First Year B. Pharm

Semester- I

Subject: Human Anatomy and Physiology-I (Theory) **Subject Code: BP101T**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP101T.1 Develop a vocabulary of appropriate terminology to effectively communicate information related to human anatomy and physiology.

CBP101T.2 Explain the structures and function of cell, tissue and its subtypes.

CBP101T.3 Explain the composition and functions of skeletal system and joints.

CBP101T.4 Recognize the anatomical structures and explain the physiological functions of few body systems and sense organs.

CBP101T.5 Explain the principles of homeostasis and the use of feedback loops to control physiological systems in the human body.

Subject: Pharmaceutical Analysis-I (Theory) **Subject Code: BP102T**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP102T.1 Explain the relevance & significance of Pharmaceutical Analysis

CBP102T.2 Describe titrimetric methods of analysis with principles, indicators used therein and applications.

CBP102T.3 Discuss gravimetric method of analysis.

CBP102T.4 Explain the basics of electrochemical analysis for quantitative and qualitative analysis

Subject: Pharmaceutics-I (Theory) **Subject Code: BP103T**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP103T.1 Discuss the history of pharmacy, development of pharmacy profession and industry in India.

CBP103T.2 Explain development and latest edition of Pharmacopoeia and other compendia

CBP103T.3 Discuss history and principles of alternative system of medicines.

CBP103T.4 Describe various routes of drug administration, concept of dosage forms, and formulation of solution.

CBP103T.5 Describe various preformulation parameters and classify excipients with its examples.

CBP103T.6 Explain the importance of quality control and quality assurance.

Subject: Pharmaceutical Inorganic Chemistry Theory **Subject Code: BP104T**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP104T.1 Explain relevance & significance of inorganic chemistry.

CBP104T.2 List different pharmacopoeia and explain monographs, purity of pharmaceuticals and limit tests for impurities and different official waters.

CBP104T.3 Explain and categorise pharmaceutical aids and necessities, acids, bases, buffers and their official compounds with their significance in pharmacy.

CBP104T.4 Summarise electrolytes, their types and application in pharmaceuticals and biologicals.

CBP104T.5 Categorise dental products, antidotes, gastrointestinal agents, ions, expectorants, emetics, haematinics, poison and antidotes, astrigents and radiopharmaceuticals with their official preparations and pharmaceutical applications

Subject: Communication Skills (Theory) **Subject Code: BP105 T**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP105T.1 To understand the behavioral needs for a Pharmacist to function effectively in the areas of pharmaceutical operation.

CBP105T.2 To communicate effectively verbal as well as nonverbal.

CBP105T.3 Effectively manage the team as a team player and develop Leadership qualities and essentials.

CBP105T.4 To develops interview skills, presentation skills and group discussion skills.

Subject: Remedial biology (Theory) **Subject Code: BP106RBT**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP106RBT.1 Explain the classification and salient features of five kingdoms of life.

CBP106RBT.2 Explain the basic concepts of anatomy & physiology of plants.

CBP106RBT.3 Explain the basic concepts of anatomy & physiology animals with special reference to human.

Subject: Remedial Mathematics Theory **Subject Code: BP106RMT**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP106RMT.1 Apply the knowledge of matrices and determinants in solving Pharmacokinetic equations.

CBP106RMT.2 Apply the lessons learnt in fractions and logarithms for solving pharmaceutical problems.

CBP106RMT.3 Apply knowledge of Calculus and Integration in solving pharmaceutical problems.

CBP106RMT.4 Apply knowledge of Differential equations in solving pharmaceutical problems.

Subject: Human Anatomy and Physiology-I (Practical) Subject Code: BP107P

Course learning objectives related to knowledge, skill and attitude: on completion of laboratory experiments, learner should be able to:

CBP107P.1 Investigate hematological functions/parameters by direct participation in laboratory experimentation, data collection, and analysis including homeostasis

CBP107P.2 Investigate physiologic functions by direct participation in laboratory experimentation, data collection, and analysis for clinical experiments

CBP107P.3 Compare and contrast the gross and microscopic anatomy of the cells, tissues, organs, sense organs and organ systems of the body

CBP107P.4 Compare and contrast the normal microanatomy of the basic tissue types (epithelia, connective, muscle, nervous) and their subtypes with attention to the details of cellular and intracellular morphology, stratification, nature of the interstitial material and anatomic location in the organ systems under study.

CBP107P.5 Compare and contrast the normal gross and microscopic anatomy of the body organs and organ systems (integumentary, skeletal, CVS and blood and body fluids and PNS) with emphasis on the size, shape, internal architecture, microanatomy, anatomic relationships, and locations.

Subject: Pharmaceutical Analysis –I (Practical) Subject Code: BP108P

Course learning objectives related to knowledge, skill and attitude: on completion of laboratory experiments, learner should be able to:

CBP108P.1 Summarize the different analytical laboratory equipments, basic operations and safety measures while working in a Pharmaceutical Analysis Lab.

