problem formulation.
CO-5	To know the literature studies, plagiarism and ethics

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Course Name: Modern Pharmaceutical Analytical Techniques (Lab) **Course Code: MPH107P**

CO-1	Colorimetry / UV / Visible, Spectroscopy, scanning of few compounds for UV-absorption, calculation of Assay / content uniformity / % of drug release
CO-2	Separation and calculation of Rf values by using paper chromatography, TLC, HPTLC Technique
CO-3	Estimate samples using HPLC technique
CO-4	Simultaneous estimation of multi component containing formulations by UV spectrophotometry
CO-5	Evaluate various glassware and analytical instruments by calibration.

Course Name: Pharmaceutical And Food Analysis (Lab)

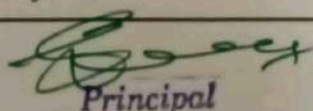
Course Code: MPH107P

CO-1	Student shall be able to determine the total reducing sugar and proteins
CO-2	Student shall be able to determine the saponification value, Iodine value, Peroxide value, Acid value in food products
CO-3	Students would able to determine rancidity in food products, preservatives in food and Analysis of natural and synthetic colors & food additives in food
CO-4	To know the determination of pesticide residue in food products and Assay of any two Analgesic & Antipyretic drugs
CO-5	To know the Assay of any two Diuretics and Microbiological assay of any two.

Course Name: Audit Course-I Value Education

Course Code: MPH108

CO-1	Understand human values, their significance and role in life.
CO-2	Promote self-reflection and critical inquiry that foster critical thinking of one's value and the values of others.
CO-3	Practice respect for human rights and democratic principles.
CO-4	Emerge as responsible citizens with clear conviction to practice values and ethics in life.
CO-5	Develop the overall personality.


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YEAR: I

SEMISTER: II

REGULATION: R22

Course Name: Advanced Instrumental Analysis-I

Course Code: MPH201T

CO-1	Students will come out with the thorough knowledge of various spectral aspects of X-Ray and different aspects regarding X-Ray diffraction methods.
CO-2	Students would able to know Biochromatography and Super critical fluid chromatography their principles, Instrumentation and applications.
CO-3	To know about the Capillary Electrophoresis the concepts of CE in pharmaceutical analysis.
CO-4	Describe on DSC, DTA, TGA and brief discussion about this techniques.
CO-5	To know Scanning electron microscope and its principle, Instrumentation and applications..

Course Name: Modern Bio Analytical Techniques

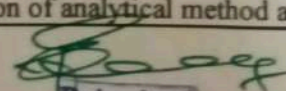
Course Code: MPH202T

CO-1	Students would be able to know the Extraction of drugs from biological samples and principles, procedures.
CO-2	To know Biopharmaceutical factors affecting drug bioavailability in In-vitro and In-vivo studies
CO-3	Students would able to learn about Bioanalysis and Bioanalytical method validation and its concepts.
CO-4	Students would able to learn Pre-Formulation, Physical characteristics, Chemical Characteristics – Degradation
CO-5	To determine Automation and computer-aided analysis, LIMS concept of auto samplers and high through put analysis and Drug Product performance, In Vivo. Bioavailability and Bioequivalence Studies.

Course Name: Pharmaceutical validation

Course Code: MPH203T

CO-1	Students would have studied about the different types of validation procedures and how it can be applied to various instruments and equipments at different stages of usage.
CO-2	To know a complete procedures involved in qualification of various analytical instruments and Glass ware
CO-3	Students would able to learn about the steps involved in qualification of laboratory equipments and validation of utility systems
CO-4	Carryout validation of analytical method used in cleaning. Cleaning of equipments, facilities and cleaning in place.
CO-5	Apply the knowledge of validation of analytical method as per ICH guidelines and USP.


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Course Name: Advanced Instrumental Analysis – II

Course Code: MPH204T

CO-1	Students will come out with the thorough knowledge of various electrochemical methods
CO-2	Students will come out with the thorough knowledge of AAS, RIA, ELISA etc. which help them in further projects works and also industrial opportunities
CO-3	Various hyphenated analytical instrumental techniques for identification, characterization and quantification of drugs.
CO-4	Students will come out with the thorough knowledge of LC-MS, GC-MS, and hyphenated techniques.
CO-5	Students will come out with the thorough knowledge of fluorimetry.

