DEPARTMENT OF PHARMACY

Program: B Pharmacy

Regulation: PCI (R14) **No. of Courses: 75**

COURSE OUTCOMES

I – I Sem	Course: Human Anatomy and Physiology – I (BP101T)
CO101.1	Recognize the various homeostatic mechanisms, cellular level organization and summarize the characteristics of different types of tissues and their location in various organs.
CO101.2	Organize the structure and functions of skin, bones and joints of human body.
CO101.3	Analyze the importance of haemopoietic system in human body.
CO101.4	Understand the importance of lymphatic system in human body.
CO101.5	Relate the physiology of sympathetic, parasympathetic, spinal/cranial nerves and organization of special senses.
CO101.6	Illustrate the anatomy, physiology and coordinated pathway of heart and blood vessels.
I – I Sem	**Course: Pharmaceutical Analysis– I (BP102T)**
CO102.1	Understand the physiochemical concepts of analysis and gain knowledge of sources of errors and minimizing techniques.
CO102.2	Analyze the techniques of acid-base titrations and non-aqueous titrations.
CO102.3	Employ volumetric titrations in quality control of pharmaceuticals.
CO102.4	Analyze the techniques of gravimetry in quality control of pharmaceuticals.
CO102.5	Analyze the techniques of redox titrations and develop analytical skills.
CO102.6	Analyze various electro chemical titrations and interpret the results.
I – I Sem	**Course: Pharmaceutics – I (BP103T)**
CO103.1	Know the history of profession of pharmacy. Understand the basics of different dosage forms and importance of prescription and posology.
CO103.2	Solve the pharmaceutical calculations and summarize the basics of compounding and dispensing of powders.
CO103.3	Summarize the basics of compounding and dispensing of liquid dosage forms.
CO103.4	Summarize the basics of dispensing and compounding of biphasic liquid dosage forms.
CO103.5	Know the preparation of suppositories and understand various pharmaceutical incompatibilities.
CO103.6	Understand the preparation of various semisolid dosage forms and their evaluations.
I – I Sem	**Course: Pharmaceutical Inorganic Chemistry (BP104T)**
CO104.1	Understand the history of pharmacopoeia, sources and types of impurities and

	describe the official methods of control like limit tests.
CO104.2	Acquires knowledge on acids, bases, buffers, buffered isotonic solutions, methods of adjusting isotonicity and major extra and intra cellular electrolytes and know the monographs of dental products.
CO104.3	Classify the gastrointestinal agents and described the methods of preparation, properties, storage, assay and uses with marketed formulations of inorganic compounds in gastrointestinal agents.
CO104.4	Analyze the importance of Cathartics and anti-microbials in treatment of gastric diseases or disorders.
CO104.5	Classify the miscellaneous compounds and know the monographs of inorganic compounds in each category.
CO104.6	Understand the radioactivity and study of different radioisotopes, storage, precautions and applications of radioactive substances.
I – I Sem	**Course: Communication Skills (BP105T)**
CO105.1	Understand and apply knowledge of human communication and language processes as they occur across various contexts, e.g., interpersonal, intrapersonal, small group, organizational, media, gender, family, intercultural communication, technologically mediated communication.
CO105.2	Find, use, and evaluate primary academic writing associated with the communication discipline.
CO105.3	Develop knowledge, skills, and job-ready skills in pharmaceutical industry that facilitate their ability to work collaboratively with others.
CO105.4	Develop effective writing skills for the purpose of running organization.
CO105.5	Enhance communication competencies such as managing conflict, understanding small group processes, active listening, appropriate self-disclosure, and other work place norms.
CO105.6	Learn interview skills.
I – I Sem	**Course: Remedial Biology (BP106RBT)**
CO106.1	Know the anatomical principles followed by scientists for classification of five kingdom animals and its salient features.
CO106.2	Getting knowledge on different parts of plants and its morphological and anatomical characters and its importance.
CO106.3	Know the basic components of human anatomy & physiology of prescribed systems.
CO106.4	Understand the Chemical coordination and regulation of endocrine glands and horrmones.
CO106.5	Know the basic components in plant anatomy & physiology and summarize photosynthesis in plants.
CO106.6	Know the basic structural and functional organization of living organism.
I – I Sem	**Course: Remedial Mathematics (BP106RMT)**
CO106a.1	Know Basic mathematical operations

CO106a.2	Know trigonometry mostly used in any sciences.
CO106a.3	Know Basic calculus which is used in analytical study of their life sciences applications
CO106a.4	Know the basic trigonometric functions from first principles.
CO106a.5	Draw lines, finding the equations for the purpose of relational study
CO106a.6	Know Some advanced calculations in Research or Project works
I – I Sem	**Course: Human Anatomy and Physiology - I (BP107P)**
CO107.1	Recall handling of compound microscope and to outline the microscopic characteristics of various tissues.
CO107.2	Summarize the characteristics of different bones (skeletal system) & types of joints.
CO107.3	Estimate the various haematological parameters such as WBC, RBC count, Hb, ESR, bleeding, clotting time and their own blood group.
CO107.4	Determine various physical parameters such as heart rate, BP.
I – I Sem	**Course: Pharmaceutical Analysis – I (BP108P)**
CO108.1	Understand the principles of identification of impurity in given sample by performing limit tests.
CO108.2	Able to prepare and standardize solutions of different concentrations.
CO108.3	Determine percentage purity of [pharmaceutical drugs by various volumetric analytical titrations.
CO108.4	Determine normality of pharmaceutical drugs by electro analytical methods.
I – I Sem	**Course: Pharmaceutics - I (BP109P)**
CO109.1	Able to formulate skills of preparing syrups, elixirs, Linctus and solutions.
CO109.2	Gain knowledge on preparation of biphasic liquid dosage forms.
CO109.3	Able to prepare various solid dosage forms using different techniques and equipment's.
CO109.4	Understand the preparation of Semisolid dosage forms.
I – I Sem	**Course: Pharmaceutical Inorganic Chemistry (BP110P)**
CO110.1	Know the source of impurities and perform the limit tests for qualitative analysis of impurities for given sample.
CO110.2	Perform the identification test for the pharmaceutical compounds.
CO110.3	Identify the test for purity of compounds.
CO110.4	Able to prepare inorganic pharmaceuticals.

