SAROJINI NAIDU VANITA PHARMACY MAHA VIDYALAYA
Sponsored by Exhibition society affiliated with Osmania University, Tarnaka, Hyderabad
COURSE OUTCOMES

PROGRAMME: B.PHARMACY –FIRST YEAR (I SEM)

Table 3.1: *List of course outcomes of a subject in I YEAR / I SEMESTER*

Subject: HUMAN ANATOMY AND PHYSIOLOGY- I THEORY **Subject code: BP101T**	
S.no.of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Impart knowledge & understanding on the anatomy & physiology of various systems of human body. Describe various homeostatic mechanisms & tissues of human body
CO2	Describe structure & functions of Integumentary system & outline divisions of skeletal system & different types of joints.
CO3	Explain composition & functions of various body fluids. Describe about hemopoietic system & Lymphatic system
CO4	Impart knowledge & understanding on the organization of Peripheral nervous system and to describe anatomy & physiology of Sense organs
CO5	Outline the structure & functions of cardiovascular system.

Subject: PHARMACEUTICAL ANALYSIS –I THEORY **Subject code: BP102T**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Understand the fundamental concepts in pharmaceutical analysis
CO2	Understand the principles of various volumetric analysis
CO3	Apply the concepts of volumetric analysis in assay of selected drugs.
CO4	. Understand the principle of electrochemical method of analysis.
CO5	Apply the concepts of electrochemical method of analysis

Subject: PHARMACEUTICS-1 THEORY **Subject code: BP103T**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Know about the history background and development of pharmacy profession , various pharmacopoeias and types of conventional dosage forms, handling of prescription and calculate the dose of a child.
CO2	Understand various pharmaceutical calculations. To know about powders, liquid dosage forms, solubility enhancement techniques
CO3	Understand various monophasic liquid dosage forms and biphasic liquid dosage forms and method of preparation and stability of emulsions.
CO4	Understand term suppository and types of suppository displacement value and various pharmaceutical Incompatibilities.
CO5	Know the definition of various semi solids, method of preparation and evaluation and also use of excipients in the preparation of semi- solids.

Subject: PHARMACEUTICAL INORGANIC CHEMISTRY THEORY **Subject code: BP104T**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Know about the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals and to know about different Pharmacopoeias.
CO2	Understand the role of acids, bases, buffers and their role in Pharmaceutical preparations. To know about electrolytes used in replacement therapy and also about dental products.
CO3	Understand the properties and medicinal uses of Acidifiers, Antacids and Cathartics. To understand the Classification, mechanism of antimicrobials.
CO4	. Understand the role of medicinal and therapeutic agents in disease conditions. To know the concept of Expectorants , Haematinics, Astringents , Emetics and Poison & Antidote.
CO5	Understand the role of different Radiopharmaceuticals as unique medicinal formulations.

Subject: COMMUNICATION SKILLS -THEORY **Subject code: BP105T**	
S.no. of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Able to learn the basics of communication and different types of communication by this they will able to know how to communicate better, how to present themselves in front of others.
CO2	By different elements available in communicating with people can express through language, and expressing their view by using verbal and non-verbal mode of communication.

CO3	They will learn difference between learning and listening and different methods in applying to learning and listening
CO4	Students will learn do's and don'ts during or while attending the interview. Knowing or focusing on the purpose of interview. Punctuality maintenance to interview dressing formally, eye contact are few of them. Deal up with fears while presenting presentations like having good content of knowledge gives confidence to the student, giving practice regularly gives confidence.
CO5	Group discussions will help in building up knowledge in student by sharing with others by using good communication skills , it is better understood to the listener.

Subject: REMEDIAL MATHEMATICS **Subject code: BP 106 RMT**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	This course involves the definition of logarithm and apply them to solve problems. Also discusses the basics of calculus like functions and limits and continuity. Also provides knowledge an partial fractions applicable in chemical kinetics and pharmacokinetics
CO2	This course comprises of matrices definitions and their type also imparts knowledge to solve simultaneous equations using matrix methods to solve pharmacokinetics equations.
CO3	This course introduces differential calculus it requires to apply the methods to solve the problems and also to memorize them for effective solution of problems.
CO4	This consists of analytical geometry to equations of straight line different form of them. Also includes integral calculus which has to be understood and use formulae to apply them in different fields.

CO5	This course includes differential equations and Laplace transforms solving differential equations require thorough knowledge of differential calculus and Integral calculus.

Subject: REMEDIAL BIOLOGY **Subject code: BP106RBT**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Understand about living world and morphology of flowering plants.
CO2	To know about body fluids, digestive enzymes and respiratory system of human body.
CO3	Illustrate the basic components of renal system and its functions.
CO4	Explain the basic components of neuronal system and its functions.
CO5	Describe about plants, plant respiration and mineral nutritions.

Subject: HUMAN ANATOMY AND PHYSIOLOGY- I PRACTICAL: **Subject code: BP107P**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Identify the various tissues and bones of the different systems of the human body.
CO2	Perform basic hematological experiments like Blood grouping, Estimation of RBC & WBC Count.
CO3	Determine physiological parameters like blood pressure, heart rate, pulse rate.

Subject: PHARMACEUTICAL ANALYSIS LAB-I PRACTICAL **Subject code: BP108P**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Analyze the presence of impurities qualitatively by performing limit tests.
CO2	Prepare various standard solution and express their concentration by standardization.
CO3	Analyze the selected compounds qualitatively by using various volumetric methods of analysis. Express concentration and analyze the end point graphically using electrochemical method.

Subject: PHARMACEUTICS-1 PRACTICAL **Subject code: BP109T**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	To know how to prepare both solid and monophasic liquid dosage forms , their labelling and packing.
CO2	Learn the manufacturing of various biphasic liquid forms along with neat and labelled container
CO3	Learn the methods of preparation of various semi- solid dosage forms along with neat and labelled container.

SUBJECT : PHARMACEUTICAL INORGANIC CHEMISTRY PRACTICALS **Subject : BP110P**	
S.No.of COs	**Course Outcome** **On completion of course the student can be able to:**
CO1	Understand the principle and procedures of limit test and their modifications, for chlorides, sulphates, iron, heavy metals and arsenic.
CO2	Understand and prepare given inorganic pharmaceuticals. Understand and perform the test for purity for the given compounds.
CO3	Understand and perform the identification tests.

Subject: COMMUNICATION SKILLS PRACTICAL Subject code: BP111P	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Learn dos & don'ts that are to be followed during communicating with each other and also learn different ways to meet greet and apologize to people.
CO2	Learn grammar and by practicing these they will be able to write sentences very effectively
CO3	Learn different types of speeches and how to apply them in communicating with others and can use them in effective writing. Presentation skills can be improved, Techniques for delivery of speeches.

PROGRAMME: B.PHARMACY –FIRST YEAR (II SEM)

Table 3.2: *List of course outcomes of a subject in I YEAR II SEMESTER*

Subject: HUMAN ANATOMY & PHYSIOLOGY-II (THEORY) Subject code: BP201T	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Explain the gross morphology, structure and functions of Nervous system.
CO2	Explain the gross morphology, structure, functions and disorders of Digestive system with a note on energetics.
CO3	Explain the gross morphology, structure, physiological functions and disorders of Respiratory system and urinary system.
CO4	Enlist endocrine hormones and their functioning with explanation on the gross morphology, structure, physiological functions and disorders of various endocrine organs.
CO5	Describe the gross morphology, structure, physiological functions and disorders of Reproductive system. To enumerate the role of genetics.

Subject: PHARMACEUTICAL ORGANIC CHEMISTRY-I THEORY **Subject code: BP202T**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	To illustrate IUPAC nomenclature of different organic compounds.
CO2	To understand the hybridization of alkanes, alkenes, mechanism involved in elimination reactions, stability and reactions of conjugated dienes and preparations.
CO3	To understand the mechanism involved in nucleophilic substitution reactions.
CO4	Evaluate the importance of carbonyl function in organic chemistry. Knowledge on Nucleophilic addition reactions and understand the reaction mechanism of various named reactions.
CO5	Enlighten relationship between acidity constant and basicity constant. Understand conversion of carboxylic acids to their derivatives.

Subject: PATHOPHYSIOLOGY THEORY. **Subject code: BP204T.**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Understand the principles and causes of cell injury and mechanism and mediators of inflammation.
CO2	Explain the pathogenesis and complications of disease of cardiovascular, respiratory and renal systems.
CO3	Understand basic pathophysiological mechanisms of blood, endocrine and nervous system disorders.
CO4	Learn and explain the pathogenesis of diseases of bones and joints, cancer, IBD, hepatitis and jaundice.
CO5	Describe the etiology and pathogenesis of STD's & infection diseases.

Subject: COMPUTER APPLICATIONS THEORY **Subject code: BP205T**	
S.no ofCOs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Understand the design and applications of number systems in information technology. Information systems help students to understand the steps involved in managing the operations.
CO2	Create Web page s using different markup languages like HTML, XML, CSS and able to design basic databases and generate reports using queries.
CO3	Understand the use and applications of computers in pharmacy and different pharmacy automation technologies.
CO4	Gain knowledge on basic bio informatics and role of bio informatics in drug discovery.
CO5	Summarize the role of computers as data analysis in preclinical development.

Subject: ENVIRONMENTAL SCIENCES THEORY **Subject code: BP206T**	
S.no ofCOs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Create the awareness about environmental problems and role of an individual in conservation of natural resources.
CO2	Basic knowledge about the environment and its allied problems.
CO3	Motivate learner to participate in environmental protection and environment improvements and solving environmental problems.

Subject: HUMAN ANATOMY AND PHYSIOLOGY-II PRACTICALS **Subject code: BP207P**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Identify the various tissues and organs of different systems of human body using models.
CO2	Demonstrate physiological actions such as, taste, smell, vision, neuronal activity.
CO3	Determination of vital parameters like tidal volume, vital capacity.

Subject: PHARMACEUTICAL ORGANIC CHEMISTRY -I PRACTICALS **Subject code: BP208P**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Deal with qualitative identification of organic compounds. The chemical tests have been designed to illustrate the application of chemical means of identifying the unknown compound.
CO2	Understand the method of preparation of various compounds.
CO3	Understand construction of molecular models and stereochemistry of compounds by use of stereochemistry.

Subject: BIOCHEMISTRYPRACTICAL **Subject code: BP209P**	
S.no of COs	**Course Outcome** **On completion of course the student can be able to:**
CO1	Perform qualitative analysis of various biomolecules in the body fluids.
CO2	Understand the various factors effecting enzyme activity.
CO3	Perform qualitative estimation of biomolecule (sugars, protein, and creatinine, total cholesterol).

Subject: COMPUTER APPLICATIONS PRACTICAL Subject code: BP210P.	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Appreciate the importance of MS word to gather information in the form of questionnaire and also mail merge tool in designing labels.
CO2	Retrieve drug information through different databases and online tools and able to design Web page using HTML language.
CO3	Create database using MS access and information of patient database using queries and generating reports.

PROGRAMME: B.PHARMACY - SECOND YEAR (III SEM)

Table 3.3: *List of course outcomes of a subject in II YEAR /III SEMESTER*

Subject: Pharmceutical organic chemistry-II **theory Subject code:** BP301T	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Recognize the general properties of aromatic compounds, the criteria of aromaticity and Huckel's rule. Know the types of electrophilic aromatic substitution reactions. Understand the reactivity of aromatic compounds.
CO2	To understand the chemistry of aromatic acids and amines.
CO3	To understand the importance of key reactions of triglycerides such as hydrolysis, hydrogenation, etc. To know the analytical constants
CO4	To understand the importance of polynuclear hydrocarbons, their synthesis and reactions.
CO5	To understand the stabilities of cycloalkanes, strainless theory.

