



CHEBROLU HANUMAIIAH INSTITUTE OF PHARMACEUTICAL SCIENCES

Chandramoulipuram, Chowdavaram, Guntur – 522019, Andhra Pradesh

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COURSE OUTCOMES

BACHELOR OF PHARMACY

SEMESTER – I

BP 101T: HUMAN ANATOMY AND PHYSIOLOGY – I (Theory)

- CO 1:** To learn the definitions, organization of human body at cellular and tissue level and basic life processes in human body.
- CO 2:** To understand the anatomy and physiology of Integumentary system and Skeletal system including the concept of muscle contraction.
- CO 3:** To gain a thorough understanding on haemopoetic and immune systems with emphasis on the mechanisms of phagocytosis.
- CO 4:** To acknowledge the basic concepts of neuro anatomy and physiology and special senses with their associated disorders.
- CO 5:** To acquire an in depth knowledge on cardio anatomy and its physiology.

BP 102T: PHARMACEUTICAL ANALYSIS – I (Theory)

- CO 1:** To gain knowledge on sources of errors and its minimizing techniques, pharmacopoeias and limit tests
- CO 2:** To understand basic techniques like acid base and non aqueous titrations
- CO 3:** To understand the concepts of precipitation, complexometric and gravimetric analysis
- CO 4:** To understand the concepts of redox titrations
- CO 5:** To understand the concepts of electrochemical methods of analysis

BP 103T: PHARMACEUTICS – I (Theory)

- CO 1:** To know about the historical background and development of pharmacy profession and to understand the pharmacopoeia, dosage forms, prescription and posology.
- CO 2:** To understand various pharmaceutical calculations and formulation of powders and liquid dosage forms.

- CO 3:** To get knowledge on the preparation of various monophasic and, biphasic liquid dosage forms like suspensions and emulsions.
- CO 4:** To identify pharmaceutical incompatibilities and to understand the basic formulation techniques pertaining to suppositories.
- CO 5:** To understand the preparation of various semisolid dosage forms.

BP 104T: PHARMACEUTICAL INORGANIC CHEMISTRY (Theory)

- CO 1:** To understand the importance of pharmacopoeia, sources and types of impurities and their control methods.
- CO 2:** To know the concepts of acids, bases, buffers, buffered isotonic solutions, methods of adjusting isotonicity and major extra and intra cellular electrolytes and monographs of dental products.
- CO 3:** To gain knowledge on the monographs of different inorganic compounds used as Gastrointestinal agents.
- CO 4:** To understand the monographs of some inorganic compounds like emetics, expectorants, haematinics, astringents and poisons & antidotes
- CO 5:** To get the concept of radioactivity and to understand the measurement, types, precautions of storage and handling and applications of radioactive substances.

BP 105T: COMMUNICATION SKILLS (Theory)

- CO 1:** To know about the basics, barriers and perspectives of communication.
- CO 2:** To understand various elements and styles of communication.
- CO 3:** To get knowledge on basics and listening and writing skills involved in effective communication.
- CO 4:** To get knowledge on interview skills and presentations.
- CO 5:** To understand the features of group discussion.

BP 106RBT: REMEDIAL BIOLOGY (Theory)

- CO 1:** To develop knowledge on the diversity of life and morphological features of flowering plants.
- CO 2:** To understand the biology of human circulatory, digestive and respiratory systems.
- CO 3:** To know the basic physiology of excretory, nervous and reproductive systems.
- CO 4:** To gain knowledge on plant respiration, growth and mineral nutrition.
- CO 5:** To understand the fundamental basis of living organisms.

BP 106RMT: REMEDIAL MATHEMATICS (Theory)

CO 1: To develop knowledge on partial fractions, logarithms, functions and limits and continuity.

CO 2: To understand about matrices and determinants.

CO 3: To know about the principles of calculus.

CO 4: To gain knowledge on analytical geometry.

CO 5: To understand the fundamentals of differential equations and laplace transforms.