I – I Sem	**Course: Communication Skills (BP111P)**
CO111.1	Learn and understand basic communication skills needed for effective for working of pharmacist in areas of pharmaceutical operations.
CO111.2	Effective in verbal and nonverbal pronunciation.
CO111.3	Develop communication skills effectively to manage team as team lead & handling the interview.
CO111.4	Presenting the advanced learning skills effectively with aid of learning.
I – I Sem	**Course: Remedial Biology (BP112RBP)**
CO111.1	Understand the usage and handling of microscope and study the microscope and study the microscopic investigation of cell and it's inclusions.
CO111.2	Identify microscopic and morphological characteristics of stem, root, fruit and flowers.
CO111.3	Identify bones and study frog by using computing models.
CO111.4	Determine physical parameters such as BP, blood groups.
I – II Sem	**Course: Human Anatomy and Physiology - II (BP201T)**
CO201.1	Relate the physiology of Central nervous system with the functioning of neurons.
CO201.2	Analyze the importance of digestive system in human body. Outline the bioenergetics involved in metabolism of food.
CO201.3	Outline the importance of Respiratory system in human body.
CO201.4	Understand the importance of Urinary system in human body.
CO201.5	Analyze the importance of endocrine system in body.
CO201.6	Illustrate the anatomy, physiology and coordinated pathway of Reproductive system. Understand basic concepts of genetics.
I – II Sem	**Course: Pharmaceutical Organic Chemistry - I (BP202T)**
CO202.1	Capable to give nomenclature and identify isomerism of organic compounds.
CO202.2	Remember the preparation methods and properties of alkanes, alkenes and conjugated dienes.
CO202.3	Remember the preparation methods and properties of alkyl halides and alcohols.
CO202.4	Remember the preparation methods and properties of Alcohols.
CO202.5	Remember the preparation methods and properties of Carbonyl compounds.
CO202.6	Remember the preparation methods and properties of Carboxylic acids.
I – II Sem	**Course: Biochemistry (BP203T)**
CO203.1	Remember the classification, properties, significance and metabolic reactions of carbohydrates, lipids, nucleic acids, proteins and amino acids.

CO203.2	Understand the metabolism of carbohydrates and process of electron transport and ATP formation. Appraise the causes, manifestations and diagnosis of metabolic disorders.
CO203.3	Remember the metabolism of Lipids and aminoacids.
CO203.4	Understand the causes, manifestations and diagnosis of metabolic disorders.
CO203.5	Understand the metabolism of Nucleic acid and distinguish the process of DNA replication, transcription and translation.
CO203.6	Apply the concept of catalytic activity and enzyme inhibition in design of new drugs, diagnostic and therapeutic applications of enzymes.
I – II Sem	**Course: Pathophysiology (BP204T)**
CO204.1	Understand the process of cell injury, morphology of cell injury and cellular adaptations.
CO204.2	Describe the etiology and pathogenesis of CVS, respiratory and renal systems diseases or disorders.
CO204.3	Explain the etiopathogenesis of hematologic, endocrine, nervous, gastrointestinal, musculoskeletal diseases and Immunopathogenesis of infectious diseases.
CO204.4	Explain the etiopathogenesis of gastrointestinal, musculoskeletal diseases and Immunopathogenesis of infectious diseases.
CO204.5	Understand the principles of physical, chemical and biologic carcinogenesis.
CO204.6	Describe the etiology and pathogenesis of infectious diseases.
I – II Sem	**Course: Computer applications in pharmacy (BP205T)**
CO205.1	Illustrate the concept of number system in computers and understand different types of databases, applications of computers and databases in pharmacy.
CO205.2	Employ web technologies such as HTML, XML, CSS, programming languages, Web servers and pharmacy drug database in pharmaceutical field.
CO205.3	Appraise the applications of computers in pharmacy such as drug information services, pharmacokinetics in drug design.
CO205.4	Understand and apply the uses of computers in hospital and clinical pharmacy.
CO205.5	Understand the importance of bioinformatics and its impact in vaccine discovery.
CO205.6	Elaborate the applications of computers for data analysis in preclinical development.
I – II Sem	**Course: Environmental Sciences (BP206T)**
CO206.1	Remember the natural renewable sources.
CO206.2	Acquire knowledge about various types of non- renewable resources and understand the role of an individual in conservation of natural resources.
CO206.3	Impart basic knowledge about various ecosystems on earth.
CO206.4	Motivate the learner to participate in environment protection.
CO206.5	Acquire knowledge on different types of Pollution.