Subject: PHYSICAL PHARMACEUTICS-I THEORY **Subject code:**BP302T	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Understand the terms and concepts of solubility and miscibility and also factors controlling and effects the solubility of drugs.
CO2	Understand the various physicochemical properties of drug molecules in the designing the dosage forms.
CO3	Understand the concept of surface and interfacial tensions, surface free energy, mechanisms of adsorption on liquid and solid interfaces.
CO4	Understand the significance of complex action, protein liquid interactions in drug action.
CO5	Formulate and analyze a buffer solution of desired pH and buffer capacity and uses of buffers in pharmaceutical solutions.
Subject: PHARMACEUTICAL MICROBIOLOGY-THEORY **Subject code: BP303T**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Understand Microbiology, know about its history, applied branches and its Scope, regarding the Bacterial Structure and its nutrition required for growth of Bacteria, Isolation procedures, and also Microscopy, its principles and Applications.
CO2	Enumerate the principles and procedures for staining and different methods of Sterilization, their advantages and disadvantages.
CO3	Importance and Classification of Fungus, Virus along with their morphological features and cultivation of them and also Explain the Disinfectants, Bacteriostatics and Bactericidals, their mode of action, Classification and Evaluation methods. Perform the Sterility Testing of Pharmaceutical Products according to IP, BP and USP.
CO4	Design an aseptic area having Laminar Flow equipment with all the specifications. To discuss the different techniques involved in the assay of Standardization of Antibiotics, Vitamins and Amino acids along with a new antibiotic.

CO5	Enumerate the different factors affecting microbiological spoilage and sources of contamination, importance of preservatives, illustrate the animal cell culture and its importance.

Subject: PHARMACEUTICAL ENGINEERING THEORY **Subject code: BP304T**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Determine the flow of fluids using various instruments and to know the Size reduction & Size separation unit operations involved in pharmaceutical industries.
CO2	Know the objectives and heat transfer mechanism and importance of Evaporation and Distillation unit operations involved during pharmaceutical manufacturing process.
CO3	Understand the importance and optimization of various parameters of Drying & Mixing unit operations involved during pharmaceutical manufacturing process.
CO4	**U**nderstand & perform the filtration and centrifugation unit operations, theories used for preparation of sterile pharmaceutical dosage forms.
CO5	Understand the material handling techniques & to appreciate various preventive methods used for corrosion control in pharmaceutical industries.
Subject: PHARMACEUTICAL ORGANIC CHEMISTRY II PRACTICAL **Subject code: BP305P**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Learn to know Re-crystallization for some organic compounds and steam distillation of solvents.
CO2	Learn the analysis of oils and fats – Acid value, Saponification value and Iodine value.
CO3	Synthesize selected organic compounds by different mechanism

Subject: PHYSICAL PHARMACEUTICS-I PRACTICAL **Subject code: BP306P**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Determine various solubility parameters of drugs room temperature, pH and distribution coefficient at various solvents.
CO2	Determine HLB number of a surfactant %composition of impurities in a system and surface tension of a liquid.
CO3	Determine the stability constants and donor acceptor ratios of cupric-glycine complex and PABA- Caffeine complex and Freundlich and Langmuir constants using activated charcoal.

Subject: PHARMACEUTICAL MICROBIOLOGY PRACTICAL **Subject code: BP307P**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Expose to different laboratory experiments, rules and regulations, sterilization of glassware and media.
CO2	Enumerate the techniques used for the preparation of cultures and also the techniques used for isolation of pure culture by different methods.
CO3	Demonstrate the different staining methods and determine the motility of microbes along with bacteriology of water. Explain the importance of sterility and illustrate the various methods for sterility and microbiological assay methods for pharmaceuticals.

SUBJECT : PHARMACEUTICAL ENGINEERING PRACTICALS Subject code : BP308P	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Perform the site reduction and site separation experiments.
CO2	Determine the radiation constants for different metals. Construction of drying curves estimate the efficiency of steam distillation, studying the effect of various factors on rate on evaporation.
CO3	Determine the humidity of air by dew point and psychrometry. Understand the concept of various factors affecting rate filtration. Determine the effect of time on rate of crystallization.

PROGRAMME: B.PHARMACY - SECOND YEAR (IV SEM)

Table 3.4: *List of course outcomes of a subject in IIYear/ IVSemester*

Subject: PHARMACEUTICAL ORGANIC CHEMISTRY -III THEORY Subject code: BP40IT	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	To understand the concept of stereo isomerism and optical isomerism.
CO2	To understand the concept of Geometrical isomerism.
CO3	Understand the basic principles of Heterocyclic Chemistry. Synthesis, reactions and medicinal uses five membered Heterocyclic compounds .
CO4	Synthesis, reactions and medicinal uses of six and seven membered Heterocyclic compounds .
CO5	To understand the Named Reactions of synthetic importance.

SUBJECT : MEDICINAL CHEMISTRY - I THEORY **Subject code : BP402T**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Know the history and development of medicinal chemistry, understand various physicochemical properties and the metabolic pathway of drugs.
CO2	Understand the role of neurotransmitters and Classification, mechanism of action, Structure activity relationship studies, uses of drugs acting on Autonomic Nervous System.
CO3	Understand the role of neurotransmitters and Classification, mechanism of action, Synthesis, Structure activity relationship studies, uses of drugs mentioned acting on cholinergic receptors
CO4	Understand Classification, mechanism of action, Structure activity relationship studies, synthesis and uses of mentioned drugs acting on Central nervous system.
CO5	Understand Classification, mechanism of action, Structure activity relationship studies, synthesis, uses of mentioned drugs acting on Central nervous system.

Subject: PHYSICAL PHARMACEUTICS-II (THEORY) **Subject code: BP403T**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Understand various physicochemical properties of drug molecules in the designing the dosage form.
CO2	Understand the flow characteristic properties of different liquids and determination of viscosity of liquids by using different equipment's.
CO3	Understand various physicochemical properties of drug molecules in the designing the emulsion and suspensions.
CO4	Know about various powder characteristic flow properties and derived properties and also determination of particle size.
CO5	Know the principles of chemical kinetics and to use them for stability testing and determination of expiry date of formulations.

Subject: PHARMACOLOGY- I THEORY **Subject code: BP404T**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	To understand the basic pharmacological knowledge and appreciate the correlation of pharmacology with other bio medical sciences.
CO2	To analyze and understand the mechanism of drug action at macro molecular levels.
CO3	To remember and understand the pharmacological actions of different categories.
CO4	To remember and understand the pharmacology of drugs acting on central nervous system.
CO5	To analyze, remember and understand the pharmacology of drugs acting on central nervous system.

Subject: PHARMACOGNOSY AND PHYTOCHEMISTRY -I THEORY **Subject code: BP405T**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Describe the history& scope, different methods of classification of crude drugs. explain various (quality control methods) of crude drugs.
CO2	Illustrate various methods of cultivation, collection & storage of crude drugs and conservation of medicinal plants.
CO3	Understand the plant tissue culture techniques and applications.
CO4	Impart knowledge on various systems of medicines and different types of secondary metabolites.
CO5	Memorize the systemic study of various plant products, primary metabolites and Marine drugs.

SUBJECT : MEDICINAL CHEMISTRY -1 PRACTICALS **Subject code : BP406P**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Synthesize the drugs or intermediates by using basic organic reaction mechanisms.
CO2	Calculate the percentage purity of given drugs by using quantitative analytical methods.
CO3	Determine the partition co-efficient, hydrophobicity or hydrophilicity of drugs.

Subject: PHYSICAL PHARMACEUTICS-II LAB **Subject code: BP407P**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	To determine various flow properties of powders & also particle size & its distribution by different methods.
CO2	To determine viscosity of a liquid & semi-solids by equipment's and also sedimentation volume of liquid.
CO3	To determine first & second order rate constants & also accelerated stability studies.

Subject: PHARMACOLOGY- I PRACTICAL **Subject code: BP408P**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	To understand the basic experimental pharmacological equipment and methodology.
CO2	To study the various activities on animals by using different instruments….
CO3	To observe the effects of drugs on animals by stimulated experiments.

SUBJECT : PHARMACOGNOSY AND PHYTOCHEMISTRY – I LAB **Subject code : BP409P**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Analyze crude drugs by performing various chemical tests.
CO2	Analyze various parameters of crude drugs by quantitative microscopic evaluation methods.
CO3	Analyze various crude drugs by physical evaluation methods.

PROGRAMME: B.PHARMACY - THIRD YEAR (V SEM)

Table 3.5: *List of course outcomes of a subject in III YEAR/ V SEMESTER*

Subject: MEDICINAL CHEMISTRY -II THEORY **Subject code: BP501T**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Study the Physiology of histamine, its receptors and their distribution in the body. Know the theory of chemotherapy, classification, mechanism of action, SAR, therapeutic activity and synthesis of antihistamines and antineoplastic agents.
CO2	Study the Physiology of diuretics and hypertension. Classification, mechanism of action, SAR, therapeutic activity, and synthesis of diuretics and hypertensive agents.
CO3	Study the Physiology of arrhythmia and coagulation. Classification, mechanism of action, SAR, therapeutic activity and synthesis of anti arrhythmia, anti hyperlipidemic, anti coagulants and congestive heart failure.
CO4	Study the Physiology of endocrine system.Classification, mechanism of action SAR, and therapeutic activity of drugs acting on endocrine system.
CO5	Study the Physiology of diabetes. Classification, mechanism of action,SAR, and therapeutic activity and synthesis of anti diabetic drugs.

Subject: INDUSTRIAL PHARMACY-I THEORY **Subject code: BP502T**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	To understand various physiochemical characteristics of the drug substances and their applications in the development of different dosage forms and its impact on the stability of dosage forms.
CO2	To understand and describe the formulation, manufacturing, quality control tests of tablets, tablet coating and formulation, manufacturing, evaluation of liquid oral preparations.
CO3	To understand the formulation, filling, quality control tests of capsules and formulations, process, manufacturing of pellets.
CO4	To learn and acquire the knowledge on formulation, manufacturing and evaluation of parenteral products and ophthalmic preparations.
CO5	To learn and acquire the knowledge on cosmetic preparations, pharmaceuticals aerosols and various packaging materials.

Subject: PHARMACOLOGY- II THEORY **Subject code: BP503T**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	To understand the mechanism of drug action in relevance to treatment of cardiovascular diseases.
CO2	To learn the different mechanisms of drugs of action in relation to its treatment of cardiovascular diseases.
CO3	To understand the physiological role of autacoids and pharmacology of drugs acting on various inflammatory disorders.

CO4	To explain Pharmacological actions of endocrine hormones and describe pharmacology of drugs used in the treatment of various hormonal disorders.
CO5	To analyze and understand pharmacology of drugs acting on reproductive organs. To understand various principles of Bioassays.

Subject: PHARMACOGNOSY AND PHYTOCHEMISTRY -II THEORY **Subject code: BP504T**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Students can be able to know the biogenesis of different secondary metabolites in plants using different pathways.
CO2	Identify different classes of phyto-constituents present in plants, their uses and their sources.
CO3	Carry out isolation and identification of phyto-constituents.
CO4	Understand industrial production ,estimation and utilization of various pure phyto-constituents.
CO5	Know the modern methods of extraction techniques, isolation, purification and analysis of drugs by different chromatographic and spectroscopic techniques.

SUBJECT : PHARMACEUTICAL JURISPRUDENCE THEORY **Subject code : BP505T**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Acquire knowledge on schedule rules, import manufacture license and analysis of drugs and cosmetics.
CO2	Describe the schedules , sale , labeling, and packing of drugs and cosmetics. Study of administration of the drugs and cosmetic act and rules.

CO3	Explain the pharmacy education , regulation, regulatory bodies alcoholic preparations, narcotic and Psychotropic substances control.
CO4	Study of prohibition of advertisements animal ethical committee procedures, controlling price of drugs.
CO5	Explain about Code of ethics, legislation acts and intellectual property rights.

Subject: INDUSTRIAL PHARMACY-I PRACTICAL **Subject code: BP506 T**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Acquire knowledge about preparation of injections.
CO2	Acquire knowledge about semisolid preparations. Acquire knowledge on pre-formulation studies of various drugs.
CO3	Prepare & evaluate the tablets, capsules, acquire knowledge on tablet coating. Evaluate the glass containers.

Subject: PHARMACOLOGY- II PRACTICALS **Subject code: BP507P**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	To understand the basic knowledge in experimental pharmacology and study the effects of drugs on animals.
CO2	To learn different methods or procedures on *in vivo* animal activity studies.
CO3	To analyze or understand the principles of bio assay.

Subject: PHARMACOGNOSY AND PHYTOCHEMISTRY II PRACTICALS Subject code: BP508P	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Understand the morphology and histological characteristics of various crude drug powders.
CO2	Isolate and detect various active principles present in plants like caffeine, atropine etc.
CO3	Analyze different phyto constituents by performing TLC and Paper chromatography techniques.

