ACADEMIC YEAR 2019-20

YEAR: I **SEMESTER: I** **REGULATION: R22**

Course Name: Human Anatomy and Physiology I **Course Code: 22PS101**

CO-1	Identify general terminology, cell structure and function, histology of various tissues and organs of different systems of human body.
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: 22PS102**

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 Principe, 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: 22PS103**

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.

Course Name: Pharmaceutical Inorganic Chemistry **Course Code: 22PS104**

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: 22HS105**

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: 22BS106**

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

Course Name: Remedial Mathematics **Course Code: 22BS107**

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: 22PS108**

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: 22PS109**

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 Principe 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.

Course Name: Pharmaceutics I lab **Course Code: 22PS110**

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: 22PS111**

CO-1	Perform Limit test for the various Inorganic compounds as per the procedure given in Indian pharmacopoeia
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

Course Name: Communication skills lab **Course Code: 22HS112**

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: 22PS111**

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

YEAR: I **SEMESTER: II** **REGULATION: R 22**

Course Name: Human Anatomy and Physiology II **Course Code: 22PS201**

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: 22PS202**

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: 22BS203**

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,

Course Name: Pathophysiology **Course Code: 22BS204**

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: 22CS205**

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: 22PS206**

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.

Course Name: Pharmaceutical Organic Chemistry I lab **Course Code: 22PS207**

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: 22BS208**

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: 22CS209**

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

ACADEMIC YEAR 2019-20

YEAR: II **SEMISTER: I** **REGULATION: R22**

Course Name: Pharmaceutical Organic chemistry-II **Course Code: 22PS301**

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: 22PS302**

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 parentral and ophthalmic preparations.
CO-5	EVALUATE formulation based on its solid state properties

Course Name: Pharmaceutical Microbiology **Course Code: 22BS303**

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 cell cultures in pharmaceutical industry

Course Name: Pharmaceutical Engineering **Course Code: 22PC304**

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: 22PS305**

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 synthesized

Course Name: Physical Pharmaceutics Lab **Course Code: 22PS306**

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

Course Name: Pharmaceutical Microbiology Lab **Course Code: 22BS307**

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 form laboratory sample.
CO-5	Standard protocols in pharmaceutical industry – IP.

Course Name: Pharmaceutical Engineering Lab **Course Code: 22PC308**

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

YEAR: II **SEMISTER: II** **REGULATION: R21**

Course Name: Pharmaceutical Organic chemistry-III **Course Code: 21PS401**

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: 21PC402**

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: 21PS403**

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.

Course Name: Pharmacology-I **Course Code: 21PC404**

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: 21PC405**

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: 21PC406**

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 theoritical yield
CO-5	calculate and estimate the percentage purity of the compunds synthesised

Course Name: Physical Pharmaceutics-II Lab **Course Code: 21PC407**

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: 21PC408**

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 *in-vitro* and *in-vivo* experiments
CO-5	Understands ethical considerations while housing and handling of experimental animals

Course Name: Pharmacognosy and Phytochemistry-I Lab **Course Code: 21PC409**

CO-1	Describes about essential oil content in Eucalyptus by Clevenger's 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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ACADEMIC YEAR 2019-20

YEAR: III **SEMISTER: I** **REGULATION: R21**

Course Name: Medicinal Chemistry II **Course Code: 21PS501**

CO-1	Describe the chemistry of drugs with respect to their pharmacological activity.
CO-2	Discuss the drug metabolic pathways, adverse effects and therapeutic value of drugs
CO-3	Explain the physicochemical properties and pharmacokinetic properties of the drugs
CO-4	Explain the structural activity relationship of different class of drugs.
CO-5	Examine the chemical synthesis of various drugs.