SEMESTER – II**BP 201T: HUMAN ANATOMY AND PHYSIOLOGY-II (Theory)**

- CO 1:** To acquire knowledge on the anatomy and physiology of brain and spinal cord along with the functions of cranial nerves.
- CO 2:** To perceive the gastro anatomy with its physiology and the basic concepts of genetics.
- CO 3:** To understand the mechanism of gases exchange and physiology of urine formation through studying the structure of Respiratory and Urinary systems, respectively.
- CO 4:** To appreciate the structure and functions of endocrine glands with emphasis on the role and mechanism of hormonal actions and their disorders.
- CO 5:** To attain the knowledge on menstruation, pregnancy, parturition and birth control techniques through male and female reproductive systems.

BP 202T PHARMACEUTICAL ORGANIC CHEMISTRY – I (Theory)

- CO 1:** To familiarise with classification, nomenclature and structural isomerism of organic compounds.
- CO 2:** To understand the preparation, reactions and properties of alkanes, alkenes and conjugated dienes.
- CO 3:** To know the preparations, reactions, properties, orientation of reactions of alkyl halides and alcohols with much emphasis on nucleophilic substitution reactions.
- CO 4:** To get knowledge on the preparations, reactions, properties and uses of carbonyl compounds.
- CO 5:** To gain information on the preparation, reactions, properties and uses of carboxylic acids and aliphatic amines

BP 203T: BIOCHEMISTRY (Theory)

- CO 1:** To have a sound knowledge on various Biomolecules and bioenergetic substances and their significance in body functioning.
- CO 2:** To learn about the metabolic pathways of glucose in body and energy generation.
- CO 3:** To understand about the lipid and amino acid metabolism with their significance and metabolic disorders.
- CO 4:** To become familiar with genomic structure, functions and catabolic pathology.
- CO 5:** To develop knowledge on enzymes with their therapeutic and diagnostic applications.

BP 204T: PATHOPHYSIOLOGY (Theory)

CO 1: To attain a thorough understanding on the mechanisms of cell injury and inflammation.

CO 2: To perceive the etiology and pathogenesis of various cardiovascular, respiratory and renal disorders.

CO 3: To elucidate the etiopathogenesis of diseases pertaining to hematological, endocrine, gastrointestinal and nervous systems.

CO 4: To understand the etiopathogenesis, clinical presentations of various musculoskeletal, infectious and sexually transmitted diseases.

CO 5: To acknowledge the principles of cancer emphasizing its classification and etiopathogenesis.

BP 205T: COMPUTER APPLICATIONS IN PHARMACY (Theory)

CO 1: To attain knowledge on concepts of number and information system and software related to it.

CO 2: To perceive the information on web technologies.

CO 3: To understand the applications of computers in pharmacy.

CO 4: To gain knowledge on basics of bioinformatics.

CO 5: To acknowledge the usage of computers in pre-clinical development.

BP206T: ENVIRONMENTAL SCIENCES (Theory)

CO 1: To acquire knowledge on environment and its associated problems.

CO 2: To create awareness on environmental problems amongst the students.

CO 3: To gain knowledge on natural resources and to motivate learners to conserve the natural resources.

CO 4: To understand the concept of ecosystems.

CO 5: To know about various environmental pollution like air pollution, water pollution and soil pollution.

SEMESTER – III**BP 301T: PHARMACEUTICAL ORGANIC CHEMISTRY – II (Theory)**

- CO 1:** To understand the concept of aromaticity with a specific reference on benzene and its reactions.
- CO 2:** To gain knowledge on the methods of preparations, reactions, acidity and test for the determination of phenols, aromatic acids and amines.
- CO 3:** To emphasise on reactions, properties and analytical constants of fats and oils.
- CO 4:** To get information on the chemical behaviour while studying the structures of some specific polynuclear hydrocarbons.
- CO 5:** To understand the concepts explaining the stabilities of cycloalkanes along with their preparation and chemical properties.

BP 302T: PHYSICAL PHARMACEUTICS – I (Theory)

- CO 1:** To develop knowledge on solubility principles of drug molecules.
- CO 2:** To know various states and properties of matter, and physicochemical properties of drug molecules.
- CO 3:** To attain knowledge on mechanisms of surface and interfacial phenomena.
- CO 4:** To gain information on complexation properties and protein binding of drug molecules.
- CO 5:** To get knowledge on pH, buffers and isotonic solutions.

