



## PROGRAMME OUTCOMES

### Programme Outcomes

- PO 1 Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.
- PO 2 Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
- PO 3 Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.
- PO 4 Modern tool us age:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.
- PO 5 Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well-being.
- PO 6 Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).
- PO 7 Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.
- PO 8 Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.
- PO 9 The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.
- PO 10 Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO 11 Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.



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SUBJECT NAME & CODE	CODE	COURSE OUTCOMES
Human Anatomy and Physiology –I BP101 T	C101.1	Identify gross morphology, structure and functions of the various organs of the human body.
	C101.2	Describe various homeostatic mechanisms and their imbalances in the human body.
	C101.3	Identify the different tissues and different systems of the human body.
	C101.4	Demonstrate the different types of bones in the human body.
	C101.5	Illustrate the coordination of working pattern of different organs of each system.
Pharmaceutical Analysis – I BP102 T	C102.1	Explain the theoretical basis of commonly used statistical methods & correctly analyze & interpret the results of statistical data from surveys, experiments & observational studies.
	C102.2	Illustrate sources of errors in analytical techniques, methods to minimize them and calibration of analytical methods.
	C102.3	Describe the various titrimetric and electrochemical methods of analysis and their application in quality control of pharmaceuticals.
	C102.4	Develop and enhance the analytical skills
Pharmaceutics – I BP103 T	C103.1	Describe the history of pharmacy profession and its scope.
	C103.2	Identify the prescription in a professional manner.
	C103.3	Describe the basics of Pharmaceutical calculations & calculate the dose for a drug.
	C103.4	Discuss about various dosage forms.
	C103.5	Identify and suggest the correction methods in pharmaceutical incompatibilities in prescription.
Pharmaceutical Inorganic Chemistry BP104 T	C104.1	Acquire Knowledge of sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals.
	C104.2	Demonstrate the principles of limit tests.
	C104.3	Identification of different anions, cations and different inorganic pharmaceuticals.
	C104.4	Describe the basic concepts of acidity /basicity, buffers and tonicity applicable in pharmaceuticals.
	C104.5	Summarize the medicinal and pharmaceutical importance of inorganic compounds.
	C104.6	Describing concepts, principles and applications of radiopharmaceuticals.
Communication Skills BO105 T	C105.1	Explain the key terminologies of process of communication.
	C105.2	Identify the importance of tone, body language and active listening as elements of effective



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		communication.
	C105.3	Interpret the factors influencing communication perspectives.
	C105.4	Explain the nuances of audience – centric presentation.
	C105.5	Demonstrate effective interview skills.
	C105.6	Apply appropriate communication style in professional context.
Remedial Biology BP106RBT	C106.1	Identify and understand the components of living world, Both Plants and Animals.
	C106.2	Classify and remember the salient features of five kingdoms of life.
	C106.3	Understand the basic components, both anatomy and physiology of plants.
	C106.4	Discuss and assess anatomy physiology of animals, particularly humans.
	C106.5	Identify and understand the various tissue systems and organ systems in plants and animals.
Remedial Mathematics BP106RMT	C106.1	Know the theory and their application in Pharmacy
	C106.2	Solve the different types of problems by applying theory.
	C106.3	Appreciate the important application of mathematics in Pharmacy.
	C106.4	Apply both conventional and creative techniques to the solutions of mathematical problems.
	C106.5	Solve problems of calculus, matrices.
	C106.6	Apply range of techniques effectively to solve problems including theory deduction, approximation and simulation.
Human Anatomy and Physiology –I BP107 P	C107.1	Perform various experiments related to identification of the tissues indifferent systems of human body.
	C107.2	Examine various techniques like blood group determination, blood pressure determination, blood cell counting.
	C107.3	Evaluate various experiments related to special senses and nervous system.
	C107.4	Practice the determination of heart rate and pulse rate.
	C107.5	Record blood parameters like hemoglobin, clotting and bleeding time.
Pharmaceutical Analysis – I BP108 P	C108.1	Understand the principles of volumetric and electro chemical analysis.
	C108.2	Evaluate various volumetric and electrochemical titrations.
	C108.3	Develop analytical skills.



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Pharmaceutics – I BP109 P	C109.1	Explain some solid, liquid and semisolid dosage forms.
	C109.2	Select suitable container and storage conditions for a product.
	C109.3	Asses the pharmaceuticals.
Pharmaceutical Inorganic Chemistry BP110 P	C110.1	Demonstrate with the principles of limit tests.
	C110.2	Acquire the knowledge on identification of inorganic salts through various qualitative tests.
	C110.3	Apply the knowledge to perform tests for purity for different compounds as per IP.
	C110.4	Implement skills to prepare inorganic salts -boric acid, potash alum and ferrous sulphate.
	C110.5	Apply knowledge to assess safety, health and consequent responsibilities relevant to this.
Communication Skills BP111 P	C111.1	Recognize phonemes for proper articulation of words.
	C111.2	Explain the key concepts of writing skills and listening skills.
	C111.3	Apply listening skills and reading skills for comprehension.
	C111.4	Demonstrate conversation skills using appropriate body language and tone.
	C111.5	Demonstrate audience – centric presentation.
	C111.6	Develop professional written document.
Remedial Biology BP112RBP	C112.1	Construct and develop microscopic sections of parts of the plant.
	C112.2	Identify various systems of frog using computer model.
	C112.3	Differentiate the various blood groups.
	C112.4	Calculate the blood pressure and tidal volumes.
Human Anatomy and Physiology – II BP201 T	C201.1	Recognize gross morphology, structure and functions of various organs of the human body.
	C201.2	Explain various homeostatic mechanisms in the human body.
	C201.3	Generalize the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body.
	C201.4	Understand the mechanisms in the maintenance of normal functioning of human body.
	C201.5	Understand the different coordinated working patterns of different organs of each system.
Pharmaceutical Organic Chemistry – I BP202 T	C202.1	acquire the knowledge and understanding of the basic experimental principles of pharmaceutical organic chemistry.
	C202.2	Generalize the classification, nomenclature, structure and the type of isomerism of the organic



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		compound.
	C202.3	Review of important physical properties, reactions (and underlying mechanisms) and methods of preparation of various functional groups.
	C202.4	List out reactivity/stability of compounds and intermediates forming in reactions.
	C202.5	Demonstrate the identification of organic compound.
	C202.6	Summarize the concepts of named reactions and its applications.
Biochemistry BP203 T	C203.1	The study of bio molecules gives knowledge on bio chemical organization of living organisms along with their role.
	C203.2	It helps in understanding the catalytic role of enzymes, importance of enzyme inhibition in the design of new drugs.
	C203.3	Study of enzymes and isoenzymes emphasizes their role in therapeutic and diagnostic applications.
	C203.4	Metabolic pathways of bio molecules helps the students to acquire knowledge on various energy metabolisms that occur in living organisms.
	C203.5	Understanding the concepts of mammalian genetic organization, concepts of DNA, RNA, Protein and mutations gives wide knowledge to the student community to face the future challenges in health care sector.
	C203.6	The study of metabolic reactions and deficiency diseases gives awareness to the students to develop new alternatives in pharmaceutical industries to face the challenges of nutritional sciences.
Pathophysiology BP204 T	C204.1	Study the various etiological factors for the development of diseases.
	C204.2	Understand the concepts of pathophysiological basis of selected diseases.
	C204.3	Learn the basics of signs and symptoms of diseases.
	C204.4	Study of common complications of the diseases.
Computer Application in Pharmacy BP205 T	C205.1	To know the various computer applications in pharmacy.
	C205.2	To understand various number systems in computers.
	C205.3	To know web technologies.
	C205.4	To understand the various types of databases and applications of databases in pharmacy.



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	C205.5	To learn Computers as data analysis in Preclinical development.
	C205.6	To know databases in the concept of bio-informatics.
Environmental Sciences BP206 T	C206.1	To create the awareness about environmental problems among learners.
	C206.2	To impart basic knowledge about the environment and its allied problems.
	C206.3	To develop an attitude of concern for the environment.
	C206.4	To motivate learner to participate in environment protection and environment improvement.
	C206.5	To acquire skills to help the concerned individuals in identifying and solving environmental problems.
	C206.6	To strive to attain harmony with Nature.
Human Anatomy and Physiology – II BP207 P	C207.1	Perform the hematological tests like blood cell counts, hemoglobin estimation, bleeding/clotting time etc.
	C207.2	Identify the various organs of different systems of human body.
	C207.3	Practice the experiments like neurological reflex, body temperature measurement
	C207.4	Study of basic physiological parameters like blood pressure, heart rate, pulse and respiratory volumes.
	C207.5	Conceptualized study of integumentary systems
Pharmaceutical Organic Chemistry – I BP208 P	C208.1	Assessment of safety measures in organic chemistry laboratory and various laboratory techniques.
	C208.2	Evaluation of steps involved in identification of unknown organic compound.
	C208.3	State abilities to prepare suitable solid derivatives from organic compounds.
	C208.4	Build skills to prepare stereo models containing various functional groups.
	C208.5	Represent stereo models and its arrangement.
	C208.6	Apply knowledge to assess safety, health and consequent responsibilities relevant to this.
Biochemistry BP209 P	C209.1	Experiments on qualitative analysis of biomolecules gives practical knowledge to the students for better understanding of compositions of blood and urine samples.
	C209.2	Quantitative analysis of blood sugars, creatinine and cholesterol levels makes the students to be aware of the health conditions like Diabetes and jaundice etc.



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	C209.3	Students can gain knowledge on different buffer preparations that helps them in research applications.
	C209.4	Study of enzymes like Amylases give knowledge to the students related to enzyme applications in industries.
	C209.5	Qualitative analysis of urine sample for abnormal constituents helps to know about the diseases related to urine in human beings.
Computer Application in Pharmacy BP210 P	C210.1	To know how to design a questionnaire using a word processing package and a form in MS Access.
	C210.2	To understand how to create a HTML web page, invoice table and database.
	C210.3	To learn how to create mailing labels Using Label Wizard, generating label in MS word.
	C210.4	To understand generating report and printing the report from database.
	C210.5	To know drug information storage and retrieval using online tools and MS Access.
	C210.6	To understand exporting tables, queries, forms and reports to web and XML pages.
Pharmaceutical Organic Chemistry – II BP301 T	C301.1	Explain the concept of orbital picture, resonance, reactions and effects of substituent's of benzene.
	C301.2	Understand on acidity, effect of substituent's, reaction and qualitative test of phenols.
	C301.3	Demonstrate basicity, effect of substituent's, reaction of aromatic amines.
	C301.4	Reproduce the concept of optical isomerism and geometrical isomerism of organic compounds. Including concept of resolution of racemic modifications.
	C301.5	Describe the synthesis, reactions, structure and medicinal uses of some polynuclear hydrocarbons.
	C301.6	Explain the theory of cycloalkanes and chemistry of fats and oils.
Physical Pharmaceutics – I BP302 T	C302.1	State the physicochemical properties of drug molecules, pH, solubility and formation of complexes.
	C302.2	Explain the role of surfactants.
	C302.3	Explain physical principles of states of matter and phase rule.
	C302.4	Complete pKa values and estimate HLB values.
	C302.5	Summarize the importance of pH and buffers in manufacturing pharmaceutical dosage forms and maintaining stability and Solving problems related to buffers and isotonic solutions.



