PSG COLLEGE OF PHARMACY

2.6.1. COURSE OUTCOME

Course outcome for B Pharm (Nonsemester)

Course Code	Name of the Course & Course outcome	
1.1	**Pharmaceutical Inorganic Chemistry**	
	CO1	Basic knowledge on chemistry periodic table ,Pharmacopoeia, Monographs and Preparation different strength of solutions
	CO2	Know about Quality control test , sources of impurities, Limit test.
	CO3	Radio activity and its measurement Properties of α, β and γ rays -Half life-Precaution and storage Pharmaceutical applications.
	CO4	Method of preparation, assay, identification test and uses of inorganic compounds
	CO5	Theory of co-ordination compounds and its application in pharmacy
1.2	**Pharmaceutical Organic Chemistry**	
	CO1	Graduates will acquire an adequate knowledge in nomenclature, structure, preparation, isomerism and physical properties of certain important classes of organic compounds which imparts a foundation for the future study of various medicinal compounds.
	CO2	Benzene structure, Chemistry Resonance Huckel's rule, Electrophilic and nucleophilic aromatic substitution Reactivity Orientation Stability. This will result in students developing correct strategies for drug synthesis involving aromatic systems.
	CO3	The mode of quality control procedures and applications of numerous medicinal agents help to adapt the students to focus on purity parameters pertaining to the drugs of choice.
	CO4	Mechanisms for (SN_1 &SN_2, E_1 & E_2) reactivity orientation and stability of the compounds generating newer products and intermediates can be correlated with novel drug design and development in future.
	CO5	The practical knowledge from the laboratory synthesis of medicinal organic molecules and their qualitative organic analysis helps to interpret and arrive to valid conclusions about the organic samples.
1.3	**Anatomy, Physiology and Health Education**	
	CO1	Knowing the basic terminologies and terms in anatomy, physiology & health education Understanding the cyto-morphology, functions, transport, conduction mechanism and electrical stimulation
	CO2	Able to explain the tissue level structure, bones, hematological, lymph, cardiovascularsystem, GIT struture and functions, Lung physiology and ductless glands and its disorders.
	CO3	Gain knowledge and awareness on renal parameters and its functions and gain basic functions, principle of conduction of the brain and its accessory structures.
	CO4	Able to explain the voluntary and involuntary actions, receptors, neurotransmitters

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		and its functions of ANS,Understanding and explain the functions of eye, ear, nose, tongue and skin and reproductive system.
	CO5	Gaining basic knowledge on health and hygiene, basic concepts of food and related diseases, basic concepts of disease and its management, first aid and life saving measures and birth control techniques and preventive measures
1.4	**Bio-chemistry**	
	CO1	To understand the bioenergetics value for all biochemical compounds
	CO2	To understand the metabolism of biomolecules in physiological and pathological conditions
	CO3	To understand the biochemical role of hormones in human physiology
	CO4	To understand the genetic organization of mammalian genome & functions of DNA in synthesis of proteins
	CO5	To study about mineral metabolism and nutritive values of biomolecules
1.5	**Biostatistics and Computer Applications**	
	CO1	know the various types of application of computers in pharmacy
	CO2	2. know the various types of databases
	CO3	3. know the various applications of databases in pharmacy
2.1	**Physical Pharmaceutics**	
	CO1	understand the basic concepts diffusion, dissolution and surface properties of ingredients in the designing the dosage forms
	CO2	know the various basic and bulk properties of powder and liquids in manufacturing of pharmaceutical products
	CO3	able to use the principles of chemical kinetics for stability testing and determination of expiry date of formulations
	CO4	understand the application of pH, buffer, isotonic solution, complexation in pharmaceutical sciences
	CO5	able to use the physicochemical properties in the formulation development
2.2	**Pharmaceutical Analysis and Physical Chemistry**	
	CO1	Importance of quality control, computation of analytical results, learns to predict the sources of errors and know to perform calibration of apparatus
	CO2	Understand concepts of titrations and perform different titrations such as acid base, precipitation titration and estimation of metal ions
	CO3	Know about determining the concentration of analyte by causing a redox reaction, quantitative determination of analytes using gravimetric analysis and estimation of gases, lipids
	CO4	Gain basic knowledge about types of solutions, properties, Laws of thermodynamics, and thermochemistry.

	CO5	Able to understand the principle behind adsorption, catalyst, rate of chemical reaction and know about polarimetry, refractometry and its applications.
2.3	**Advanced Pharmaceutical Organic Chemistry**	
	CO1	To obtain knowledge on stereo chemical aspects of organic compounds
	CO2	To emphasize and learn the important named reactions along with mechanism
	CO3	To develop sufficient knowledge in synthesis and chemistry of important heterocyclic compounds
	CO4	To understand the medicinal uses & other applications of natural products
	CO5	To understand the methods of preparation , chemistry and SAR of Natural products
2.4	**Pharmaceutical Technology**	
	CO1	To learn the materials used in pharmaceutical plant construction including glass, SS, along with its composition and corrosion, humidification and dehumidification control with its measurements & Industrial hazards and its safety measures for its prevention
	CO2	Ability to understand the relationship between pressure and fluid flow and its measurements. Understand various mechanisms of size reduction and separation based on size, shape and density
	CO3	To learn the operations of filtration and centrifugation process of pharmaceutical products along with utilizing equipments. Understand its application in preparing sterile dosage forms. The crystal developing process and its characters.
	CO4	Basic understanding of mechanism of heat transfer. Ability to understand the operation and principles of various evaporators and distillation. Understand the separation of compounds based on difference in boiling point
	CO5	Understand the significance of drying in pharmaceutical product. Ability to understand the operation and principles of drying units. Application of mixing in solid & liquid dosage forms such as tablet, capsules, and syrups.
2.5	**Pharmacy Practice and Pathophysiology**	
	CO1	Identify and handle the prescription. Determine the factors affecting dose of a drug and work out various calculations related to dispensing.
	CO2	Distinguish, prepare & dispense prescriptions containing various types of dosage forms. Identify & rectify the incompatibilities found in the prescription.
	CO3	Establish the professional ethics and their role in the development of community health care & education. Gain knowledge on various surgical supplies.
	CO4	Explain comprehensively the basic mechanisms involved in cell injury, repair & adaptation.
	CO5	Elaborate the molecular mechanism involved in the pathophysiology of communicable & non-communicable diseases.