CBP108P.2 List different analytical reagents according to grade, purity and strength requirement.

CBP108P.3 Apply the theoretical principles in pharmaceutical analysis of different pharmaceutical dosage forms, APIs and powders using the titrimetric techniques.

CBP108P.4 Perform electro analytical methods for pharmaceutical

Subject: Pharmaceutics-I (Practical) **Subject Code: BP109P**

Course learning objectives related to knowledge, skill and attitude: on completion of laboratory experiments, learner should be able to:

CBP109P.1 Demonstrate skill of preparation and evaluation of monophasic liquids.

CBP109P.2 Explain principles of formulation and evaluation of powder preparations.

CBP109P.3 Perform pharmaceutical calculations to determine parameters like density, specific gravity, angle of repose, Carr's index and Hausner's ratio

CBP109P.4 Draw the labels in prescribed manner including all the component/parts.

Subject: Pharmaceutical Inorganic Chemistry (Practical) **Subject Code: BP110P**

Course learning objectives related to knowledge, skill and attitude: on completion of laboratory experiments, learner should be able to:

CBP110P.1 Perform few limit test and explain its significance.

CBP110P.2 Perform identification tests for inorganic compounds.

CBP110P.3 Prepare some inorganic pharmaceutical compounds.

CBP110P.4 Determine swelling index, acid neutralizing property, presence of iodate and iodine in some inorganic compounds.

Subject: Communication Skills Practical (Practical) **Subject Code: BP111P**

Course learning objectives related to knowledge, skill and attitude: on completion of laboratory experiments, learner should be able to:

CBP111P.1 To develop basic communication skills using English language lab software

CBP111P.2 To learn and practice different types of pronunciations.

CBP111P.3 To improve advanced learning using English language lab software.

CBP111P.4 To develop writing skills, interview handling skills, presentation skills and group discussion skills using English language lab software.

Subject: Remedial Biology (Practical) **Subject Code: BP112RBP**

Course learning objectives related to knowledge, skill and attitude: on completion of laboratory experiments, learner should be able to:

CBP112RBP.1 Demonstrate different techniques used in histology

CBP112RBP.2 Explain the structure of cell of animal and plants with its inclusions

CBP112RBP.3 Study of different physiological parameters of human

CBP112RBP.4 Illustrate study of frog using computer model

First Year B. Pharm

Semester- II

Subject: Human Anatomy and Physiology-II (Theory) **Subject Code: BP201T**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP201T.1 Develop a vocabulary of different body parameters to effectively communicate information related to human anatomy and physiology.

CBP201T.2 Explain the structure and functions of nervous, digestive, respiratory, urinary endocrine and reproductive system.

CBP201T.3 Discuss the genetics and energetics

Subject: Pharmaceutical Organic Chemistry-I (Theory) **Subject Code: BP202T**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP202T.1 Understand and explain the basic principles of organic chemistry, structure, name and type of isomerism of organic compound

CBP202T.2 Understand the reaction, name of the reaction and orientation of reactions.

CBP202T.3 Account for reactivity and stability of alkanes, alkenes and conjugated dienes.

CBP202T.4 Demonstrate the structure, uses and identification test for alkyl halides, alcohols, carbonyl compounds, carboxylic acids and aliphatic amines.

Subject: Biochemistry (Theory) **Subject Code: BP203T**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP203T.1 Identify the classes of biomolecules with concept of cell metabolism.

CBP203T.2 Explain how the metabolism of glucose leads ultimately to the generation of large quantities of ATP.

CBP203T.3 Understand the metabolism of nutrient molecules in physiological and pathological conditions.

CBP203T.4 Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.

CBP203T.5 Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes.

Subject: Pathophysiology (Theory) **Subject Code: BP204T**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP204T.1 Describe basic principles of cell injury and mechanism of inflammation

CBP204T.2 Discuss pathophysiology of disorders viz CVS, CNS, Respiratory system, GIT, Endocrine system including Cancer

CBP204T.3 Describe pathophysiology of disorders of Bones and Joints

CBP204T.4 Explain pathophysiology of selected infectious diseases including STDs

Subject: Computer Application In Pharmacy (Theory) **Subject Code: BP205T**
Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP205T.1 Describe different application of computers in pharmaceutical industry

CBP205T.2 Explain several types of databases used in Pharmacy

CBP205T.3 Identify various applications of databases in pharmacy

CBP205T.4 Understand importance of computers in preclinical pharmacy

Subject: Environmental Sciences (Theory) **Subject Code: BP206T**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP206T.1 Elaborate the natural resources available, their advantages and disadvantages on the human and animal health and plants.

CBP206T.2 Explain the ecology, energy flow and various ecosystems in the environment describing the biodiversity of state and India

CBP206T.3 Describe various environmental pollution, roll of individual in the pollution and disaster management.