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	C302.6	Summarize skills and working knowledge of the principles and concepts of surface tension and its measurement.
Pharmaceutical Microbiology BP303 T	C303.1	Study of ph. Microbiology gives overall knowledge on microorganisms, infections, treatment and their applications in pharmaceutical industries and medicine.
	C303.2	Methods of identification, cultivation and preservation of microbes give knowledge to students for better understanding in handling them and to know their applications in human life.
	C303.3	Understanding of sterilization concepts gives immense knowledge to the students which help them in getting knowledge in industrial processing.
	C303.4	Concepts of sterility testing are more useful to the students to have sound knowledge in pharmaceutical product manufacturing.
	C303.5	The concepts of cell culture technology are useful for various applications in industries.
	C303.6	Study of equipments like aseptic cabinet, hot air oven and incubator updates the knowledge of students to have experience in modern tool usage in academics
Pharmaceutical Engineering BP304 T	C304.1	Explain various unit operations used in Pharmaceutical industries.
	C304.2	To comprehend the material handling techniques.
	C304.3	Identify various processes involved in pharmaceutical manufacturing process.
	C304.4	Instruct the pharmaceutical applications of various unit operations.
	C304.5	Review the significance of plant lay out design for optimum use of resources.
	C304.6	Generalize the preventive methods used for corrosion control in Pharmaceutical industries.
Pharmaceutical Organic Chemistry – II BP305 P	C305.1	Acquire Knowledge on separation and identification of qualitative analysis of solid-solid organic binary mixtures.
	C305.2	Demonstrate the concept of re-crystallisation and Steam distillation.
	C305.3	Determination of Ester value, Acid value and saponification value of oil sample.
	C305.4	Use various techniques for the different organic compounds to understand the reaction mechanisms.
	C305.5	Apply knowledge to assess safety, health and



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		consequent responsibilities relevant to this.
Physical Pharmaceutics – I BP306 P	C306.1	Demonstrate solubility studies for different drugs.
	C306.2	Evaluate pKa values and estimate HLB values.
	C306.3	Examine and determine the percentage composition.
	C306.4	Asses Critical Micellar Concentration of various surfactants.
	C306.5	Evaluate of stability constants and partition coefficients.
Pharmaceutical Microbiology BP307 P	C307.1	Hands on experience on the equipments like BOD incubator, LMF chamber, aseptic cabinet and Hot air oven gives knowledge to the students that is useful in understanding microbiological concepts.
	C307.2	Sterilization techniques illustrates role of sterilization and disinfection in various ph. Industries.
	C307.3	Staining techniques helps the students to identify the morphological and cultural characteristic features of microorganisms.
	C307.4	Pure culture (isolation) techniques helps the students in better understanding of contamination, spoilage like conditions in processing mechanism in industries.
	C307.5	Sterility testings give knowledge to the students about the industrial production of various drugs and medicines and their safety.
	C307.6	Biochemical and analytical tests makes the students to learn the safety issues of products that are useful for community.
Pharmaceutical Engineering BP308 P	C308.1	Design various experiments related to unit operations.
	C308.2	Instruct to operate equipment's used in the manufacture of pharmaceutical products.
	C308.3	Interpret results of the experiments conducted.
	C308.4	Demonstrate the material and energy requirements for optimizing the pharmaceutical unit processes.
Pharmaceutical Organic Chemistry – III BP401 T	C401.1	Summarize the medicinal uses and other applications of organic compounds.
	C401.2	Acquire the knowledge and understanding of the basic experimental principles of heterocyclic chemistry.
	C401.3	Instruct to draw the structures and synthesize simple pharmaceutically active organic compounds having five and six membered heterocyclic compounds.



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	C401.4	Describe detailed mechanisms for common naming reactions.
	C401.5	Identify Stereo-chemical features including conformation and stereo electronic effects; Geometrical isomers.
Medicinal Chemistry – I BP402 T	C402.1	Explain history and basic principles of Medicinal Chemistry.
	C402.2	Study the concept of Physicochemical properties on biological action of drug molecule
	C402.3	Describe classification, mechanism of action, structure activity relationship and uses of drugs acting on Autonomic nervous and Central Nervous system.
	C402.4	Explanation on recent development of Prodrugs, Soft drugs and hard drugs. Scheme of synthesis of drugs from various therapeutic categories.
	C402.5	Acquire Knowledge on structural activity relationship (SAR) of different class of drugs.
	C402.6	Classification of centrally and peripherally acting analgesic drugs.
Physical Pharmaceutics – II BP403 T	C403.1	Explain the concept of rheology and flow properties of pharmaceutical preparations.
	C403.2	Describe the factors leading to instability of disperse systems, effect of particle size distribution of powders on the manufacture of dosage forms.
	C403.3	State the principles of chemical kinetics in stability testing.
	C403.4	Apply the principles of micrometrics, rheology, chemical kinetics & stability, coarse dispersions in the formulation development and evaluation of dosage forms.
Pharmacology – I BP404 T	C404.1	Describe the pharmacological actions of different classes of drugs.
	C404.2	Recognize molecular mechanisms of drug action in the human body.
	C404.3	Read the Basic pharmacological knowledge of drugs in the prevention and treatment of various diseases.
	C404.4	Define the concepts of different types of drug receptors and their signaling mechanisms.
	C404.5	Enumerate the basic knowledge of drug addiction, abuse, drug interactions, and Pharmacovigilance.
Pharmacognosy and Phytochemistry – I BP405 T	C405.1	know the techniques in the cultivation, storage and production of crude drugs .
	C405.2	Learn the fundamental aspects and applications of plant tissue culture.



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	C405.3	Apply various techniques to evaluate the herbal drugs.
	C405.4	Understand the significance of Pharmacognosy in allopathy and traditional system of medicine.
	C405.5	Explain the Sources, chemical nature and uses of plant fibres, hallucinogens, teratogens and natural allergens and novel medicinal agents from marine sources.
Medicinal Chemistry – I BP406 P	C406.1	Construct synthetic procedure and understand related reaction mechanism.
	C406.2	Learn synthesis of medicinally important compounds / drug intermediates with Recrystallization and TLC techniques.
	C406.3	Implement Purification methods for synthesized compounds using Column chromatography.
	C406.4	Evaluation of Partition coefficient of drugs.
	C406.5	Examination of Ionisation constants of drugs.
	C406.6	Apply knowledge to assess safety, health and consequent responsibilities relevant to this.
Physical Pharmaceutics – II BP407 P	C407.1	Evaluate flow properties of liquids and powders.
	C407.2	Asses the particle size & size distribution using various methods.
	C407.3	Demonstrate the effect of suspending agents on sedimentation volume.
	C407.4	Asses the various orders of reactions.
	C407.5	Examine shelf – life by carrying out accelerated stability studies.
Pharmacology – I BP408 P	C408.1	Choose different routes of drug administration in experimental animals.
	C408.2	Demonstrate the effects of drugs on animals by simulated experiments.
	C408.3	Define the knowledge of the interrelation of pharmacology with other biomedical sciences.
	C408.4	Performance of laboratory investigation techniques.
	C408.5	Basic knowledge of anesthetic and euthanasia techniques used in animal studies.
Pharmacognosy and Phytochemistry – I BP409 P	C409.1	Understand the chemical nature of crude drug by chemical tests.
	C409.2	Perform stomatal number, stomatal index, vein islet number, vein islet termination and palisade ratio of leaf drug.
	C409.3	Understand and determine size of starch grains, calcium oxalate crystals, length and width of fiber of the sample.
	C409.4	Able to perform Ash value, Extractive values,



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		moisture content, swelling and foaming index for the evaluation of crude drug.
Medicinal Chemistry – II BP501 T	C501.1	Evaluate basic principles and development of diuretics.
	C501.2	Generalize History and basic and core aspects of the drug design.
	C501.3	Summarize the development of drugs used in cardiac diseases like Arrhythmias, hypertension, diuretics and endocrine system.
	C501.4	Describe recent development in Drugs acting on blood.
	C501.5	To acquire knowledge about the chemotherapy for cancer.
Industrial Pharmacy – I BP502 T	C502.1	Asses the physicochemical properties of drugs as a tool in the optimization of solid and liquid dosage forms.
	C502.2	Develop Solid dosage forms and liquid dosage forms using established procedures and machinery.
	C502.3	To learn Awareness on the facilities and required standards necessary for the industrial production of sterile dosage forms.
	C502.4	To Formulate and prepare different types of parenteral, ophthalmic dosage forms, cosmetics such as lipsticks, shampoos, cold cream and vanishing cream.
	C502.5	Select and evaluate appropriate packaging materials for various pharmaceutical dosage forms.
Pharmacology – II BP503 T	C503.1	Understand the pharmacology and pharmacotherapy of common and essential medications used to treat cardiovascular disorders.
	C503.2	Explain the principles, uses, and types of bioassays.
	C503.3	Recognize drugs interactions and adverse drug responses.
	C503.4	Understand the relationship between pharmacology and other biomedical sciences.
	C503.5	Discuss pharmacological mechanisms and their importance in disease treatment.
Pharmacognosy and Phytochemistry – II BP504 T	C504.1	Know the basic metabolic pathways and formation of different secondary metabolites through various biosynthetic pathways.
	C504.2	Understand the utilization of radioactive isotopes in the investigation of biogenetic studies.