BP 303T: PHARMACEUTICAL MICROBIOLOGY (Theory)

- CO 1:** To attain knowledge on history of microbiology and cellular organisms along with microscopy, features and growth of bacteria.
- CO 2:** To know about various staining techniques of microorganisms and sterilization techniques.
- CO 3:** To understand the features of fungi, virus, disinfectants and sterility testing of pharmaceuticals.
- CO 4:** To get knowledge on aseptic area and microbiological assays.
- CO 5:** To attain basics of microbial contamination and cell culture technology.

BP 304T: PHARMACEUTICAL ENGINEERING (Theory)

- CO 1:** To understand the fundamental flow mechanisms of fluids and working principles and equipment for size reduction and size separation processes.
- CO 2:** To provide knowledge on various heat transfer mechanisms and their application in unit operations like evaporation and distillation in pharmacy.

- CO 3:** To understand the importance, applications and equipment involved in drying and mixing operations
- CO 4:** To gain knowledge on objectives, applications and equipment employed in separation techniques like filtration and centrifugation.
- CO 5:** To provide basic knowledge on various materials used in pharmaceutical plant construction and their interference in corrosion.

SEMESTER – IV**BP 401T: PHARMACEUTICAL ORGANIC CHEMISTRY – III (Theory)**

- CO 1:** To get the concept of the stereo chemical aspects of organic compounds and stereo chemical reactions
- CO 2:** To understand the concepts of Geometrical isomers, conformational isomers, stereo-selective and stereo-specific reactions.
- CO 3:** To gain information on the synthesis, reactions, relative aromaticity of various heterocyclic compounds
- CO 4:** To get knowledge on the synthesis, reactions and uses of some medicinally important heterocyclic ring systems.
- CO 5:** To familiarize with some reactions of synthetic importance.

BP 402T: MEDICINAL CHEMISTRY – I (Theory)

- CO 1:** To understand the concepts of physicochemical properties of drugs which influences biological action and to know the drug metabolism pathways.
- CO 2:** To study the medicinal chemistry of sympathomimetic drugs.
- CO 3:** To study the medicinal chemistry of parasymphomimetic drugs.
- CO 4:** To understand the medicinal chemistry of some CNS drugs like sedatives and hypnotics, antipsychotics and anticonvulsants.
- CO 5:** To gain information on the chemistry of CNS drugs medicinally available as anaesthetics, analgesics and anti-inflammatory agents.

BP 403T: PHYSICAL PHARMACEUTICS – II (Theory)

- CO 1:** To know about general features of colloidal dispersions.
- CO 2:** To attain information on rheological properties and solid deformation.
- CO 3:** To get knowledge on preparation and formulation of suspensions and emulsions.
- CO 4:** To get complete knowledge on particle size and other flow properties of powders.
- CO 5:** To know the principles of chemical kinetics and their usage for stability testing of formulations.

BP 404T: PHARMACOLOGY – I (Theory)

- CO 1:** To learn the basic terminology and general pharmacology.
- CO 2:** To gain a sound knowledge on the pharmacodynamics, adverse effects of drugs and various aspects pertaining to drug discovery and clinical evaluation of drugs.
- CO 3:** To get thorough understanding on the neurotransmitters and effects of drugs on peripheral nervous system.
- CO 4:** To get thorough understanding on the neurotransmitters and effects of drugs on central nervous system.
- CO 5:** To acquire knowledge on drugs indicated for the management of neurological and psychiatric disorders.

BP 405T: PHARMACOGNOSY & PHYTOCHEMISTRY – I (Theory)

- CO 1:** To know about the history, scope and development of Pharmacognosy and to acquire knowledge on various sources of crude drugs and their classification.
- CO 2:** To evaluate the quality control tests for crude drugs and to carry out their microscopic and morphological evaluations.
- CO 3:** To gain knowledge about various methods involved in the cultivation, collection and processing of crude drugs.
- CO 4:** To study about Plant tissue culture and its applications in production of secondary metabolites.
- CO 5:** To learn the systemic pharmacognostic study of Ayurvedic drugs, primary metabolites and drugs of marine origin.