Subject: Human Anatomy and Physiology-II (Practical) **Subject Code: BP207P**

Course learning objectives related to knowledge, skill and attitude: on completion of laboratory experiments, learner should be able to:

CBP207P.1 Investigate hematological functions/parameters by direct participation in laboratory experimentation, data collection, and analysis including homeostasis

CBP207P.2 Demonstrate and aware the students related to various parameters used to check and regulate the normal functions of human body including visit to hospital /pathology laboratory.

CBP207P.3 Clarify structural and microscopically aspects of various organs system of human.

CBP207P.4 Investigate the normal hemostasis by use of negative and positive feedback system and demonstration of family planning devices and pregnancy diagnosis test.

CBP207P.5 Develop laboratory discipline organize the work in the laboratory. Follow the instructions given in the laboratory

Subject: Pharmaceutical Organic Chemistry-I (Practical) Subject Code: BP208P
Course learning objectives related to knowledge, skill and attitude: on completion of laboratory experiments, learner should be able to:

CBP208P.1 Perform laboratory work in safe and tidy manner

CBP208P.2 Perform Qualitative Analysis of Organic Compounds including characteristics of elements, functional group, and characterization of unknown organic compound by derivatization.

CBP208P.3 Set up the methods of preparation, crystallization and determination of physical properties, covering various chemical reactions.

CBP208P.4 Experiment the work-up procedure for a reaction.

Subject: Biochemistry (Practical) Subject Code: BP209P
Course learning objectives related to knowledge, skill and attitude: on completion of laboratory experiments, learner should be able to:

CBP209P.1 Detect and identify proteins, amino acids and carbohydrates by various qualitative as well as quantitative tests.

CBP209P.2 Detect and identify abnormal constituents of urine by various qualitative tests.

CBP209P.3 Detect presence of some serum constituents like creatinine, sugar and total cholesterol and study its significance.

CBP209P.4 Demonstrate action of salivary amylase on starch and understand denaturation of enzymes along with enzymatic hydrolysis, effect of temperature and substrate concentration

Subject: Computer Application In Pharmacy (Practical) Subject Code: BP210P

Course learning objectives related to knowledge, skill and attitude: on completion of laboratory experiments, learner should be able to:

CBP210P.1 To create a HTML web page to show personal information

CBP210P.2 To design a form in MS Access to view, add, delete and modify the patient record in the database.

CBP210P.3 To creating and working with queries in MS Access and exporting tables, queries, forms and reports to web pages

Second Year B. Pharm

Semester -III

Subject: Pharmaceutical Organic Chemistry-II (Theory) **Subject code: BP301T**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP301T.1	Explain the concept of aromaticity in benzene & its derivatives with its methods of preparation & reactions
CBP301T.2	Describe methods of preparation, reactions and uses of Phenols and Aromatic Amines
CBP301T.3	Recognize and draw stereoisomers including optical & geometrical isomers with their nomenclature & methods of determination
CBP301T.4	Describe methods of preparation, reactions and uses of Polynuclear hydrocarbons
CBP301T.5	Explain stabilities of cycloalkanes with their methods of preparation and reactions
CBP301T.6	Explain Saponification and Rancidity of fats and oils with their chemical reactions

Subject: Physical Pharmaceutics I (Theory) **Subject Code: BP302T**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP302T.1	Investigate and apply various theories, laws and equations related to different states of matter
CBP302T.2	Distinguish the principles of complexation/ protein binding & understanding its applications for calculations of drug release and stability constant.
CBP302T.3	Demonstrate use of physicochemical properties of drugs in the formulation development and evaluation of dosage forms.
CBP302T.4	Understand the importance of solubility and methods of determination of solubility of various API.
CBP302T.5	Understand the concept of surface and interfacial tension and their applications in pharmaceuticals.
CBP302T.6	Understanding and applying the knowledge of Buffers and Isotonic solutions in the formulation and development of various dosage form.

Subject: Pharmaceutical Microbiology (Theory) **Subject Code: BP303T**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP303T.1	Explain methods of identification, cultivation and preservation of various microorganisms.
CBP303T.2	Understand the effectiveness of sterilization processes implemented in pharmaceutical industry.
CBP303T.3	Understand mode of action disinfectants, sterility testing & microbiological assays of various pharmaceutical products.
CBP303T.4	Summarize types of microbial spoilages & preservation of pharmaceutical products.
CBP303T.5	Outline the cell culture technology and its applications in pharmaceutical industries.

Subject: Pharm Engineering (Theory) **Subject Code: BP304T**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP304T.1	To know various unit operations used in Pharmaceutical industries
CBP304T.2	To understand the material handling techniques.
CBP304T.3	To perform various processes involved in pharmaceutical manufacturing process.
CBP304T.4	To carry out various tests to prevent environmental pollution.
CBP304T.5	To appreciate and comprehend significance of plant lay out design for optimum use of resources.
CBP304T.6	To appreciate the various preventive methods used for corrosion control in Pharmaceutical industries.