Course Name: Industrial Pharmacy - I **Course Code: 21PS502**

CO-1	Define various Pharmaceutical dosage forms
CO-2	Explain considerations involved in development of Pharmaceutical dosage forms
CO-3	Apply preformulation concepts in the development of solid, liquid and parenteral dosage forms
CO-4	Compare various dosage forms based on their formulation and usage
CO-5	Evaluate the dosage forms for their quality

Course Name: Pharmacology II **Course Code: 21PS503**

CO-1	Understanding of Anatomy and Physiology of cardiovascular system, concept of various cardio vascular disorders (Hypertension, Congestive heart failure, Angina
CO-2	Describes treatment of hyperlipidemias along with their classification of drugs and pharmacology, Drugs acting on blood and blood forming agents.
CO-3	Outline Concept of Autacoids- various types of autacoids (amine autacoids, lipid derived autacoids and peptide autacoids).
CO-4	Summarize Physiology of respiration and drugs acting on respiratory disorders. Concept of Bio-assay- Principle, types, Importance and applications of biological
CO-5	Demonstrates Treatment of metabolic disorders like Diabetes Mellitus, Drugs acting on Thyroid disorders. Steroidal anti-inflammatory agents and Oral

Course Name: Pharmacognosy and Phytochemistry - II **Course Code: 21PS504**

CO-1	Define Primary metabolites. Explain about shikimic acid path way .
CO-2	Explain about biogensis of Atropine and Morphine.
CO-3	List out factors effecting tracer technique .
CO-4	Define Alkaloids and glycosides with extraction procedure .
CO-5	Define tannins and resins

Course Name: Green Chemistry **Course Code: 21PS506**

CO-1	Apply the 12 principles of green chemistry for environment benign chemical synthesis
CO-2	Discuss anout the the solvent less reactions and green solvent used for chemical synthesis
CO-3	Apply the principles of sonochemsitry and microwave irradiations in green synthesis
CO-4	Discuss the principles and green chemistry strategies by using catalysts and alternative reagents.

CO-5	Apply the principle of green chemistry in synthesizing some important drugs

Course Name: Cosmetic science **Course Code: 21PS508**

CO-1	RECALL regulations pertaining to cosmetics and cosmetic excipients
CO-2	OUTLINE classification of cosmetics and cosmeceuticals
CO-3	UTILIZE the knowledge of creams, antiperspirants, deodorants, skin and hair care products etc.in further formulation.
CO-4	ANALYZE various oral, hair and skin related problems.
CO-5	EVALUATE various cosmetic formulations based on skin functions, hair and oral care.

Course Name: Industrial Pharmacy - I Lab **Course Code: 21PS509**

CO-1	Explain how solubility, particle size, particle shape, crystallinity, amorphous structure of pure drug as preformulation parameters plays a major role in the
CO-2	Determine the formulation and manufacturing procedures of different types of tablet dosage forms and capsule dosage forms.
CO-3	Develop different coating procedures to tablets and evaluate prepared coated tablets.
CO-4	Evaluate materials used for packaging such as glass, plastic and rubber containers.
CO-5	Formulate various types of cosmetics and perform evaluation of cosmetic preparations

Course Name: Pharmacology II Lab **Course Code: 21PS510**

CO-1	Define various terminology used in pharmacology
CO-2	Identify the pharmacological actions of drugs on the tissues
CO-3	Identify the unknow concentration of a drugs on the animal model
CO-4	Compare the potency of standard with the test compound
CO-5	Demonstrate the animal model or bioassay method by using stimulated softwares

Course Name: Pharmacognosy and Phytochemistry - II **Course Code: 21PS511**

CO-1	Define Primary metabolites. Explain about shickmic acid path way .
CO-2	Explain about biogensis of Atropine and Morphine.
CO-3	List out factors effecting tracer technique .
CO-4	Define Alkaloids and glycosides with extraction procedure .

CO-5	Define tannins and resins

Course Name: Environmental sciences **Course Code: 21MC500**

CO-1	Define Ecosystem and classify food chain and food web and biogeocycles
CO-2	Explain About different types of natural resourceswith examples.
CO-3	List out different nation parks present in india and write about conservation of biodiversity.
CO-4	Define pollution and explain about different types of pollution
CO-5	Define environmental policy and legislation and write about forest act

YEAR: III **SEMISTER: II** **REGULATION: R21**

Course Name: Medicinal Chemistry - III **Course Code:21PS601**

CO-1	Describe the chemistry of drugs with respect to their pharmacological activity.
CO-2	Discuss the drug metabolic pathways, adverse effects and therapeutic value of drugs.
CO-3	Explain the physicochemical properties and pharmacokinetic properties of the drugs
CO-4	Explain the structural activity relationship of different class of drugs.
CO-5	Examine the chemical synthesis of various drugs

Course Name: Pharmacology - III **Course Code: 21PS602**

CO-1	Define various diseases and the drugs category which are used in their treatment.
CO-2	Classify various drugs for the treatment according to their action category and Summarize their pharmacological actions with side effects, dose,
CO-3	Summarize the mechanism of action of drugs and its relevance in the treatment of different diseases.
CO-4	Distinguish between the available treatments procedures and select the appropriate method of treatment.
CO-5	Evaluate the condition of patient and council him with their knowledge of pharmacology.