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	C504.3	Understand the basic techniques like spectroscopy, chromatography and electrophoresis in the isolation, purification and identification of crude drugs.
	C504.4	Learn the isolation, identification and analysis of phytoconstituents.
	C504.5	Explain the source, chemistry, therapeutic uses and commercial applications of various secondary metabolites containing drugs.
	C504.6	Discuss the method for industrial production, estimation and utilization of some therapeutically important phytoconstituents.
Pharmaceutical Jurisprudence BP505 T	C505.1	Explain the importance of code of pharmaceutical ethics.
	C505.2	Memorize and explain the provisions of acts pertaining to drugs and cosmetics.
	C505.3	State the latest amendments with respect to DPCO and patent and design act.
	C505.4	Describe the concepts of price fixation of pharmaceutical products.
	C505.5	Summarize the Pharmaceutical Acts and Laws and their implications in the development and marketing of pharmaceuticals.
	C505.6	Identify the labelling requirements of scheduled and non-scheduled formulations.
Industrial Pharmacy – I BP506 P	C506.1	Produce formulations of different dosage forms by using various excipients.
	C506.2	Select suitable packaging container and closing and labeling requirements for the prepared dosage forms.
	C506.3	Demonstrate different equipment's used in preparation of solid and other dosage forms.
	C506.4	Apply the physicochemical properties of drugs to dosage form characteristics.
	C506.5	Summarize to evaluate different dosage forms by performing quality control tests with the range of limits to pass the test.
Pharmacology – II BP507 P	C507.1	Study of physiological salt solutions, drug solution and use in various animal experiments.
	C507.2	Analyze the effect of drug on Concentration Response Curves (CRC) using suitable isolated tissue preparations (Synergism and Antagonism).
	C507.3	Using computer models to demonstrate drug effects.
	C507.4	Analyze the impact of spasmogens and spamolytics on appropriate tissue preparations.



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	C507.5	Conduct in vivo research using isolated tissue preparations.
Pharmacognosy and Phytochemistry – II BP508 P	C508.1	Analyze the Macroscopy, Microscopic and powder characteristics of crude drugs for detection.
	C508.2	Apply techniques and tests for the isolation, identification of phytoconstituents.
	C508.3	Understand the separation techniques of sugars and herbal extract by paper and thin layer chromatography.
	C508.4	Know the separation and detection techniques of volatile oils.
	C508.5	Distinguish the unorganized crude drugs by various chemical test.
Medicinal Chemistry – III BP601 T	C601.1	Generalize the concept and development of anti-biotic.
	C601.2	Describe how current drugs were developed by using pharmacophore modelling and docking technique.
	C601.3	Acquire knowledge in the chemotherapy for cancer.
	C601.4	Impart knowledge on microbial diseases.
	C601.5	Demonstrate the concept of viral diseases and its development.
	C601.6	To acquire knowledge about the mechanism pathways of different class of medicinal compounds.
Pharmacology – III BP602 T	C602.1	Outline classification, category and pharmacology of drugs acting on respiratory and gastrointestinal systems.
	C602.2	Understand the significance of chemotherapeutic agents.
	C602.3	Explain the importance of drugs used in treatment of Cancer, tuberculosis, leprosy, fungal Diseases, viral diseases, UTI, STD & immunosuppressive agents.
	C602.4	Understand the mechanism of action and treatment of drugs act on infectious diseases.
	C602.5	Evaluate the symptoms and treatment of various drug poisoning.
Herbal Drug Technology BP603 T	C603.1	Understand raw material as source of herbal drugs from cultivation to herbal drug product.
	C603.2	Utilize the plants as nutraceuticals in ailments and also understand herb-food and herb-drug interaction of various plant drugs.
	C603.3	Identify the natural origin drugs as raw materials for preparation of cosmetics, excipients,



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		conventional herbal formulations and novel dosage forms like phytosomes.
	C603.4	Explain and understand the stability testing of herbal drugs as per WHO and ICH guidelines for evaluation of herbal drugs and patenting of natural products.
Biopharmaceutics and Pharmacokinetics BP604 T	C604.1	Describe the concept of ADME of drug in human body.
	C604.2	Describe the various pharmacokinetic parameters from either plasma concentration or urinary excretion data of the drug.
	C604.3	Apply the various regulations related to developing BA-BE study protocol for the new drug molecule.
	C604.4	Summarize the concept of multi compartment models, multiple dose administration and their significance.
	C604.5	Identify the various causes of nonlinear pharmacokinetics.
Pharmaceutical Biotechnology BP605 T	C605.1	Ph. Biotechnology helps in understanding the applications of Immobilized enzymes in pharmaceutical industries.
	C605.2	The study of genetic engineering concepts emphasizes the applications of various r DNA products for the future therapeutics.
	C605.3	Monoclonal antibodies by Hybridoma technology gives knowledge on future problems and their solutions in healthcare sector of our society.
	C605.4	Fermentation technology mainly illustrates the production of various fermented products in industries and their benefits to the community as well as learning skills of various techniques on fermentation process.
	C605.5	The concepts of immunology gives knowledge to the students to aware of various infections or diseases caused by different pathogens.
	C605.6	The techniques like PCR, Blottings and ELISA are the modern tools for the usage in pharmacy and medicine.
Quality Assurance BP606 T	C606.1	Understand the cGMP and GLP, ICH aspects in a pharmaceutical industry.
	C606.2	Realize the importance of documentation.
	C606.3	Explain the responsibilities of TQM, QA & QC departments.
	C606.4	Know the handling of return goods and Good Warehousing Practices in pharma industry.
	C606.5	Describe the importance of calibration and



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		validation of instruments.
Medicinal Chemistry – III BP607 P	C607.1	Apply various Synthetic, recrystallization techniques and understand reaction mechanisms involved in synthesis of medicinally important organic compound.
	C607.2	Learn the Synthesis of medicinally important organic compounds using microwave assisted organic synthesis.
	C607.3	Acquire Knowledge on assay principles and procedure of medicinally important drugs including antibiotic.
	C607.4	Examine and implementation of principle and operating procedure of microwave assisted synthesis in comparison with conventional procedure.
	C607.5	Apply knowledge to assess safety, health and consequent responsibilities relevant to this.
Pharmacology – III BP608 P	C608.1	Calculate animal doses for experiments in pharmacology.
	C608.2	Examine the biochemical investigations.
	C608.3	Record the effect of drugs on isolated preparations by using computerized simulated software.
	C608.4	Define OECD guidelines and ethical principles in acute and chronic oral toxicity study.
	C608.5	Understand various Biostatistics methods in experimental pharmacology.
Herbal Drug Technology BP609 P	C609.1	Evaluate the preliminary qualitative screening of crude drugs and excipients of natural sources.
	C609.2	Determine the alcohol content of ayurvedic preparation and aldehyde content, phenol content of volatile oils.
	C609.3	Know the formulation and evaluation techniques of herbal creams, lotions and shampoos.
	C609.4	Apply the Preparation and standardization process for herbal syrup, mixtures and tablets.
	C609.5	Analyze the monograph herbal drugs as per Pharmacopoeia.
Instrumental Method of Analysis BP701 T	C701.1	Impart a fundamental knowledge on the principles and instrumentation of spectroscopic and chromatographic technique.
	C701.2	Understand the interaction of matter with electromagnetic radiations and its applications in drug analysis.
	C701.3	Describe the general methods for separation and purification of components from a mixture and their application to pharmaceutical industry.



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	C701.4	Perform quantitative & qualitative analysis of drugs using various analytical instruments.
	C701.5	Underlines on theoretical and practical knowledge on modern analytical instruments that are used for drug testing.
Industrial Pharmacy – II BP702 T	C702.1	Summarize the scale up process in pharmaceutical industry.
	C702.2	Review the technology transfer.
	C702.3	Explain about various laws and acts that regulate pharmaceutical industry.
	C702.4	Implement the regulatory environment by upholding good regulatory practices.
	C702.5	Describe the regulations and approval process in pharmaceutical industry.
Pharmacy Practice BP703 T	C703.1	Describe the functioning of hospital and community pharmacy. Identify and assess adverse drug reactions.
	C703.2	Establishment of pharmacy and therapeutic committee. To develop the contents of hospital formulary and adapt to drug distribution system in the hospital.
	C703.3	Implementation and practice patient medication history interview and patient counseling in management of diseases.
	C703.4	To establish drug store, manage and implement inventory control techniques.
	C703.5	To identify and interpret clinical laboratory tests of specific disease states.
	C703.6	To describe the functions and responsibilities of hospital and clinical pharmacist.
	Novel Drug Delivery System BP704 T	C704.1
C704.2		Review Different Types of Oral Controlled Drug Delivery System.
C704.3		Recite Knowledge on Transdermal Drug Delivery Systems.
C704.4		Evaluate various approaches for the development of targeted drug delivery systems.
C704.5		Describe about Mucoadhesive Delivery Systems and Their Significance.
C704.6		Fundamental Study of Resealed Erythrocytes: A Novel and Promising drug carrier.
Instrumental Method of Analysis BP705 P	C705.1	Understand the interaction of matter with electromagnetic radiations and its applications in drug analysis.
	C705.2	Describe the chromatographic separation and



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		analysis of drugs.
	C705.3	Perform quantitative & qualitative analysis of drugs using various analytical instrument.
Biostatistics and Research Methodology BP801T	C801.1	To Formulate a research question, hypotheses and related objectives (general and specific).
	C801.2	To Understand and apply statistical methods for the design of biomedical research.
	C801.3	To gain the knowledge and understanding the concept of statistical theories in evaluation of research.
	C801.4	To gain the knowledge how to and interpret results from specialized computer software.
	C801.5	To Know the various statistical techniques to solve statistical problems.
	C801.6	To Know the operation of M.S. Excel, SPSS, R and MINITAB®, DoE (Design of Experiment).
Social and Preventive Pharmacy BP802T	C802.1	Understand the concept of health and health education.
	C802.2	To create awareness about various preventive measures of stated communicable and non communicable diseases.
	C802.3	Applying the mentioned knowledge of national health program serving the community in the real world.
	C802.4	To describe the several vaccines included in the national immunization program and their schedule.
	C802.5	To illustrate the influence of urbanization and socio-cultural influences on health.
	C802.6	To assess the issue with pharmacy and health from a societal perspective.