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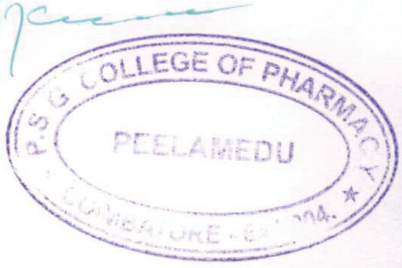
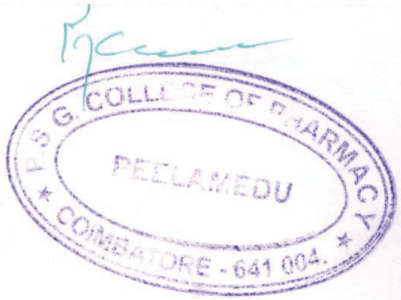
3.1	**Pharmacognosy and Phyto chemistry**	
	CO1	To know the introduction on pharmacognosy and its classification based on different category of source of crude drugs. Quality control techniques involved in detection of adulterants of herbal drugs as per regulatory guideline
	CO2	To know the techniques in the cultivation, collection process and its factors affecting the production of crude drugs along with natural pesticides
	CO3	To know the sources, macro & micro diagnostic characters, phytochemical nature, therapeutic / commercial utilization of primary phytoconstituents present in various crude drugs
	CO4	To know the sources, macro & micro diagnostic characters, phytochemical nature, therapeutic /commercial utilization of secondary phytoconstituents present in various crude drugs
	CO5	To know the sources, diagnostic characters, phytochemical nature, therapeutic /commercial utilization of pharmaceutical aids such as mineral origin and fibres.
3.2	**Medical Chemistry – I**	
	CO1	CO1: Basic understanding of factors involved in Drug Distribution and transport and the molecular and chemical properties affecting them.
	CO2	CO2: Understanding of the ANS and the workings of the Sympathetic nervous system and their use in Cardiovascular and bronchial ailments and the principles involved in them. Also, the relationship of structure to activity
	CO3	CO3: Understanding of the ANS and the workings of the Parasympathetic nervous system and their use in Cardiovascular and bronchial ailments and the principles involved in them.Also, the relationship of structure to activity
	CO4	CO4: Understanding of the CNS and the various mental ailments of pyschosis and depression and the various drugs used in treating them and the logic behind using them. Also, the relationship of structure to activity.
	CO5	CO5: Understanding of the CNS and the conditions epilepsy and anesthesia and the various drugs deployed in this regard and the logic behind using them. The study of inflammatory pathways and various agents used to counter inflammation. Also, the relationship of structure to activity.
3.3	**Pharmaceutical Dosage Forms and Cosmetic Technology**	
	CO1	Knowledge on drugs formulation and evaluation of liquids for internal & external as well as topical semisolid formulations.
	CO2	Knowledge about evaluation and design of dosage form for body cavities and preparation of blood products.

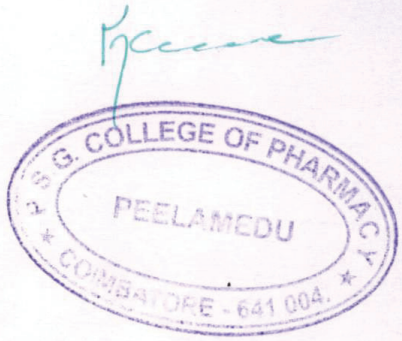
	CO3	Idea on how to select packaging material according to norms and knowledge on cosmetics formulation as well as evaluation.
	CO4	Knowledge on formulation, plant design and evaluation of sterile dosage forms, and Pharmaceutical GMP, QA.
	CO5	
3.4	**Pharmacology – I**	
	CO1	The students will be capable of explaining the basics of pharmacology like drug, agonists & antagonists, pharmacokinetics & dynamics, receptors & its families, routes of drug administration, bioassays, and basic clinical pharmacokinetics.
	CO2	The students will understand the sympathetic and parasympathetic divisions of ANS, various receptors, neurotransmitters in the ANS and pharmacology of drugs acting in it and local anesthetics.
	CO3	The students will understand the various CNS diseases and the pharmacology of drugs acting on central nervous system like sedative & hypnotics, anticonvulsants, general anesthetics psychopharmacological agents etc.
	CO4	The students will know the pharmacological management of various cardiovascular disorders like hypertension, angina, arrhythmia and therapy of shock etc.
	CO5	The students will understand the fluid and electrolyte balance and pharmacology of diuretics & anti-diuretics and drugs acting on reparatory tract like bronchodilators, expectorants, anti-tussives etc.
3.5	**Hospital and Clinical Pharmacy**	
	CO1	Knowledge in hospital, hospital pharmacy, committees & the policies of hospital
	CO2	To know the purchase& distribution of pharmaceuticals, management of central sterile supply department and Radiopharmaceuticals
	CO3	Knowledge in answering drug information query, drug related problems& Patient medication counseling
	CO4	Understand the ethics in clinical research and knowledge in clinical trials
	CO5	Knowledge in Therapeutic drug monitoring of specific drugs for dosage individualization
3.6	**Pharmaceutical Biotechnology**	
	CO1	Understand the importance of microorganisms, able to cultivate, identify and preserve microorganism.
	CO2	Apply the knowledge of sterilization and disinfection process in pharmaceutical industry.
	CO3	Understand the immune mechanism and employ it for the production of immunological products
	CO4	Apply the genetic engineering knowledge for the production of rDNA products
	CO5	Sketch various process involved in the fermentation technology and apply them in the production of pharmaceutical products
4.1	**Formulative Pharmacy and Bio-Pharmaceutics**	
	CO1	able to use the concepts of preformulation and stabilty testing in