Course Name: Herbal Drug Technology **Course Code: 21PS603**

CO-1	Illusurate WHO guide lines for standardisation of herbal drugs .
CO-2	Explain and evaluate about formulation of herbal shampoos.
CO-3	Demonstrate about Nutraceuticals with classification .

CO-4	Define plant tissue culture with applications .
CO-5	Ensure about formulation of herbal syrups .

Course Name: Biopharmaceutics and Pharmacokinetics **Course Code: 21PS604**

CO-1	Recall and understand basic concepts of absorption, distribution, metabolism and excretion of drugs.
CO-2	Understand the mechanisms; interpret various factors affecting drug absorption, distribution, metabolism and excretion of drugs.
CO-3	Utilize the pharmacokinetic models for the determination of pharmacokinetic parameters.
CO-4	Analyze the bioavailability of a drug and to compare the bioequivalence between drug products.
CO-5	Evaluate various pharmacokinetic parameters for the drugs exhibiting saturation kinetics.
CO-6	Design multiple dosage regimens based on pharmacokinetic parameters for maximizing patient compliance and therapeutic effectiveness.

Course Name: Pharmaceutical Quality Assurance **Course Code: 21PS605**

CO-1	Understand the c GMP aspects in a pharmaceutical industry.
CO-2	Appreciate the importance and construct the documentation.
CO-3	Develop Knowledge and understand the scope of quality certifications applicable to pharmaceutical industry
CO-4	Develop basic knowledge and understand the responsibilities of QA & QC departments.
CO-5	Develop basic knowledge Manufacturing operations and controls.

Course Name: Pharmaceutical Biotechnology **Course Code: 21PS606**

CO-1	Define basic concepts of enzyme biotechnology and protein engineering.
CO-2	Outline about recombinant DNA technology and Immunity
CO-3	Utilize the knowledge of hybridoma technology and vaccines
CO-4	Examine immune blotting techniques and genetic organization
CO-5	Explain about mutants, use of microorganisms in fermentation technology

Course Name: Bioinformatics **Course Code: 21PS607**

CO-1	Interpret relationships among living things and analyze and solve biological problems, from the chemical to molecular level using bioinformatics concepts,
CO-2	Create computer programs that facilitate biological data analysis including protein, mRNA annotation
CO-3	Conduct their own basic, fundamental bioinformatics research that solves most of the biological problems
CO-4	Identify and use bioinformatics tools to solve problems in biochemistry, molecular biology and biomedicine.
CO-5	Effective usage of existing software to extract information from large databases and to use this information in computer modeling

Course Name: Screening Methods in Pharmacology **Course Code: 21PS608**

CO-1	Apply the knowledge gained on preclinical evaluation of drugs and recent experimental techniques in the drug discovery and development.
CO-2	Understand the maintenance of laboratory animals as per the guidelines, basic knowledge of various in-vitro and in-vivo preclinical evaluation processes
CO-3	Apply the regulations and ethical requirement for the usage of experimental animals.
CO-4	Describe the various animals used in the drug discovery process and good laboratory practices in maintenance and handling of experimental
CO-5	Describe the various screening methods involved in the drug discovery process

Course Name: Medicinal chemistry - III lab **Course Code: 21PS609**

CO-1	Experiment with chemicals to prepare drugs and Intermediates.
CO-2	Estimate the percentage purity of the compounds by performing different types of assay techniques.
CO-3	Utilize the microwave irradiation technique for the preparation of drugs and intermediates.
CO-4	Design the structures and reactions using chem draw.
CO-5	Determine the physiological properties of drugs.