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<b>SUBJECT NAME &amp; CODE</b>	<b>CODE</b>	<b>COURSE OUTCOMES</b>
Human Anatomy and Physiology 101 T	C101.1	Identify the various tissues and organs of the different systems.
	C101.2	Describe the various homeostatic mechanisms and the imbalances of various systems.
	C101.3	Explain the structure and functions of various organs of the human body.
	C101.4	Discuss the interlinked mechanisms in the maintenance of normal functioning of human body.
	C101.5	Understand the effect of Skeletal muscles in Sports physiology.
Pharmaceutics 102 T	C102.1	Describe the evolution of Pharmacy and Pharmacopoeias.
	C102.2	Discuss the need and identification of different dosage forms.
	C102.3	Design a suitable formulation/dosage form with the use of appropriate ingredients.
	C102.4	Discuss the different techniques involved in formulation of a dosage form.
	C102.5	Analyze the instabilities observed in formulations and suggest suitable remedial measures to overcome the instabilities of dosage form.
	C102.6	Prepare appropriate labels and recommend storage conditions for dosage forms.
Medicinal Biochemistry 103 T	C103.1	Describes the cell organization, catalytic activity of enzymes and importance of isoenzymes in diagnosis of diseases.
	C103.2	Illustrates the metabolic process of biomolecules in health and illness (metabolic disorders).
	C103.3	Explains the genetic organization of mammalian genome; protein synthesis; replication; mutation and repair mech
	C103.4	Describe the biochemical principles of organ function tests of kidney, liver and endocrine gland.
	C103.5	Demonstrate the qualitative analysis and determination of biomolecules in the body



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		fluids.
Pharmaceutical Organic Chemistry 104 T	C104.1	Understand basic concepts of organic chemistry.
	C104.2	Summarize the naming reactions of carbonyl compounds and special emphasis on mechanisms and orientation of chemical reactions.
	C104.3	Analysis of kinetics, mechanism, stereochemistry of free radical, electrophilic, nucleophilic addition reactions and theory of resonance.
	C104.4	Comparison of reactivity, orientation and factors influencing aliphatic nucleophilic substitution with aromatic nucleophilic substitution.
	C104.5	Discussion on the method of preparation, test for purity, assay and medicinal uses of selected organic compounds.
	C104.6	Remember IUPAC rules for nomenclature of organic compounds and Identification of the structures of a given organic compound and nomenclature.
Pharmaceutical Inorganic Chemistry 105 T	C105.1	Summarize the principles, procedures and applications of various titrations.
	C105.2	Understand concept of impurities its identification and limit tests in pharmaceutical substances.
	C105.3	Construct various methods to prepare inorganic pharmaceutical substances.
	C105.4	Remember storage conditions for inorganic pharmaceuticals.
	C105.5	Estimate the inorganic medicinal substances and interpret their percentage purity.
	C105.6	Understand basics of radio activity and recognize the role of essential trace elements.
Remedial Mathematics 106 T (A)	C106.1 A	Know the theory and their application in Pharmacy.
	C106.2 A	Solve the different types of problems by applying theory.
	C106.3 A	Appreciate the important application of mathematics in Pharmacy.
	C106.4 A	Apply both conventional and creative techniques



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		to the solutions of mathematical problems.
Remedial Biology 106 T (B)	C106.1 B	Understand the basic components, both anatomy and physiology of plants.
	C106.2 B	Identify and understand the Physiology and reproduction in plants.
	C106.3 B	Understand the taxonomy in plants.
	C106.4 B	Identify and understand the various tissue systems and cell organization in animals.
	C106.5 B	Classify and study about different animal classes especially reptiles, aves, pisces and mammals.
Human Anatomy and Physiology 107 P	C107.1	Identify the various tissues of the human body.
	C107.2	Perform the hematological tests.
	C107.3	Record blood pressure and simple muscle curve.
	C107.4	Study of various systems of the human body.
Pharmaceutics 108 P	C108.1	Formulate various solid and liquid dosage forms.
	C108.2	Demonstrate different techniques involved in formulation.
	C108.3	Identify and apply the suitable remedial measures to solve instabilities observed in formulations.
	C108.4	Prepare appropriate labels for dosage forms.
	C108.5	Conducts planned experiments and prepare laboratory report in a standard format.
Medicinal Biochemistry 109 P	C109.1	Employs the qualitative analysis of urine sample for normal and abnormal constituents.
	C109.2	Experiments on blood sample helps the students to know the various parameters that are related to health and disease conditions.
	C109.3	Examining the biological samples for clinical significance of blood sugar, creatinine, cholesterol like samples gives practical knowledge to the students.
	C109.4	Describes about the enzymatic tests like SGOT, SGPT and enzyme kinetic tests.
Pharmaceutical Organic Chemistry 110 P	C110.1	Acquire the knowledge and understanding of the basic experimental principles of pharmaceutical organic chemistry.



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	C110.2	Apply stereo models and explain the structural aspects of organic compounds.
	C110.3	Identify various classes of organic compounds by systematic qualitative analysis, outline the preliminary tests and detection of elements for qualitative analysis.
	C110.4	Make correct use of various equipment's and take safety measures while working in Chemistry Laboratory.
	C110.5	Synthesize simple organic compounds by different organic reactions.
	C110.6	Analyze the appropriate method for purification of organic compounds.
	Pharmaceutical Inorganic Chemistry 111 P	C111.1
C111.2		Identify the impurities in given inorganic compounds by performing limit tests.
C111.3		Apply different methods to prepare inorganic pharmaceuticals.
C111.4		Carryout identification tests as per Indian Pharmacopoeia.
C111.5		Determine the impurities qualitatively by performing test for purity.
C111.6		Estimation of pharmaceutical inorganic compounds by gravimetry.
Remedial Biology 112 P	C112.1	Construct and develop microscopic sections of parts of the plant.
	C112.2	Identify and study different animal specimen.
	C112.3	Various systems of frog using computer model.
Pathophysiology 201 T	C201.1	Apply the knowledge of the relevant aspects of pathology of various conditions with reference to its pharmacological applications.
	C201.2	Evaluate the basic Pathophysiological mechanisms in various diseases.
	C201.3	Explain the etiopathogenesis of selective diseases.
	C201.4	Discuss the pathogenesis and morphology of reversible and irreversible cell injury.
	C201.5	Describe various lipoproteins and lipoprotein disorders, with acute and chronic inflammation,



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		cancer, auto immune diseases with biological significance of hypersensitivity disorders.
	C201.6	Execute the baseline knowledge and application in other subject of pharmacy.
Pharmaceutical Microbiology 202 T	C202.1	Explains the anatomy, identification, growth factors and sterilization of microorganisms.
	C202.2	Describes the mode of transmission of disease causing microorganism, symptoms of disease, and treatment aspect.
	C202.3	Illustrates the cultivation and identification methods of the microorganisms in the laboratory.
	C202.4	Demonstrates the identification of diseases by performing the diagnostic test.
	C202.5	Describes the behavior of motility and behavioral characteristics of microorganisms.
Pharmacognosy &Phytopharmaceuticals 203 T	C203.1	Describe the history and scope of pharmacognosy and identify the cell wall constituents and cell inclusions.
	C203.2	Know the cultivation, collection, processing, storage of medicinal plants.
	C203.3	Discuss regarding natural pesticides and their sources and describe the various plant fibers used in surgical dressing and related products.
	C203.4	Learn the pharmacognosy and chemistry of carbohydrates, lipids, proteins and elaborate on their sources.
	C203.5	Learn the Microscopical and powder microscopical study of crude drugs.
	C203.6	Enumerate the role of medicinal plants in the identification of adulteration and contamination of herbal medicines and determine the adulteration in crude drug.
Pharmacology-I 204 T	C204.1	Demonstrate the basics of pharmacodynamics, adverse reaction, drug interaction and drug discovery.
	C204.2	Explain the role of neurohumoral transmission and drugs acting on peripheral nervous system.
	C204.3	Distinguish the function of neurotransmitters and drugs acting on central nervous system.
	C204.4	Identify the role of autocooids and related drugs.



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	C204.5	Classify and explain the pharmacology of drugs acting on various systems.
	C204.6	Explain the physiological role of sex hormones and to assess the effect of oral contraceptives.
Community Pharmacy 205 T	C205.1	Discuss the roles and responsibilities of community pharmacist.
	C205.2	Outline the layout and infrastructure requirements for community pharmacy.
	C205.3	Recognize the need of inventory control and discuss the various methods.
	C205.4	Discuss the factors affecting medication adherence.
	C205.5	Perform general patient counseling.
	C205.6	Apply health screening services in community pharmacy.
Pharmacotherapeutics-I 206 T	C206.1	The Pathophysiology of selected disease states and the rationale for drug therapy. And therapeutic approach to management of these diseases.
	C206.2	The controversies in drug therapy; The importance of preparation of individualized therapeutic plans based on diagnosis; Needs to identify the patient-specific parameters relevant in initiating drug therapy and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects).
	C206.3	Describe the Pathophysiology of selected disease states and explain the rationale for drug therapy.
	C206.4	Summarize the therapeutic approach to management of these diseases including reference to the latest available evidence; discuss the controversies in drug therapy.
	C206.5	Explain the general prescribing guidelines and rational use of drugs.
	C206.6	Recognize the role of pharmacist in essential and rational drug use.
Pharmaceutical Microbiology 207 P	C207.1	Explains the sterilization and disinfection methods for the control of micro-organisms.
	C207.2	Examination of microbes by staining techniques



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		helps to identify the different types of micro-organisms.
	C207.3	Biochemical tests employs in study of cultural characteristic features of microbes.
	C207.4	Diagnostic tests like widal tests give experimental knowledge to the students on diagnosis of diseases.
Pharmacognosy &Phytopharmaceuticals208 P	C208.1	Experiment macroscopical&microscopical characters of few pharmacognostically important crude drugs with neat labeled diagrams. Examine the powder microscopy of few crude drugs with well demonstrated diagrams.
	C208.2	Able to identify compound by performing chemical test.
	C208.3	Determine the chemical parameters of few oils that is of pharmacognostic significance.
	C208.4	Enumerate and list the cell contents and cell inclusions in a plant.
Pharmacotherapeutics-I 209 P	C209.1	Discuss the controversies in drug therapy.
	C209.2	Discuss the preparation of individualised therapeutic plans based on diagnosis.
	C209.3	Identify the patient-specific parameters relevant in initiating drug therapy.
	C209.4	Monitoring of drug therapy (including alternatives, timecourse of clinical and laboratory indices of therapeutic response and adverse effects).
	C209.5	Discuss the therapeutic approach to management of selected diseases.
	C209.6	Perform patient counselling and Conduct planned experiments and prepare laboratory report in a standard format.
Pharmacology-II 301 T	C301.1	Identify the pharmacological aspects of various drugs.
	C301.2	Review the experiments confidently.
	C301.3	Reproduce the importance of pharmacology subject as a basis of therapeutics.
	C301.4	Duplicate the knowledge therapeutically.
	C301.5	Describe the pharmacokinetic and



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		pharmacodynamic principles in pharmacology.
	C301.6	List the drugs in chemotherapy of various diseases.
Pharmaceutical Analysis 302 T	C302.1	Understand the importance of Regulatory authorities like GLP, ISO, TQM and Validation Guidelines involved in Pharmaceutical Analysis and various methods to ensure the Quality assurance of Drug and formulation.
	C302.2	Discuss the Application of Chromatography technique like TLC, Paper Chromatography and Electrophoresis used in analysis of Pharmaceuticals.
	C302.3	Examine the application of electrometric method utilized in analysis of drugs and Pharmaceuticals.
	C302.4	Illustrate the Principle, Instrumentation and application of various spectroscopic techniques involved in Analysis of Drug and Pharmaceuticals.
	C302.5	Instruct theoretical knowledge on various hyphenated instrumental techniques adopted for analysis of Pharmaceuticals.
	C302.6	Describe the fundamental principles and applications of Flame photometry, X-ray diffraction, atomic emission and atomic absorption spectroscopy.
Pharmacotherapeutics-II 303 T	C303.1	To know the pathophysiology of selected disease states and the rationale for drug therapy.
	C303.2	To understand the therapeutic approach for management of different diseases.
	C303.3	To know the importance of preparation of individualized therapeutic plans based on diagnosis & controversies in drug therapy.
	C303.4	To understand & identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy.
	C303.5	Explain the etiopathogenesis of selected infectious diseases, musculoskeletal and renal disorders.
	C303.6	Discuss the principles of cancer therapy and dermatological disorders.