PROGRAMME: B.PHARMACY - THIRD YEAR (VI SEM)

Table 3.6: *List of course outcomes of a subject in IIIyear/ VIsemester –*

Subject: MEDICINAL CHEMISTRY III THEORY Subject code: BP601T	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Know the history and development of Antibiotics. Classification, stereochemistry, mechanism of action,SAR, therapeutic activity and important products of lactam antibiotics, aminoglycosides and tetracyclines.
CO2	Know the history and development of Macrolide antibiotics and antimalarial drugs. Classification, stereochemistry, mechanism of action,SAR, therapeutic activity and synthesis of Macrolide antibiotics and antimalarial drugs. Learn the basic concepts and applications of Prodrugs.
CO3	Study the pathophysiology of Tuberculosis and urinary tract infections. Learn the classification, mechanism of action, SAR, therapeutic activity and synthesis of anti tubercular, urinary tract anti- infective and antiviral agents.
CO4	Study the pathophysiology of Fungal and protozoal infections. Learn the classification, mechanism of action, SAR, therapeutic activity and synthesis of anti-Fungal and protozoal agents.
CO5	Know the development and various approaches used in Drug design. Learn the concepts and applications of combinatorial chemistry in drug synthesis.

Subject: PHARMACOLOGY-IIITHEORY **Subject code: BP602T**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Understand the mechanism of drug action and its relevance in the treatment of respiratory and Gastrointestinal tract diseases.
CO2	Learn the general principles of chemotherapy.
CO3	Learn and understand the mechanism of drug action in relevance in the treatment of different infectious disease.
CO4	Understand the principles of chemotherapy and immune pharmacology.
CO5	Comprehend the principles of toxicology and treatment of various poisonings and understand the basic knowledge in chemo pharmacology

Subject: HERBAL DRUG TECHNOLOGY **Subject code: BP603T**	
S.no of COs	**Course Outcomes**
On completion of course the student can be able to:	
CO1	Understand about the raw materials as a source of herbal products, the good agricultural practices and Indian system of medicines.
CO2	Understand about the nutraceuticals and their benefits and Herbal-Drug and Herb -Food Interactions.
CO3	Know the herbal cosmetics, herbal excipients and novel herbal formulations.
CO4	Know the WHO and ICH guidelines for evaluation of herbal drugs and Patenting and Regulatory issues of natural products.
CO5	Know about the scope and future prospects of herbal industry and good manufacturing practice of Indian systems of medicines.

Subject: BIOPHARMACEUTICS AND PHARMACOKINETICS THEORY **Subject code: BP604T**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Understand basics concepts in biopharmaceutics and pharmacokinetics and their significance. Describe mechanism of drugs absorption, determine factors influencing absorption through GIT and non-per oval extra vascular routes. Understand and determine the factors affecting distribution affecting protein and tissue binding of volume of distribution, kinetics of protein binding of drugs and their significance.
CO2	Understand metabolism and metabolic Pathway for renal and non-renal routes of excretion, describe the factors affecting renal and non-renal excretion of drugs, renal clearance. Understanding bioavailability and invitro dissolution models *in-vitro in-vivo* correlation, studies. Determine the methods to enhance dissolution and bioavailability of poorly soluble drugs.
CO3	Understand pharmacokinetics and various pharmacokinetics models, describe one compartments. Open model a) Iv bolus b) Infusion c) Extra vascular administration. Understand and derive various PK parameters their significance and application.
CO4	Understanding multi compartments model (Two compartments open model) Derive kinetics of multiple dosing, loading and maintenance doses, calculation of doses and their significance.
CO5	Understanding nonlinear pharmacokinetics describes the causing factor for non-linearity, derive Michaels – Menten method for estimation of parameter explanation with example.

Subject: PHARMACEUTICAL BIOTECHNOLOGY THEORY **Subject code: BP605T**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Understand biotechnology and explain the methods and applications of enzyme in biotechnology, biosensors, protein engineering and in the production of enzymes.
CO2	Summerize the basic principles of genetic engineering and diseases, the role of recombinant DNA technology in the production of interferons ,vaccines, hepatitis – B ,hormones insulin its with applications.
CO3	Explain types of immunity and its application during the hypersensitive reactions, immune simulations and immune suppressors. Discuss the passive immunity and immunization products Blood products monoclonal antibodies with their applications.
CO4	Explain microbial biotransformation and its applications and types of mutation and mutants also discuss about the immunodiagnostic tests and genetic organization.
CO5	Discuss the design, methods requirements various controls along with media composition, equipments and sterilization methods and explain production of penicillin citric acid vitamin - B12, glutamic acid, griseofulvin along with a brief note on blood products and plasma substitutes.

Subject: QUALITY ASSURANCE THEORY **Subject code: BP606T**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Understand and recognize the various aspects of quality control and management and the scope of quality certification applicable to pharmaceutical industries.
CO2	Understand the cGMP aspects affecting the quality of pharmaceuticals in various departments.
CO3	Understand and recognize the various Good Laboratory Practices followed and quality control tests of packing materials.
CO4	Understand and recognize the need for proper documentation in maintenance of quality.
CO5	Understand the responsibilities of quality control and quality assurance department.

Subject: MEDICINAL CHEMSITRY-III LAB **Subject code: BP607P**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Synthesis of drugs and intermediates by using principles of organic reaction mechanisms.
CO2	Calculate the percentage purity of some drugs by using quantitative analytical methods.
CO3	Synthesize and know the importance of microwave irradiation techniques when compared to conventional methods of synthesis.
CO4	Learn the drawing structures and reactions using CHEMDRAW software.
CO5	Calculate the physicochemical parameters by using various software's used in drug design and those related to the biological activity.

Subject: PHARMACOLOGY-III PRACTICAL **Subject code: BP608P**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Learn dose calculation and pharmaco-kinetic parameters in pharmacological experiments.
CO2	Understand various activity studies by using various animal model.
CO3	Learn various effects on animals by using simulated experiments.
CO4	Acquire the knowledge in determination of toxicity testing of a given drug.
CO5	Learn and understand the biostatistics methods in experimental pharmacology.

PROGRAMME: B.PHARMACY - FOURTH YEAR (VII SEM)

Table 3.7: *List of course outcomes of a subject in IV year / VII semester*

Subject: INSTRUMENTAL METHODS OF ANALYSIS THEORY **Subject code: BP701T**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Understand and apply the concepts of interaction of electromagnetic radiation with matter.
CO2	Understand and apply the principle of separation involved in various chromatographic techniques.
CO3	Understand and apply the concepts of separation using various electrophoretic techniques.

Subject: INDUSTIAL PHARMACY II THEORY **Subject code:BP702T**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Know the process of pilot plant and scale up of bulk pharmaceutical dosage forms.
CO2	Understand the process of technology transfer from lab scale to commercial batch.
CO3	Know different laws and acts, general considerations of investigational new drug (IND) application that regulate pharmaceutical industry.
CO4	Understand the concept of quality, total quality management and ISO:69000 series of quality standards to industry.
CO5	Understand the approval process and regulatory requirements and approval procedures for new drugs and certificate of pharmaceutical product.

Subject: PHARMACY PRACTICE THEORY **Subject code: BP703T**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Understand different type of hospital and it's department staff and their functions to know the organization of hospital pharmacy and its function and managing community pharmacy. To understand the ADRS and medical related problems.
CO2	Understand the dispensing and distribution of drugs in different department of hospital. To know the importance of hospital formulary. To understand the need of therapeutic drug monitoring. Role of pharmacist in medication adherence to understand medication history interview.
CO3	Know the role of PTC in hospital, importance of DIC and PIC and pharmacist role in it. To know the step wise process of patient counseling, to know the role pharmacist in CME and CPE.
CO4	Know the role of pharmacist in hospital budget preparation, importance to drug therapy monitoring, ward round and pharmaceutical care. To know the rationality of OTC drugs.
CO5	Know the different types of inventory control methods and their importance. to know the various committee in hospital .to know the normal value of laboratory report and interpretation of abnormal values.

Subject: NOVEL DRUG DELIVERY SYSTEMS(THEORY) **Subject code: BP704T**	
S.no ofCOs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Understand controlled drug delivery systems. and the various approaches to design-controlled release formulations and to know the various physicochemical and biological properties of control drug delivery systems and to Understand polymers & microspheres &its applications in formulations.
CO2	Understand mucosal drug delivery systems, their principles and concepts of bio adhesion/muco- adhesionand transmucosal permeability. Understand formulation for buccal delivery systems.
CO3	Understand the basic concepts and components of trans-dermal drug delivery system. factors affecting &various approaches in formulations of TDDS & Gastro retentive drug delivery systems along with Naso pulmonary delivery systems.
CO4	Understand various approaches to design targeted drug delivery systems of niosomes , liposomes and nanoparticles.
CO5	Understand the various ocular drug delivery systems and intra-uterine systems and their approaches and its applications.

Subject: INSTRUMENTAL METHODS OF ANALYSIS PRACTICAL **Subject code: BP705P**	
S.no ofCOs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Analyse the given drugs qualitatively and quantitatively using various spectroscopic techniques.
CO2	Analyse the given drugs qualitatively and quantitatively using various chromatographic techniques.

PROGRAMME: B.PHARMACY - FOURTH YEAR (VIII SEM)

Table 3.8: *List of course outcomes of a subject inIV year / VIII semester*

Subject: BIOSTATISTICS AND RESEARCHMETHODOLOGY **Subject code: BP801T.**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	This course gives introduction to biostatistics . Measure of dispersion helps us to apply the concepts in the field of pharmacy. It helps to understand the concept of standard deviation, with emphasis on pharmaceutical examples. Correction studies help us to understand the closeness & relation between multiple variable.
CO2	This course deals with the fitting of data using regression lives. It also focuses on probability theory and theoretical and continuous distribution like binomial, Poisson and normal. It gives knowledge on samplings, method of sampling and basic concepts of inferential statistic. It helps us on to understand and various parametric statistical tests like t test, Anova etc.
CO3	This course comprises of non-parametric tests like walcoxin rank sum test,MannWhitney U test etc. Also,this includes the course to know the need of research and its methodology. This also discusses the methods of graphical representation.
CO4	This course gives introduction by practical statistical analysis by using online satisfied software like excel SPSS MINITAB design of experiments etc.
CO5	This course deals with designation and analysis of experiments using factorial designs to learn the principles of experimental designs.

Subject: SOCIAL AND PREVENTIVE PHARMACY **Subject code: BP802T**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Understand basic concepts of health and disease and also general measures and strategies to be followed in the social and preventive pharmacy.
CO2	Acquire knowledge on general principles of prevention and control of various diseases.
CO3	categorize different national health programs, its objectives, functions and outcomes of various life-threatening diseases.
CO4	Describe various national health intervention programs and role of WHO in Indian national program.
CO5	Evaluate different ways of solving problems related to health and community services.

Subject: COMPUTER AIDED DRUG DESIGN THEORY **Subject code: BP807ET**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Design and discover of new lead molecules & explain the role of drug design in drug discovery process.
CO2	Distinguish between SAR &QSAR. Describe the concept of QSAR.

CO3	Explain about the Molecular Modelling , virtual screening techniques and Docking techniques.
CO4	Acquire knowledge on Informatics methods & databases used for the drug design process.
CO5	Design new lead molecules using molecular modeling software.

Subject: COSMETIC SCIENCE THEORY **Subject code: BP809 ET**	
S.no of COs	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Summarize the excipients used in preparation of cosmetic formulations.
CO2	Understanding Principles of formulation and building blocks of cosmetic products.
CO3	Appreciate the importance of herbs in cosmetics.
CO4	Know the Indian and EU regulations governing cosmetic preparations and understanding the principle of cosmetic evaluation.
CO5	Understand the problems associated with cosmetic products.