CO206.6	Understand the sources, causes and prevention of pollution.
I – II Sem	**Course: Human anatomy and physiology – II (BP207P)**
CO207.1	Recall the physiology of special senses with the help of models, charts and specimens.
CO207.2	Develop the knowledge on coordinating working of organs of various systems with the help of models, charts and specimens.
CO207.3	Analyze the functions of cranial nerves by various sensory and motor functions. Evaluate body temperature and body mass index.
CO207.4	Determine tidal volume and vital capacity Assess the knowledge on family planning devices, pregnancy diagnostic tests, tissues of vital organs and gonads.
I – II Sem	**Course: Pharmaceutical Organic Chemistry – I (BP208P)**
CO208.1	Analyze unknown pharmaceutical organic compounds by determining their melting point/boiling point.
CO208.2	Prepare and characterize the derivatives of organic compounds.
CO208.3	Perform qualitative analysis of pharmaceutical organic compounds and identify the extra elements present in the pharmaceutical organic compounds and find the presence of several functional groups in pharmaceutical compounds.
CO208.4	Able to construct molecular models.
I – II Sem	**Course: Biochemistry (BP209P)**
CO209.1	Remember the qualitative analysis of carbohydrates and proteins.
CO209.2	Understand the principle and clinical significance of blood glucose. Identify the amount of reducing sugars by DNSA method
CO209.3	Determine the effect of temperature and substrate concentration on salivary amylase activity.
CO209.4	Examine the constituents present in Urine and their clinical significance.
I – II Sem	**Course: Computer applications in pharmacy (BP210P)**
CO210.1	Demonstrate and make use of MS Office, MS Word, MS Excel, MS Access and MS Power point.
CO210.2	Understand the paradigms of program languages and be exposed to at least one language from each model, C and SQL.
CO210.3	Summarize the report and printing the report from patient database. Design a questionnaire using a word processing package to gather information about a particular disease.
CO210.4	Create HTML web page to show personal information.
II – I Sem	**Course: Pharmaceutical organic chemistry – II (BP301T)**
CO301.1	Understand about aromaticity, chemistry and reactions of Benzene and its derivatives.

CO301.2	Understand the Chemistry and Reactions of phenols, aromatic amines and acids
CO301.3	Understand the basic concepts of fats and oils.
CO301.4	Understand the concept of hydrolysis, hydrogenation, saponification and rancidity of fatty acids & oils.
CO301.5	Understand the Chemistry and Reactions of Polynuclear hydrocarbons.
CO301.6	Understand the Chemistry and Reactions, theories of cycloalkanes.
II – I Sem	**Course: Physical Pharmaceutics – I (BP302T)**
CO302.1	Understand the effect of solubility in designing dosage forms.
CO302.2	Identify the properties of states of matter. Understand the various physiochemical properties of drug molecules to design dosage forms.
CO302.3	Understand the principle of interfacial tension and the applications of surface-active agents in drug solubilization.
CO302.4	Understand the concepts of Interfacial Phenomenon.
CO302.5	Perceive and apply the concepts of complexation and protein binding in pharmacy.
CO302.6	Gain knowledge of pH and buffers and their use in the stabilization of pharmaceutical formulations.
II – I Sem	**Course: Pharmaceutical Microbiology (BP303T)**
CO303.1	Remember the scope of microbiology and its branches, methods of classification. Understand the structure, morphology of bacteria.
CO303.2	Gain the knowledge on various staining techniques. Understand the importance and implementation of sterilization in pharmaceutical processing and industry.
CO303.3	Understand the structure, morphology of fungi and virus.
CO303.4	Understand the importance and implementation of disinfectants in pharmaceutical industry.
CO303.5	Remember the tests used for the microbiological standardization of pharmaceuticals.
CO303.6	Remember the preservation of pharmaceutical products. Choose the cell culture technology and microbial characters for the pharmaceutical industry.
II – I Sem	**Course: Pharmaceutical Engineering (BP304T)**
CO304.1	Understand the concepts of flow of fluids, size reduction and size separation used for manufacturing of pharmaceutical products.
CO304.2	Summarize different mechanisms of heat transfer. Compare and contrast different types of evaporation and distillation process.
CO304.3	Understand the BP207T and principle involved in operation of drying equipments.
CO304.4	Summarize the BP207T and principle of mixing equipments.
CO304.5	Understand the BP207T, principle and determine the factors influencing mixing, filtration and centrifugation.

CO304.6	Elaborate various preventive methods used for corrosion control in pharmaceutical industries.
II – I Sem	**Course: Pharmaceutical organic chemistry – II (BP305P)**
CO305.1	Gain the knowledge on different recrystallization and steam distillation techniques.
CO305.2	Identify the purity of fats and oils by acid value, saponification value and iodine value of fatty acids and oils.
CO305.3	Perform various reactions like diazotization, oxidation reactions.
CO305.4	Test the knowledge on different electrophilic aromatic substitutions reactions like bromination, nitration in monosubstituted aromatic compounds.
II – I Sem	**Course: Physical Pharmaceutics - I (BP306P)**
CO306.1	Understand the significance of physical properties such as solubility, surface tension, partition coefficient and pKa in the design of dosage forms.
CO306.2	Determine the surface tension of sample liquids by drop count and drop weight methods.
CO306.3	Estimate the HLB value and critical micellar concentration of surfactants. Explain adsorption isotherms and determine Freundlich-Langmuir constant using activated charcoal.
CO306.4	Estimate the stability constants of complexes by solubility and pH titration methods.
II – I Sem	**Course: Pharmaceutical Microbiology (BP307P)**
CO307.1	Recall different techniques of sterilization. Interpret the results of microbial testing
CO307.2	Demonstrate various staining methods – simple, gram staining and acid fast staining.
CO307.3	Test for possible microbial contaminants. Estimate the microbiological assay of antibiotics.
CO307.4	Estimate the motility in the given sample. Choose the correct method to evaluate the microbes to be tested.
II – I Sem	**Course: Pharmaceutical Engineering (BP308P)**
CO308.1	Determine overall heat transfer coefficient by heat exchanger and calculate the efficiency of steam distillation.
CO308.2	Demonstrate various staining methods – simple, gram staining and acid fast staining.
CO308.3	Demonstrate and explain about the construction, working and applications of pharmaceutical equipments such as colloid mill, planetary mixer, fluidized bed dryer and freeze dryer.
CO308.4	Estimate the process variables of filtration, evaporation and infer the same.
II – II Sem	**Course: Pharmaceutical organic chemistry - III (BP401T)**
CO401.1	Discuss optical isomerism-optical activity, enantiomers, diastereoisomerism and meso compounds.