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Pharmaceutical Jurisprudence 304 T	C304.1	Acquire the basic knowledge about pharmaceutical laws and role of ethics in pharmacy profession in India.
	C304.2	Memorize and explain the provisions of acts pertaining to Drugs and Cosmetics Act and Narcotic Drugs & Psychotropic Substance Act.
	C304.3	Describe the concepts of price fixation of pharmaceutical products.
	C304.4	Implement the rules and regulations of M&TP (Excise Duties) Act and Drugs and Magic remedies Act.
	C304.5	Summarize the Pharmaceutical Acts and Laws and their implications in the development and marketing of pharmaceuticals.
Medicinal Chemistry 305 T	C305.1	Understand the chemistry of drugs with respect to their pharmacological activity.
	C305.2	Analyze how current drugs were developed by using pharmacophore modeling and docking technique.
	C305.3	Know the structural activity relationship of different class of drugs.
	C305.4	Acquire knowledge in the chemotherapy for cancer and microbial diseases and different anti-viral agents.
	C305.5	Relate the knowledge of the chemistry of drugs with respect to their pharmacological activity, mode of action & adverse effect.
	C305.6	Interpret the concept of rational drug design including combinatorial chemistry and computer aided drug design.
Pharmaceutical Formulations 306 T	C306.1	Explain the significance of formulation, preparation and evaluation of various pharmaceutical dosage forms.
	C306.2	Describe formulation additives for various dosage forms.
	C306.3	Explain suitable measures for stability of the dosage forms.
	C306.4	Describe the manufacturing methods of solid, semisolid, parenteral and ophthalmic products.
	C306.5	Evaluate different dosage forms with appropriate quality control test for a given drug.



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	C306.6	Assess suitable packaging material for a dosage form of a given drug Pharmaceuticals.
Pharmacology-II 307 P	C307.1	Identify the drugs confidently in experiments.
	C307.2	Interpret the experiments of pharmacology.
	C307.3	Identify the various techniques in pharmacology experiments.
	C307.4	Interpret the results of biological samples in experimental pharmacology.
	C307.5	Demonstrate the pharmacological experiments.
Pharmaceutical Analysis 308 P	C308.1	Perform quantitative & qualitative analysis of drugs using various analytical instruments like UV-visible and IR spectrophotometer.
	C308.2	Interpret spectra of UV-visible, IR, NMR and Mass to identify the given compound.
	C308.3	Compare spectral data with chemical structure.
	C308.4	Evaluate the quantity of a drug in a given mixture or solution.
	C308.5	Practice planned experiments and prepare laboratory report in a standard format.
Pharmacotherapeutics-II 309 P	C309.1	To understand therapeutic goals of the drugs used in different diseases.
	C309.2	· To understand dose and frequency of the medications.
	C309.3	· To understand the time-course of clinical and laboratory indices of therapeutic response and adverse effects.
	C309.4	Identify adverse drug reactions, drug interactions and rationalize the prescription.
	C309.5	Prepare individualized therapeutic plans based on diagnosis.
	C309.6	Perform patient counseling.
Medicinal Chemistry 310 P	C310.1	Make correct use of various equipment's and take safety measures while working in Medicinal Chemistry Laboratory.
	C310.2	Synthesize medicinally important compounds.
	C310.3	Apply and understand the reaction mechanisms involved in synthesis of medicinally important compound.
	C310.4	Conduct monograph analysis of the



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		pharmaceutical compounds and determination of the amount of drug present.
	C310.5	Determine partition coefficient and dissociation constant of a given compound.
	C310.6	Gains knowledge on purification of the synthesized medicinal compound by using appropriate techniques.
Pharmaceutical Formulations 311 P	C311.1	Develop formulations of different dosage forms as per the batch formula,
	C311.2	Demonstrate different equipment's and instruments used in preparation of dosage forms
	C311.3	Select suitable packaging container for a dosage form.
	C311.4	Evaluate different dosage forms by performing quality control tests.
	C311.5	Prepare and evaluate cosmetics such as lipstick, cold cream and shampoo.
	C311.6	Design planned experiments and prepare laboratory report in a standard format.
Pharmacotherapeutics-III 401 T	C401.1	Explain the etiopathogenesis of selected gastrointestinal, haematological, neurological and psychiatric diseases.
	C401.2	Discuss the principles of evidence-based therapy and pain management.
	C401.3	Identify the patient-specific parameters relevant in initiating and monitoring drug therapy and adverse effects.
	C401.4	Discuss the therapeutic approach in the management of selected diseases and controversies in drug therapy.
	C401.5	Prepare individualized therapeutic plans based on diagnosis.
	C401.6	Recognize the role of pharmacist in essential and rational drug use.
Hospital Pharmacy 402 T	C402.1	Discuss the roles and responsibilities of hospital pharmacist, hospital drug policies and guidelines for hospital pharmacy.
	C402.2	Discuss various drug distribution methods in a hospital pharmacy.
	C402.3	Apply various methods of inventory control.



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	C402.4	Formulate parenteral preparations.
	C402.5	Review a newsletter for providing continuous education and awareness.
	C402.6	Explain about handling and packaging of radiopharmaceuticals.
Clinical Pharmacy 403 T	C403.1	Explain the roles and responsibilities of clinical pharmacist.
	C403.2	Analyze and interpret the laboratory test results for clinical diagnosis.
	C403.3	Conduct interview to elicit medication history and perform patient counseling.
	C403.4	Identify, monitor, assess, manage, prevent, document and report suspected adverse drug reactions.
	C403.5	Provide drug and poison information through critical analysis.
	C403.6	Recognize the potential sources of medication errors and act for its prevention.
Biostatistics & Research Methodology 404 T	C404.1	Choose the appropriate research design and develop appropriate research hypothesis for a research project.
	C404.2	Explain the concept of central tendency of data & describe the different measures of central tendency.
	C404.3	Describe the appropriate statistical methods required for a particular research design.
	C404.4	Understand the basic epidemiological methods and study designs.
	C404.5	Explain the applications of computer in Hospital and Community Pharmacy.
Biopharmaceutics & Pharmacokinetics 405 T	C405.1	Understand the concept of ADME of a drug in the human body and factors influencing them.
	C405.2	Explain the introductory aspects of pharmacokinetics.
	C405.3	Determine the various pharmacokinetic parameters from either plasma concentration or urinary excretion data of the drug for a drug following one and multi compartment models.
	C405.4	Summarize the concept of multiple-dose administration and identify the various causes of the nonlinear pharmacokinetics.



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	C405.5	Describe the concept of non-compartmental pharmacokinetics and state the principles underlying Bioavailability and Bioequivalence studies.
Clinical Toxicology 406 T	C406.1	Developing general working knowledge of the principles and management of clinical toxicology.
	C406.2	Generalized understanding of the health implications of toxic exposure involving therapeutic and non therapeutic agents.
	C406.3	Examine previous history, assessment, and therapy considerations associated with the management of a toxic exposure.
	C406.4	Distinguishing the characteristics and treatment guidelines for specific toxic substances.
	C406.5	Implementing several preventive approaches to reduce unintentional poisoning.
Pharmacotherapeutics-III 407 P	C407.1	Identify drug interactions and rationalize the prescription.
	C407.2	Discuss the therapeutic approach to management of selected diseases.
	C407.3	Prepare individualized therapeutic plans based on diagnosis.
	C407.4	Conduct patient counseling.
	C407.5	Conducts planned experiments and prepare laboratory report in a standard format.
Hospital Pharmacy 408 P	C408.1	Analyze prescriptions for drug interaction.
	C408.2	Develop and prepare parenteral formulations and powders.
	C408.3	Solve inventory analysis.
	C408.4	Solve drug information queries through literature search.
	C408.5	Conduct planned experiments and prepares laboratory report in a standard format.
	C408.6	Produce various preparations used in hospital.
Clinical Pharmacy 409 P	C409.1	Assess prescriptions for drug interaction and answer drug information query.
	C409.2	Perform patient counseling on medication and conduct medication history interview.



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	C409.3	Analyze and interpret the data obtained through laboratory tests.
	C409.4	Conducts planned experiments and prepare laboratory report in a standard format.
Biopharmaceutics & Pharmacokinetics 410 P	C410.1	Compare the in-vitro drug release profile of different marketed products and perform the solubility enhancement techniques for improvement of drug release of poorly water soluble drugs.
	C410.2	Estimate the bioavailability (absolute and relative) and bioequivalence from the given clinical data.
	C410.3	Calculate the drug content in blood sample using Area Under Curve approach and interpret various pharmacokinetic parameters from the given clinical data.
	C410.4	Conducts planned experiments and prepare laboratory report in a standard format.
Pharmacotherapeutics I & II 411 T	C411.1	Explain the etiopathogenesis of selected diseases.
	C411.2	Prepare individualized therapeutic plans based on diagnosis.
	C411.3	Recognize the role of pharmacist in essential and rational drug use.
	C411.4	Explain the general prescribing guidelines and rational use of drugs.
	C411.5	Discuss the therapeutic approach in the management of selected diseases and controversies in drug therapy.
Pharmacotherapeutics I & II 412 P	C412.1	Identify drug interactions and rationalize the prescription.
	C412.2	Discuss the therapeutic approach to management of selected diseases.
	C412.3	Prepare individualized therapeutic plans based on diagnosis.
	C412.4	Conduct patient counseling.
Clinical Research 501 T	C501.1	Discuss the Pharmacological and Toxicological considerations in process of development of new drugs.
	C501.2	Discuss the principles and phases in clinical trial of drug.