Subject: Pharmaceutical Organic Chemistry-II (Practical) **Subject Code: BP305P**

Course learning objectives related to knowledge, skill and attitude: on completion of laboratory experiments, learner should be able to:

CBP305T.1 Perform laboratory work in safe and tidy manner.

CBP305T.2 Perform experiments involving laboratory techniques like recrystallization, steam distillation.

CBP305T.3 Perform determination of oil values (including standardization of reagents).

CBP305T.4 Perform synthesis of organic compounds.

Subject: Physical Pharmaceutics-I (Practical) **Subject Code: BP306P**

Course learning objectives related to knowledge, skill and attitude: on completion of laboratory experiments, learner should be able to:

CBP306T.1 Calculate surface tension of given liquid, critical micelle concentration and HLB value of given surfactant.

CBP306T.2 Determine partition coefficient of drug in O/W system and understanding its importance in formulation development.

CBP306T.3 Understanding the phase rule and determining % composition of NaCl in a solution using phenol-water system by CST method.

CBP306T.4 Determining pKa value of drug substances using Half Neutralization/ Henderson Hasselbalch equation and applying this knowledge in formulating suitable drug delivery system to improve bioavailability

CBP306T.5 Determination of stability constant and donor acceptor ratio of various complexes by pH titration and solubility method.

CBP306T.6 Determine thermodynamic parameters and refractive index of given samples.

Subject: Pharmaceutical Microbiology (Practical) **Subject Code: BP307P**

Course learning outcomes related to Knowledge, Skills & attitude: On completion of following laboratory experiments, learner should be able to:

CBP307T.1	Apply the knowledge in operating various instruments & scientific techniques.
CBP307T.2	Demonstrate various staining procedures for studying morphology of bacteria & observe the motility of bacteria.
CBP307T.3	Isolate bacteria by streak plate technique & count them by pour plate technique.
CBP307T.4	Carry out microbiological standardization of Pharmaceuticals.
CBP307T.5	Perform bacteriological analysis of water and sterility testing of pharmaceutical products.

Subject: Pharm Engineering (Practical) **Subject Code: BP308P**

Course learning outcomes related to Knowledge, Skills & attitude: On completion of following laboratory experiments, learner should be able to:

CBP308T.1	To understand the principle, mechanism, factors affecting and applications of the various unit operations
CBP308T.2	To appraise various laws governing the unit operations.
CBP308T.3	To understand the construction, working and application of Pharmaceutical Machinery.
CBP308T.4	To demonstrate the various pharmaceutically important processes and equipments.

Second Year B. Pharm

Semester –IV

Subject: Pharmaceutical Organic Chemistry-III (Theory) **Subject Code: BP401T**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP401T.1	Explain stereoisomerism with chirality, racemic modification & its resolution and asymmetric synthesis with suitable examples
CBP401T.2	Explain conformational isomerism and stereospecific and stereoselective reactions.
CBP401T.3	Describe and categorise heterocyclic compounds with their structures, numbering, types, synthesis, reactivity and their applications in medicinal chemistry.
CBP401T.4	Explain various name reactions along with their mechanism & synthetic importance

Subject: Medicinal Chemistry-I (Theory) **Subject Code: BP402 T**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP402T.1	To understand the chemistry of drugs with respect to their pharmacological activity.
CBP402T.1	To understand the drug metabolic pathways, adverse effect and therapeutic value of drugs.
CBP402T.1	To know the Structural Activity Relationship (SAR) of different class of drugs.
CBP402T.1	To study and write the chemical synthesis of selected drugs.

Subject: Physical Pharmaceutics II (Theory) **Subject Code: BP403T**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP403T.1	Relate various physicochemical properties of drug and excipient molecules in designing the dosage forms.
CBP403T.2	Distinguish the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations.
CBP403T.3	Demonstrate the behavior and mechanism of drugs and excipients in the formulation development and evaluation of dosage forms.
CBP403T.4	Understand the concept of rheology and its applications in pharmaceutical industries.
CBP403T.5	Understanding the micromeritics and its applications in designing various drug delivery systems.

Subject: Pharmacology- I (Theory) **Subject Code: BP404T**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP404T.1	Discuss terms and concepts related to pharmacology viz. pharmacokinetics, pharmacodynamics, adverse drug reactions, drug interactions, including route of drug administration.
CBP404T.2	Discuss about drug receptors including qualitative and quantitative actions of drugs on receptors.
CBP404T.3	Discuss about study of mechanism of action, pharmacodynamics, pharmacokinetics, adverse effects, clinical uses, drug interactions, doses, contraindications and route of administration of drugs acting on peripheral and central nervous system.

Subject: Pharmacognosy and Phytochemistry-II (Theory) **Subject code: BP405T**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP405T.1 Explain meaning of term 'Pharmacognosy' & quality control of natural origin drugs.

CBP405T.2 Comprehend the significance of cultivation, collection, processing & storage of crude drugs including conservation of medicinal plants.