		development of pharmaceutical dosage forms
	CO2	know the various excipients and manufacturing techniques used in solid dosage forms
	CO3	know various manufacturing techniques of capsules and encapsulation of drugs
	CO4	understand various approaches for development of novel drug delivery systems.
	CO5	able to use the basic concepts of biopharmaceutics and pharmacokinetics
4.2	**Advanced Pharmacognosy**	
	CO1	To learn the biogenesis, laboratory and industrial isolation, identification and PTC techniques of secondary metabolites
	CO2	To learn the traditional system of medicine, the formulations belongs to the system and standardization techniques
	CO3	To know the enzymes of natural origin, isolation, allergens, teratogenic plants and traditional drugs
	CO4	To know the preparation of tinctures, herbal syrups and other herbal formulations along with WHO guidelines for the assessment of herbal medicines
	CO5	To learn the biosynthesis of antibiotics and antivirals of natural origin and its specific utilization
4.3	**Pharmacology-II**	
	CO1	Apply the basic pharmacological knowledge in the prevention and treatment of various diseases in different categories of drugs.
	CO2	Appreciate the correlation of pharmacology with other biomedical sciences.
	CO3	Demonstrate the isolation of different organs/tissues from the laboratory animals by simulated experiments and demonstrate the various receptor actions using isolated tissue preparation
	CO4	Explain the mechanism of drug action at the organ system / subcellular/ macromolecular levels.
	CO5	Understand the basic concepts, pre-clinical trials, design of clinical trials phases of clinical trials and new drug discovery process.
4.4	**Modern methods of Pharmaceutical Analysis**	
	CO1	Understand the interaction of matter with electromagnetic radiations and its applications in drug analysis using various analytical instruments
	CO2	Develops ability to involve in the quantitative & qualitative chromatographic separation and analysis of drugs
	CO3	It facilitates the students to perform the voltametric titration of drugs using different instruments
	CO4	Understand the principles of Nmr, Mass, X Ray Techniques and assays
	CO5	Able to do the calibration and validation of instruments and understand the importance of documentation
4.5	**Medicinal Chemistry-II**	
	CO1	To Gain the Knowledge about Principles of Drug Design through QSAR, CADD & Molecular Modeling



	CO2	To Learn The Classification, Mechanism Of Action, Synthesis & Other Medicinal Chemistry Properties Of Drugs Against Virus, Bacteria, Parasites And Cancer Cells.
	CO3	To develop required knowledge about drugs acting on CVS & blood vessels
	CO4	To understand biological actions & uses of hormones & steroidal related drugs
	CO5	To learn about different diagnostic reagents & combinatorial chemistry
4.6	**Pharmaceutical Jurisprudence and Pharmacy Business Management**	
	CO1	They should know about the scope, role of pharmacist in drug treatment, drug usage. Pharmacist as a member of health care team.
	CO2	The Pharmaceutical legislations and their implications of pharmaceutical education in India and its present status. The code of ethics and legal responsibilities of Pharmacy professional practice.
	CO3	The regulatory authorities and agencies governing for import, manufacture, sales, and analysis of drugs. Administration of the Act, schedules, labeling & packing guidelines. Constitution and function of TNPC, PCI & ER. Detailed study and function of Excise duties act, Dangerous drug act, Advertisement act and MTP act. The members & functioning of IAEC and CPCSEA guidelines. DPCO for price fixing and NLEM. Patents, procedure for patent application and IPR
	CO4	Principle and concept of Management. Identification of key points to give maximum thrust for development of marketing
	CO5	Functions and evaluation of pharmaceutical marketing to improve the salesmanship.



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2.6.1. COURSE OUTCOME

Course outcome for B Pharm (Semester)

Course code	name of the subject and course outcome
BP101T	**Human Anatomy and Physiology 1**
CO1	Should understand the gross morphology, structure and functions of various organs of the human body.
CO2	Should understand various homeostatic mechanisms and their imbalances.
CO3	Should identify the various tissues and organs of different systems of human body.
CO4	Perform the various experiments related to special senses and nervous system.
CO5	Should understand the coordinated working pattern of different organs of each system
BP102T	**Pharmaceutical Analysis 1**
CO1	Appreciable knowledge will be gained by the students in the analytical techniques, learn about buffers, preparation of different strength of solutions. It facilitates the students to predict the sources of errors, know about sources of impurities in medicinal agent and its determination according to Pharmacopoeias.
CO2	Learning this subject content will develop the ideas with the fundamental chemistry of indicator and aqueous, non aqueous acid base titrations.
CO3	Understand and perform estimation of metal ions, primary aromatic amines and quantitative determination of analytes.
CO4	Know about determining the concentration of analyte by causing a redox reaction and its applications
CO5	It peculates the basic knowledge in the principles of electrochemical analytical techniques
BP103T	**Pharmaceutics 1**
CO1	Fundamental knowledge about development of pharmacy profession, pharmacopoeia and various types of dosage form and garner skills to interpret the Physician's prescription and designing of dose.
CO2	Understand the basic concepts in fundamental pharmaceutical calculation and their application in designing of dosage forms and to develop powder dosage forms.
CO3	Ability to classify different liquid dosage forms and develop formulation skills to design stable liquid dosage forms.
CO4	Acquire knowledge to classify different suppositories dosage forms and apply principles of pharmaceutical science in formulation and understand the significant incompatibilities that influence the stability of dosage forms.
CO5	Classify different semisolid dosage forms and apply principles of pharmaceutical science in formulation and dispensing
BP104T	**Pharmaceutical Inorganic chemistry**
CO1	Know the source of impurities and determine impurities in inorganic compounds.
CO2	Theory about buffer, isotonicity, methods adjusts isotonicity. Able to prepare buffer solution,- Function , therapy and acid base balance- Electrolytes, ORS- Dental product and its treatments.