DOCTOR OF PHARMACY

(Pharm.D) COURSE

OBJECTIVES AND OUTCOMES

FIRST YEAR (I/VI)

TABLE 1.1: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN I YEAR

Subject: HUMAN ANATOMY AND PHYSIOLOGY- I THEORY **OBJECTIVE:** This course is designed to impart a fundamental knowledge on the structure and functions of the human body. It also helps in understanding both homeostasis mechanisms and homeostatic imbalances of various body systems. Since a medicament, which is produced by pharmacist, is used to correct the deviations in human body, it enhances the understanding of how the drugs act on the various body systems in correcting the disease state of the organs. **Subject code: 1.1**	
S. No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Can identify tissues and organs of the different systems of the human body.
CO2	Able to describe the homeostatic mechanisms and their imbalances of various systems.
CO3	Perform the hematological tests and also record blood pressure, heart rate and pulse and respiratory volumes also helps to understand the interlinked mechanism in maintenance of normal functioning of body.
CO4	Acquired knowledge of anatomy and physiological role of various systems in human body like urinary, endocrine, reproductive and sense organs.
CO5	Appreciate coordinated working pattern & interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body and also to identify the changes when the body exposed to various exercises.
1.1 HUMAN ANATOMY & PHYSIOLOGY – I (Practical)	
CO1	Capable of carrying out hematological experiments with a brief study of tissues and also having brief knowledge on family planning.
CO2	Demonstrate practical knowledge of human gross and microscopic anatomy using prepared histological slides, organ models.
CO3	To acquire knowledge on experimental pharmacology.

TABLE 1.2: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN I YEAR

Subject: Pharmaceutics (Theory)	
OBJECTIVE: This course is designed to impart a fundamental knowledge on the art and science of formulating different dosage forms. It prepares the students for most basics of the applied field of pharmacy.	
Subject code: 1.2	
S. No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Fundamental knowledge on handling of Prescription adjusting dose and history of pharmacy profession.
CO2	To Know preparation, calculation and dispensing of various dosage forms.
CO3	To appreciate the effective use of excipients selection in Biphasic and special preparations.
CO4	To know about Galanical (Extract) preparations and pharmaceutical calculations.
CO5	Have the basic knowledge of pharmaceutical Incompatibilities and surgical aids.
1.2 PHARMACEUTICS (Practical)	
CO1	Able to prepare and dispense liquid dosage forms. Labeling and container requirements for pharmaceutical liquid dosage forms.
CO2	Able to differentiate labeling and container requirements for pharmaceutical products for biphasic and semi solid dosage forms.
CO3	Can analyze the incompatibility problems present in the prescription and also acquire knowledge on solid dosage forms.

TABLE 1.3: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN I YEAR

Subject: MEDICINAL BIOCHEMISTRY (Theory) (Mrs. vinuta)

OBJECTIVE: Biochemistry is the branch of both chemistry and biology. The main goal of biochemistry is to understand the structure and metabolism of various bio molecules like carbohydrates, proteins, lipids and nucleic acids which are very essential for the necessities of life process in the living organisms like energy production and transforming the genetic information.

Subject code: 1.3

S. No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Understand the biochemical organization of a cell, fundamental concepts bioenergetics of biomolecules, respiratory chain and oxidative phosphorylation of cell.
CO2	Understand the metabolic pathways of different nutrient molecules, mechanisms involved in biological oxidation pathway (and inhibitor associated with it).
CO3	Abstract about the role of clinical biochemistry laboratory, the catalytic role of enzyme inhibitor in design of new drug molecules with their therapeutic diagnostic applications.
CO4	Determine the tests for the liver function, Kidney function and lipid profile.
CO5	Understand the Immunochemical techniques for determination of hormone levels and protein levels in serum, Electrolyte balance. .
1.3 MEDICINAL BIOCHEMISTRY (Practical)	
CO1	Perform qualitative analysis of various biomolecules in the body fluids, lipid profile tests.
CO2	Understand the various factors effecting enzyme activity.
CO3	Perform quantitative estimation of biomolecule (sugars, protein, and creatinine, urea, total cholesterol), SGOT, SGPT.

TABLE 1.4: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN I YEAR

Subject: PHARMACEUTICAL ORGANIC CHEMISTRY (Theory)

OBJECTIVE :

This course is designed to impart very good knowledge about

1. IUPAC/Common system of nomenclature of simple organic compounds belonging todifferent classes of organic compounds;
2. Some important physical properties of organic compounds;
3. Some named organic reactions with mechanisms
4. Methods of preparation, test for purity, principle involved in the assay, important medicinaluses of some important organic compounds.

Subject code: 1.4

S. No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Acquire understanding of the physical properties of organic compounds.
CO2	Can give IUPAC names of simple hydrocarbons.
CO3	Acquire the knowledge of preparation and reactions and mechanisms of various clauses of organic compounds.
CO4	Can explain important named reactions with mechanisms and applications.
CO5	Know the methods of preparation , qualitative and quantitative analysis of medicinal organic compounds.
	1.4 PHARMACEUTICAL ORGANIC CHEMISTRY (Practical)
CO1	Able to synthesize organic compounds by benzoylation, condensation, diazotization, nitration etc.
CO2	Able to identify organic compounds through systematic analysis.
CO3	Able to make stereo models of simple organic compounds and evaluate stereochemical aspects.

TABLE 1.5: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN I YEAR

Subject: PHARMACEUTICAL INORGANIC CHEMISTRY (Theory) **OBJECTIVE:** This course mainly deals with fundamentals of Analytical chemistry and also the studyof inorganic pharmaceuticals regarding their monographs and also the course deals with basic knowledge of analysis of various pharmaceuticals. **Subject code: 1.5**	
S. No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Acquire the knowledge on theoretical aspects of volumetric analysis and applications of inorganic chemistry.to understand principles and procedures of analysis of drugs.
CO2	To know the analysis of inorganic pharmaceuticals and their applications.
CO3	Acquires knowledge of Limit tests.
CO4	Explain the methods of preparation, assay, properties, medicinal uses of medicinal gases inorganic pharmaceuticals, pharmaceutical aids and miscellaneous compounds.
CO5	Describe the properties, storage condition and application of radiopharmaceuticals.
1.5 PHARMACEUTICAL INORGANIC CHEMISTRY (Practical)	
CO1	Able to perform the identification tests and preparation of inorganic compounds.
CO2	Able to perform the limit tests and purity test for inorganic pharmaceuticals in a QC lab.
CO3	Able to perform Assays of mixtures and estimations of inorganic compounds.

TABLE 1.6: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN I YEAR

Subject: REMEDIAL MATHEMATICS (Theory) **OBJECTIVE:** This is an introductory course in mathematics. This subject deals with the matrices, trigonometry and Analytical geometry also deals with Calculus subjects limits, differentiation, integration,differential equations and laplace transformations. **Subject code: 1.6**	
S. No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Understands the matrices and its applications in solving pharmacokinetics equations and know the concept of trigonometry and its applications in solving problems.
CO2	Understand the analytical geometry by studying about straight lines , circles, parabola and improves the problem solving skill by using the knowledge.
CO3	Understand the concept of calculus by focusing on limits, differentiation , definite and indefinite integration and the application of these core concepts in the pharmacy field.
CO4	Apply the fundamental concepts of differentiation and integration for the solution of differential equations also learn pharmaceutical applications.
CO5	To learn the laplace transformations and its application to evaluate integrations and solve linear differential equations.

TABLE 1.7: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN I YEAR

Subject: REMEDIAL BIOLOGY (Theory)

OBJECTIVE: This is an introductory course in Biology, which gives detailed study of natural sources such as plant and animal origin. This subject has been introduces to the pharmacy course in order to make the student aware of various naturally occurring drugs and its history, sources, classification, distribution and the characters of the plants and animals. This subject gives basic foundation to Pharmacognosy.

Subject code: 1.6

S. No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Acquire basic knowledge on composition of general organization ofplants, plant tissues, plant kingdomand classification.
CO2	Get knowledge on morphologyof root, stem, leaf, plant physiology and taxonomy.
CO3	Know the basic study of fungi, yeast, bacteria.
CO4	Obtained knowledge on nature of animal cell and tissues.
CO5	Able to acquire knowledge on reptiles and mammals.
1.6 REMEDIAL BIOLOGY (Practical)	
CO1	Able to identify different plants using their morphological characteristics.
CO2	Able to prepare permanent slides for different samples of seeds, stems, roots and barks.
CO3	Can do evaluation of different plants using anatomical methods. Study on animals and computer based tutorials.

DOCTOR OF PHARMACY (PHARM D) SECOND YEAR
(II/VI)

TABLE 2.1: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN II YEAR

Subject: PATHOPHYSIOLOGY (Theory)

OBJECTIVE: This course is designed to impart a thorough knowledge of the relevant aspects of pathology of various conditions with reference to its pharmacological applications, and understanding of basic Pathophysiological mechanisms. Hence it will not only help to study the syllabus of pathology, but also to get baseline knowledge of its application in other subject of pharmacy.

Subject code: 2.1

S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Acquired thorough knowledge of pathology of various conditions with reference to its pharmacological applications.
CO2	Have understanding of basic Pathophysiological mechanisms.
CO3	Able to describes the etiology and pathogenesis of the selected disease states.
CO4	Can describe the signs and symptoms of the diseases.
CO5	Aware of complications of the diseases.

TABLE 2.2: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN II YEAR

Subject: PHARMACEUTICAL MICROBIOLOGY (Theory) **OBJECTIVE:** The main objective of this course includes the study of different types of microorganisms, cultivation methods, sterilization techniques, antiseptic, disinfectants, diagnostic tests, microbiological assay and some important diseases caused by microorganisms. **Subject code: 2.1**	
S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Acquire the knowledge in detail about the different characteristic of microorganisms such as bacteria, virus, rickettsia, spirochetes and nutritional requirements of the microorganisms
CO2	Determine the impact of pharmaceutical significance of microorganisms, cultivation and identification of bacteria and role of different scientist involved in the development of microbiology field.
CO3	Gained the basis of bacterial growth curve, different growth pattern like batch culture, continuous culture, synchronous culture, chemostat and turbidostatic methods.
CO4	Learned in detail about the immunity, different types of immunity, active, passive immunity, phagocytosis, structure of antigen, types of antibodies, exo and endo toxin and booster dose.
CO5	Understand the different types of sterilization methods to kill the pathogenic microorganisms like moist heat sterilization, dry heat sterilization, radiation, filtration and chemical substances involved for the sterilization of microorganisms.
2.2 PHARMACEUTICAL MICROBIOLOGY (Practical)	
CO1	Understand different equipments and processing used in experimental microbiology.
CO2	Determine and report the Sterilization of glassware, preparation and sterilization of media,Sub culturing of bacteria and fungus. Nutrient stabs and slants preparations.
CO3	Determine the methods of Simple, Grams staining and acid fast staining.

TABLE 2.3: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN II YEAR

Subject: PHARMACOGNOSY & PHYTOPHARMACEUTICALS (Theory)

OBJECTIVE: This subject has been introduced for the pharmacy course in order to make the student aware of medicinal uses of various naturally occurring drugs its history, sources, distribution, method of cultivation, active constituents, medicinal uses, identification tests, preservation methods, substitutes and adulterants.

Subject code: 2.3

S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Know development of pharmacognosy from ancient to present.
CO2	Understand the basic Principles of cultivation, collection and storage of crude drugs.
CO3	Recognize crude drugs of pharmaceutical and medicinal importance and their microscopic study.
CO4	Appreciate the applications of Primary and Secondary metabolites of the plants.
CO5	Know the different methods of Adulteration and evaluation of Crude drugs.
2.3 PHARMACOGNOSY & PHYTOPHARMACEUTICALS (Practical)	
CO1	Understand well about cell wall constituents and cell inclusions.
CO2	Learn and experience techniques of macroscopical (colour, odour, taste, size, shape) and microscopical identification (T.S.) of crude drugs-alkaloids, glycosides, volatile oils, carbohydrates, resin crude drugs for the detection of identity and purity.
CO3	Learn and experience techniques of Quantitative chemical tests for carbohydrates, proteins and lipid drugsfor the detection of identity and purity.

TABLE 2.4: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN II YEAR

Subject: PHARMACOLOGY-I (Theory)

OBJECTIVE: The major objective of this course is to provide orientation on drugs acting on different systems of the body.

Subject code: 2.4

S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Possess broad knowledge on classification, Pharmacological aspects, adverse effects, Therapeutic uses of different drug categories. Can apply the knowledge therapeutically in deciding dose, route of administration, precautions, and contraindications.
CO2	Understood the pharmacological aspects of drugs used to treat ailment of different organ systems of the body like ANS, CVS.
CO3	Understood the pharmacological aspects of drugs used to treat ailment of different organ systems of the body like CNS, Respiratory system.
CO4	To understand pharmacology of hormones.
CO5	Able to analyze different inflammatory mediator.