SEMESTER – V**BP 501T: MEDICINAL CHEMISTRY – II (Theory)**

- CO 1:** To impart fundamental knowledge on the chemical aspects of Anti-histaminic agents, Gastric proton pump inhibitors and Antineoplastic agents.
- CO 2:** To understand the medicinal chemistry of Cardiovascular drugs like Anti-anginals, Diuretics and Antihypertensive agents
- CO 3:** To understand the medicinal chemistry of cardiovascular drugs like anti-arrhythmics, anti-hyperlipidemics, coagulant and anticoagulants and drugs used in congestive heart failure.
- CO 4:** To appreciate the medicinal importance of drugs acting on endocrine system.
- CO 5:** To understand the medicinal chemistry of drugs such as anti-diabetic agents and local anaesthetics.

BP 502T: INDUSTRIAL PHARMACY – I (Theory)

- CO 1:** To get knowledge on preformulation studies with physical and chemical properties to be tested for development of dosage form.
- CO 2:** To understand concepts of development, manufacturing and evaluation of tablets and liquid orals.
- CO 3:** To attain information on formulation and evaluation of hard and soft gelatin capsules and pellets.
- CO 4:** To know the production facilities, procedure and quality control tests for development of parenterals and ophthalmic preparations.
- CO 5:** To formulate and evaluate pharmaceutical aerosols, cosmetics and to get knowledge about materials used for packaging of pharmaceutical products.

BP 503T: PHARMACOLOGY – II (Theory)

- CO 1:** To perceive the effect of drugs on cardiac system.
- CO 2:** To understand the pharmacology of drugs acting on vascular and urinary systems.
- CO 3:** To learn about the autocooids and related drugs.
- CO 4:** To have an in depth knowledge on the effect of drugs on endocrine system.
- CO 5:** To develop knowledge on drugs pertaining to reproductive system and principles and methods of bioassays.

BP 504T: PHARMACOGNOSY & PHYTOCHEMISTRY – II (Theory)

- CO 1:** To elucidate the basic biogenetic pathways involved in the synthesis of primary and secondary metabolites.
- CO 2:** To learn the systemic pharmacognostic study of secondary metabolites like alkaloids, glycosides, tannins etc.
- CO 3:** To carryout isolation and identification of different types of phytoconstituents like terpenoids, alkaloids, glycosides etc.
- CO 4:** To gain knowledge on Industrial production, analysis and utilization of phytoconstituents.
- CO 5:** To know the modern extraction techniques, characterization and identification of the herbal drugs and active constituents.

BP 505T: PHARMACEUTICAL JURISPRUDENCE (Theory)

- CO 1:** To know about the significance of Drugs and cosmetics act 1940 and its Rules 1945 in relation to import, manufacture, and sale of drug and cosmetics.
- CO 2:** To understand the labeling and packaging guidelines and various schedules pertaining to Drugs and cosmetics act 1940.
- CO 3:** To understand Pharmacy act, Medicinal and Toilet Preparation act and narcotic and psychotropic substances act.
- CO 4:** To get knowledge on the salient features of drugs and magic remedies act, prevention of cruelty to animal's act and drugs price control order.
- CO 5:** To know about the pharmaceutical legislations, code of pharmaceutical ethics, right to information act, medical termination of pregnancy act and intellectual property rights.

SEMESTER – VI**BP 601T: MEDICINAL CHEMISTRY – III (Theory)**

- CO 1:** To gain knowledge on the medicinal chemistry of beta lactum antibiotics, aminoglycosides and tetracyclines.
- CO 2:** To know the medicinal chemistry of macrolides and antimalarials and to appreciate the concept of prodrugs.
- CO 3:** To get idea on the medicinal chemistry of antitubercular drugs, urinary tract anti-infective agents and antiviral agents.
- CO 4:** To know the medicinal chemistry of antifungal agents, anti-protozoal agents, anthelmintics and sulphonamides.
- CO 5:** To appreciate the importance of drug design and different techniques of drug design and to understand the concept of combinatorial chemistry.