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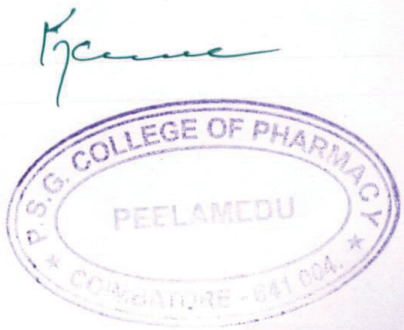
CO3	Preparation and property and assay of inorganic compounds.
CO4	Preparation, uses, assay of miscellaneous compounds.
CO5	Radio activity and its measurement Properties of α, β and γ rays -Half life-Precaution and storage Pharmaceutical applications.
BP105T	**Communication skills (NU)**
CO1	Understand the behavioral needs for a Pharmacist to function effectively in the areas of pharmaceutical operation
CO2	Communicate effectively (Verbal and Non Verbal)
CO3	Effectivelymanage the team as a team player
CO4	Develop interview skills
CO5	Develop Leadership qualities and essentials
BP106T	**Remedial Biology (NU)**
CO1	Know the classification and salient features of five kingdoms of life
CO2	Understand the basic components of anatomy & physiology of plant
CO3	Know understand the basic components of anatomy & physiology animal with Special reference to human
BP106T	**Remedial Mathamedics (NU)**
CO1	1. Know the theory and their application in Pharmacy
CO2	2. Solve the different types of problems by applying theory
CO3	3. Appreciate the important application of mathematics in Pharmacy
BP107P	**HAP 1 - Practical**
CO1	1. Identify various tissues and explain its morphological structure and functions
CO2	2. Enumerate their own RBC, WBC count(s)
CO3	3. Determine their own blood group, bleeding & clotting time
CO4	4. Identify the bones and types of joints
CO5	5. Determination of heart rate & pulse rate, blood pressure
	6. Determination of erythrocyte sedimentation rate and its significance
BP108P	**Pharmaceutical Analysis 1- Practical**
CO1	Well acquainted with the principles and adjudge the level of specific impurities in the given inorganic compounds by performing different limit tests.
CO2	Learn the expression of various concentrations and able to prepare and standardize solutions
CO3	Determine percentage purity of given pharmaceutical drugs by titrimetric analysis.
CO4	Understand the principles of volumetric and electro chemical analysis, carryout various volumetric and electrochemical titrations and develop analytical skills.
CO5	
BP109P	**Pharmaceutics 1 - Practical**



CO1	Knowledge on basic calculation on formulating dose as per patients requirements
CO2	Specific formulating skills of making of powder dosage forms and analytical as per regulatory guidelines and also students know how to trouble shoot to cater to patient needs.
CO3	Student will be able to have the relevant formulating skills to operate in sterile conditions as per regulatory guidelines and know how to trouble shoot in formulation of liquid dosage forms.
CO4	Knowledge on formulating suppositories
CO5	Students will able to formulate semisolid dosage forms including cosmetics as per as regulatory requirements to suit the clinical requirements

BP110P	**Pharmaceutical Inorganic chemistry Practicals**
CO1	Know the source of impurities and determine impurities in inorganic compounds.
CO2	Know the identification test of few inorganic compounds
CO3	To test the purity some inorganic compounds
CO4	To Know Preparation of inorganic pharmaceuticals
BP111P	**Communication skills - Practical (NU)**
CO1	To learn the behavioral needs for a Pharmacist to function effectively in the areas of pharmaceutical operation
CO2	CO 2 To be effective in verbal and non verbal communication
CO3	CO 3 To develop the communication skills to effectively manage the team as a team player
CO4	CO 4 To communicate in a interview effectively
CO5	CO 5 To know and develop the essential qualities of a good leader

BP112P	**Remedial Biology - Practical (NU)**
CO1	Basic understanding and technioques on microscopy of tissues of plant parts.
CO2	Study of Stem, Root, Leaf, seed, fruit, flower and their modifications
CO3	Detailed study of frog by using computer models
CO4	Able to identify bones, measure BP and determine the blood group and tidal volume.
CO5	

BP201T	**Human Anatomy and Physiology 2**
CO1	1. Explain the anatomy and physiology of Central nervous system, nerve tracts, reflex action
CO2	2. Knowing the Gastrointestinal tract functions, secretions, digestion and absorption of nutrients and its disorders, role of ATP, creatinine and BMR
CO3	3. Understand the Lung functions, mechanism of respiration, resuscitation techniques and methods
CO4	4. Appreciate the urinary system and its functions, formation urine, role of RAS in kidney and its disorders
CO5	5. Understand the reproductive system of male and female, formation sperm and ovum, menstrual cycle, pregnancy, chromosomes, DNA and protein synthesis, pattern of inheritance
	6. Knowing the various endocrine glands, its secretions, functions, hypo & hyper secretions, its disorders

BP202T	**Pharmaceutical Organic Chemistry 1**
CO1	Graduates will acquire an adequate knowledge in nomenclature, isomerism and physical properties of certain important classes of organic compounds which imparts a foundation for the future study of various medicinal compounds.
CO2	Mechanisms of synthetic tools in generating newer products and intermediates can be correlated with novel drug design and development in future.
CO3	The mode of quality control procedures and applications of numerous medicinal agents help to adapt the students to focus on purity parameters pertaining to the drugs of choice.
CO4	The account for reactivity, orientation and stability of the compounds attribute to the influence towards predicting the prognosis of certain reactions.
CO5	The practical knowledge from the laboratory synthesis of medicinal organic molecules and their qualitative organic analysis helps to interpret and arrive to valid conclusions about the organic samples.

BP203T	**Biochemistry**
CO1	Learn the essential bio molecules of living cells, basics of bioenergetics and energy currency of cells.
CO2	Know and understand the biochemical facts and the principles of metabolism of nutrient molecules in physiological and pathological conditions.
CO3	Understand the molecular levels of the chemical process of metabolism of nutrient molecules, energy generation and other chemical process that are associated with living cells.3
CO4	Know about genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins and & autocatalytic functions of DNA.
CO5	Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes.