Course Name: Pharmacology - III lab **Course Code: 21PS610**

CO-1	Determination of PA2 value of antagonists on various isolated tissue
CO-2	Interpretation of unknown concentration of drugs by various bioassay methods
CO-3	Identify the antiulcer activity of a drug using pylorus ligation method in rats.
CO-4	Determination of PA2 value of agonists on various isolated tissue
CO-5	Interpret various drug actions on experimental animals

Course Name: Herbal Drug Technology lab **Course Code: 21PS611**

CO-1	Perform preliminary phytochemical screening of crude drugs.
CO-2	Incorporation of prepared and standardized extract in cosmetics formulations
CO-3	Analysis of herbal drugs from recent Pharmacopoeias
CO-4	Determination of Aldehyde content
CO-5	Determination of phenolic content

Course Name: Human Values and Professional Ethics **Course Code: 21*MC600**

CO-1	Develop the critical ability to distinguish between what is of value and what is superficial in life
CO-2	Understand the values, the need for value adoption and prepare them meet the challenges
CO-3	Develop the potential to adopt values, develop a good character and personality and lead a happy life
CO-4	Practice the values in life and contribute for the society around them and for the development of the institutions /organization around them
CO-5	Understand the professional ethics and their applications to their profession

ACADEMIC YEAR 2019-20

YEAR: IV **SEMISTER: I** **REGULATION: R17**

Course Name: Instrumental Methods of Analysis – II **Course Code: PS701**

CO-1	Understand the interaction of matter with Electromagnetic radiation and its applications in drug analysis
CO-2	Understand the different types of analytical techniques and their applications
CO-3	Describe the principle of chromatographic separation and analysis of drugs
CO-4	Understand the different types of Chromatographic separation techniques and Applications in drug analysis
CO-5	Perform quantitative and qualitative analysis of Drugs using various analytical instruments

Course Name: Industrial Pharmacy -II **Course Code: PS702**

CO-1	Explain pilot plant scale up techniques and SUPAC guidelines
CO-2	Outline various aspects of technology transfer involved from R & D to productions.
CO-3	Choose and apply various responsibilities and regulatory requirements for drug approval. new drugs by Indian Regulatory
CO-4	Analyze and study various quality management systems in pharmacy field.
CO-5	Discuss about the approval process and regulatory requirements for drug products

Course Name: Pharmacy Practice **Course Code: PS703**

CO-1	Demonstrate knowledge about therapeutics, quality improvement, communication, economics, health behaviour, social and administrative aspects.
CO-2	ability to know the drug distribution methods in hospital and apply it in the practice of pharmacy
CO-3	Can effectively apply principles of drug store management and inventory control to medication use.
CO-4	Will be able to provide patient-centred care to diverse patients using the best available evidence and monitor drug therapy of patient through medication chart

	review, counsel patients and identify drug related problems
CO-5	Students will engage in innovative activities by making use of the knowledge of clinical trails.

Course Name: Novel Drug Delivery Systems **Course Code: PS704**

CO-1	Define various types of drug delivery systems
CO-2	Compare the different types of delivery systems based on their formulation and usage
CO-3	Evaluate drug delivery systems for their quality
CO-4	Apply the mechanisms in developing various drug delivery systems
CO-5	Develop various devices related to drug delivery systems

Course Name: Pharmaceutical Marketing **Course Code: PS705**

CO-1	Recall about Marketing, selling, buying and market research
CO-2	Explain about Branding, packaging, labelling, and product management
CO-3	Utilize promotional and advertising techniques
CO-4	Classify marketing channels and professional sales representative
CO-5	Evaluate about pricing, global and industrial marketing

Course Name: Pharmaceutical Regulatory Sciences **Course Code: PS706**

CO-1	Recall the concepts of Drug discovery, development process, clinical studies and generic drug product development.
CO-2	Perceive the regulatory approval process and timelines for IND, NDA and ANDA and to know about changes to an approved NDA/ANDA.
CO-3	Familiar with regulatory authorities and registration process of Indian drugs in India and overseas markets like USA, Europe, Australia, Japan and Canada, Understand concepts of Technical documents like DMF, CTD, eCTD and ACTD
CO-4	Assimilate the process of clinical trials and pharmacovigilance as well as to understand the obligations of GCP in clinical trials.
CO-5	Understand the concepts of Regulatory scythe nce in pharmaceutical industry as well as to make use of regulatory guidelines, land ws, acts, orange and purple book.