CBP405T.3 Appraise the importance of plant tissue culture for enhancement of secondary metabolites.

CBP405T.4 Outline tissue system, macroscopy & anatomy of different parts of plant, illustrate definition, classification, properties, & test for identification of Secondary metabolites.

CBP405T.5 Describe source, chemistry, extraction, uses systematic pharmacognostic study and commercial utility of primary metabolites.

Subject: Medicinal Chemistry-I (Practical) **Subject Code: BP406P**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP406P.1 Explain correct use of various equipment & take safety measures while working in Medicinal Chemistry Laboratory.

CBP406P.2 To demonstrate skills of recrystallization, Chromatography and vacuum distillation for purification of drugs and drugs intermediate.

CBP406P.3 To synthesize, recrystallize and understand reaction mechanisms involved in synthesis of medicinally important organic compounds.

CBP406P.4 To characterize and interpret synthesized medicinally important organic compounds using IR and purification techniques.

Subject: Physical Pharmaceutics II (Practical) **Subject Code: BP407P**

Course learning objectives related to knowledge, skill and attitude: on completion of laboratory experiments, learner should be able to:

CBP407P.1 Determine of particle size, particle size distribution, flow propertoes bulk density, true density and porosity using various methods.

CBP407P.2 Determine viscosity of liquids and semisolids by various methods.

CBP407P.3 Determine sedimentation rate and sedimentation volume, Cloud and Kraft points of given surfactants,

CBP407P.4 Determine reaction rate constant.

CBP407P.5 To carry out stability studies.

Subject: Pharmacology- I (Practical) **Subject Code: BP408P**

Course learning objectives related to knowledge, skill and attitude: on completion of laboratory experiments, learner should be able to:

CBP408P.1 Discuss the basic of experimental pharmacology, commonly used instruments and care & handing of laboratory animals as per CPCSEA guidelines.

CBP408P.2 Describe different methods for blood withdrawal, anesthetics, euthanasia and different routes of drugs administration.

CBP408P.3 Explain different basic animal models to determine effect of drugs on peripheral and central nervous system including effect on hepatic microsomal enzyme inducers on the phenobarbitone sleeping time.

CBP408P.4 Develop laboratory discipline organize the work in the laboratory. Follow the instructions given in the laboratory.

Subject: Pharmacognosy and Phytochemistry-II (Practical) **Subject Code: BP409P**

Course learning objectives related to knowledge, skill and attitude: on completion of laboratory experiments, learner should be able to:

CBP409P.1 Demonstrate Qualitative analysis of unorganized crude drugs.

CBP409P.2 Explain the significance of quantitative microscopy & proximate chemical analysis.

CBP409P.3 Apply theoretical knowledge of various quality control parameters studied in theory.

Third Year B. Pharm
Semester- V

Subject: Medicinal Chemistry-II (Theory) **Subject Code: BP501T**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP501P.1 Understand the chemistry of drugs with respect to their pharmacological activity.

CBP501P.2 Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs.

CBP501P.3 Know the Structural Activity Relationship (SAR) of different class of drugs.

CBP501P.4 Study and write the chemical synthesis of selected drugs.

Subject: Industrial Pharmacy –I (Theory) **Subject Code: BP502T**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP502P.1 Know the various pharmaceutical dosage forms and their manufacturing techniques.

CBP502P.2 Know various considerations in development of pharmaceutical dosage forms.

CBP502P.3 Formulate solid, liquid and semisolid dosage forms and evaluate them for their Quality.

Subject: Pharmacology- II **Subject Code: BP503T**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP503P.1 Discuss pharmacology drugs acting on cardiovascular system including Diuretics.

CBP503P.2 Discuss pharmacology of autacoids and related drugs.

CBP503P.3 Discuss pharmacology drugs acting on endocrine system.

CBP503P.4 Acquaint with basics of bioassay including few examples.

Subject: Pharmacognosy and Phytochemistry- II (Theory) **Subject Code: BP504T**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP504T.1	Understand & explain tools & techniques used in study of biosynthetic pathways in plants along with difficulties thereof.
CBP504T.2	Assess significance of secondary metabolite as medicinal molecule for industrial utility
CBP504T.3	Describe modern extraction, isolation & Characterization techniques for various secondary metabolites
CBP504T.4	Illustrate Indussstrial production, estimation and utilization of the phytoconstituents.

Subject: Pharmaceutical Jurisprudence (Theory) **Subject Code: BP 505 T**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP505T.1	Understand history of Pharmaceutical legislations and conduct of code of ethics regarding pharmacy profession in India.
CBP505T.2	Discuss various techniques of extraction, isolation and detection of Phytoconstituents.
CBP505T.3	Study Pharmacy Act, Medicinal and Toilet Preparation Act, Narcotics and Psychotropic Substances Act, Features of Drugs and Magic Remedies Act and Medical Termination of Pregnancy Act
CBP505T.4	Study Prevention of Cruelty to animals Act, National Pharmaceutical Pricing Authority and Right to Information Act.
CBP505T.5	Study of Introduction to Intellectual Property Rights (IPR).