BP 602T: PHARMACOLOGY – III (Theory)

- CO 1:** To gain knowledge on the pharmacology of drugs acting on respiratory system and gastrointestinal tract.
- CO 2:** To understand the mechanisms and effects of chemotherapeutic agents in management of various ailments.
- CO 3:** To commend the chemotherapy involved in treatment of various infectious diseases.
- CO 4:** To attain information on cancer and immunological agents.
- CO 5:** To develop knowledge on toxicological agents, their effects and chronopharmacology.

BP 603T: HERBAL DRUG TECHNOLOGY (Theory)

- CO 1:** To attain knowledge on herbs as raw materials, biodynamic agriculture techniques and to understand the basic principles of Indian systems of medicine.
- CO 2:** To acknowledge the general aspects & role of nutraceuticals in treatment of various disorders and to understand the herbal drug interactions.
- CO 3:** To know about various herbal cosmetics, excipients and herbal formulations
- CO 4:** To understand the regulatory guidelines for the evaluation of herbal drugs and patenting of natural products.
- CO 5:** To know about the current scenario of herbal drug industry and Schedule T.

BP 604T: BIOPHARMACEUTICS AND PHARMACOKINETICS (Theory)

- CO 1:** To impart knowledge on basic concepts of biopharmaceutics like drug absorption, distribution and protein binding
- CO 2:** To understand the concepts of drug elimination, bioavailability and bioequivalence.
- CO 3:** To attain knowledge on pharmacokinetic models and pharmacokinetic parameters to describe the kinetics of drug ADME.
- CO 4:** To understand the concepts of various pharmacokinetic parameters and multi compartment models and their significance in clinical settings.
- CO 5:** To understand about the concept of non-linear pharmacokinetics.

BP605T: PHARMACEUTICAL BIOTECHNOLOGY (Theory)

- CO 1:** To attain knowledge on enzymes and microbes used and other basics in biotechnology.
- CO 2:** To know about various tools and techniques used in the construction of a rDNA and its applications in relation to production of pharmaceuticals.
- CO 3:** To gain information on immunity and production of immunological agents and blood products.
- CO 4:** To get knowledge on immunoblotting techniques, mutations and microbial genetics.
- CO 5:** To know about fermentation methods and production of blood products.

BP 606T: QUALITY ASSURANCE (Theory)

- CO 1:** To gain knowledge on the concepts of quality assurance, quality management, TQM, QbD, ISO and ICH guidelines.
- CO 2:** To identify the organization and personnel responsibilities.
- CO 3:** To analyze quality control parameters and good laboratory practices in pharmaceutical industry.
- CO 4:** To evaluate the complaints and documents maintenance in industry with required regulatory guidelines.
- CO 5:** To understand the concepts of calibration, validation procedures and good warehousing practices.

SEMESTER – VII**BP 701T: INSTRUMENTAL METHODS OF ANALYSIS (Theory)**

- CO 1:** To understand the concept of UV-VISIBLE Spectroscopy
- CO 2:** To get knowledge on the analytical techniques like IR-Spectroscopy, Flame Photometry, AAS and Nepheloturbidimetry.
- CO 3:** To understand the basics of Chromatography and separation of Compounds by PC, TLC, Column Chromatography and Electrophoresis.
- CO 4:** To gain information on the chromatographic techniques like GC and HPLC
- CO 5:** To understand the basic chromatographic techniques like Ion exchange chromatography, gel chromatography and affinity chromatography.

BP 702T: INDUSTRIAL PHARMACY – II (Theory)

- CO 1:** To know the process of pilot plant and scale up of pharmaceutical dosage forms.
- CO 2:** To understand the process of technology transfer from lab scale to commercial batch scale.
- CO 3:** To know the regulatory affairs and requirements for drug approval.
- CO 4:** To understand the quality management systems involved in drug production and evaluation.
- CO 5:** To gain knowledge on various Indian regulatory requirements.