TABLE 2.5: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN II YEAR

Subject: COMMUNITY PHARMACY (Theory)

OBJECTIVE:. In the changing scenario of pharmacy practice in India, Community Pharmacists are expected to offer various pharmaceutical care services. In order to meet this demand, students will be learning various skills such as dispensing of drugs, responding to minor ailments by providing suitable safe medication, patient counselling, health screening services for improved patient care in the community set up.

Subject code: 2.5

S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Able to provide pharmaceutical care services.
CO2	Know the business and professional practice management skills in community pharmacies and prescription legality and identification of medication related problems.
CO3	Able to learn to show empathy and provide patient counseling and health screening services to the community.
CO4	Able to manage to minor ailments and provide appropriate OTC medication.
CO5	Able to provide rational drug therapy to the patient.

TABLE 2.6: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN II YEAR

Subject: PHARMACOTHERAPEUTICS-I (Theory)

OBJECTIVE: This course is designed to impart knowledge and skills necessary for contribution to quality use of medicines. Chapters dealt cover briefly pathophysiology and mostly therapeutics of various diseases. This will enable the student to understand the pathophysiology of common diseases and their management.

Subject code: 2.6

S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Able to identify the abnormal physiology and pathogenesis of diseases.
CO2	Able to interpret the data from diagnostic tools.
CO3	Able to diagnose the disease by monitoring the clinical manifestations of the patient and suggest individualized therapy.
CO4	Capable to suggest the treatment options for special populations like pediatric, geriatric, breast feeding & pregnant.
CO5	Able to provide rational drug therapy to the patient.
2.6 PHARMACOTHERAPEUTICS-I (Practical)	
CO1	Identify drug interactions and rationalize the prescription.
CO2	Discuss the therapeutic approach to management of selected diseases.
CO3	Prepare individualized therapeutic plans based on diagnosis.

DOCTOR OF PHARMACY (PHARM D) THIRD YEAR (III/VI)

TABLE 3.1: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN III YEAR

Subject: PHARMACOLOGY-II (Theory)

OBJECTIVE: The major objectives include study on renal, hemopoetic disorders, cancers, various infections, so as to give solid knowledge to select specific drugs based on pathological conditions of the patient and to improve practical skills of a student.

Subject code: 3.1

S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Possess in depth knowledge of pharmacological aspects of drugs.
CO2	Able to correlate pharmacology and therapeutics to provide better pharmaceutical care.
CO3	Able to correlate animal studies.
CO4	Posses in depth knowledge on cell, macromolecules, cell signaling, DNA replication and cell cycle.
CO5	Appreciate the importance of gene and its structure, genome, gene expression, recombinant and DNA technology.
	3.1 PHARMACOLOGY-II (Practical)
CO1	Able to perform Pharmacological effect of drugs on tissue preparations.
CO2	Able to perform the dosage calculations of drug.
CO3	Able to perform animal experiments.

TABLE 3.2: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN III YEAR

Subject: PHARMACEUTICAL ANALYSIS (Theory)

OBJECTIVE: This course deals with the various aspects of quality control and quality assurance aspects of pharmaceutical industries. This subject is designed to impart a fundamental knowledge on the principles and instrumentation of spectroscopic and chromatographic techniques.

Subject code: 3.2

S. No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Understand the concepts of Quality assurance, Good Laboratory practices, ICH guidelines and their importance in pharmaceutical Industry.
CO2	Obtained basic knowledge on chromatographic methods of analysis.
CO3	Acquire knowledge on basic principles of electrochemical analytical techniques.
CO4	Gain knowledge on the basic principles of spectroscopy; develop the practical skills using instrumental techniques for analysis of Pharmaceutical formulations.
CO5	Perform quantitative and qualitative analysis of drugs using various analytical instruments.
3.2 PHARMACEUTICAL ANALYSIS (Practical)	
CO1	Able to perform Paper, Thin layer chromatographic experiments and gain the knowledge on interpretation of data obtained after the experiment and to conclude the results.
CO2	Able to operate different analytical equipments to carry out quantitative and qualitative analyse of the Pharmaceutical compounds.
CO3	Apply the concepts of quality assurance and evaluation of analytical standards.

TABLE 3.3: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN III YEAR

Subject: PHARMACOTHERAPEUTICS II (Theory)

OBJECTIVE: This course is designed to impart knowledge and skills necessary for contribution to quality use of medicines. Chapters dealt cover briefly pathophysiology and mostly therapeutics of various diseases. This will enable the student to understand the pathophysiology of common diseases and their management.

Subject code: 3.3

S. No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Able to understand different causes of diseases.
CO2	Able to identify the pathogenisis of individuals with specific disease states.
CO3	Able to diagnose the disease by correlating clinical manifestations and laboratory indices.
CO4	Able to prepare individualized therapeutic plans based on diagnosis.
CO5	Able to suggest lifestyle modifications based on the disease states.
3.3 PHARMACOTHERAPEUTICS II (Practical)	
CO1	Able to perform patient counseling regarding specific diseased states and drugs.
CO2	Can identify relevant patient specific parameters in initiating drug therapy and monitoring therapy.
CO3	Can monitor controversies in drug therapy and suggest rationale for drug therapy of selected diseases.

TABLE 3.4: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN III YEAR

Subject: PHARMACEUTICAL JURISPRUDENCE (Theory)

OBJECTIVE: This course exposes the student to several important legislations related to the profession of pharmacy in India. The Drugs and Cosmetics Act, along with its amendments are the core of this course. Other acts, which are covered, include the Pharmacy Act, dangerous drugs, medicinal and toilet preparation Act etc. Besides this the new drug policy, professional ethics, DPCO, patent and design Act will be discussed.

Subject code: 3.4

S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Aware of various concepts of the pharmaceutical legislation in India .
CO2	Able to develope inclination to follow the Professional ethics.
CO3	Obtained in depth knowledge of various acts & rules governing pharmacy profession Know the various parameters in the Drug and Cosmetic Act and rules , Pharmacy Act, Pharmacy Council of India and its functioning.
CO4	Know the Drug policy, DPCO, Patent and design act and understand the labeling requirements and packaging guidelines for drugs and cosmetics.
CO5	Able to understand patent and design Act.

TABLE 3.5: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN III YEAR

Subject: MEDICINAL CHEMISTRY (Theory)

OBJECTIVE:. To gain the knowledge in the medicinal chemistry of various classes of drugs, structures, mechanism of actions, understand the SAR and perform drugs and intermediate synthesisand analysis.

Subject code: 3.5

S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Obtained basic knowledge on modern techniques of drug design , the role SAR and QSAR in drug discovery.
CO2	Obtained knowledge of the chemistry of drugs with respect to their biological activity of Anti-Infective agents.
CO3	Obtained knowledge of the chemistry of drugs with respect to their biological activity of Sulphonamides and sulphones, Anti Malarials , Antibiotics and Anti-Neoplastic agents.
CO4	Obtained knowledge of the chemistry of drugs with respect to their biological activity of Cardiovascular agents.
CO5	Obtained knowledge of the chemistry of drugs with respect to their biological activity of Hypoglycemic agents, Thyroid Anti-thyroid agents, Diuretics ,Diagnostic agents and steroidal Hormones and Adrenocorticoids.
3.5 **MEDICINAL CHEMISTRY (Practical)**	
CO1	Able to prepare different medicinally important compounds.
CO2	Able to perform Monograph analysis and assay of drugs.
CO3	Able to determine partition coefficient dissociation constant, molar refractivity of compounds for QSAR analysis of different drugs.

TABLE 3.6: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN III YEAR

Subject: PHARMACEUTICAL FORMULATIONS (Theory)

OBJECTIVE:. The objective of pharmaceutical formulations is to acquire knowledge on formulation and evaluation of solid, liquid and novel drug delivery systems, which serves as an important pre requisite for dosage form design.

Subject code: 3.6

S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Acquired knowledge about the various solid dosage forms and their manufacturing techniques.
CO2	Obtaining knowledge about various liquid orals and their stability parameters.
CO3	Acquired knowledge on manufacturing, labeling, sterilization & sterility testing of SVPs, LVPs.
CO4	Understand the concept of ophthalmic preparations, and also acquiring knowledge on semi – solid dosage forms.
CO5	Obtained knowledge on the concepts of controlled and novel drug delivery system.
3.6 PHARMACEUTICAL FORMULATIONS (Practical)	
CO1	Able to formulate various solid dosage formulations and carry out their in process control tests.
CO2	Able to formulate liquid oral preparations , semi solid dosage forms and their evaluation tests.
CO3	Able to formulate cosmetic preparations and perform its evaluation tests.

DOCTOR OF PHARMACY (PHARM D) FOURTH YEAR (IV/VI)

TABLE 4.1: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN IV YEAR

Subject: PHARMACOTHERAPEUTICS-III (Theory)

OBJECTIVE: *This course is designed to impart knowledge and skills necessary for contribution to quality use of medicines. Chapters dealt cover briefly pathophysiology and mostly therapeutics of various diseases. This will enable the student to understand the pathophysiology of common diseases and their management.*

Subject code: 4.1

S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	1. Able to identify the abnormal physiology of individuals with diseases.
CO2	Able to interpret the data from diagnostic tools.
CO3	Able to diagnose the disease by monitoring the clinical features of the patient and suggest the therapy.
CO4	Able to differentiate types of pain and can suggest the management strategies for each.
CO5	Capable to suggest the treatment options from the evidences.
4.1 **PHARMACOTHERAPEUTICS-III (Practical)**	
CO1	Able to systematically analyze a case
CO2	Able to diagnose as well as suggest the medicine
CO3	Can perform the patient counseling effectively

TABLE 4.2: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN IV YEAR

Subject: HOSPITAL PHARMACY (Theory)

OBJECTIVE: In the changing scenario of pharmacy practice in India, for successful practice of Hospital Pharmacy, the students are required to learn various skills like drug distribution, drug dispensing, manufacturing of parenteral preparations, drug information, patient counselling, and therapeutic drug monitoring for improved patient care.

Subject code: 4.2

S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Know the professional practice management in hospital Pharmacies.
CO2	Appreciate importance of store management and inventory control.
CO3	Know various drug distribution methods.
CO4	Aware manufacturing practices of various formulations on hospital set up.
CO5	To provide unbiased drug information to the doctors and appreciate the practice based research methods.
	4.2 **HOSPITAL PHARMACY (Practical)**
CO1	Conduct planned experiments and prepare laboratory report in a standard way.
CO2	Formulate and prepare parenteral formulations and powders and perform inventory analysis.
CO3	Answer drug formulation queries through literature search and to analyze prescription for drug interaction.

TABLE 4.3: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN IV YEAR

Subject: CLINICAL PHARMACY (Theory)

OBJECTIVE:

1. Monitor drug therapy of patient through medication chart review and clinical review.
2. Obtain medication history interview and counsel the patients.
3. Identify and resolve drug related problems.
4. Detect, assess and monitor adverse drug reaction.

Subject code: 4.3

S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Have good understanding of elements of comprehensive pharmaceutical care. Identify and resolve drug related problems and counsel the patients.
CO2	Can interpret laboratory results to aid the clinical diagnosis of various disorders can provide integrated poison information.
CO3	Can able to detect assess to monitor ADR's medications history interview and counsel the patients.
CO4	Can retrieve, analyze, interpret to formulate drug (or) medicine information.
CO5	Able to promote in the efficient patient management along with other health care professionals.
4.3 CLINICAL PHARMACY (Practical)	
CO1	Can analyze, interpret and formulate drug information.
CO2	Able to detect monitoring parameters in therapeutics for determination of liver and kidney abnormalities.
CO3	Can identify, detect, assess and monitor adverse drug reaction.

TABLE 4.4: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN IV YEAR

Subject: BIOSTATISTICS & RESEARCH METHODOLOGY (Theory) **Objective:** This subject deals with the fundamental knowledge on research methodology and understands the basic concept of descriptive and inferential statistics. **Subject code: 4.4**	
S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Get knowledge on data collection in clinical research , design, sampling protocol for research and method of report writing and presentations.
CO2	Understand concepts of descriptive statistics like measure of central tendency, measure of dispersion correlation , regression and types of data distribution. Graphical and diagrammatic representation of data.
CO3	Able to understand and apply the concepts of fundamental statistics in the research data analysis by studying parametric and non parametric tests and usage of statistical software tools.
CO4	Understand the different statistical methods in epidemiology.
CO5	Know the applications of computer in hospital and community pharmacy and also drug information and literature retrieval using computers.