CO4012	Understand the fundamentals of geometric and conformational stereo chemical aspects.
CO401.3	Understand the nomenclature, properties and methods of preparation of heterocyclic compounds.
CO401.4	Identify preparation, properties, medicinal uses and other applications of five membered heterocyclic compounds.
CO401.5	Identify preparation, properties, medicinal uses and other applications of six membered and fused heterocyclic compounds.
CO401.6	Elaborate the reactions, understand their mechanisms and synthetic importance of organic naming reactions.
II – II Sem	**Course: Medicinal Chemistry – I (BP402T)**
CO402.1	Understand the physicochemical properties, steric aspects of drugs and their metabolic pathways in relation to biological action
CO402.2	Categorize the drugs acting on Autonomous nervous system based on their mechanism of action, understand their SAR, synthesis and clinical uses.
CO402.3	Categorize the drugs acting on Parasympathetic nervous system based on their mechanism of action, understand their SAR and clinical uses.
CO402.4	Identify medicinal uses and other applications of drugs acting on Parasympathetic nervous system.
CO402.5	Categorize the drugs acting on Central nervous system based on their mechanism of action, understand their SAR and clinical uses.
CO402.6	Categorize the general anesthetics, Narcotic analgesics based on their mechanism of action, understand their and clinical uses.
II – II Sem	**Course: Physical Pharmaceutics – II (BP403T)**
CO403.1	Demonstrate the suitable physical properties that contribute in designing a stable colloidal dispersion and understand the applications of colloidal dispersions.
CO403.2	Gain knowledge about different rheological or thixotropic behavior of different pharmaceutical dosage forms & deformation of solids and to demonstrate, modify & predict the designing of different pharmaceutical dosage forms.
CO403.3	Formulate and evaluate Emulsions making use of rheological and electrical properties for effective clinical management.
CO403.4	Formulate and evaluate Suspensions making use of rheological and electrical properties for effective clinical management.
CO403.5	Formulate and evaluate coarse Suspensions making use of rheological and electrical properties for effective clinical management.
CO403.6	Formulate and evaluate Colloidal Suspensions making use of rheological and electrical properties for effective clinical management.
II – II Sem	**Course: Pharmacology – I (BP404T)**
CO404.1	Define the fundamental concepts of pharmacology and pharmacokinetics of drugs.
CO404.2	Understand the basic concepts of pharmacodynamics of drugs, adverse drug reactions and drug discovery.

CO404.3	Describe organization, function, and neurohumoral transmission of peripheral nervous system.
CO404.4	Employ the knowledge to study the pharmacological actions of drugs acting on peripheral nervous system.
CO404.5	Describe neurohumoral transmission of the central nervous system with reference to Excitatory and Inhibitory neurotransmitters and apply the basics in studying the pharmacological actions of drugs acting on the central nervous system.
CO404.6	Understand the effects of drugs against neurodegenerative disorders and to elaborate the concepts of drug addiction/abuse/tolerance/ dependence.
II – II Sem	**Course: Pharmacognosy - I (BP405T)**
CO405.1	Recall the history, scope and development of pharmacognosy and remember different sources, classification and quality control of crude drugs.
CO405.2	Illustrate about cultivation, collection, processing and storage of crude drugs. Understand the factors affecting the production of crude drugs along with its hybridization.
CO405.3	Elaborate the applications of advanced technologies of plant tissue culture.
CO405.4	Employ the knowledge tostudy the usage of edible vaccines.
CO405.5	Illustrate the basic plant metabolites and the various metabolic pathways to form secondary metabolites.
CO405.6	Understand systematic pharmacognostic study of primary metabolites, ayurvedic drugs, marine drugs and teratogens.
II – II Sem	**Course: Medicinal chemistry - I (BP406P)**
CO406.1	Synthesize, characterize and purify various medicinal compounds and intermediates.
CO406.2	Analyze the selected drugs present in dosage forms and to determine the assay by using various analytical techniques.
CO406.3	Prepare drugs and determine melting point or boiling point for prepared drugs.
CO406.4	Determine the partition coefficient of drugs.
II – II Sem	**Course: Physical Pharmaceutics - II (BP407P)**
CO407.1	Determine the flow properties of powders and interpret the characteristics of powders.
CO407.2	Asses the rheology of fluids by using viscometers. Evaluate the stability of coarse dispersions.
CO407.3	Distinguish the rate constants as per the chemical reaction.
CO407.4	Interpret the shelf life of a given formulation by accelerated stability studies.
II – II Sem	**Course: Pharmacology - I (BP408P)**
CO408.1	Learn about basic instruments, common laboratory animals used in experimental pharmacology and to organize animal house as per the CPCSEA guidelines.