Course Name: Pharmacovigilance **Course Code: PS707**

CO-1	Know why drug safety monitoring is important? History and development of pharmacovigilance
CO-2	Appreciate National and international scenario of pharmacovigilance
CO-3	Appreciate International standards for classification of diseases and drugs.Adverse drug reaction reporting systems and communication in pharmacovigilance
CO-4	Understand ICH guidelines for ICSR, PSUR, expedited reporting, pharmacovigilance planning
CO-5	Understand the data during pre-clinical, clinical and post approval Pharmacovigilance Program of India (PvPI) .ICH guidelines for ICSR, PSUR, expedited reporting, pharmacovigilance planning

Course Name: Instrumental Methods of Analysis Lab **Course Code: PS709**

CO-1	Determine the percentage purity of Ascorbic acid by performing acid-base titration.
CO-2	Estimate the percentage purity of Ampicillin by their assay method.
CO-3	Calculate the purity of Metronidazole by performing assay.
CO-4	Estimate the percentage purity of ibuprofen by their volumetric titration
CO-5	Determine the percentage purity of compounds by gravimetric analysis

Course Name: Practice School **Course Code: PS710**

CO-1	To visit industry and interact with executives to facilitate the process of learning and observation.to understand the working of different dept. of industries.
CO-2	To visit different hospitals and understand and study different case studies
CO-3	To visit different retail pharmacy outlet and understand the prescriptions patterns and study the dispensing.
CO-4	To visit the medicinal garden and study in detail about some of the medicinal plants
CO-5	To visit Regulatory affairs and poison centres to understand their work pattern and study the cases they have booked and also to study formulation aspects Using different equipment.

YEAR: IV **SEMISTER: II** **REGULATION: R17**

Course Name: Biostatistics and Research Methodology **Course Code: PS801**

CO-1	Know the operation of M.S. Excel, SPSS.
CO-2	Know the operation of, R and MINITAB®.
CO-3	Know the operation of DoE (Design of Experiment)
CO-4	Know the various statistical techniques to solve statistical problems
CO-5	Appreciate statistical techniques in solving the problems

Course Name: Social and Preventive Pharmacy **Course Code: PS802**

CO-1	Acquire high realization of current issues related to health and pharmaceutical problems within the country
CO-2	Acquire high realization of current issues related to health and pharmaceutical problems within the worldwide
CO-3	Acquire high consciousness of current issues related to health and current healthcare development
CO-4	Have a critical way of thinking based on current healthcare development.
CO-5	Evaluate alternative ways of solving problems related to health and pharmaceutical issues

Course Name: Pharmaceutical Jurisprudence **Course Code: PS803**

CO-1	Understand the Acts
CO-2	The Pharmaceutical legislations and their implications in the development and marketing
CO-3	Various Indian pharmaceutical Acts and Laws
CO-4	The regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals
CO-5	The code of ethics during the pharmaceutical practice

Course Name: Computer Aided Drug Design **Course Code:PS804**

CO-1	Understand the design and discovery of lead molecules
CO-2	Understand the role of drug design in drug discovery process

CO-3	Understand the concept of QSAR and docking
CO-4	Understand the various strategies to develop new drug like molecules
CO-5	Understand the design of new drug molecules using molecular modeling software

Course Name: Nano Technology **Course Code: PS805**

CO-1	Discuss the approaches for the development of novel drug delivery systems
CO-2	Perform the formulation and evaluation of novel drug delivery systems.
CO-3	Apply the criteria for selection of drugs and polymers for the development of Nano technology delivery systems
CO-4	Develop nano formulations with appropriate technologies
CO-5	Evaluate the product-related test and for identified diseases

Course Name: Experimental Pharmacology **Course Code: PS806**

CO-1	Understand about usage of experimental requirements and blood collection techniques
CO-2	Utilize the knowledge of dose selection and grouping of animals
CO-3	Describe the various animals and newer screening methods of parasympathetics used in the drug discovery
CO-4	Describe the various animals and newer screening methods of anti cancer drugs used in the drug discovery
CO-5	Understand the Research methodology to be followed Bio-statistical data interpretation of the assays

Course Name: Advanced Instrumentation Techniques **Course Code: PS807**

CO-1	Understand the advanced instruments used and their applications in drug analysis
CO-2	Understand the chromatographic separation and analysis of drugs
CO-3	Perform qualitative and quantitative analysis of drugs using various analytical instruments
CO-4	Understand the calibration of various analytical instrument
CO-5	Know analysis of drugs using various analytical instrument