BP204T	**Pathophysiology**
CO1	To understand the basics of cell injury and their adaptations along with pathophysiological mechanism
CO2	To be able to understand the mechanism beyond the process of inflammation
CO3	To understand the principles of cancer and its pathogenesis
CO4	To be able to learn about the pathophysiological mechanism of various infectious diseases.
CO5	To be able to learn the etiology, pathogenesis and basic treatment of various other disease conditions.

BP205T	**Computer Applications in Pharmacy (NU)**
CO1	know the various types of application of computers in pharmacy
CO2	2. know the various types of databases
CO3	3. know the various applications of databases in pharmacy

BP206T	**Environmental sciences (NU)**
CO1	1. Create the awareness about environmental problems among learners.
CO2	2. Impart basic knowledge about the environment and its allied problems.
CO3	3. Develop an attitude of concern for the environment.

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CO4	4. Motivate learner to participate in environment protection and environment improvement.
CO5	5. Acquire skills to help the concerned individuals in identifying and solving environmental problems.

BP207P	**Human Anatomy and Physiology 2 - Practical**
CO1	Functions of special senses and central nervous system
CO2	Concepts of ductless glands and neurological function assessment
CO3	Knowledge on olfactory function and different tastes
CO4	The visual function and reflex action
CO5	Knowledge on positive and negative feedback mechanism and body temperature

BP208P	**Pharmaceutical Organic Chemistry 1 - Practical**
CO1	Understand the procedures for preparation of medicinal/organic compound.
CO2	Identification test help to interpret and arrive to valid conclusions about the prepared organic samples.
CO3	Gain practical knowledge from various determinations (Saponification value, Acid value etc) and standardization of reagents.
CO4	Know about handling of various instruments (Melting point apparatus, Microwave oven etc).
CO5	Able to carry out purification methods (Distillation and recrystalisation) adopted for organic compounds.

BP209P	**Biochemistry - Practical**
CO1	Able to carry out the qualitative analysis of different nutrients such as carbohydrates, protein and lipids.
CO2	Know to find out the concentration/percentage of different bio molecules present in blood or urine sample.
CO3	Able to carry our urine analysis and find out the normal and abnormal constituents present in it.
CO4	Know to prepare and check the pH buffers.
CO5	Able to analyze the factors such as temp, concentration and time affect enzyme activity.

BP210P	**Computer Applications in Pharmacy - Practical (NU)**
CO1	Retrieve the information of a drug and its adverse effects using online tools
CO2	Able to acquire knowledge of computer application in clinical studies and use of databases
CO3	Work with MS access
CO4	Exporting Tables, Queries, Forms and Reports to web pages and HTML.
CO5	Creating labels, databases regarding patient information.

BP301T	**Pharmaceutical Organic Chemistry 2**
CO1	CO1: Benzene structure Chemistry Resonance Huckel's rule Electrophilic substitution Reactivity Orientation Stability. This will result in students developing correct strategies for drug synthesis involving aromatic systems
CO2	CO2: Using the principles of phenol chemistry in synthesis as well as formulation
CO3	CO3: Analytical and formulation strategies as well as synthetic approaches.

CO4	CO4: More synthetic strategies
CO5	CO5: Relationship of conformations to molecular shape and its importance in Drug-Receptor interactions.
BP302T	**Physical Pharmaceutics 1**
CO1	Acquire detailed knowledge on different types of solubilities and their application in the development of delivery system
CO2	Describe the pharmaceutical relevance of different states of matter to drug delivery systems
CO3	Demonstrate the underlying principles of adsorption, solubilisation & differentiate types of interfaces with relevant examples in pharmaceutical sciences.
CO4	Describe, analyze, distinguish the types of complexes & correlate to drug action and protein binding
CO5	Appreciate the methods to determine pH & able to prepare pharmaceutical buffers and isotonic solutions.
BP303T	**Pharmaceutical Microbiology**
CO1	Understand the importance of microorganisms, able to cultivate, identify and preserve microorganism.
CO2	Apply the knowledge of sterilization and disinfection process in pharmaceutical industry.
CO3	Demonstrate how sterility test will be done for various Pharmaceutical products
CO4	Design and plan a sterile area, describe sources and prevention of contamination.
CO5	Categorize different types of spoilage and use of preservatives, and able to cultivate animal cell *in vitro*
BP304T	**Pharmaceutical Engineering**
CO1	Ability to understand the relationship between pressure and fluid flow. Basic knowledge of relationship between particle size and solubility for developing nanoparticles. Understand various mechanism of size separation based on size, shape and density.
CO2	Basic understanding of mechanism of heat transfer. Ability to understand the operation and principles of various evaporators and distillation. Understand the separation of compounds based on difference in boiling point
CO3	Understand the significance of drying in pharmaceutical product. Ability to understand the operation and principles of drying units. Application of mixing in solid & liquid dosage forms such as tablet, capsules, and syrups
CO4	Ability to understand the operation and principles of filtration and centrifugation units. Understand its application in preparing sterile dosage forms.
CO5	Ability to participate in preparing pharmaceutical plant layout and to control corrosion by proper selection of materials.
BP305P	**Pharmaceutical Organic Chemistry 2 - Practical**
CO1	CO1. Understand the procedures for preparation of medicinal/organic compound.
CO2	CO2. Identification test help to interpret and arrive to valid conclusions about the prepared organic samples.
CO3	CO3. Gain practical knowledge from various determinations (Saponification value, Acid value etc) and standardization of reagents.

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CO4	CO4. Know about handling of various instruments (Melting point apparatus, Microwave oven etc).
CO5	CO5. Able to carry out purification methods (Distillation and recrystalisation) adopted for organic compounds.