	Demonstrate the common laboratory techniques like routes of administration, blood withdrawal, anesthetics and euthanasia used for animal studies.
CO408.2	Interpret the effects of various drugs on rabbit eye and ciliary motility of frog esophagus in correlation with humans.
CO408.3	Analyse the effect of drugs acting as enzyme inducers, skeletal muscle relaxants and affecting locomotor activity in laboratory animals.
CO408.4	Predict various screening models for anticonvulsant and anxiolytic activity.
II – II Sem	**Course: Pharmacognosy - I (BP409P)**
CO409.1	Remember different morphological and microscopical characteristic features of crude drugs.
CO409.2	Analyze crude drugs as per regulatory guidelines.
CO409.3	Evaluate the crude drugs by quantitative evaluation methods.
CO409.4	Understand the cellular structure of crude drugs.
III – I Sem	**Course: Medical Chemistry-II (BP501T)**
CO501.1	Categorize drugs acting on GIT based on their mechanism of action, understand their SAR, synthesis and clinical uses.
CO501.2	Categorize the anti-anginal and anti-hypertensive drugs based on their mechanism of action; understand their SAR, synthesis and clinical uses.
CO501.3	Categorize the drugs acting on Cardiovascular system based on their mechanism of action, understand their SAR, synthesis and clinical uses.
CO501.4	Categorize the drugs acting on heart based on their mechanism of action, understand their SAR, synthesis and clinical uses.
CO501.5	Categorize the drugs acting on Endocrine system based on their mechanism of action, understand their SAR, synthesis and clinical uses.
CO501.6	Categorize the anti-diabetics and Local anesthetics based on their mechanism of action, understand their SAR, synthesis and clinical uses.
III – I Sem	**Course: Industrial Pharmacy-I (BP502T)**
CO502.1	Know the importance of preformulation studies, excipients in the development and stability of dosage forms.
CO502.2	Understand the manufacturing techniques, formulation and evaluation methods of Tablets and Liquid oral preparations.
CO502.3	Understand the manufacturing techniques, formulation and evaluation methods of Capsules.
CO502.4	Understand the manufacturing techniques, formulation and evaluation methods of Pellets.
CO502.5	Gain the knowledge on manufacturing techniques, formulation and evaluation methods of Parenteral and Ophthalmic preparations.
CO502.6	Summarize formulation, manufacturing and evaluation of cosmetic preparations, pharmaceutical aerosols and appraise the science of packaging materials.

III – I Sem	**Course: Pharmacology-II (BP503T)**
CO503.1	Describe organization, function, of cardiovascular system and employ the knowledge to study the pharmacological actions of drugs acting on cardiovascular system.
CO503.2	Describe organization, function, of urinary system and employ the knowledge to study the pharmacological actions of drugs acting on urinary system.
CO503.3	Gain the knowledge on pharmacology of autocoids and related drugs.
CO503.4	Summarize the pharmacology of NSAIDS, anti-gout agents and anti-rheumatic agents.
CO503.5	Describe organization, function, of endocrine system and employ the knowledge to study the pharmacological actions of drugs acting on endocrine system.
CO503.6	Predict principles of bioassay and to construct the bioassay methods of various compounds.
III – I Sem	**Course: Pharmacognosy - II (BP504T)**
CO504.1	Outline the metabolic pathway in higher plants and their biogenetic studies.
CO504.2	Summarize the pharmacognistic study of secondary metabolites like alkaloids, glycosides, tannins, volatile oils.
CO504.3	Demonstrate the different types and steps involved in isolation, identification and analysis of Phytoconstituents like terpenoids and glycosides.
CO504.4	Summarize the pharmacognistic study of alkaloids and resins.
CO504.5	Understand the industrial production, estimation and utilization of Phytoconstituents.
CO504.6	Assess the crude drug by modern methods of extraction, spectroscopy, chromatography, isolation and purification.
III – I Sem	**Course: Pharmaceutical Jurisprudence (BP505T)**
CO505.1	Understand about objectives of the Drug and Cosmetics Act.
CO505.2	Gain knowledge about the sale of drugs, labeling of drugs.
CO505.3	Gain knowledge about the code of pharmaceutical ethics with the importance of pharmacist role and pharmacists' oath and to remember Pharmacy Act with the education regulation & to get knowledge about Medical and toilet preparation Act.
CO505.4	Understand the constitution and functions of narcotic & Psychotropic consultative committee and to remember the objectives of, offences and penalties.
CO505.5	Remember the objectives of Drug and Magic remedies Act with the prohibition of certain advertisements and prevention of cruelty to animal Act with ethical committee and guidelines. Know about drug price control order on bulk drugs and the sale price.
CO505.6	Know about the pharmaceutical legislation including different committees and understand about the objectives and rules regulations of Medical Termination and Pregnancy and all types of Intellectual property rights.
III – I Sem	**Course: Industrial Pharmacy-I (BP506P)**
CO506.1	Assess the preformulation studies of drugs and interpret the characteristics of drugs.

CO506.2	Gain the knowledge on formulation and evaluation of tablets, capsules, containers.
CO506.3	Gain the knowledge on formulation and evaluation of injections and ophthalmics.
CO506.4	Prepare and evaluate cosmetics such as lipstick, cold cream and shampoo.
III – I Sem	**Course: Pharmacology-II (BP507P)**
CO507.1	Learn the importance of physiological salt solutions and to identify the effect of various drugs on isolated frog heart, blood pressure and heart rate of dog. Illustrate the diuretic activity of drugs in mice/rats.
CO507.2	Identify the dose response relationship, effect of drugs on DRC and to construct the drug concentrations by various bioassay methods using animal simulator software.
CO507.3	Categorize the PA2 and PD2 value of drugs using rat anococcygeus muscle and guinea pig ileum.
CO507.4	Interpret the effect of spasmogens and spasmolytics using rabbit jejunum. Predict various screening models for analgesic and anti-inflammatory.
III – I Sem	**Course: Pharmacognosy - II (BP508P)**
CO508.1	Remember the wide variety of the crude drugs and their sources by morphological and microscopic characteristics.
CO508.2	Exercise the isolation and detective principles of crude drugs,
CO508.3	Predict the crude drug by performing chromatographic techniques.
CO508.4	Analyze crude drugs by chemical tests.
III - II Sem	**Course: Medical Chemistry-III (BP601T)**
CO601.1	Categorize the antibiotics based on their mechanism of action, understand their SAR, synthesis and clinical uses.
CO601.2	Categorize the antimalarials based on their mechanism of action, understand their SAR, synthesis and clinical uses.
CO601.3	Categorize the anti tubercular and anti infective drugs based on their mechanism of action, understand their SAR, synthesis and clinical uses.
CO601.4	Categorize the anti viral drugs based on their mechanism of action, understand their SAR, synthesis and clinical uses.
CO601.5	Categorize the drugs used to treat infectious diseases based on their mechanism of action, understand their SAR, synthesis and clinical uses.
CO601.6	Apply modern techniques like Quantitative Structure Activity Relationship (QSAR), Prodrug concept, Combinatorial Chemistry and Computer Aided Drug Design (CADD) in rational drug design.
III - II Sem	**Course: Pharmacology - III (BP602T)**
CO602.1	Describe organization, function, of Respiratory and Gastro-intestinal systems and employ the knowledge to study the pharmacological actions of drugs acting on Respiratory and Gastro-intestinal systems.