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	C501.3	Explain the guidelines for ethics and safe monitoring in clinical trial of a drug.
	C501.4	Design the documents of clinical trial.
	C501.5	Distinguish the guidelines of national and international regulatory bodies for clinical trial.
	C501.6	Recognize differing roles and obligations of the Investigator, Sponsor and Institutional Review Board.
Pharmacoepidemiology and Pharmacoeconomics 502 T	C502.1	Discuss the scope, need, origin and evaluation of Pharmacoepidemiology.
	C502.2	Explain the importance of Measurement of outcomes in Pharmacoepidemiology.
	C502.3	Recommend suitable method for measuring the outcome of Pharmacoepidemiology for a disease.
	C502.4	Suggest an appropriate Pharmacoepidemiological method for a given drug and address the risks associated with Pharmacoepidemiological study.
	C502.5	Discuss the basic principles, role and relevance of Pharmacoeconomics in the development of a new drug.
	C502.6	Identify and justify an appropriate evaluation method for Pharmacoeconomics study of a disease.
Clinical Pharmacokinetics & Pharmacotherapeutic Drug Monitoring 503 T	C503.1	Discuss the pharmacokinetic principles to individualize drug therapy in patient care situations.
	C503.2	Determine dose, dosing intervals and dosage adjustments of a drug for a given patient.
	C503.3	Apply the principles of pharmacokinetics to analyze and predict drug interactions.
	C503.4	Prepare protocol for TDM of drugs for selected diseases.
	C503.5	Discuss the concept of genetic polymorphism in metabolism, transport and target of a drug.



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Course Outcomes (CO's)

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## DEPARTMENT OF PHARMACEUTICAL QUALITY ASSURANCE

SUBJECT NAME & CODE	CODE	COURSE OUTCOMES
Modern Pharmaceutical Analytical Techniques 1101 T	C1101.1	Understand the basic knowledge on assay of single and multiple component pharmaceuticals by using various analytical instruments.
	C1101.2	Develop the theoretical knowledge on various instrumental techniques available for analysis of organic substances by using analytical instruments.
	C1101.3	Improve skills in selecting the suitable techniques for analysis of drugs and pharmaceuticals.
	C1101.4	Interpret spectra of UV-visible, IR, NMR and Mass to identify the given compound.
	C1101.5	Describe the general methods for separation and purification of components from a mixture and their application to pharmaceutical industry.
	C1101.6	Apply the knowledge learnt in developing new procedures of their own design.
Quality Management System 4101 T	C4101.1	Understand the importance of quality.
	C4101.2	Learning about ISO management systems and Tools for quality improvement.
	C4101.3	Analysis of issues in quality.
	C4101.4	Provide comprehensive knowledge Quality evaluation of pharmaceuticals.
	C4101.5	Stability testing of drug and drug substances.
	C4101.6	Statistical approaches for quality.
Quality Control & Quality Assurance 4102 T	C4102.1	Understand the responsibilities of QA & QC departments.
	C4102.2	Explain the cGMP aspects in a pharmaceutical industry.
	C4102.3	Apply the knowledge learnt in quality control tests for pharmaceuticals and containers.
	C4102.4	Appreciate the importance of documentation.
	C4102.5	Develop skills in Manufacturing operations and controls.
Produce Development & Technology Transfer 4103 T	C4103.1	Explain the new product (drug) development process.
	C4103.2	Summarize the concept of Pre-Formulation Studies.



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	C4103.3	Understand the necessary information to transfer technology from R&D to actual manufacturing by sorting out various information obtained during R&D.
	C4103.4	Apply the knowledge learnt in quality control tests for pharmaceutical packaging materials.
	C4103.5	Elucidate necessary information to transfer technology of existing products between various manufacturing places.
Modern Pharmaceutical Analytical Techniques 1105 P	C1105.1	Recall and relate the principle of spectroscopy, chromatography and other commonly used instrumental methods of analysis.
	C1105.2	Train the students and to give hands on training on these sophisticated instruments.
	C1105.3	Perform quantitative & qualitative analysis of drugs using various analytical instruments like UV-visible and IR spectrophotometer and HPLC.
	C1105.4	Plan and select lab experiments using appropriate analytical skills. Evaluate the quantity of a drug in a given formulation.
	C1105.5	Practice them on solving spectral problems and generate a comprehensive analytical report on the findings.
	C1105.6	Interpret spectra of UV-visible, IR, NMR and Mass to identify the given compound.
Quality control & Quality Assurance Lab 4104 P	C4104.1	Explain the TQM, Six-Sigma concepts in a pharmaceutical industry.
	C4104.2	Develop of Stability study protocol.
	C4104.3	Perform in-process and finished product quality control tests for tablets, capsules, parenterals and semisolid dosage forms.
	C4104.4	Carry out pre-formulation study for tablets, parenterals.
	C4104.5	Perform quality control tests for Primary and secondary packaging materials.
	C4104.6	Perform the solubility enhancement techniques for improvement of drug release of poorly water soluble drugs.
Disaster Management C101b	C101b.1	Analyze the vulnerability of an area to natural and man-made disasters/hazards as per the guidelines to solve complex problems using appropriate



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		techniques ensuring safety, environment and sustainability.
	C101b.2	Propose appropriate mitigation strategies for earthquake and tsunami impacts as per code of practice using suitable techniques ensuring safety, environment and sustainability besides communicating effectively in graphical form.
	C101b.3	Analyze the causes and impacts of floods, cyclones and droughts using appropriate tools and techniques and suggest mitigation measures ensuring safety, environment and sustainability besides communicating effectively in graphical form.
	C101b.4	Analyze the causes and impacts of landslides using appropriate tools and techniques and suggest mitigation measures ensuring safety, environment and sustainability.
	C101b.5	Design disaster management strategies to solve pre, during and post disaster problems using appropriate tools and techniques following the relevant guidelines and latest developments ensuring safety, environment and sustainability besides communicating effectively in graphical form
Hazard and safety Management 4201 T	C4201.1	Understand about environmental problems among learners and impart basic knowledge about the environment and its allied problems.
	C4201.2	Develop an attitude of concern for the industry environment.
	C4201.3	Ensure safety standards in pharmaceutical industry.
	C4201.4	Provide comprehensive knowledge on the safety management.
	C4201.5	Empower an idea to clear mechanism and management in different kinds of hazard management system.
	C4201.6	Teach the method of Hazard assessment, procedure, methodology for provide safe industrial atmosphere.
Pharmaceutical Manufacturing Technology 4202 T	C4202.1	The common practice in the pharmaceutical industry developments, plant layout and production planning.



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	C4202.2	Will be familiar with the principles and practices of aseptic process technology.
	C4202.3	Ensure an idea about non-sterile manufacturing technology.
	C4202.4	Provides clear information regarding packaging technology.
	C4202.5	Have a better understanding of principles and implementation of Quality by design (QbD).
	C4202.6	Understand the principles and implementation of process analytical technology (PAT) in pharmaceutical manufacturing.
Pharmaceutical validation 21SO301a	C301a.1	Explain the aspect of Qualification, Validation and Calibration.
	C301a.2	Carryout validation of manufacturing processes and analytical instruments.
	C301a.3	Validate the manufacturing facilities.
	C301a.4	Apply the knowledge of validation to analytical methods.
	C301a.5	Distinguish and Explain various forms of IPRs & apply statutory provisions to protect particular form of IPRs.
Audits and Regulatory Compliance 4203 T	C4203.1	Understand the importance of auditing in pharmaceutical industries.
	C4203.2	Understand the methodology of auditing process of different in pharmaceutical industries.
	C4203.3	Evaluate the bulk pharmaceutical chemicals and manufacturing process of tablets, capsules, sterile products and packaging in pharmaceutical industries.
	C4203.4	Summarize auditing reports for vendor, warehouse, weighing process and manufacturing process in pharmaceutical industries.
	C4203.5	Organize the check list for auditing of HVAC, water, water for Injection systems and ETP.
Pharmaceutical Manufacturing Technology Lab 4204 P	C4204.1	Prepare and evaluate the different types of semisolid dosage forms.
	C4204.2	Compare the results of evaluation tests for different marketed pharmaceutical products.
	C4204.3	Performs the Stability study testing of tablet dosage forms.



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	C4204.4	Implement of Quality by design (QbD) to Product & Procedure Development.
	C4204.5	Design the plant lay-out & Prepare the check list for sterile production area & water for injection.
Pharmaceutical validation 205 P	C4205.1	Perform the validation of analytical methods.
	C4205.2	Validate the manufacturing area & facilities
	C4205.3	Carryout validation of manufacturing and testing equipment's.
	C4205.4	Carryout validation of analytical instruments.
	C4205.5	Prepare the MFR and BMR.
Padagogy Studies 201a	C201a.1	Recognize the theories underlying methodology, searching, and learning.
	C201a.2	Describe the pedagogical approaches of teachers in formal and informal classrooms in developing countries practice.
	C201a.3	Analysis of pedagogical practices effectiveness.
	C201a.4	Describe the teacher's classroom professional development in detail.
	C201a.5	Determine and fill research gaps for future research actions.



**DEPARTMENT OF PHARMACOLOGY**

<b>SUBJECT NAME &amp; CODE</b>	<b>CODE</b>	<b>COURSE OUTCOMES</b>
Modern Pharmaceutical Analytical Techniques 1101 T	C1101.1	Understand the basic knowledge on assay of single and multiple component pharmaceuticals by using various analytical instruments.
	C1101.2	Develop the theoretical knowledge on various instrumental techniques available for analysis of organic substances by using analytical instruments.
	C1101.3	Improve skills in selecting the suitable techniques for analysis of drugs and pharmaceuticals.
	C1101.4	Interpret spectra of UV-visible, IR, NMR and Mass to identify the given compound.
	C1101.5	Describe the general methods for separation and purification of components from a mixture and their application to pharmaceutical industry.
	C1101.6	Apply the knowledge learnt in developing new procedures of their own design.
Advanced Pharmacology - I 1102 T	C1102.1	Discuss the pathophysiology and pharmacotherapy of certain diseases.
	C1102.2	Explain the mechanism of drug actions at cellular and molecular level.
	C1102.3	Understand the adverse effects, contraindications and clinical uses of drugs used in treatment of diseases.
	C1102.4	Study the General aspects and steps involved in neurotransmission.
	C1102.5	Demonstrate the physiological and pathological role of hormones in the human body.
Clinical Pharmacology and Pharmacotherapeutics 1103 T	C1103.1	Understand the pathophysiology of selected disease states and the rationale for drug therapy.
	C1103.2	Outline the importance of preparation of individualized therapeutic plans based on diagnosis.
	C1103.3	Identify the needs to the patient-specific parameters relevant in initiating drug therapy.