BP306P	**Physical Pharmaceutics 1 - Practical**
CO1	Perform, determine and analyse the solubility, partition co-efficient of various drug molecules under various conditions.
CO2	Determine the critical solution temperature of two component system, dissociation constant of various drugs and to appreciate their application in the development of dosage form.
CO3	Demonstrate the underlying principles of adsorption, solubilisation by performing various experiments.
CO4	Demonstrate the preparation of buffer and isotonic solutions and determination of pH
CO5	Analyze the drug complexes by various methods and interpret the data.

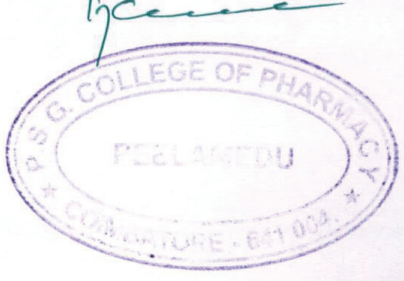
BP307P	**Pharmaceutical Microbiology - Practical**
CO1	Able to perform sterilization and disinfection process
CO2	Able to culture bacteria and fungus in the laboratory.
CO3	Familiarize with various identification and isolation techniques.
CO4	Understand the importance of sterility testing
CO5	Perform various experiments related to microbiological analysis.

BP308P	**Pharmaceutical Engineering - Practical**
CO1	Ability to determine particle size of polydispersed powder by using sieve analysis. Ability to apply the concept of size reduction using various size reduction techniques
CO2	Ability to determine end point of drying, loss of drying and moisture content of a wet sample by constructing drying rate curve.
CO3	Understand the significance of various factors affecting filtration, evaporation and crystallization
CO4	Understand the construction, working and application of various equipments by practical demonstration.
CO5	Perform various experiments related to heat transfer.

BP401T	**Pharmaceutical Organic Chemistry 3**
CO1	CO1: To gain knowledge on stereo chemical aspects of organic compounds and organic reactions
CO2	CO2: To emphasize and learn the important named reactions along with mechanism
CO3	CO3: To develop sufficient knowledge in synthesis and chemistry of important heterocyclic compounds
CO4	CO4: To understand the medicinal uses & other applications of organic compounds
CO5	CO5: To understand the methods of preparation and chemical properties of organic compounds

BP402T	**Medicinal Chemistry 1**
CO1	To Gain the Knowledge about Principles of Drug action & physicochemical Properties

CO2	To Learn The Classification, Mechanism Of Action, Synthesis & Other Medicinal Chemistry Properties Of Drugs on Sympathetic nervous system
CO3	To Learn The Classification, Mechanism Of Action, Synthesis & Other Medicinal Chemistry Properties Of Drugs on Para sympathetic nervous system
CO4	To learn the SAR of Drugs acting on ANS
CO5	To Learn The Classification, Mechanism Of Action, Synthesis & Other Medicinal Chemistry Properties Of Drugs on Central nervous system
BP403T	**Physical Pharmaceutics 2**
CO1	Demonstrate suitable physiochemical properties that contribute in designing a stable colloidal system
CO2	Describe the pharmaceutical significance of different states of flow to drug delivery systems.
CO3	Formulate and evaluate various dispersion systems for effective clinical management.
CO4	Describe, analyze and distinguish the fundamental properties of particle & develop analytical skills to optimize the flow of powders.
CO5	Know the principles of chemical kinetics and use them for stability testing and determination of expiry date of formulations according to ICH guidelines.
BP404T	**Pharmacology 1**
CO1	The students will be capable of explaining the basics of pharmacology like drug, agonists & antagonists, tolerance & dependence, idiosyncrasy & allergy and pharmacokinetics of drug.
CO2	The students will understand the pharmacodynamics of drugs including receptor theories, types and signal transduction mechanisms of various receptors, Adverse drug reaction, drug discovery & clinical evaluations of new drugs
CO3	The students will be capable of explaining of Organization and function of ANS, various neurotransmitters, sympathetic and parasympathetic drugs, local anesthetics, drugs used for myasthenia gravis and glaucoma
CO4	The students will understand the neurohumoral transmission in the CNS and importance of various neurotransmitters and the pharmacology of drugs acting on central nervous system like sedative & hypnotics, anticonvulsants, general anesthetics and alcohol, & disulfiram
CO5	The students will understand the CNS diseases and drugs used to treat them including antipsychotics, antidepressants, anti-anxiety agents,
	anti-manics and hallucinogens, drugs used to treat Parkinson's disease and Alzheimer's disease, CNS stimulants & opioid drugs.
BP405T	**Pharmacognosy and Phytochemistry 1**
CO1	The term Pharmacognosy, various sources of crude drugs and its classification based on different category. The parameters involved in crude drug evaluation & determining the adulteration of crude drugs
CO2	The cultivation, collection process and its factors affecting the production of crude drugs along with its hybridization
CO3	The plant tissue culture techniques and its application in Pharmacognosy and introduction on edible vaccines



CO4	The role of pharmacognosy in allopathy and traditional system of medicine. The properties and confirmatory tests for secondary metabolites
CO5	Introduction on plant fibers, natural allergens and sources, constituents, evaluation and its utilization of primary metabolites

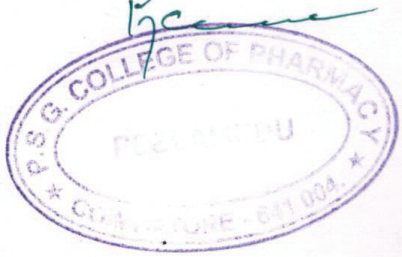
BP406P	**Medicinal Chemistry I - Practical**
CO1	To perform / learn the preparation of drugs
CO2	To Perform/ learn the preparation of drug intermediates
CO3	To perform / learn the assay procedures of selected drugs / medicinal compounds
CO4	To determine the partition coefficient of drugs
CO5	To determine the melting point / recrystallisation of the synthesized drugs

BP407P	**Physical Pharmaceutics 2 - Practical**
CO1	Acquire knowledge on basic mathematical calculations to formulate and evaluate the physiochemical properties of different stable systems
CO2	Knowledge on flow behavior of the fluid via evaluating the deformation of liquids under different stress conditions,
CO3	Student gather knowledge on formulating different liquid to assess their quality..
CO4	Able to optimize the particle behavior by assessing their physical properties to suit the stable solid dosage forms
CO5	Able to assure the quality of the pharmaceutical products by assessing the stability parameters under different stress conditions.