CO602.2	Understand the principles of chemotherapy and illustrate the mechanism of action of antibiotics.
CO602.3	Analyze the chemotherapy of UTI's, STD's and to categorize the immunopharmacology.
CO602.4	Summarize the chemotherapy of anti-cancer drugs.
CO602.5	Assess the various types of toxicity studies, principles of treatment of poisoning and management of various poisoned conditions.
CO602.6	Understand the principles of toxicology and treatment of metal poisoning. Compile the biological clock and its significance leading to chronotherapy.
III - II Sem	**Course: Herbal Drug Technology (BP603T)**
CO603.1	Recall the fundamental concepts of herbal raw materials and biodynamic agriculture techniques
CO603.2	Understand the concept of formulation and evaluation of neutraceuticals and herbal drug and herbal food interactions.
CO603.3	Acquire the knowledge on formulation and evaluation of herbal cosmetics.
CO603.4	Acquire the knowledge on herbal formulations.
CO603.5	Remember the regulatory guidelines for the assessment of herbal drugs and patenting.
CO603.6	Establish and follow the SOP's, infrastructure of industries as per GMP.
III - II Sem	**Course: Biopharmaceutics and Pharmacokinetics (BP604T)**
CO604.1	Understand basic concepts of absorption, distribution of drugs in body.
CO604.2	Understand basic concepts of elimination of drugs in body. Define and explain the principles and importance of drug products as they are bioavailable and bioequivalent as well as to outline the results by using the hyphenated tools to interpret the results.
CO604.3	Utilize the pharmacokinetic models for the determination of pharmacokinetic parameters.
CO604.4	Understand the application of pharmacokinetic models in design of dosage form.
CO604.5	Able to design multiple dosage regimens based on pharmacokinetic parameters for maximizing patient compliance and therapeutic effectiveness.
CO604.6	Interpret the data and to understand the basic principles of multi-compartmental & nonlinear Pharmacokinetic models.
III - II Sem	**Course: Pharmaceutical Biotechnology (BP605T)**
CO605.1	Remember the basic concepts of biotechnology with respect to enzyme technology, immunology, microbial technology, genetic engineering and protein engineering.
CO605.2	Understand the steps involved in development of biosensors, recombinant products and concepts of immunology. Outline the production parameters important in pharmaceutical product development using principles of biotechnology.
CO605.3	Elaborate on microbial genetics, biotransformation of products.

CO605.4	Understand the various immunological products and its manufacturing process.
CO605.5	Assess the genetic organization of different types of cells and to list detection methods at genomic level, gene transfer methods and mutagens.
CO605.6	Assess the general requirements of fermentative production and biotechnological production of pharmaceuticals.
III - II Sem	**Course: Pharmaceutical Quality Assurance (BP606T)**
CO606.1	Summarize the different levels of pharmaceutical quality development and quality assurance such as cGMP, QC tests, literature and regulatory issues.
CO606.2	Gain knowledge on cGMP perspectives and QA and QC departments roles.
CO606.3	Understand guidelines related to ICH, Q-series, SOP and Testing protocols.
CO606.4	Able to differentiate, and demonstrate the value of personnel responsibilities, training, hygiene and maintenance of stores.
CO606.5	Outline the concept of demands and approval, return handling, recall and waste management, request and assessment. Followed by concepts of master formula record, SOP, quality audit, quality review and recording of quality, distribution reports and articles as well as its application.
CO606.6	Understand calibration principles, certification and validation concepts, validation significance and scale, forms of validation, master plan for validation.
III - II Sem	**Course: Medicinal Chemistry - III (BP607P)**
CO607.1	Synthesize, characterize and purify various medicinal compounds and intermediates.
CO607.2	Analyze the selected drugs present in dosage forms and to determine the assay by using various analytical techniques.
CO607.3	Compare the advantages of microwave technique over conventional synthesis of drugs.
CO607.4	Able to drawing chemical structures and reactions by using software. Predict the relation between physicochemical properties and biological activity.
III - II Sem	**Course: Pharmacology - III (BP608P)**
CO608.1	Recall the dose calculations in pharmacological experiments, and to relate the antiallergic activity / anti-ulcer activity in rat models.
CO608.2	Demonstrate of effect of drugs on gastrointestinal motility and the effect of agonist/antagonists on guinea pig ileum. Construct serum biochemical parameters by using semi auto analyzer.
CO608.3	Analyze effect of saline purgative on frog intestine, insulin hypoglycemic effect and test for pyrogens using rabbit method. .
CO608.4	Predict the pharmacokinetic parameters and adapt the biostatistics methods in experimental pharmacology. Evaluate acute oral toxicity (LD50), acute skin irritation / corrosion and acute eye irritation / corrosion of a test substance C608.6 Predict the pharmacokinetic parameters and adapt the biostatistics methods in experimental pharmacology.