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	C1103.4	Study the drug therapy of pediatric, geriatrics and pregnant women's.
	C1103.5	Summarize the therapeutic approach to management of various diseases.
Cellular and Molecular Pharmacology 1104 T	C1104.1	Understand the interaction of cellular components with drugs.
	C1104.2	Describe the receptor signal transduction processes.
	C1104.3	Study of the molecular pathways affected by drugs.
	C1104.4	Explain the applicability of molecular pharmacology and biomarkers in drug discovery process.
	C1104.5	Illustrate molecular biology techniques as applicable for pharmacology.
Modern Pharmaceutical Analytical Techniques 1105 P	C1105.1	Recall and relate the principle of spectroscopy, chromatography and other commonly used instrumental methods of analysis.
	C1105.2	Train the students and to give hands on training on these sophisticated instruments.
	C1105.3	Perform quantitative & qualitative analysis of drugs using various analytical instruments like UV-visible and IR spectrophotometer and HPLC.
	C1105.4	Plan and select lab experiments using appropriate analytical skills. Evaluate the quantity of a drug in a given formulation.
	C1105.5	Practice them on solving spectral problems and generate a comprehensive analytical report on the findings.
	C1105.6	Interpret spectra of UV-visible, IR, NMR and Mass to identity the given compound.
Advanced Pharmacology - I Lab 1106 P	C1106.1	Demonstrate the various routes of drug administration in experimental animals.
	C1106.2	Compute various techniques of blood sampling in experimental animals.
	C1106.3	Employ different bio assay techniques in isolated preparations of experimental animals.
	C1106.4	Practice anaesthetic techniques in experimental animals.
	C1106.5	Operate dose response curve of Ach using



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		isolated ileum/rectus abdominis muscle preparation.
Disaster Management C101b	C101b.1	Analyze the vulnerability of an area to natural and man-made disasters/hazards as per the guidelines to solve complex problems using appropriate techniques ensuring safety, environment and sustainability.
	C101b.2	Propose appropriate mitigation strategies for earthquake and tsunami impacts as per code of practice using suitable techniques ensuring safety, environment and sustainability besides communicating effectively in graphical form.
	C101b.3	Analyze the causes and impacts of floods, cyclones and droughts using appropriate tools and techniques and suggest mitigation measures ensuring safety, environment and sustainability besides communicating effectively in graphical form.
	C101b.4	Analyze the causes and impacts of landslides using appropriate tools and techniques and suggest mitigation measures ensuring safety, environment and sustainability.
	C101b.5	Design disaster management strategies to solve pre, during and post disaster problems using appropriate tools and techniques following the relevant guidelines and latest developments ensuring safety, environment and sustainability besides communicating effectively in graphical form.
Advanced Pharmacology - II 1201 T	C1201.1	Explain the mechanism of drug actions at cellular and molecular level.
	C1201.2	Discuss the Pathophysiology and pharmacotherapy of certain diseases.
	C1201.3	Understand the adverse effects, contraindications and clinical uses of drugs used in treatment of diseases.
	C1201.4	Understand the chemotherapystrategies of various diseases in the human body.
	C1201.5	Demonstrate the free radical pharmacology in the treatment of diseases.



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Pharmacological Screening Methods & Toxicology 1202 T	C1202.1	Describe the regulations and ethical requirement for the usage of experimental animals.
	C1202.2	Describe the various animals used in the drug discovery process and good laboratory.
	C1202.3	Reproduce the practices in maintenance and handling of experimental animals.
	C1202.4	Describe the various newer screening methods involved in the drug discovery process.
	C1202.5	Compare and correlate the preclinical data to humans.
Principles of Drug Discovery 1203 T	C1203.1	Explain the various stages of drug discovery.
	C1203.2	Summarize the importance of the role of genomics, proteomics and bioinformatics in drug discovery.
	C1203.3	Describe various targets for drug discovery.
	C1203.4	Explain various lead seeking method and lead optimization.
	C1203.5	Memorize the importance of the role of computer aided drug design in drug discovery.
Clinical research and Pharmacovigilance 1204 T	C1204.1	Understand the regulatory requirements for conducting clinical trial.
	C1204.2	Describe the types of clinical trial designs.
	C1204.3	Discuss the responsibilities of key players involved in clinical trials.
	C1204.4	Explain the principles of Pharmacovigilance.
	C1204.5	Detect new adverse drug reactions and their assessment.
Advanced Pharmacology - II Lab 1205 P	C1205.1	Isolation and identification of DNA from various sources like Bacteria, Cauliflower, onion and Goat liver.
	C1205.2	Analysis of enzyme based <i>in-vitro</i> assays.
	C1205.3	Examine DNA fragmentation assay by agarose gel electrophoresis.
	C1205.4	Identify Enzyme inhibition and induction activity using virtual software's.
Pharmacological Screening Methods and Toxicology Lab 1206 P	C1206.1	Recall the various newer screening methods involved in the drug discovery process.
	C1206.2	Identify and correlate the preclinical data to



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		humans.
	C1206.3	Identify the regulations and ethical requirement for the usage of experimental animals.
	C1206.4	List the various animals used in the drug discovery process and good laboratory.
	C1206.5	Demonstrate the practices in maintenance and handling of experimental animals.
Padagogy Studies 201a	C201a.1	Recognize the theories underlying methodology, searching, and learning.
	C201a.2	Describe the pedagogical approaches of teachers in formal and informal classrooms in developing countries practice.
	C201a.3	Analysis of pedagogical practices effectiveness.
	C201a.4	Describe the teacher's classroom professional development in detail.
	C201a.5	Determine and fill research gaps for future research actions.
Research Methodology and Intellectual Property Rights 21DRM101	CM101.1	Understand Research Problem formulation.
	CM101.2	Analyze research Related information.
	CM101.3	Follow research ethics.
	CM101.4	Understand that today's world is controlled by computer, Information technology, but tomorrow world will be ruled by ideas, concept, and creativity.
	CM101.5	Understand that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
	CM101.6	Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.



**DEPARTMENT OF PHARMACEUTICS**

SUBJECT NAME & CODE	CODE	COURSE OUTCOMES
Modern Pharmaceutical Analytical Techniques 1101 T	C1101.1	Understand the basic knowledge on assay of single and multiple component pharmaceuticals by using various analytical instruments.
	C1101.2	Develop the theoretical knowledge on various instrumental techniques available for analysis of organic substances by using analytical instruments.
	C1101.3	Improve skills in selecting the suitable techniques for analysis of drugs and pharmaceuticals.
	C1101.4	Interpret spectra of UV-visible, IR, NMR and Mass to identify the given compound.
	C1101.5	Describe the general methods for separation and purification of components from a mixture and their application to pharmaceutical industry.
	C1101.6	Apply the knowledge learnt in developing new procedures of their own design.
Advanced Physical Pharmaceutics 3101 T	C3101.1	Describe the particle size analysis method, solid dispersion, physics of tablets, polymer classification and its applications.
	C3101.2	Explain the stability calculations, shelf life calculations and accelerated stability studies.
	C3101.3	Explain the rheology, absorption related to liquids and semi-solid dosage forms.
	C3101.4	State the factors affecting the dissolution and solubility in related to <i>in-vitro/in-vivo</i> correlations.
Modern Pharmaceutics - I 3102 T	C3102.1	Explain the Preformulation parameters, apply ICH guidelines and evaluate drug, drug excipients compatibility.
	C3102.2	Explain about formulation and development, use of excipients in various solid dosage form.
	C3102.3	Describe the tablets, powders, micro-encapsules and coating techniques.
	C3102.4	Describe the capsules, advances in capsule manufacture, machines, processing and control including pharmaceutical aspects.
	C3102.5	Apply the statistical design in different



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		formulations.
Advanced Biopharmaceutics & Pharmacokinetics 3103 T	C3103.1	Understand the various factors affecting drug absorption and apply the various regulations related to developing the BA-BE study protocol for the new drug molecule.
	C3103.2	Determine the various pharmacokinetic parameters from either plasma concentration or urinary excretion data of the drug following one and multi compartment models.
	C3103.3	Determine the various pharmacokinetic parameters of a drug after oral administration.
	C3103.4	Summarize the concept of non-linear and clinical pharmacokinetics and their significance.
	C3103.5	Understand the various causes of the pharmacokinetics and drug interactions.
Modern Pharmaceutical Analytical Techniques 1105 P	C1105.1	Recall and relate the principle of spectroscopy, chromatography and other commonly used instrumental methods of analysis.
	C1105.2	Train the students and to give hands on training on these sophisticated instruments.
	C1105.3	Perform quantitative & qualitative analysis of drugs using various analytical instruments like UV-visible and IR spectrophotometer and HPLC.
	C1105.4	Plan and select lab experiments using appropriate analytical skills. Evaluate the quantity of a drug in a given formulation.
	C1105.5	Practice them on solving spectral problems and generate a comprehensive analytical report on the findings.
	C1105.6	Interpret spectra of UV-visible, IR, NMR and Mass to identify the given compound.
Modern Pharmaceutics - I 3104 P	C3104.1	Perform Preformulation studies for development of various dosage forms.
	C3104.2	Perform the effect of compressional force on tablet disintegration time.
	C3104.3	Perform the effect of particle size and binders on dissolution of tablets.
	C3104.4	Compare the dissolution efficiency of various marketed pharmaceutical products.
	C3104.5	Perform the Accelerated stability testing of different tablets.



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	C3104.6	Determine the beta cyclodextrin complexes of new drugs and rate order constants.
Disaster Management C101b	C101b.1	Analyze the vulnerability of an area to natural and man-made disasters/hazards as per the guidelines to solve complex problems using appropriate techniques ensuring safety, environment and sustainability.
	C101b.2	Propose appropriate mitigation strategies for earthquake and tsunami impacts as per code of practice using suitable techniques ensuring safety, environment and sustainability besides communicating effectively in graphical form.
	C101b.3	Analyze the causes and impacts of floods, cyclones and droughts using appropriate tools and techniques and suggest mitigation measures ensuring safety, environment and sustainability besides communicating effectively in graphical form.
	C101b.4	Analyze the causes and impacts of landslides using appropriate tools and techniques and suggest mitigation measures ensuring safety, environment and sustainability.
	C101b.5	Design disaster management strategies to solve pre, during and post disaster problems using appropriate tools and techniques following the relevant guidelines and latest developments ensuring safety, environment and sustainability besides communicating effectively in graphical form.
Modern Pharmaceutics - II 3201 T	C3201.1	Understand the planning of pilot plant techniques used for all pharmaceutical dosage forms such as tablets, capsules, parenterals, aerosols, cosmetics and neutraceuticals.
	C3201.2	Describe the formulation development of parenteral dosage forms.
	C3201.3	Outline the principles and formulation aspects of various aerosol dosage forms.
	C3201.4	Explain the principles and formulation aspects of cosmetics and neutraceuticals.
	C3201.5	Understand the concept of aseptic processing and HVAC system.
Advanced Drug Delivery	C3202.1	Explain fundamentals of controlled drug delivery