TABLE 4.5: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN IV YEAR

Subject: BIOPHARMACEUTICS &PHARMACOKINETICS (Theory) **Subject code: 4.5**	
S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Learnt the basic concepts in bio pharmaceutics and pharmacokinetics.
CO2	Possess knowledge on the effect of Pharmacokinetic parameters on biological effects of the drug.
CO3	Capable of designing and evaluating dosage regimens of the drugs using pharmacokinetic and bio-pharmaceutics parameters.
CO4	Can calculate various pharmacokinetic parameters from plasma and urinary excretion data applying compartment modeling and model independent methods.
CO5	Can design Bioavailability and Bioequivalence studies of new drugs or dosage forms.
4.5 BIOPHARMACEUTICS &PHARMACOKINETICS (Practical)	
CO1	Able to perform the Dissolution studies for different marketed products of the same drug.
CO2	Able to compute various pharmacokinetic parameters from plasma and urinary excretion data applying compartment modeling and model independent methods.
CO3	Can perform Bioavailability and Bioequivalence studies of drugs on animal/human model .

TABLE 4.6: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN IV YEAR

Subject: CLINICAL TOXICOLOGY (Theory) **Subject code: 4.6**	
S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Student can support the medical professional in identifying the antidote for specified poisons.
CO2	Able to give poison information especially regarding clinical features and management of poisoning.
CO3	Can identify the venomous snakebite poison substance.
CO4	Able to differentiate different types of substance abuse and can suggest the clinical features and its management.
CO5	Able to give suggestions on the management of poisoning.

DOCTOR OF PHARMACY (PHARM D) FIFTH YEAR
(V/VI)

TABLE 5.1: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN V YEAR

Subject: CLINICAL RESEARCH (Theory) ***Subject code: 5.1***	
S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Able to take part in drug discovery and new drug development process at clinical trial stage.
CO2	Acquired knowledge to conduct clinical trial.
CO3	Capable of preparing various study documents used in clinical trials and able to carry out clinical trial start up activities.
CO4	Possess knowledge about the procurement, storage, filing of investigational product and to conduct monitoring visit, close out visit and safety reporting.
CO5	Possess knowledge of data management and quality assurance in CDM.

TABLE 5.2: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN V YEAR

Subject: PHARMACOEPIDEMIOLOGY AND PHARMACOECONOMICS (Theory) **Subject code: 5.2**	
S. No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Possess knowledge of pharmacoepidemiology and concept of risk in pharmacoepidemiology .
CO2	Capable of measuring outcomes pharmacoepidemiology using various pharmacoepidemiological methods.
CO3	Possess knowledge of Sources of data for pharmacoepidemiological studies and applications of pharmacoepidemiology.
CO4	Aware of concepts of pharmacoeconomics and its significance.
CO5	Can perform pharmacoeconomic evaluation. Able to apply different types of soft ware and case studies used in pharmacoeconomics.

TABLE 5.3: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN V YEAR

Subject: CLINICAL PHARMACOKINETICS & PHARMACOTHERAPEUTIC DRUG MONITORING (Theory) **Subject code: 5.3**	
S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Able to design of dosage regimen.
CO2	Able to give drug dosing information about elderly, pediatrics and obese patients.
CO3	Able to give TDM information especially regards cardiac, seizure and psychiatric conditions.
CO4	Can support the medical professional in dosage adjustment in Renal and Hepatic disease.
Co5	Able to individualize the drug therapy.

TABLE 5.4: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN V YEAR

Subject: CLERKSHIP **Subject code: 5.4**	
S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Capable of delivering clinical pharmacy services efficiently.
CO2	Able to plan and execute pharmaceutical care.
CO3	Possess sound knowledge of therapeutics.

TABLE 5.5: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN V YEAR

Subject code: 5.5	**Subject: Project Work**
S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Able to identify, design and carry out research work scientifically following research ethics
CO2	Able to collect data, interpret them using appropriate statistical tools and arrive at conclusion scientifically.
CO3	Able to document the research work in the form of thesis in an acceptable format.

DOCTOR OF PHARMACY (PHARM D) SIXTH YEAR (VI/VI)

TABLE 6.1: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN VI YEAR

Subject: Internship **Subject code: 6.1**	
S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Expert in providing patient care as well as manage and use resources efficiently as a member of health care team.
CO2	Capable of promoting health improvement , wellness and disease prevention in cooperation with other related professionals and community .
CO3	Developed skills in the monitoring of the national health programs and schemes with effective communication skill.

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COURSE OUTCOME

PROGRAMME: M.PHARM – PHARMACEUTICS

FIRST YEAR (I/II)

TABLE 1.1: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN I YEAR

Subject: MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES (THEORY) **OBJECTIVE:** After completion of course student is able to know, Chemicals and Excipients The analysis of various drugs in single and combination dosage forms Theoretical and practical skills of the instruments **Subject code: MPH101T**	
S.No.of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Understand the methods- UV -Visible Spectroscopy , spectrofluorimetry , IR,Flame emmission spectroscopy , Atomic absorbtion spectroscopy.
CO2	know NMR spectroscopy , instrumentation and applications.
CO3	Understand the Principles of mass spectroscopy, different ionization techniques and applications of mass spectroscopy.
CO4	Understand different chromatographic techniques like Paper , Gas , Ion exchange , Affinity chromatography ,HPLC etc .
CO5	know the principles and procedures of paper and capillary electrphoresis; X ray cristallography and its applications and to Understand immunobiological assays.
Subject: PHARMACEUTICS (PRACTICALS) **Subject code: MPH105P**	
CO1	Able to perform experiments using instruments like UV Visible Spectrophotometer, HPLC, IR spectrophotometer and Spectroflurimetry.

CO2	Able to compare the invitro release of CR/SR marketed formulations and able to formulate and evaluate various novel drug delivery systems.
CO3	Capable of performing preformulation investigation, micromeritics and characterization of solid dosage forms. To study the effect of particle size and binders on *invitro* release of drug.

TABLE 1.2 : LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN I YEAR

Subject: DRUG DELIVERY SYSTEMS **(THEORY)**

OBJECTIVE: Upon completion of the course, student shall be able to understand

- The various approaches for development of novel drug delivery systems.
- The criteria for selection of drugs and polymers for the development of delivering system.
- The formulation and evaluation of Novel drug delivery systems.

Subject code: MPH102T

S.No. of CO's	**CourseOutcomes** **On completion of course the student can be able to:**
CO1	Capable of designing sustained release and controlled release drug delivery systems and know about of the concepts of Polymers, personalized medicines, pharmacogenetics, customized drug delivery system and Bioelectronic 3D printing of pharmaceuticals, Tele pharmacy etc.
CO2	Capable of developing rate-controlled drug delivery systems, its principles and fundamentals.
CO3	Capable of developing various gastro retentive drug delivery systems and Buccal Drug Delivery Systems, Methods of formulation and its evaluations. capable of developing new formulation and evaluation of ocular drug delivery systems.
CO4	Able to develop Transdermal drug delivery systems and able to understand protein and peptide delivery of drug.
CO5	Able to know about the concept of vaccine as drug delivery system.

TABLE1.3 : LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN I YEAR

Subject : MODERN PHARMACEUTICS (THEORY)

OBJECTIVES : Objectives upon completion of the course , student shall be able to understand

- The elements of preformulation studies.
- The Active Pharmaceutical Ingredients and Generic drug Product development
- Industrial Management and GMP Considerations.
- Optimization Techniques & Pilot Plant Scale Up Techniques
- Stability Testing, sterilization process & packaging of dosage forms.

Subject code: MPH103T

S.No. of CO's	**CourseOutcomes** **On completion of course the student can be able to:**
CO1	Application of preformulation concepts in development of various dosage forms.
CO2	Application and understanding of validation process.
CO3	Understanding the importance of industrial management system.
CO4	Evaluating the role of compression and compaction.
CO5	Designing and application of statistical methods.

TABLE 1.4: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN I YEAR

S.No. of CO's	**CourseOutcomes** **On completion of course the student can be able to:**
CO1	Know the importance of documentation and understanding the role of regulatory department in drug approval
CO2	Evaluating the role of regulatory affairs and Aware of regulatory submissions in CTD / ECTD format
CO3	Knowing and understanding INA and NDA
CO4	Designing and evaluation of clinical trials
CO5	understanding the concept of non-clinical drug development process

TABLE 1.5: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN I YEAR

Subject: MOLECULAR PHARMACEUTICS (NANO TECHNOLOGY & TARGETED DDS) (NTDS) **(THEORY)**

OBJECTIVE: Upon completion of the course student shall be able to understand

- The various approaches for development of novel drug delivery systems.
- The criteria for selection of drugs and polymers for the development of NDDS
- The formulation and evaluation of novel drug delivery systems.

Subject code: MPH201T

S.No. of CO's	**CourseOutcomes** **On completion of course the student can be able to:**
CO1	Understanding targeted drug delivery systems.
CO2	know the role and importance of drug targeting.
CO3	Understand the preparation and evaluation of Micro Capsules / Micro Spheres, Monoclonal Antibodies and Niosomes, Aquasomes, Phytosomes, Electrosomes.
CO4	Design and evaluation of Pulmonary drug delivery systems.
CO5	Application of gene therapy and knowing its importance in the treatment of cancer and inherited diseases and to understand the knowledge of therapeutic antisense molecules and aptamers as drugs.

TABLE 1.6: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN I YEAR

Subject: ADVANCED BIOPHARMACEUTICS & PHARMACOKINETICS **(THEORY)**

OBJECTIVE: Upon completion of this course it is expected that students will be able understand,

- The basic concepts in biopharmaceutics and pharmacokinetics.
- The use raw data and derive the pharmacokinetic models and parameters the best describe the process of drug absorption, distribution, metabolism and elimination.
- The critical evaluation of biopharmaceutic studies involving drug product equivalency.
- The design and evaluation of dosage regimens of the drugs using pharmacokinetic and biopharmaceutic parameters.
- The potential clinical pharmacokinetic problems and application of basics of pharmacokinetic

Subject code: MPH202T

S.No. of CO's	**CourseOutcomes** **On completion of course the student can be able to:**
CO1	Able to understand basic concepts of bio pharmaceutics-pharrmacokinetics and drug absorption from Gastro intestinal tract.
CO2	Able to understand Biopharmaceutics considerations in drug product design and In Vitro Drug Product Performance.
CO3	Understand the basics of pharmacokinetics of the drug using Pharmacokinetic and biopharmaceutical parameters along with drug interactions.
CO4	The critical evaluation of bio pharmaceutics studies involving drug product performance.
CO5	Know the applications of pharmacokinetics in drug production, pharmacodynamics of drug interactions & biotechnology drugs. Introduction Proteins and peptides, Monoclonal antibodies, Oligonucleotides, Vaccines (immunotherapy), Gene therapies.

TABLE 1.7: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN I YEAR

Subject: COMPUTER AIDED DRUG DEVELOPMENT **(THEORY)**

OBJECTIVE: Upon completion of this course it is expected that students will be able to understand,

- History of Computers in Pharmaceutical Research and Development
- Computational Modeling of Drug Disposition
- Computers in Preclinical Development
- Optimization Techniques in Pharmaceutical Formulation
- Computers in Market Analysis
- Computers in Clinical Development
- Artificial Intelligence (AI) and Robotics
- Computational fluid dynamics(CFD)

Subject code: MPH203T

S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Know the history of computers in Pharmaceutical Research and development and application of QbD in pharmaceutical development.
CO2	Know the applications of computational modelling of drug disposition .
CO3	Utilization of computers in preclinical development and understanding the role of optimization techniques in pharmaceutical formulations.
CO4	Evaluation of computer aided biopharmaceutical characterization and its applications.
CO5	Application and importance of Artificial intelligence.

TABLE 1.8: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN I YEAR

- Key building blocks for various formulations.
- Current technologies in the market .
- Various key ingredients and basic science to develop cosmetics and cosmeceuticals .
- Scientific knowledge to develop cosmetics and cosmeceuticals with desired Safety, stability, and efficacy.

Subject code: MPH204T

S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Aware of the regulatory provisions related to the import and manufacture of cosmetics.
CO2	Understand the biological aspects of cosmetics and acquire knowledge on the problems related to the skin and hair.
CO3	Able to understand the importance of Formulation Building blocks and to know the key ingredients suitable in the formulation of various cosmetics.
CO4	Design and evaluation of various cosmeceutical products and address the problem related to skin body and dental care.
CO5	Able to describe the guidelines for the regulation of herbal cosmetics and selection of herbal ingredients in the formulation of cosmetics for hair care, skin care and oral care.