Subject: Industrial Pharmacy –I (Practical) **Subject Code: BP506P**

Course learning objectives related to knowledge, skill and attitude: on completion of laboratory experiments, learner should be able to:

CBP506P.1 Demonstrate the correct use of various equipment in pharmaceutics laboratory relevant to tablets, capsules, parenteral, semisolids and pharmaceutical packaging material evalution.

CBP506P.2 Explain formulation, evaluation and labeling of tablets & capsules, parenteral And semisolids as per regulatory requirements.

CBP506P.3 Understand use of excipients in formulation of tablet, capsules, semisolids and parenteral preparations.

CBP506P.4 Perform evaluation of glass containers as per IP.

Subject: Pharmacology- II (Practical) **Subject Code: BP507P**

Course learning objectives related to knowledge, skill and attitude: on completion of laboratory experiments, learner should be able to:

CBP507P.1 Discuss the basic concept and technique of *in-vitro* pharmacology.

CBP507P.2 Demonstrate isolation of different organs/tissues from the laboratory animals by simulated experiments including different receptor action.

CBP507P.3 Explain different basic animal models to determine effect of drugs on blood pressure, heart rate, diuretic activity, anti-inflammatory and analgesic activity

CBP507P.4 Demonstrate different types bio-assays using different chemical/drugs including PD_2 and PA_2 value.

CBP607P.5 Develop laboratory discipline organize the work in the laboratory Follow the instructions given in the laboratory.

Subject: Pharmacognosy and Phytochemistry- II (Practical) **Subject Code: BP508P**

Course learning objectives related to knowledge, skill and attitude: on completion of laboratory experiments, learner should be able to:

CBP508P.1	Identify and interpret the crude drugs by pharmacognostic study.
CBP508P.2	Discuss various techniques of extraction, isolation and detection of Phytoconstituents.
CBP508P.3	Describe quantitative estimation of phytoconstituents.
CBP508P.4	Illustrate chromatographic evaluation (TLC) of herbal extracts.
CBP508P.5	Discuss distillation of volatile oil & judge the quality of volatile oil by TLC.
CBP508P.6	Demonstrate Qualitative analysis of unorganized crude drugs.

Third Year B. Pharm
Semester- VI

Subject: Medicinal Chemistry-III (THEORY) **Subject Code: BP601T**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP601T.1	To understand the chemistry of drugs with respect to their pharmacological Activity.
CBP601T.2	To understand the drug metabolic pathways, adverse effect and therapeutic value of drugs.
CBP601T.3	To know the Structural Activity Relationship (SAR) of different class of drugs.
CBP601T.4	To study and write the chemical synthesis of selected drugs.
CBP601T.5	Study of the development of the following classes of drugs, Classification, mechanism of action, uses of drugs mentioned in the course, Structure activity relationship of selective class of drugs as specified in the course and synthesis of drugs.

Subject: Pharmacology- III (Theory) **Subject Code: BP602T**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP602T.1	Discuss pharmacology drugs acting on respiratory and gastrointestinal system chemotherapeutic agents including cancer.
CBP602T.2	Discuss principles of toxicology.
CBP602T.3	Discuss insight of chronopharmacology.

Subject: Herbal Drug Technology (Theory) **Subject Code: BP603T**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP603T.1	Comprehend & explain identification, authentication and processing of herbal raw material, understand & explain principle & treatment aspects of traditional systems of medicines; along with method of preparation of Ayurvedic dosage forms.
CBP603T.2	Compare & contrast nutraceuticals, functional foods & its significance along with safe use of natural products, possible toxicities & interaction.
CBP603T.3	Understand & explain significance of novel drug delivery of natural products, know herbal cosmetics, herbal excipients & herbal formulation.
CBP603T.4	Know the WHO and ICH guidelines for evaluation of herbal drugs including stability testing and appreciate patenting of herbal drugs, GMP

Subject: Bio-Pharmaceutics & Pharmacokinetics (Theory) **Subject Code: BP604T**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP604T.1	Understand the concept of bio pharmaceutics and its applications in formulation development.
CBP604T.2	Discuss various pharmacokinetic processes and their relevance in dosage form design.
CBP604T.3	Explain the concepts of bioavailability and bioequivalence.
CBP604T.4	Discuss nonlinear pharmacokinetics, compartment and non-compartment models of analysis.
CBP604T.5	Explain mechanisms of dissolution and in vitro in vivo correlation.