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System 3202 T		system.
	C3202.2	Describe design, fabrication, evaluation and applications of controlled drug delivery system.
	C3202.3	Summarize on transdermal drug delivery system, ocular drug delivery system.
	C3202.4	Explain bioadhesive drug delivery system and nasal drug delivery system.
	C3202.5	Explain on vaccine delivery for immunization.
	C3202.6	Generalize on liposomes, niosomes, microspheres and nanoparticles.
Industrial Pharmacy 3203 T	C3203.1	Explain the machinery involved in mixing, milling, filtration and drying.
	C3203.2	Describe packaging material constructions used in the production of pharmaceutical materials.
	C3203.3	Represent the salient features of GMP, TQM applicable in industry.
	C3203.4	Explain the effluent treatment and prevention of pollution.
	C3203.5	Evaluate the validation of analytical methods and processes.
Nano Drug Delivery System 3204 T	C3204.1	Identify the right material for the nanoformulations.
	C3204.2	Apply the knowledge to develop nano formulations with appropriate technologies.
	C3204.3	Evaluate the product related test and for identified diseases.
	C3204.4	Understand the toxicological aspects of nanosized surfaces, particle size and stability for release of drugs.
Modern Pharmaceutics - II 3205 P	C3205.1	Develop and evaluate mouth washes, cold cream, vanishing cream, calamine lotion, foundation creams and cleansing creams.
	C3205.2	Design and evaluate antiseptic cream, Film coated tablets, floating, fast dissolving and chewable tablets.
	C3205.3	Illustrate the effect of surfactants on drug release.
	C3205.4	Develop and evaluate oral rehydration solution, calcium carbonate tablets
Advanced Drug Delivery	C3206.1	Develop formulation and evaluate sustained



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System 3206 P		release oral matrix tablets.
	C3206.2	Develop formulation and evaluate microspheres.
	C3206.3	Develop formulation and evaluate transdermal films.
	C3206.4	Develop formulation and evaluate mucoadhesive system.
	C3206.5	Develop formulation and evaluate enteric coated tablets.
Padagogy Studies 201a	C201a.1	Recognize the theories underlying methodology, searching and learning.
	C201a.2	Describe the pedagogical approaches of teachers in formal and informal classrooms in developing countries practice.
	C201a.3	Analysis of pedagogical practices effectiveness.
	C201a.4	Describe the teacher's classroom professional development in detail.
	C201a.5	Determine and fill research gaps for future research actions.
Research Methodology and Intellectual Property Rights 21DRM101	CM101.1	Understand Research Problem formulation.
	CM101.2	Analyze research Related information.
	CM101.3	Follow research ethics.
	CM101.4	Understand that today's world is controlled by computer, Information technology, but tomorrow world will be ruled by ideas, concept, and creativity.
	CM101.5	Understand that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
	CM101.6	Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.



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## DEPARTMENT OF PHARMACEUTICAL CHEMISTRY

SUBJECT NAME & CODE	CODE	COURSE OUTCOMES
Modern Pharmaceutical Analytical Techniques 1101 T	C1101.1	Understand the basic knowledge on assay of single and multiple component pharmaceuticals by using various analytical instruments.
	C1101.2	Develop the theoretical knowledge on various instrumental techniques available for analysis of organic substances by using analytical instruments.
	C1101.3	Improve skills in selecting the suitable techniques for analysis of drugs and pharmaceuticals.
	C1101.4	Interpret spectra of UV-visible, IR, NMR and Mass to identify the given compound.
	C1101.5	Describe the general methods for separation and purification of components from a mixture and their application to pharmaceutical industry.
	C1101.6	Apply the knowledge learnt in developing new procedures of their own design.
Advanced Organic Chemistry - I 2101 T	C2101.1	Apply the knowledge learnt in asymmetric synthesis.
	C2101.2	Understand the concepts of aromaticity and reaction intermediates.
	C2101.3	Gain detailed knowledge regarding the reactions, mechanisms and their relative reactivity
	C2101.4	Learn mechanism of electrocyclic and pericyclic reactions.
	C2101.5	Enhances the knowledge on various reactions and synthetic applications.
Advanced Medicinal Chemistry - I 2102 T	C2102.1	Application of basic knowledge of pharmaceutical chemical aspects of drugs that are in clinical use in defining, analyzing and proposing actions related to the research and implementation of new laboratory methods for detecting and monitoring diseases and effects or efficacy of the therapy.
	C2102.2	Learn the discovery of lead molecules and rational drug discovery models.
	C2102.3	Development of enzyme inhibitors.
	C2102.4	Provide insight knowledge on prodrug design and analog design.
	C2102.5	Gain advanced knowledge on enzyme inhibitors.



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Chemistry of Natural Products 2103 T	C2103.1	Learn to explore the natural lead compounds for the treatment of diseases like cancer.
	C2103.2	Understand various principles of extraction methods and factors influencing the choice of extraction.
	C2103.3	Describe the extraction of plant drugs by microwave assisted synthesis, their merits and demerits.
	C2103.4	Gain advanced knowledge on importance and structural elucidation of steroids, terpenoids and antibiotics.
	C2103.5	Determination of structure of amino acids, peptides, proteins, alkaloids and purines.
	C2103.6	Summary of natural pigments and plant hormones.
Modern Pharmaceutical Analytical Techniques 1105 P	C1105.1	Recall and relate the principle of spectroscopy, chromatography and other commonly used instrumental methods of analysis.
	C1105.2	Train the students and to give hands on training on these sophisticated instruments.
	C1105.3	Perform quantitative & qualitative analysis of drugs using various analytical instruments like UV-visible and IR spectrophotometer and HPLC.
	C1105.4	Plan and select lab experiments using appropriate analytical skills. Evaluate the quantity of a drug in a given formulation.
	C1105.5	Practice them on solving spectral problems and generate a comprehensive analytical report on the findings.
	C1105.6	Interpret spectra of UV-visible, IR, NMR and Mass to identify the given compound.
Advanced Medicinal Chemistry - I 2104 P	C2104.1	Learn advanced techniques for synthesis of various classes of drugs.
	C2104.2	Learn Synthesis of CVS drugs.
	C2104.3	Perform the isolation of various plant products.
	C2104.4	Characterization of various plant products by IR, NMR and Mass.
	C2104.5	Identification of degraded intermediates by microTLC.
Disaster Management	C101b.1	Analyze the vulnerability of an area to natural and



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Course Outcomes (CO's)

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C101b		man-made disasters/hazards as per the guidelines to solve complex problems using appropriate techniques ensuring safety, environment and sustainability.
	C101b.2	Propose appropriate mitigation strategies for earthquake and tsunami impacts as per code of practice using suitable techniques ensuring safety, environment and sustainability besides communicating effectively in graphical form.
	C101b.3	Analyze the causes and impacts of floods, cyclones and droughts using appropriate tools and techniques and suggest mitigation measures ensuring safety, environment and sustainability besides communicating effectively in graphical form.
	C101b.4	Analyze the causes and impacts of landslides using appropriate tools and techniques and suggest mitigation measures ensuring safety, environment and sustainability.
	C101b.5	Design disaster management strategies to solve pre, during and post disaster problems using appropriate tools and techniques following the relevant guidelines and latest developments ensuring safety, environment and sustainability besides communicating effectively in graphical form.
Advanced Organic Chemistry - II 2201 T	C2201.1	Memorize the applications of synthetic reagents.
	C2201.2	Understand various types of catalysis like homogenous catalysis and heterogeneous catalysis.
	C2201.3	Understand molecular arrangements and their applications.
	C2201.4	Gain the sound knowledge on chemistry of peptides.
	C2201.5	Learn the principles of green chemistry.
Advanced Medicinal Chemistry - II 2202 T	C2202.1	Understand the basic knowledge of pharmaceutical-chemical aspects of drugs that are in clinical use.
	C2202.2	Detailed knowledge on enzyme inhibitors.
	C2202.3	Gain advanced knowledge on enzyme inhibitors
	C2202.4	Understand role of receptors and their pharmacokinetics.



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	C2202.5	Summarize the therapeutic values of peptidomimetics and design of peptidomimetics.
Computer Aided Drug Design 2203 T	C2203.1	Understand Role of CADD in drug discovery.
	C2203.2	Learn Different CADD techniques and their applications.
	C2203.3	Apply various strategies to design and develop new drug like molecules.
	C2203.4	Working with molecular modeling software's to design new drug molecules.
	C2203.5	Illustrate the <i>insilico</i> virtual screening protocols, pharmacophore modeling and mapping.
Pharmaceutical Process Chemistry 2204 T	C2204.1	Understand various strategies of scale up process of APIs and intermediates.
	C2204.2	Summarize unit operations like extraction, filtration and crystallization.
	C2204.3	Learn kinetics and mechanism of nitration, halogenation and oxidation.
	C2204.4	Analysis of case studies on industrial reduction process.
	C2204.5	Differentiate Aerobic and Anaerobic fermentation.
	C2204.6	Understand the industrial safety process chemistry.
Advanced Organic Chemistry - II 2205 P	C2205.1	Analysis of pharmacopoeial compounds and their formulations by UV Vis Spectrophotometer.
	C2205.2	Understand principles of spectroscopy in determination of organic compound.
	C2205.3	Understand structural elucidation of organic and natural compounds by IR and UV spectral data.
	C2205.4	Apply principles of melting point, boiling point and chromatographic techniques in identification of organic compound.
	C2205.5	Analyze various functional groups of organic compounds.
Advanced Medicinal Chemistry - II 2206 P	C2206.1	Understand basic principles involved in Synthesis of active pharmaceutical ingredients and reaction intermediates.
	C2206.2	Evaluation of log P, MR, hydrogen bond donors and acceptors of selected drugs using software's.
	C2206.3	Compute with molecular modeling software's to design new drug molecules.



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	C2206.4	Summarize 2D and 3D QSAR studies.
	C2206.5	Understand concept of virtual and docking based experiments.
	C2206.6	Calculation of ADMET properties of drug molecules.
Padagogy Studies 201a	C201a.1	Recognize the theories underlying methodology, searching, and learning.
	C201a.2	Describe the pedagogical approaches of teachers in formal and informal classrooms in developing countries practice.
	C201a.3	Analysis of pedagogical practices effectiveness.
	C201a.4	Describe the teacher's classroom professional development in detail.
	C201a.5	Determine and fill research gaps for future research actions.
Research Methodology and Intellectual Property Rights 21DRM101	CM101.1	Understand Research Problem formulation.
	CM101.2	Analyze research Related information.
	CM101.3	Follow research ethics.
	CM101.4	Understand that today's world is controlled by computer, Information technology, but tomorrow world will be ruled by ideas, concept, and creativity.
	CM101.5	Understand that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
	CM101.6	Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.