BP408P	**Pharmacology 1 - Practical**
CO1	Proficient in handling common laboratory animals used in pharmacological testing
CO2	Capable of performing common methods of euthanasia and anesthesia
CO3	Proficient in withdrawing blood and administration of drugs via different routes
CO4	Able to simulate and evaluate the effect of drugs on gastrointestinal tract using computational software Ex-Pharm
CO5	Able to simulate and evaluate the effect of drugs acting on CNS and CVS using computational software Ex-Pharm

BP409P	**Pharmacognosy and Phytochemistry 1- Practical**
CO1	Explain correct use of various equipments in Pharmacognosy laboratory.
CO2	Handle simple/compound/digital microscope in technically correct way
CO3	Decide on staining reagents required for specific part of plant.
CO4	Explain significance of qualitative, quantitative microscopy & its social relevance.
CO5	Analysis of the unorganizedcrude drugs as per regulatory guidelines

BP501T	**Medicinal Chemistry 2**
CO1	CO 1. Know the development, chemistry, SAR, Mechanism of action and synthesis of various drugs used to treat allergic responses, ulcer and cancer.



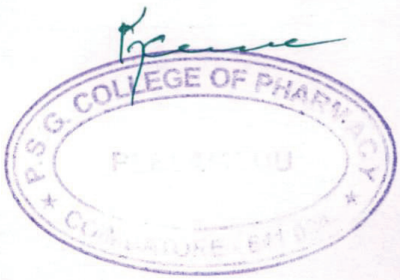
CO2	CO 2: Learn the classification, chemistry, SAR, Mechanism of action and synthesis of cardio vascular agents.
CO3	CO 3. Know the chemistry, Mechanism of action and synthesis and uses of Drugs used to treat cardiac related disorders.
CO4	CO 4. Understand the chemistry, SAR, Mechanism of action and uses of drugs acting on endocrine system.
CO5	CO 5: Development, chemistry, SAR, Mechanism of action, synthesis and various formulations of hypoglycemic agents and local anesthetics.

BP502T	**Industrial Pharmacy 1**
CO1	Importance of preformulation of drugs, excipients & their role in formulation design
CO2	Knowledge on tablet and liquid dosage forms & their processing problems with QC checking
CO3	Knowledge on capsules production and pellets with QC tests.
CO4	Knowledge on sterile preparation and their QC evaluation
CO5	Knowledge on formulation of cosmetics and packaging material sciences.

BP503T	**Pharmacology 2**
CO1	The students will be capable of explaining electrophysiology of heart, various heart disease and its pharmacological management
CO2	The students will understand the hemostasis, coagulation cascade and drugs used to treat blood disorders and the fluid – electrolyte balance by understanding the pharmacology of diuretics and anti-diuretics
CO3	The students will understand the different autocoids and their physiological and pathological role, pharmacology of drugs acting on their receptors.
CO4	The students will be capable of explaining the role of endocrine system in the body homeostasis, various hormonal disorders and its pharmacological management.
CO5	The students will be capable of explaining the pharmacology of natural and synthetic sex steroids and principles & applications of bioassay.

BP504T	**Pharmacognosy and Phytochemistry 2**
CO1	Basic biosynthetic pathways and its brief - involved in the metabolism of production of secondary metabolites
CO2	The sources, phytochemistry, composition, therapeutic and commercial utilization of secondary metabolites present in various crude drugs
CO3	Isolation techniques, identification and analysis of selected phytoconstituents
CO4	Industrial production, estimation and utilization of therapeutically much useful phytoconstituents
CO5	Modern extraction techniques, characterization and identification/quality control of the herbal drugs (phytoconstituents) through spectroscopy.

BP505T	**Pharmaceutical Jurisprudence**
CO1	Legal definitions to the Drugs and Cosmetics Act, 1940 and its rules 1945. The regulatory authorities and agencies governing the import, manufacture and sale of pharmaceuticals, test, and analysis of drugs, loan license and repacking license.



CO2	Detailed study of Schedules, Labeling & Packing guidelines for drugs and cosmetics. Administration of the Act and Rules
CO3	Constitution and function of TNPC, PCI & ER-91; Licensing and manufacture of bonded and non bonded lab; Narcotics and Psychotropic consultative Committee and its functions.
CO4	Study of salient features of advertisements and prohibited advertisements. The members & functioning of IAEC and CPCSEA guidelines. The objective of DPCO and price fixing for scheduled & non-scheduled formulation, NLEM
CO5	The Pharmaceutical legislations and their implications in the development and marketing. The code of ethics during the pharmaceutical practice. Patents, procedure for patent application and IPR, MTP act, RTI act

BP506P	**Industrial Pharmacy 1 - Practical**
CO1	Importance of preformulation of drugs in formulation of dosage forms
CO2	Knowledge on Preparation of tablet and liquid dosage forms & evaluation of the formulations.
CO3	Knowledge on Preparation & evaluation of capsules
CO4	Knowledge on sterile product preparation and their evaluation
CO5	Knowledge on formulation of cosmetics and packaging material sciences.