BP 703T: PHARMACY PRACTICE (Theory)

- CO 1:** To know the organization, functions and management of hospital, hospital pharmacy and community pharmacy along with identification, assessment reporting and management of adverse drug reactions and drug interactions.
- CO 2:** To have knowledge regarding drug distribution process in a hospital, therapeutic drug monitoring, patient medication history interview, medication adherence and hospital formulary.
- CO 3:** To gain expertise on pharmacy and therapeutics committee, information services, counseling, education, training programs, prescribed medication order and communication skills in hospital.
- CO 4:** To study in detail about clinical pharmacy and to excel in various services like budget preparation and implementation, and OTC sales.
- CO 5:** To get idea on drug store management, inventory control, investigational use of drugs and interpretation of clinical laboratory tests.

BP 704T: NOVEL DRUG DELIVERY SYSTEM (Theory)

- CO 1:** To provide knowledge on basic concepts and formulation approaches in design of controlled drug delivery systems including novel polymers.
- CO 2:** To get knowledge on basics of microencapsulation and formulation approaches for mucosal drug delivery and implantable drug delivery systems.
- CO 3:** To understand the importance of specialized drug delivery through transdermal, gastroretentive and nasoplummonary systems.
- CO 4:** To get knowledge on the concepts of particulate and targeted drug delivery systems.
- CO 5:** To gain importance of the drug delivery formulation approaches to specific body cavities like ocular and intrauterine administration.

SEMESTER – VIII

BP 801T: BIOSTATISTICS AND RESEARCH METHODOLOGY (Theory)

- CO 1:** To become a proficient on basics of statistics and its application in pharmacy.
- CO 2:** To become an adept in the application of probability, sampling and statistical tests in pharmaceutical research.
- CO 3:** To commend the designing and development of a research protocol.
- CO 4:** To attain information on various statistical software's.
- CO 5:** To develop knowledge on designing and analysis of experiments.

BP 802T: SOCIAL AND PREVENTIVE PHARMACY (Theory)

- CO 1:** To understand the basics on health, diseases, sociology, social and health education, and personal hygiene.
- CO 2:** To develop knowledge on preventive medicine employed in control of various diseases.
- CO 3:** To attain information on various national health programmes related to communicable diseases.
- CO 4:** To gain knowledge on various national and social health programmes.
- CO 5:** To be able to provide education and health promotion services at community level.

BP 803ET: PHARMA MARKETING MANAGEMENT (Theory)

- CO 1:** To understand the basics of pharmaceutical market and marketing.
- CO 2:** To develop knowledge on product decision.
- CO 3:** To attain information on various pharmaceutical promotion techniques.
- CO 4:** To gain knowledge on various pharmaceutical marketing channels and professional sales representative.
- CO 5:** To know about pricing of pharmaceuticals and emerging concepts in marketing.

BP 804ET: PHARAMCEUTICAL REGULATORY SCIENCE (Theory)

- CO 1:** To get knowledge on concepts of drug discovery, development and generic drug development.
- CO 2:** To understand the concepts of regulatory approval process and various regulatory authorities and agencies related to it.
- CO 3:** To gain information on regulatory approval process and their registration of Indian drug products in international markets.

CO 4: To understand the regulations and requirements for conduction of clinical trials and pharmacovigilance process of monitoring the clinical trials.

CO 5: To know the concepts of regulatory laws and acts in pharmaceutical drug regulations.

BP 805ET: PHARAMCOVIGILANCE (Theory)

CO 1: To get knowledge on basic concepts and terminology of pharmacovigilance and adverse drug reactions.

CO 2: To understand about drugs and diseases pertaining to pharmacovigilance along with drug dictionaries, coding, information resources and establishing a pharmacovigilance programme.

CO 3: To gain information on vaccine safety surveillance, methods and communication in pharmacovigilance.

CO 4: To understand the safety data generation and ICH guidelines of pharmacovigilance.

CO 5: To know the concepts of pharmacogenomics, drug safety evaluation in special population and role of CDSCO and CIOMS in pharmacovigilance.