Subject: Pharmaceutical Biotechnology (Theory) **Subject Code: BP605T**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP605T.1	Discuss the importance and Application of Immobilized enzymes.
CBP605T.2	Understand concepts of recombinant DNA technology, genetic engineering, fermentation technology and its applications in production of pharmaceuticals.
CBP605T.3	Explain production of Monoclonal antibodies
CBP605T.4	Discuss various immune blotting techniques

Subject: Quality Assurance (Theory) **Subject Code: BP606T**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP606T.1	To Understand importance of QA, QC, GMP, TQM, QbD, NABL and ISO.
CBP606T.2	Study the organizational and personnel responsibilities related to organizational premises, equipment's and raw materials used for different purposes.
CBP606T.3	Study the quality control tests and good laboratory practices in pharmaceutical industry
CBP606T.4	Importance of document maintenance in pharmaceutical industry and handling the complaints related to documentation.
CBP606T.5	Study procedures for performance of Calibration and Validation of equipment.

Subject: Medicinal Chemistry-III (Practical) **Subject Code: BP607P**

Course learning objectives related to knowledge, skill and attitude: on completion of laboratory experiments, learner should be able to:

CBP607P.1	Explain correct uses of various equipment's & take safety measures while working in Medicinal Chemistry Laboratory
CBP607P.2	To draw the structures and reactions using Chem draw®.
CBP607P.3	To synthesize medicinally important compounds by microwave assisted synthesis
CBP607P.4	Explain reaction mechanisms involved in synthesis of compounds.
CBP607P.5	To determine the physicochemical properties such as logP, clogP, MR, Molecular weight etc
CBP607P.6	To calculate hydrogen bond donors and acceptors for class of drugs using drug design software Drug likeliness screening (Lipinski's RO5)

Subject: Pharmacology- III (Practical) **Subject Code: BP608P**

Course learning objectives related to knowledge, skill and attitude: on completion of laboratory experiments, learner should be able to:

CBP608P.1	Explain different animal models to determine effect of drugs on gastrointestinal tract and diabetes
CBP608P.2	Explain different toxicity test viz. LD50, skin irritation, eye irritation including pharmacokinetic insight and biochemical estimation
CBP608P.3	Demonstrate conduct of different bio-assays, conduct of bio statistical test and mydriatic and miotic effects of drugs on rabbit eye
CBP608P.4	Evaluate of products natural origin.
CBP608P.5	Develop laboratory discipline organize the work in the laboratory Follow the instructions given in the laboratory

Subject: Herbal Drug Technology (Practical) **Subject Code: BP609P**

Course learning objectives related to knowledge, skill and attitude: on completion of laboratory experiments, learner should be able to:

CBP609P.1	Identify and interpret the crude drugs by phytochemical screening
CBP609P.2	Prepare & evaluate herbal formulation and herbal cosmetics as for the Pharmacopoeias.
CBP609P.3	Analysis of herbal drugs as per the Pharmacopoeias.
CBP609P.4	Evaluate of products natural origin.
CBP609P.5	Undertake the various estimations determinations; infer from result obtained and report evalution results.

Final Year B. Pharm

SEMESTER VII

Subject: Instrumental Method of Analysis (Theory) **Subject Code: BP 701 T**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP701T.1	Apply the fundamental principles of Pharmaceutical Analysis.
CBP701T.2	Understand the principle, instrumentation, pharmaceutical applications, interaction of matter with electromagnetic radiations and its applications drug analysis.
CBP701T.3	Understand the principle, instrumentation, pharmaceutical application and troubleshooting of chromatographic separation and analysis of drugs.

Subject: Industrial Pharmacy II (Theory) **Subject Code: BP702T**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP702T. 1	Know the process of pilot plant and scale up of pharmaceutical dosage
CBP702T.2	Understand the process of technology transfer from lab scale to commercial batch
CBP702T.3	Know different laws and acts that regulate pharmaceutical industry
CBP702T.4	Understand the approval process and regulatory requirements for drug products.

Subject: Pharmacy Practice(Theory) **Subject Code: BP703T**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP703T. 1	Know various drug distribution methods in a hospital, appreciate the pharmacy stores management and inventory control
CBP703T.2	Obtain medication history interview, counsel the patients and monitor drug therapy of patient through medication chart review and clinical review
CBP703T.3	Identify drug related problems and detect adverse drug reactions and appreciate the concept of Rational drug therapy
CBP703T.4	Interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states.
CBP703T.5	Perform patient counseling in community pharmacy and should know pharmaceutical care services.

Subject: Novel Drug Delivery System (Theory) **Subject Code: BP704T**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP704T.1	Understand various approaches for development of novel drug delivery systems
CBP704T.2	Understand the criteria for selection of drugs and polymers for the development of Novel drug delivery systems.
CBP704T.3	Understand the formulation, evaluation and applications of various novel drug delivery systems.

Subject: Instrumental Method of Analysis (Practical) **Subject Code: BP 705 P**

Course learning objectives related to knowledge, skill and attitude: on completion of laboratory experiments, learner should be able to:

CBP705P.1	Apply the principles of instrumental methods in qualitative and quantitative analysis of drugs
CBP705P.2	Demonstrate the ability to follow the analytical approach to the solution of problems in chemical analysis and adhere to good laboratory practice.
CBP705P.3	Apply practical knowledge on modern analytical instruments that are used for drug testing.