III - II Sem	**Course: Herbal Drug Technology (BP609P)**
CO609.1	Remember different preliminary phytochemical screening of crude drugs.
CO609.2	Able to formulate and evaluate herbal cosmetics.
CO609.3	Apply monographic analysis of herbal drugs as per pharmacopoeias.
CO609.4	Assess the evaluation parameters such as aldehyde and phenol content and total alkaloid content.
IV- I Sem	**Course: Instrumental Methods of Analysis - II (BP701T)**
CO701.1	Understand principle, operation and applications of UV visible spectrophotometer and fluorimetry.
CO701.2	Gain maximum knowledge on characterization and estimation of molecules, ions by spectroscopical techniques.
CO701.3	Elaborate various principles, BP207T and instruments employed for the characterization and analysis of drugs by using chromatographic techniques.
CO701.4	Undersatand the principle, operation and applications of chromatographic techniques.
CO701.5	Create protocol for analysis of pharmaceutical substances by spectroscopic and chromatographic techniques.
CO701.6	Interpret chromatographic separation & analysis of drugs.
IV- I Sem	**Course: Industrial Pharmacy – II (BP702T)**
CO702.1	Gain maximum knowledge on pilot plant scale up techniques and SUPAC guidelines.
CO702.2	Outline various aspects of technology transfer involved from R & D to production departments.
CO702.3	Understand the importance of regulatory affairs for drug approval.
CO702.4	Know the process of drug approval guidelines in india.
CO702.5	Remember the quality management system protocols for quality of products delivery.
CO702.6	Able to process the regulatory requirements for drug approval process in india.
IV- I Sem	**Course: Pharmacy Practice (BP703T)**
CO703.1	Acquire knowledge on organization of hospitals, various methods of distribution and hospital formulary in hospitals and apply it in the practice of pharmacy.
CO703.2	Demonstrate the knowledge of therapeutic drug monitoring, patient medication history interview and to apply the knowledge on assessment of drug related problems.
CO703.3	Evaluate the role of hospital pharmacist in pharmacy and therapeutic committee, drug information services in hospitals.
CO703.4	Remember the role of patient counseling, education and training programs in hospitals.

CO703.5	Understand the professional responsibilities of the clinical pharmacist.
CO703.6	Explain the principles of drug store management and inventory control methods during practice. Interpret clinical laboratory tests of specific disease states to provide better patient centered service.
IV- I Sem	**Course: Novel Drug Delivery Systems (BP704T)**
CO704.1	Understand fundamentals, polymers used in the design of controlled drug delivery systems.
CO704.2	Outline the concepts of formulation and evaluation of oral, mucosal and implantable drug delivery system.
CO704.3	Develop and study oral, mucosal, dermal, pulmonary drug delivery systems over conventional dosage forms for prolonged action.
CO704.4	Understand the mechanism, formulation and evaluation of Nasal drug delivery systems.
CO704.5	Illustrate the principles and fundamentals of drug targeting in the design of site-specific drug delivery system.
CO704.6	Study the importance of site-specific drug delivery systems or devices for ocular and intra uterine routes.
IV- I Sem	**Course: Instrumental Methods of Analysis - II (BP705P)**
CO705.1	Acquire the knowledge in interpretation of UV, IR, NMR, MS spectra's of simple organic compounds for structure.
CO705.2	Understand process, interpret the data obtained through experimentation and report the results as per regulatory requirements.
CO705.3	Acquire the knowledge in operation of HPLC, TLC, column chromatography and paper chromatography.
CO705.4	Understand the separation and identification of compounds by electrophoresis technique.
IV- II Sem	**Course: Biostatistics and research Methodology (BP801T)**
CO801.1	Understand the basic aspects of statistics such as central tendency, dispersion, correlation and regression.
CO801.2	Know the statistical techniques and to apply those to solve the statistical problems
CO801.3	Explain the need of research, research designs and their applications and to explain methodological designs.
CO801.4	Apply the clinical research methods in clinical development of drugs.
CO801.5	Operate statistical tools like M.S. Excel, SPSS, R and MINITAB.
CO801.6	To elaborate design and analysis of experiments and response surface methodology.
IV- II Sem	**Course: Social and Preventive Pharmacy (BP802T)**
CO802.1	Recognize the concepts and evaluation of public health.

CO802.2	Relate food to nutrition health, balanced diet, deficiencies and its prevention.
CO802.3	Illustrate sociocultural factors and its relation with health.
CO802.4	Identify avoidable habits for personal hygiene and health.
CO802.5	Explain the principles on the prevention and control of communicable and non-communicable diseases.
CO802.6	Identify National health programs its objectives functioning and outcomes.
IV- II Sem	**Course: Pharma Marketing Management (BP803T)**
CO803.1	Understand the concept of marketing and able to recognize the aspects related to pharmaceutical market.
CO803.2	Gain knowledge about product decision.
CO803.3	Classify different types of sales promotion.
CO803.4	Know the skills required for sales promotion.
CO803.5	Know different channels of product promotion in market.
CO803.6	Know the principles of drug pricing according to DPCO and NPPA.
IV- II Sem	**Course: Pharmaceutical Regulatory Science (BP804T)**
CO804.1	Recall the concepts of Drug discovery, development process, clinical studies and generic drug product development.
CO804.2	Understand the basic guidelines of drug regulatory approval process.
CO804.3	Know the regulatory registration process of Indian drugs in overseas market.
CO804.4	Understand about technical documents like DMF, CTD, eCTD and ACTD.
CO804.5	Assimilate the process of clinical trials and pharmacovigilance as well as to understand obligations of GCP in clinical trials.
CO804.6	Understand the concepts of Regulatory science in pharmaceutical industry as well as to make use of regulatory guidelines.
IV - II Sem	**Course: Pharmacovigilance (BP805T)**
CO805.1	Recall the history, scope, development and basic terms used in pharmacovigilance.
CO805.2	Able to utilize Drug dictionaries, coding, information resources in Pharmacovigilance programme.
CO805.3	Understand methods of pharmacovigilance and communication process during ADR reporting
CO805.4	Analyze the concepts of ADR reporting by using software.
CO805.5	Appraise safety data generation and ICH guidelines in pharmacovigilance.
CO805.6	Build the ability to report adverse drug reactions through various ADR reporting forms.