Course Name: Advanced Instrumental Analysis - I (Lab)

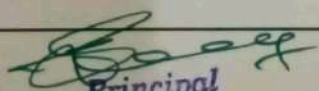
Course Code: MPH205P

CO-1	Students would be able to know about Determination of chlorides and sulphates by Nephelo – Turbidimetry.
CO-2	Students would be able to learn compounds of sodium, potassium and calcium by Flame photometry and Estimation of riboflavin/quinine sulphate by fluorimetry.
CO-3	Students would be able to learn about assay of official compounds by potentiometric titrations and conductimetric titrations
CO-4	To know about Demonstration on ELISA, Quenching of fluorescence.
CO-5	Students would be able to study phosphate interference on absorption of calcium

Course Name: Modern Bio Analytical Techniques Lab

Course Code: MPH206P

CO-1	Analyze samples quantitatively using gel electrophoresis & isolate analgesics from biological fluids
CO-2	Analyze samples using HPLC technique & develop method for API using HPLC
CO-3	Determine antihistaminic drugs using TLC
CO-4	Estimate drugs from biological matrices by SPE/LLE technique
CO-5	Assess the drug from Diclofenac formulation by HPLC technique


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Course Name: Audit Course -2 Disaster Management

Course Code: MPH207

CO-1	Understand key concepts of disasters and its relationships with development and disaster prone areas in India.
CO-2	Explain repercussions of disasters and hazards.
CO-3	Promote prevention and preparedness for disaster
CO-4	Understand the techniques of risk reduction
CO-5	Enhance awareness of disaster risk management and build skills to respond to disasters.

M. Pharmacy/ Second Year/ I Semester

Course Name: Scale up And Technology Transfer

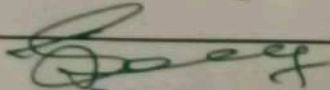
Course Code: MPH301

CO-1	Design the pilot scale up technology
CO-2	Judge the documentation process
CO-3	Conclude in choosing of equipment for dosage form production
CO-4	Summarize the process validation
CO-5	Describe safety and hazards in industries

Course Name: Audits and Regulatory Compliance

Course Code: MPH302

CO-1	Discuss briefly about audit objectives and their management.
CO-2	Understand the role of quality systems and audits in pharmaceutical manufacturing environment
CO-3	Prepare checklist of auditing of vendors and production department.
CO-4	Organize the auditing of a microbiological laboratory
CO-5	List the basics of auditing various engineering systems in a manufacturing plant.


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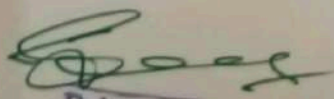
Program Specific Outcomes (PSOs) (M.PHARMACY)

PSO1: To develop new/ groundbreaking medications / bulk drug/pharmaceutical formulation requires latest methods, technologies and processes. In this, phase/topic wise is covered in the syllabus e.g., selection of drugs, dose calculations, dose adjustments by applying biopharmaceutics theories, pharmacokinetic and bioequivalence models, in-vitro and in-vivo studies using computer simulations, population modeling's, potential clinical pharmacokinetic and problem analysis, selection of polymers and various preformulation elements, pilot plant scale up techniques, industrial management, GMP considerations, stability testing, sterilization, formulation, evaluation and packaging of dosage forms.

PSO2: Professional Training to the students to work on drug compounds and develop new medications based on research. In this students learn test medications for efficiency and safety, oversee the production process to ensure medication are produced accurately, conducting clinical drug trials and evaluating the results of these trials to gauge a drugs's effectiveness and to determine potential risks or side effects.

PSO3: Students are trained to collaborate with various pharmaceutical companies and variety of health care professionals to ensure clinical drug trials are conducted safely as per regulatory guidelines for the testing of drugs.