BP 806ET: QUALITY CONTROL AND STANDARDIZATION OF HERBALS (Theory)

CO 1: To develop knowledge on basic tests and guidelines for quality control of herbal drugs.

CO 2: To attain information on quality assurance process in herbal drug industry according to WHO guidelines.

CO 3: To acquire knowledge on quality control based on EU and ICH guidelines, and research guidelines for safety and efficacy evaluation of herbal medicine.

CO 4: To learn about stability testing, documentation and GMP requirements of herbal medicines.

CO 5: To understand about regulatory requirements and safety monitoring of herbal medicines, herbal pharmacopoeia and biological markers.

BP 807ET: COMPUTER AIDED DRUG DESIGN (Theory)

CO 1: To develop knowledge on basics of drug discovery, lead and analog based drug design and development.

CO 2: To get knowledge on quantitative structure activity relationship.

CO 3: To acquire knowledge on molecular docking and virtual screening techniques of drugs.

CO 4: To know the informatics and methods in drug design.

CO 5: To understand about various concepts of molecular modeling.

BP 808ET: CELL AND MOLECULAR BIOLOGY (Theory)

- CO 1: To develop knowledge on cellular basics of life.
- CO 2: To attain information on genetic material processing and their functioning.
- CO 3: To acquire knowledge on protein structure and synthesis.
- CO 4: To learn about genetics and cell cycle.
- CO 5: To understand about various cellular signaling mechanisms.

BP 809ET: COSMETIC SCIENCE (Theory)

- CO 1: To understand the cosmetic excipients and body parts related to cosmetic application.
- CO 2: To provide knowledge on basic principles of formulation of skin and body care products
- CO 3: To gain information on role of herbs in the preparation of cosmetics.
- CO 4: To understand the principles of basic cosmetic evaluation.
- CO 5: To attain information on various cosmetic problems associated with hair, scalp and skin.

BP 810ET: PHARMACOLOGICAL SCREENING METHODS (Theory)

- CO 1: To develop knowledge on various guidelines and techniques related to laboratory animal care.
- CO 2: To understand the basics of screening and preclinical models.
- CO 3: To acquire knowledge on pharmacological screening of drugs acting on autonomic nervous system.
- CO 4: To learn about the screening of cardiovascular agents and metabolic disorders.
- CO 5: To gain expertise on research methodology and biostatistics in pharmacology.

BP 811ET: ADVANCED INSTRUMENTATION TECHNIQUES (Theory)

- CO 1: To develop knowledge on concepts of nuclear magnetic resonance spectroscopy and mass spectrometry.
- CO 2: To understand the components of various thermal methods of analysis and X-ray diffraction methods.
- CO 3: To acquire knowledge on calibration and validation of various analytical instruments as per ICH and USFDA guidelines.
- CO 4: To learn about radio immune assay and analytical extraction techniques.
- CO 5: To gain expertise on various hyphenated techniques.

BP 812ET: DIETARY SUPPLEMENTS AND NUTRACEUTICALS (Theory)

- CO 1:** To know about basics of nutraceuticals health problems, public health nutrition and data related to various functional foods.
- CO 2:** To understand the concepts of various phytochemicals which are useful as nutraceuticals.
- CO 3:** To acquire knowledge on mechanisms of free radicals and dietary fibres.
- CO 4:** To learn about free radical related diseases, antioxidant sources and functional foods for chronic disease prevention.
- CO 5:** To gain knowledge on environmental factors, regulatory aspects and pharmacopoeial specifications for dietary supplements and nutraceuticals.

BP 813ET: PHARMACEUTICAL PRODUCT DEVELOPMENT (Theory)

- CO 1:** To provide knowledge on basics of pharmaceutical product development.
- CO 2:** To provide adequate knowledge on various categories of pharmaceutical excipients used in the preparation of formulations.
- CO 3:** To understand the formulation and applications of various excipients in tablets, capsules, parenterals, aerosols and other novel drug delivery systems.
- CO 4:** To provide knowledge on various optimization techniques, quality by design (QbD) and their applications in pharmaceutical product development.
- CO 5:** To attain information on the selection and quality control testing of packaging materials for pharmaceutical product development.