BP507P	**Pharmacology 2 - Practical**
CO1	Students were able to design and perform pharmacological experiment using isolated tissue preparation and setting up in vitro experiment
CO2	Quantitative estimation of biological samples using isolated tissue preparations, their interpretation and efficacy assessment.
CO3	Students were able to understand receptor mediated responses and to determine EC50 of agonists & antagonists through graphical representation.
CO4	Students were able to screen the drugs for CNS mediated actions & diuretic properties and able to apply proper methods to calculate effective dose
CO5	Students were able to design and perform pharmacological experiment using isolated tissue preparation and setting up in vitro experiment

BP508P	**Pharmacognosy and Phytochemistry 2 - Practical**
CO1	Macroscopy and Microscopic diagnostic characters of secondary metabolite
CO2	Isolation /extraction, identification /analysis of selected phytoconstituents
CO3	Detection of phytoconstituents by chromatographic techniques
CO4	Isolation and commercial utility of volatile oil
CO5	Chemical analysis/quality control of the unorganized crude drugs as per regulatory guidelines

BP601T	**Medicinal Chemistry III- theory**
CO1	CO 1. Know the development, different classes, chemistry, SAR, Mechanism of action and synthesis anti biotics.
CO2	CO 2: Learn the development, different classes, chemistry, SAR, Mechanism of action and synthesis of some antibiotics and anti malarials. Understand the chemistry behind prodrugs and its applications.

CO3	CO 3. Understand the chemistry, Mechanism of action and synthesis and uses of anti infective agents.
CO4	CO 4. Know the chemistry, SAR, Mechanism of action and uses of sulpha drugs and anthelmintics.
CO5	CO 5: Understand the basic concept of drug design and able to apply different drug design approaches and techniques towards the drug development.

BP602T	**Pharmacology 3**
CO1	The students will be capable of explaining various respiratory tract diseases and GI tract diseases and pharmacology drugs used to treat them.
CO2	The students will understand the basics and principles of chemotherapy and pharmacology of antibiotics such as beta lactams, macrolides, quinolones, aminoglycosides etc.
CO3	The students will understand the chemotherapy of tuberculosis, leprosies, fungal, viral and amoebic infections, malaria etc.,
CO4	The students will understand the chemotherapy of UTI & STD, Malignancy and basics and drugs acting in immune systems such as immunostimulants & immunosuppressant.
CO5	The students will be capable of explaining the basic principles of toxicology, poisoning treatment (symptoms & managements) and biological clock, its significance and rhythms & cycles.

BP603T	**Herbal Drug Technology**
CO1	Selection of herbs from its sources, authentication, processing and development of herbal medicinal product. Cultivation and its Good cultivation and agricultural practice, Indian system of medicine, formulation and its standardization
CO2	Study of nutraceuticals in the health care and its market survey
CO3	Sources and description of raw materials originated form herbs used in personal care products. Herbal excipients used in formulations and the novel dosage forms
CO4	Evaluation and stability testing of herbal drugs as per WHO and ICH guidelines. Patenting and regulatory requirements of natural products and case study
CO5	Plant based industries and institutions in India. Good manufacturing practices of Indian system of medicine

BP604T	**Biopharmaceutics & Pharmacokinetics-Theory**
CO1	Knowledge on absorption & distribution of drugs.
CO2	Knowledge on bioavailability, bioequivalence and elimination of drugs.
CO3	Knowledge on pharmacokinetics, various compartment model of drugs, pharmacokinetic parameters, elimination and their significance with application.
CO4	Knowledge on multi compartment model & their significance.
CO5	Knowledge on nonlinear pharmacokinetics.

BP605T	**Pharmaceutical Biotechnology -Theory**
CO1	Understand the importance of microbes in enzyme biotechnology, protein engineering and biosensor application.
CO2	Apply the genetic engineering knowledge for the production of rDNA products
CO3	Understand the immune mechanism and employ it for the production of new immunological

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	products
CO4	Recognize the importance of microbial genetics and its application in biotechnology
CO5	Sketch various process involved in the fermentation technology and apply them in the production of pharmaceutical products
BP606T	**Pharmaceutical Quality Assurance- Theory**
CO1	Know about the responsibilities of QA& QC department ,The students are explored into importance of Good practices such as GMP,TQM,certifications and accreditation applicable to Pharmaceutical industries
CO2	Understand the importance of organization,personnel,premises,equipment purchase specifications in Pharmaceutical industries
CO3	Gain knowledge on quality control test for packaging materials and Good Laboratory practices
CO4	The various documentation process is highlighted to the student
CO5	Student shall be able to explain the aspect of validation, the importance of calibration to be performed for the instruments and good warehousing practices in Pharmaceutical industries
BP607P	**Medicinal Chemistry III - Practical**
CO1	CO 1: Understand and carryout the preparation of important medicinal compounds or intermediates by conventional and microwave irradiated methods and their characterization.
CO2	CO 2: Able to find out the percentage purity of given sample of medicinal compounds along with standardization.
CO3	CO 3: Able to sketch chemical structures using softwares/online tools.
CO4	CO 4: Able to determine physicochemical properties such as logP, clogP, MR, Molecular weight, Hydrogen bond donors and acceptors for certain class of drugs using drug design software
CO5	Able to analyse the the Drug likeliness screening (Lipinskies Rule of 5)
BP608P	**Pharmacology 3 Practical**
CO1	Students were able to calculate the dose for pharmacological experiments and translate to human dose using standard calculation methods.
CO2	Screening the drugs for gastrointestinal efficacy, hypoglycemic effects & anti-allergic effects and able to correlate clinical, biochemical parameters with disease.
CO3	Able to understand OECD guidelines and interpret the acute toxicity and other related acute studies for safety evaluation and able to interpret the pharmacokinetic profile of the given drug.
CO4	Able to apply proper biostatistical method for data interpretation and calculations.
CO5	Students were able to calculate the dose for pharmacological experiments and translate to human dose using standard calculation methods.
BP609P	**Herbal Drug Technology- Practical**
CO1	To perform the preliminary qualitative screening of crude drugs, excipients of natural sources
CO2	Quantitative analysis of phytochemicals and others in crude extracts,volatile oils, ayurvedic formulations
CO3	Preparation and standardization of herbal extracts and their formulation development for external application as per regulatory guidelines
CO4	Preparation and standardization of herbal extracts and their formulation development for internal use application as per regulatory guidelines
CO5	Monograph analysis as per Pharmacopoeia