PSO4: To develop a scientific innovation thought /innovation by assigning independent research projects to each students under specialized subjects supervisors. The findings/outcome of the research are promoted to be published in reputed national/international journals.


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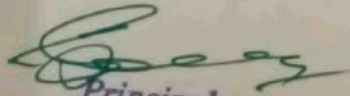
Program Specific Outcomes (PSO's)

(B.PHARMACY)

PSO 1: Detail understanding of theoretical and practical knowledge of all core and allied subjects of pharmaceutical sciences, which consist of dosage form design, routes of administration of various drugs, their mechanism of action, chemical moiety involved, doses of drugs, patient treatment, patient counseling, drug dispensing, hospital administration, drug manufacturing, QA/QC and regulation etc.

PSO2: Highlight the concepts and operative components of pharmacovigilance, clinical pharmacy, hospital pharmacy, community pharmacy, pharmaceutical care, pharmacovigilance, pharmacoeconomics, clinical research, clinical pharmacokinetics and other related areas for the benefit of academicians, hospital/community pharmacists and industry, emphasizing the consequences of the use of medications.

PSO3: Rigorous core course-work in biopharmaceutics, drug transport, pharmacokinetics & pharmacodynamics, drug delivery systems, cell and molecular biology, synthetic and macromolecular chemistry, chemical and biomedical engineering, materials science, physiology and pharmacology.


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Pharm D Programme PSO - (Programme Specific Outcomes)

PSO 1. Acquire knowledge in the field of synthetic and natural sources of drugs as well as their formulation and evaluation, including their regulatory requirements.

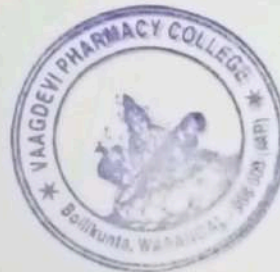
PSO 2. Using the fundamentals in physiology, anatomy and pathology to understand and explain the pharmacological and toxicological aspects of various drugs and increase their creativity in developing novel clinical research initiatives in these areas.

PSO 3. Applying their expertise to recognize possible adverse drug interactions and counsel the patients in complying with the prescribed treatment regimen.

PSO 4. Graduates can comprehend the role of pharmaceutical care, medication management, pharmacoeconomics, pharmacogenomics, and the concepts of hospital, community and clinical pharmacy for serving the community.

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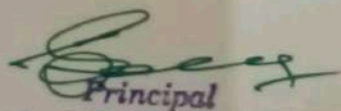
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M. Pharmacy Program Outcomes

M. Pharm Pharmaceutics Program outcome (MPH)	
PO1(MPH)	To Understand the principles of novel drug delivery system and apply the same for the fabrication of cost effective, efficacious, and patient compliant dosage form.
PO2(MPH)	To Understand the concepts of pre-formulation and its importance in developing a quality, efficacious, safe and stable dosage form and gain knowledge in performing various analytical techniques using different equipments and instruments.
PO3(MPH)	To Gain knowledge of drug and cosmetics regulatory process in India and other countries. To comprehend the computer aided drug development process using various PK-PD soft wares and understand the basic concepts of bio pharmaceutics & pharmacokinetics and its Problem solving techniques.
PO4(MPH)	To Attain hands-on training in handling various analytical equipment; perform pre-formulation studies, and formulation of cosmetics and novel drug delivery system, usage of pharmacokinetics softwares and hands-on training in the formulation of cosmetics and cosmoceuticals. Ability to understand research methodology and conduct research work and its presentation


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M. Pharmacy Program Outcomes

M.Pharm Regulatory Affairs Program outcome (MPH)	
PO1(MRA)	Understand key regulatory, registration and compliance elements with respect to documentation, clinical trials, drugs & cosmetics, biologicals and intellectual property rights.
PO2(MRA)	Understand the regulatory aspects of drugs & cosmetics, herbal & biologicals, medical devices, food and nutraceuticals.
PO3(MRA)	Gain knowledge in research & review article writing, research methodologies and biostatistics tools.
PO4(MRA)	Able to file documents for registration and marketing of drugs, cosmetics, medical devices, biologicals, herbals for different regulatory bodies.

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