TABLE 1.9: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN I YEAR

Subject: PHARMACEUTICS PRACTICALS - II **Subject code: MPH205P**	
S.No.of CO's	**CourseOutcomes** **On completion of course the student can be able to:**
CO1	Formulation and evaluation of various encapsulated Dosage forms . Studying on improvement of dissolution charecteristics of slightly soluble drugs.
CO2	Evaluating protein binding studies of a highly protein bound drugs and poorly protein bound drugs and use of design expert software in formulation and optimization.
CO3	Formulation and evaluation of various cosmetics and herbal formulations.

PROGRAMME: M.PHARM – PHARMACEUTICAL ANALYSIS

SECOND YEAR(II/II)

TABLE 2.1: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN II YEAR

Subject: RESEARCH METHODOLOGY & BIOSTATISTICS (THEORY) **Subject code: MPH301T**	
S.No.of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Understand general research methodology.
CO2	Understand basic statistical methods which are used in collecting data and performing statistical tests of significance, type of significance tests, parametric tests , non-parametric tests, null hypothesis, P values, degree of freedom, interpretation of P values.
CO3	Identify the concept of medical research and values in medical ethics.
CO4	Define CPCSEA guidelines for laboratory animal facility.
CO5	Describe the declarations of Helsinki and basic principle for medical research.

TABLE 2.2: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN II YEAR

Subject: JOURNAL CLUB	
S.No.of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Able to collect relevant literature and critically evaluate them.
CO2	Learnt to make a PPT presentation scientifically and deliver the same.
CO3	Able to involve effectively in post presentation discussion.

TABLE 2.3: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN II YEAR

Subject: PROJECT DISCUSSION / PRESENTATION	
S.No.of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Able to select research topic through literature review.
CO2	Able to design research methodology.
CO3	Able to Present the selected research proposal convincingly.

TABLE 2.4: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN II YEAR

Subject: RESEARCH WORK	
S.No.of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Able to carry out research work scientifically following research ethics.
CO2	Able to collect date, interpret them using appropriate statistical tools and arrive at conclusion scientifically.
CO3	Able to document the research work in the form of thesis in an acceptable format.

TABLE 2.5: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN II YEAR

Subject: PRE SUBMISSION DISCUSSION / PRESENTATION	
S.No.of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Able to organize the research work for presentation.
CO2	Able to make PPT presentation of the research work scientifically and deliver the same.
CO3	Learnt to defend the research work scientifically and convincingly.

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COURSE OUTCOMES

PROGRAMME: M.PHARM – PHARMACEUTICAL ANALYSIS

FIRST YEAR (I/II)

TABLE 1.1: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN I YEAR

Subject: MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES (THEORY) **OBJECTIVE:** After completion of course student is able to know about chemicals and excipients The analysis of various drugs in single and combination dosage forms Theoretical and practical skills of the instruments **Subject code: MPA101T**	
S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Understand the UV -Visible Spectroscopy, IR, Flame, Atomic absorption spectroscopy.
CO2	Know NMR spectroscopy, instrumentation and its applications.
CO3	Understand the Principles of mass spectroscopy, different ionization techniques and applications of mass spectroscopy.
CO4	Understand different chromatographic techniques like Paper , Gas chromatography, Ion exchange ,HPLC ,column , HPTLC , UHPLC, affinity chromatography , gel chromatography.
CO5	Understand principles procedures of electrophoresis , Potentiometry and thermal analytical techniques .
Subject: MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES (THEORY) **Subject code: MPA105P**	
CO1	Analysis, estimation , assay and qualitative determination of pharmacopoeial compounds in bulk by UV ,HPLS , GC , Fluorimetry , Photometry and different titrimetric methods.

CO2	Able to calibrate, clean, and validate different analytical equipments.
CO3	Determination of total reducing sugars , proteins , fat content vitamins content , preservatives and pesticide content in food and determination of density and specific gravity of food substances .

TABLE 1.2 : LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN I YEAR

Subject: ADVANCED PHARMACEUTICAL ANALYSIS(THEORY)

OBJECTIVE: After completion of the course students shall able to know,

Appropriate analytical skills required for the analytical method development.

Principles of various reagents used in functional group analysis that renders necessary support in research methodology and demonstrates its application in the practical related problems.

Analysis of impurities in drugs, residual solvents and stability studies of drugs and biological products

Subject code: MPA102T

S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Aware of regulatory perception of impurities classification, residual solvents classification and limits and its implications in approval process. Understand the classification of elemental impurities, factors affecting stability and stability commitment.
CO2	Understand accelerated stability studies, stability zones, photo stability testing stability of biological products.
CO3	Understand regulatory requirements and HPTLC fingerprinting.
CO4	Know bioassays of vaccines and PCR instrumentation.
CO5	Understand the principles and procedures of different immunoassays.

TABLE1.3 : LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN I YEAR

Subject: PHARMACEUTICAL VALIDATION(THEORY)

OBJECTIVE: Upon completion of the subject student shall be able to

Explain the aspect of validation

Carryout validation of manufacturing processes

Apply the knowledge of validation to instruments and equipments

Validate the manufacturing

Subject code: MPA103T

S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Understand introduction of Qualification and validation Master plan, DQ, IQ, OQ , PQ , RQ , FAT , SAT .
CO2	Know qualification of analytical instruments and glassware.
CO3	Know advanced validation of utility systems (water, HVAC, compressed air and Nitrogen) and cleaning validation.
CO4	Know analytical method validation according to USP and ICH guidelines.
CO5	Understand rigorous detailing of general principles of intellectual property.

TABLE 1.4: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN I YEAR

Subject: FOOD ANALYSIS (THEORY)

OBJECTIVE: At completion of this course student shall be able to understand various analytical techniques in the determination of

Food constituents

Food additives

Finished food products

Pesticides in food

And also student shall have the knowledge on food regulations and legislations

Subject code: MPA104T

S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Learn about the flavor studies and to detect the spoilage of food. Understand the advanced analytical methods for estimation of concentration of carbohydrates, vitamins ,fats , amino acids, proteins in food.
CO2	Understand the advanced analytical methods for estimation of concentration of lipids and vitamins.
CO3	Know about Food additives and pigments and synthetic dyes their occurrence and characteristic properties.
CO4	Know about the Analytical methods for milk and milk constituents. To know Methods of Analysis of fermentation products like wine, spirits, beer and vinegar.
CO5	Understand how to select a suitable analytical methods for qualitative and quantitative analysis of a pesticide residues in food substances and to know about the use of BIS MARK , AGMARK on food substances.

TABLE 1.5: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN I YEAR

Subject: ADVANCED INSTRUMENTAL ANALYSIS (THEORY)

OBJECTIVE: After completion of course student is able to know,

interpretation of the NMR, Mass and IR spectra of various organic compounds

theoretical and practical skills of the hyphenated instruments

identification of organic compounds

Subject code: MPA201T

S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	To understand principles of HPLC and applications of HPLC.
CO2	Understand chromatographic techniques like size exclusion , ion exchange , ion pair , affinity , gas and HPTLC.
CO3	Acquired sound knowledge of state of art analytical technique; CE, CE-MS and SFC hyphenation.
CO4	To understand principles of Mass spectrometry and applications of Mass spectrometry (FAB and MALD, APCI, ESI, APPI) LC-MS hyphenation and DART MS analysis. Mass analyzers (Quadrpole, Time of flight, FT-ICR, ion trap and Orbitrap) instruments. MS/MS systems ,Tandem: QqQ, TOF-TOF;Q-IT, Q-TOF, LTQ-FT, LTQ-Orbitrap.
CO5	To understand NMR and its applications, and able to use 2D NMR data for structural elucidation.

TABLE 1.6: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN I YEAR

Subject: MODERN BIOANALYTICAL TECHNIQUES (THEORY) **OBJECTIVE:** Upon completion of the course, the student shall be able to understand Extraction of drugs from biological samples Separation of drugs from biological samples using different techniques Guidelines for BA/BE **Subject code: MPA202T**	
S.No. of CO's	**CourseOutcomes** **On completion of course the student can be able to:**
CO1	Able to perform sample treatment for using sophisticated techniques for analytical purpose and steps involved in the bioanalytical method development and validation.
CO2	Appreciate the biopharmaceutical consideration in the bioanalytical method development permeability study method.
CO3	To acquire knowledge on pharmacokinetics and toxicokinetics.
CO4	Possess basic knowledge of cell culture techniques .
CO5	To understand method of metabolite identification and also different methods available for bioavailability and bioequivalence studies.

TABLE 1.7: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN I YEAR

Subject: QUALITY CONTROL AND QUALITY ASSURANCE (THEORY)

OBJECTIVE: At the completion of this subject it is expected that he student shall be able to know

The cGMP aspects in a pharmaceutical industry.

To appreciate the importance of documentation.

To understand the scope of quality certifications applicable to Pharmaceutical industries To understand the responsibilities of QA & QC departments.

Subject code: MPA203T

S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Understand concepts of QC / QA ,GLP , ICH Guidelines Q-series . Purchase specifications , selection of vendors and maintenance of stores.
CO2	Know GMP guidelines in accordance to USFDA including CDER, CBER , PIC ,WHO , EMEA for industrial management and CPCSEA guidelines.
CO3	Understand detailed analysis of raw materials , IPQC , finished products and developing specifications according to ICH Q6 and Q3.
CO4	Know charecteristic documentation in pharmaceutical industry.
CO5	Understand clear prespective of manufacturing operations and controls.

TABLE 1.8: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN I YEAR

Subject: HERBAL AND COSMETIC ANALYSIS (THEORY) **OBJECTIVE:** At completion of this course student shall be able to understand Determination of herbal remedies and regulations Analysis of natural products and monographs Determination of Herbal drug-drug interaction Principles of performance evaluation of cosmetic products. **Subject code: MPA204T**	
S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	To be aware of the regulatory requirements and AYUSH/ WHO guidelines for herbal drugs manufacturing & standardization.
CO2	Possess good understanding on various adulterants used in herbal products and modern analytic methods used to determine adulterants in various herbal formulations.
CO3	Understand the process of determination of herbal drugs and monographs of herbal drugs.
CO4	Possess knowledge of herbal drug-drug interactions and WHO / AYUSH guidelines for the safety monitoring of natural medicine.
CO5	Know about the evaluation of cosmetic products.

TABLE 1.9: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN I YEAR

Subject: PHARMACEUTICAL ANALYSIS PRACTICALS - II **Subject code: MPA205P**	
S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Know comparison of absorption spectra by UV and wood ward - fiesure rule and interpretation of organic compounds by FT-IR , NMR , MS . understand determination of purity by DSC in pharmaceuticals and identification of organic compounds using FT-IR , NMR , CNMR and Mass spectra.
CO2	Know the Biomolecule separation utilizing various techniques, isolation of analgesics from biological fluids , and to know about protocol preparation for the conduct of BA/BE studies according to guidelines.
CO3	Perform in process and finished product quality control test for tablets, capsules parenterals and creams and also Primary and secondary packing materials. Assay of raw materials as per official monographs. Preparation of Master Formula Record and Batch Manufacturing Record. Quantitative analysis of rancidity in lipsticks and hair oil . know the Determination of aryl amine content and Developer in hair dye, foam height and SLS content of Shampoo, total fatty matter in creams (Soap, skin and hair creams) , acid value and saponification value and calcium thioglycolate in depilatories.

PROGRAMME: M.PHARM – PHARMACEUTICAL ANALYSIS

SECOND YEAR(II/II)

TABLE 2.1: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN II YEAR

Subject: RESEARCH METHODOLOGY & BIOSTATISTICS (THEORY) **Subject code: MPA301T**	
S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Understand general research methodology.
CO2	Understand basic statistical methods which are used in collecting data and performing statistical tests of significance, type of significance tests, parametric tests, non-parametric tests, null hypothesis, P values, degree of freedom, interpretation of P values.
CO3	Identify the concept of medical research and values in medical ethics.
CO4	Define CPCSEA guidelines for laboratory animal facility.
CO5	Describe the declarations of Helenski and basic principle for medical research.