IV - II Sem	Course: Quality control and Standardization of Herbal drugs (BP806T)
CO806.1	Remember the WHO guidelines for the quality control of herbal drugs.
CO806.2	Outline the quality assurance in herbal drug industry including CGMP.
CO806.3	Understand EU guidelines for the quality control, safety and efficacy of herbal drugs.
CO806.4	Understand ICH guidelines for the quality control, safety and efficacy of herbal drugs.
CO806.5	Gain the knowledge on stability testing of herbal drugs. Know the procedure for export of drugs and new drug approval.
CO806.6	Know the regulatory requirements of herbal medicines.
IV - II Sem	Course: Computer Aided Drug Design (BP807T)
CO807.1	Understand stages in drug discovery and development, lead discovery based on metabolism and clinical observation and also analog based drug design of molecular modeling and virtual screening techniques.
CO807.2	Able to perform QSAR in drug design by using software tools.
CO807.3	Understand the basic concepts of molecular docking.
CO807.4	Apply the molecular docking techniques to examine the binding interactions of ligand with molecular targets.
CO807.5	Explain the applications of bioinformatics, chemo informatics, ADME databases, chemical, biochemical and pharmaceutical databases relevant to drug design
CO807.6	Discuss the conformational analysis of molecules using molecular and quantum mechanics approach and also determine the global conformational minima.
IV- II Sem	Course: Cell and Molecular Biology (BP808T)
CO808.1	Summarize the history, functioning and composition of cell and molecular biology.
CO808.2	Describe the chemical foundations of cell biology. Summarize the DNA properties of cell biology.
CO808.3	Understand the structure, synthesis and function of proteins.
CO808.4	Apply the structure of protein in molecular docking studies.
CO808.5	Describe the cell membrane structure and function.
CO808.6	Summarize the cell cycle and elaborate how cell communication occur and discuss mechanisms of receptors for cell signaling/signaling pathways/Protein kinase.
IV- II Sem	Course: Cosmetic Science (BP809T)
CO809.1	Remember classification and historical evolution of cosmoceuticals, cosmetic excipients. Understand the basic structure of skin, hair and oral cavity.
CO809.2	Understand the principles of formulation and building blocks of various skin care products and hair care products.
CO809.3	Understand the principles of formulation and evaluation of sun screen products.

CO809.4	Understand the principles of formulation and evaluation of herbal products.
CO809.5	Understand the principles of cosmetic evaluation.
CO809.6	Apply the knowledge gained and develop cosmetics to solve problems associated with skin, hair and scalp.
IV- II Sem	**Course: Experimental Pharmacology (BP810T)**
CO810.1	Understand CPCSEA/OECD guidelines for maintenance, breeding and conduct of experiments on laboratory animals and to demonstrate different laboratory/transgenic/ mutant animals, various routes of administration, techniques of blood collection and euthanasia.
CO810.2	Outline various preclinical screening models for diuretics, hypnotics, antiasthmatics and drugs acting on CNS.
CO810.3	Construct preclinical screening models for drugs acting on ANS, eye.
CO810.4	Construct preclinical screening models for local anesthetics.
CO810.5	Construct preclinical screening models for drugs acting on CVS.
CO810.6	Compile research methodology and biostatistics in pharmacological screening methods.
IV - II Sem	**Course: Advanced Instrumentation Techniques (BP811T)**
CO811.1	Understand the principle and procedure involved in NMR and mass spectrophotometer.
CO811.2	Gain knowledge on characterization and estimation of drugs by thermal techniques and X-ray diffraction techniques.
CO811.3	Simplify the importance of calibration of analytical instruments as per ICH and USFDA guidelines.
CO811.4	Analyze the validation parameters according ICH guidelines.
CO811.5	Gain knowledge on RIA and principles involved in extraction techniques.
CO811.6	Summarize the principle, instrumentation and applications of hyphenated techniques.
IV - II Sem	**Course: Dietary Supplements and Nutraceuticals (BP812T)**
CO812.1	Classify and remember the functional foods, Nutraceuticals and dietary supplements.
CO812.2	Interpret the applications of phytochemicals as Nutraceuticals like sulfies, phytochemicals as Nutraceuticals like sulfides, polyphenolics, flavonoids, probiotics, Tocopherols, proteins, minerals etc.
CO812.3	Analyse the role of dietary fibres and complex carbohydrates as functional food ingredients.
CO812.4	Identify the damaging reactions of free radicals on terpenoids, carbohydrates, proteins and nucleic acids.
CO812.5	Role of functional foods in various disease conditions.

CO812.6	Discuss the regulatory aspects, adulteration of dietary fibres and Neutraceuticals and their pharmacopoieal specifications.
IV – II Sem	**Project Work**
CO813.1	Define the fundamentals, carry out the literature review on the proposed research work and identify the problem.
CO813.2	Develop the research hypothesis.
CO813.3	Summarise the requirements in the proposed research.
CO813.4	Take part in research experiments and documented.
CO813.5	Evaluate the work done by applying statistic tools.
CO813.6	Appraise societal application and appreciation.