BP706PS Practice School

Final Year B. Pharm

Semester -VIII

Subject: Biostatistics and Research Methodology (Theory) **Subject Code: BP801T**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP801T.1	Understand the basics of biostatistics
CBP801T.2	Understand the various statistical techniques to solve statistical problems and its applications in pharma industry
CBP801T.3	Appreciate statistical techniques in solving the problems.
CBP801T.4	Understand the various research methodologies
CBP801T.5	Know the operation of M.S. Excel, SPSS, R and MINITAB, DoE (Design of experiment)

Subject: Social and Preventive Pharmacy (Theory) **Subject Code: BP802T**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP802T.1	Acquire high consciousness/realization of current issues related to health and pharmaceutical problems within the country and worldwide.
CBP802T.2	Have a critical way of thinking based on current healthcare development.
CBP802T.3	Evaluate alternative ways of solving problems related to health and pharmaceutical issues.

Subject: Pharma Marketing Management (Theory) **Subject Code: BP803ET**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP803ET.1	Understand basics concepts of marketing.
CBP803ET.2	Develop understating of 4P's of marketing i.e. place- channel of distribution, promotion, product, pricing.
CBP803ET.3	Apply various marketing concepts to pharmaceutical industry.
CBP803ET.4	Understand the emerging concepts in marketing

Subject: Pharmaceutical Regulatory Science (Theory) Subject Code: BP804ET

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP804ET.1	Understand the process of drug discovery and development.
CBP804ET.2	Know the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals.
CBP804ET.3	Know the regulatory approval process and their registration in Indian and international markets.
CBP804ET.4	Know the basics of developing clinical trial protocol.
CBP804ET.5	Understand the guidelines, regulations, Laws and Acts governing the registration of products in Indian and international markets.

Subject: Pharmacovigilance(Theory) Subject Code: BP805ET

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP805ET.1	Discuss basic terminologies used in pharmacovigilance, adverse drug reactions, including establishment of pharmacogilance programme.
CBP805ET.2	Explain surveillance, methods and communication in pharmacogilance..
CBP805ET.3	Discuss phases of safety data generation including ICH guidelines.
CBP805ET.4	Explain pharmacogenomics of adverse drug reactions, special population including CIOMS and CDSCO.

Subject: Quality Control and Standardization of Herbals (Theory)Subject Code: BP806ET

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP806ET.1	Understand WHO guidelines for quality control of herbal drugs
CBP806ET.2	Elaborate Quality assurance in herbal drug industry.
CBP806ET.3	Understand the regulatory approval process and their registration in Indian and International markets
CBP806ET.4	Appreciate EU and ICH guidelines for quality control of herbal drugs.

Subject: Computer Aided Drug Design (Theory) **Subject Code: BP807ET**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP807ET.1	Explain design and discovery of strategies to develop new drug molecules.
CBP807ET.2	Describe the role of drug design in drug discovery process.
CBP807ET.3	Apply the concept of QSAR, docking and molecular modelling softwares.

Subject: Cell and Molecular Biology (Theory) **Subject Code: BP808ET**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP808ET.1	Summarize history of cell and molecular biology including properties, type and reproduction of cell.
CBP808ET.2	Explain chemical foundation of cell including cellular composition and functioning.
CBP808ET.3	Discuss structure of proteins incluing cell signaling and genetics.

Subject: Cosmetic Science (Theory) **Subject Code: BP809ET**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP809ET.1	Understand the concepts of cosmetics, cosmeceuticals and its classification.
CBP809ET.2	Know the various cosmetic excipients.
CBP809ET.3	Understand the formulation and evaluation of different cosmetic products.

Subject: Experimental Pharmacology (Theory) **Subject Code: BP810ET**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP810ET.1	Explain applications of various commonly used laboratory animals including techniques and methods.
CBP810ET.2	Discuss different pre-clinical screening models.
CBP810ET.3	Demonstrate the use of biostatistics and research methodology in conducting research in the pre-clinical domain.

Subject: Advanced Instrumentation Techniques (Theory) **Subject Code: BP 811 ET**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP811ET.1	Understand the calibration of various analytical instruments.
CBP811ET.2	Understand the advanced instruments' principle, instrumentation, pharmaceutical applications used and its application in drug analysis.
CBP811ET.3	Understand the chromatographic separation, analysis and troubleshooting of drugs.

Subject: Dietary Supplements and Nutraceuticals (Theory) **Subject Code: BP812ET**

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CBP812ET.1	Understand the need of supplements by the different group of people to maintain healthy life.
CBP812ET.2	Understand the outcome of deficiencies in dietary supplements.
CBP812ET.3	Appreciate the components in dietary supplements and the application.
CBP812ET.4	Appreciate the regulatory and commercial aspects of dietary supplements including health claims.

BP813PW Project Work