TABLE 2.2: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN II YEAR

Subject: JOURNAL CLUB	
S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Able to collect relevant literature and critically evaluate them.
CO2	Learnt to make a PPT presentation scientifically and deliver the same.
CO3	Able to involve effectively in post presentation discussion.

TABLE 2.3: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN II YEAR

Subject: PROJECT DISCUSSION / PRESENTATION	
S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Able to select research topic through literature review.
CO2	Able to design research methodology.
CO3	Able to Present the selected research proposal convincingly.

TABLE 2.4: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN II YEAR

Subject: RESEARCH WORK	
S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Able to carry out research work scientifically following research ethics.
CO2	Able to collect date, interpret them using appropriate statistical tools and arrive at conclusion scientifically.
CO3	Able to document the research work in the form of thesis in an acceptable format.

TABLE 2.5: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN II YEAR

Subject: PRE SUBMISSION DISCUSSION / PRESENTATION	
S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Able to organize the research work for presentation.
CO2	Able to make PPT presentation of the research work scientifically and deliver the same.
CO3	Learnt to defend the research work scientifically and convincingly.

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COURSE OUTCOME

PROGRAMME: M.PHARM – PHARMACEUTICAL QUALITY ASSURANCE

FIRST YEAR (I/II)

TABLE 1.1: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN I YEAR

Subject: MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES (THEORY) **OBJECTIVE:** After completion of course student is able to know about chemicals and excipients · The analysis of various drugs in single and combination dosage forms · Theoretical and practical skills of the instruments **Subject code: MQA101T**	
S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Aware of the availability of vide choice of analytical techniques for routine drug analysis.
CO2	Able to select appropriate analytical technique for a given analytical problem.
CO3	Possess sound knowledge on theory, principle, instrumentation and use of commonly used instrumental methods.
CO4	Acquired expertise in mathematical treatment of analytical data in quantitative analysis.
CO5	Acquired expertise in interpretation of analytical data to characterise drugs in qualitative analysis.
Subject: MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES (THEORY) **Subject code: MPA105P**	

CO1	Perform assay of single components and multi components by UV Spectrophotometer and experiments on HPLC , GAS , Fluorimetry , Flame and AAS techniques.
CO2	Know the Case studies and development of Stability study protocol Estimation of process capability and In process and finished product quality control tests for tablets, capsules, parenterals and semisolid dosage forms.
CO3	Know the Assay of raw materials as per official monograph, Quality control tests for Primary and secondary packaging materials, Accelerated stability studies and Determination of Pka and Log p of drug.

TABLE 1.2 : LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN I YEAR

Subject: QUALITY MANAGEMENT SYSTEMS **(THEORY)**

OBJECTIVE: At completion of this course it is expected that students will be able to understand-

· The importance of quality

· ISO management systems

· Tools for quality improvement

· Analysis of issues in quality

· Quality evaluation of pharmaceuticals

· Stability testing of drug and drug substances

· Statistical approaches for quality

Subject code: MQA102T

S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Understand the importance of quality.
CO2	Understand the importance of TQM, GMP, ISO, organization, personnel, premises, and equipment purchase specifications of raw materials in Pharmaceutical industries.
CO3	Analysis of issues in quality. Know six system inspection model , and quality systems (OOS, OOT , CAPA and IPQC).

CO4	Provides comprehensive knowledge of drug stability in relation to ICH guidelines.
CO5	Understand statistical process control and regulatory compliance through Quality management and development of Quality culture.

TABLE1.3 : LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN I YEAR

Subject: QUALITY CONTROL AND QUALITY ASSURANCE **(THEORY)**

OBJECTIVE: Upon completion of this course the student should be able to

· Understand the cGMP aspects in a pharmaceutical industry

· To appreciate the importance of documentation

· To understand the scope of quality certifications applicable to Pharmaceutical industries

· To understand the responsibilities of QA & QC departments.

Subject code: MQA103T

S.No.of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Understand the importance of TQM , GMP , ISO , organization , personnel , premises , equipment purchase specifications of raw materials in Pharmaceutical industries
CO2	Gain knowledge about different record documentation, SOPs , audit , quality control tests for packaging and good laboratory practices
CO3	Explore importance of finished product release, Good warehousing practices and distribution of records. Know about evaluation of complaints, Recall procedures and waste disposal procedure.
CO4	Have the knowledge on regulatory aspects of pharmaceuticals, Loan License Auditing and recent amendments of drugs and cosmetics act, certification procedure.

CO5	Understand about globalization of drug industry, patent regimen and regulatory affairs.
Subject: QUALITY ASSURANCE PRACTICAL - I **Subject code:** (MQA 105P)	
CO1	Recall and relate the principle of spectroscopy, chromatography and other commonly used instrumental methods of analysis. Acquire hands on training on these sophisticated instruments.
CO2	Perform quantitative & qualitative analysis of drugs using various analytical instruments like UV-visible and IR spectrophotometer and HPLC. Plan and select lab experiments using appropriate analytical skills. Evaluate the quantity of a drug ina given formulation.
CO3	Practice spectral problems and generate a comprehensive analytical report on the findings. Interpret spectra of UV-visible, IR, NMR and Mass to identity the given compound.

TABLE 1.4: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN I YEAR

Subject: PRODUCT DEVELOPMENT AND TECHNOLOGY TRANSFER **(THEORY)**

OBJECTIVE: Upon completion of this course the student should be able to

· To understand the new product development process

· To understand the necessary information to transfer technology fromR&D to actual manufacturing by sorting out various information obtained during R&D

· To elucidate necessary information to transfer technology of existing products between various manufacturing

Subject code: MQA104T

S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**

CO1	To understand the new product development process
CO2	Understand the preformulation studies required to develop a stable formulation, its protocol and stability testing during product development.
CO3	To understand the necessary information to transfer technology from R&D to actual manufacturing by sorting out various information obtained during R&D.
CO4	Understand the requirements of packaging materials for different dosage form, selection and evaluation of pharmaceutical packaging materials.
CO5	To elucidate necessary information to transfer technology of existing products between various manufacturing place.

TABLE 1.5: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN I YEAR

Subject: HAZARDS AND SAFETY MANAGEMENT **(THEORY)**

OBJECTIVE: At completion of this course it is expected that students will be able to

· Understand about environmental problems among learners.

· Impart basic knowledge about the environment and its allied problems.

· Develop an attitude of concern for the industry environment.

· Ensure safety standards in pharmaceutical industry

· Provide comprehensive knowledge on the safety management

· Empower an ideas to clear mechanism and management in different kinds of hazard management system

· Teach the method of Hazard assessment, procedure, methodology for provide safe industrial atmosphere

Subject code: MQA201T

S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Understand about environmental problems among learners and impart basic knowledge about the environment and its allied problems.
CO2	Develop an attitude of concern for the industry environment and ensure safety standards in pharmaceutical industry
CO3	Ensure safety standards in pharmaceutical industry.
CO4	Provide comprehensive knowledge on the safety management.
CO5	Empower an ideas to clear mechanism and management in different kinds of hazard management system and teach the method of Hazard assessment, procedure, methodology for provide safe industrial atmosphere.

TABLE 1.6: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN I YEAR

Subject: PHARMACEUTICAL VALIDATION **(THEORY)**

OBJECTIVE: At completion of this course, it is expected that students will be able to understand

· The concepts of calibration, qualification and validation

· The qualification of various equipments and instruments

· Process validation of different dosage forms

· Validation of analytical method for estimation of drugs

· Cleaning validation of equipments employed in the manufacture of pharmaceuticals

Subject code: MQA202T

S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Explain the aspects of Qualification, Validation andCalibration.
CO2	Understand qualification and validation of manufacturing processes analytical instruments and laboratory equipments.
CO3	Validate the manufacturing processes and know the guidelines of process validation.
CO4	Able to understand the concent of cleaning validation and computerized system validation.
CO5	Distinguish and Explain various forms of IPRs & apply statutory provisions to protect particular form of IPRs.

TABLE 1.7: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN I YEAR

Subject: AUDITS AND REGULATORY COMPLIANCE **(THEORY)**

OBJECTIVE: Upon completion of this course the student should be able to

· To understand the importance of auditing

· To understand the methodology of auditing

· To carry out the audit process

· To prepare the auditing report

· To prepare the check list for auditing

Subject code: MQA203T

S.No. of CO's	Course Outcomes On completion of course the student can be able to:
CO1	Understand the importance of auditing in pharmaceutical industries.
CO2	Understand the methodology of auditing process in different pharmaceutical manufacturing department.
CO3	Evaluate the bulk pharmaceutical chemicals and manufacturing process of tablets, capsules, sterile products and packaging in pharmaceutical industries.
CO4	Summarize auditing reports for vendor, warehouse, weighing process and manufacturing process in pharmaceutical microbiological laboratory.
CO5	Organize the check list for auditing of HVAC, water, water for Injection systems and ETP.

TABLE 1.8: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN I YEAR

Subject: PHARMACEUTICAL MANUFACTURING TECHNOLOGY **(THEORY)**

OBJECTIVE: At completion of this course it is expected that students will be able to understand,

· The common practice in the pharmaceutical industry developments, plant layout and production planning · Will be familiar with the principles and practices of aseptic process technology, non sterile manufacturing technology and packaging technology.

· Have a better understanding of principles and implementation of Quality by design (QbD) and process analytical technology (PAT) in pharmaceutical manufacturing

Subject code: MQA204T

S.No. of CO's	Course Outcomes On completion of course the student can be able to:

CO1	Know the Legal requirements and Licenses for API and formulation industry . Design the plant lay-out and prrepare the check list for sterile production area.
CO2	Know about the Aseptic process technology , Advanced sterile product manufacturing technology , Process Automation in Pharmaceutical Industry and Lyophilization technology.
CO3	Understand Non sterile manufacturing process technology, Advance non-sterile solid product manufacturing technology and Coating technology.
CO4	Know the Containers and closures for pharmaceuticals and evaluation of stability of packaging material.
CO5	Implement of Quality by design (QbD) to Product & Procedure Development.

TABLE 1.9: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN I YEAR

Subject: QUALITY ASSURANCE PRACTICAL – II PRACTICALS **Subject code: MQA205P**	
S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Estimation of contaminants by different analytical methods.
CO2	Qualification of pharma equipments and validation of analytical methods.
CO3	Validation of bulk pharmaceutical vendors , tableting and sterile proand water for injection .Design plan layout , case study on application of QbD and PAT.

PROGRAMME: M.PHARM – PHARMACEUTICAL ANALYSIS

SECOND YEAR(II/II)

TABLE 2.1: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN II YEAR

Subject: RESEARCH METHODOLOGY & BIOSTATISTICS (THEORY) **Subject code: MQA301T**	
S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Have fundamental knowledge on selection of research topic.
CO2	Understand basic statistical methods which are used in collecting data and performing statistical tests of significance, type of significance tests, parametric tests, non-parametric tests, null hypothesis, P values, degree of freedom, and interpretation of P values.
CO3	Identify the concept of medical research and values in medical ethics.
CO4	Define CPCSEA guidelines for laboratory animal facility.
CO5	Describe the declarations of Helsinki and basic principles for medical research.

TABLE 2.2: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN II YEAR

Subject: JOURNAL CLUB	
S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Able to collect relevant literature and critically evaluate them.
CO2	Learnt to make a PPT presentation scientifically and deliver the same.
CO3	Able to involve effectively in post presentation discussion.

TABLE 2.3: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN II YEAR

Subject: PROJECT DISCUSSION / PRESENTATION	
S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Able to select research topic through literature review.
CO2	Able to design research methodology.
CO3	Able to Present the selected research proposal convincingly.

TABLE 2.4: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN II YEAR

Subject: RESEARCH WORK	
S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Able to carry out research work scientifically following research ethics.
CO2	Able to collect date, interpret them using appropriate statistical tools and arrive at conclusion scientifically.
CO3	Able to document the research work in the form of thesis in an acceptable format.

TABLE 2.5: LIST OF COURSE OBJECTI VES AND OUTCOMES OF A SUBJECT IN II YEAR

Subject: PRE SUBMISSION DISCUSSION / PRESENTATION	
S.No. of CO's	**Course Outcomes** **On completion of course the student can be able to:**
CO1	Able to organize the research work for presentation.
CO2	Able to make PPT presentation of the research work scientifically and deliver the same.
CO3	Learn to defend the research work scientifically and convincingly.