JSS Academy of Higher Education & Research, Mysuru
JSS Colleges of Pharmacy, Mysuru
Course Outcomes (COs) and Program Outcomes (POs) of B Pharm Program

Course Outcomes (COs) and Program Outcomes (POs)

Course code/ Course title	Course outcomes
B. Pharmacy I Semester	
BP101T Anatomy, Physiology and Health Education	The students should be able to: 1) Explain the terminologies related to human anatomy, physiology and health education 2) Explain the gross morphology, structure and functions of various organs of the human body. 3) Describe the various homeostatic mechanisms and their imbalances. 4) Identify the various tissues and organs of different systems of human body. 5) Appreciate coordinated working pattern of different organs of each system
BP102T Pharmaceutical Analysis-I	The students should be able to: 1) Explain the basic concepts of quantitative and qualitative analysis. 2) Explain principles and applications of aqueous, non-aqueous titrimetric methods to evaluate purity of drugs. 3) Describe principles and applications of volumetric and electro chemical analysis methods to evaluate purity of drugs 4) Explain principles and applications of redox titrations involved in the quantitative analysis of drugs. 5) Describe principles and applications of complexometric and precipitation titrations to evaluate purity of drugs
BP103T Pharmaceutics-I	The students should be able to: 1) Describe the history and development of pharmacy profession 2) Explain the concepts of posology, pharmaceutical incompatibilities and pharmaceutical calculations 3) Describe the parts of prescriptions and handling of prescriptions 4) Explain the method of preparations and stability studies of monophasic and biphasic liquid dosage forms 5) Explain the method of preparations and evaluation studies of semisolid dosage forms
BP104T Pharmaceutical Inorganic Chemistry	The students should be able to: 1) Explain the sources of impurities and quality control tests to determine the impurities in drugs and pharmaceuticals 2) Describe the medicinal and pharmaceutical importance of inorganic compounds 3) Acquire knowledge on different types of diagnostic agents, dialysis fluids and dental products 4) Describe the definitions, preparations and assay procedures of gastrointestinal agents, expectorants, haematinics, astringents and antidotes 5) Explain the measurement, storage and pharmaceutical applications of radiopharmaceuticals

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BP105T Communicative English	The students should be able to: 1) Explain the importance, barrier and perspectives of communication for a pharmacist to function effectively 2) Describe the elements (verbal and non-verbal) and styles of communication for a pharmacist to function effectively 3) Explain the concepts of interview skills and presentation skills 4) Explain about the leadership qualities and essentials 5) Explain about the importance and elements of group discussion
BP106RBT Remedial Biology	The students should be able to: 1) Explain about the kingdom living organisms and salient features 2) Explain about the morphology and general anatomy of the flowering plants 3) Describe the concepts of plant and mineral nutrition 4) Explain the plant tissues, respiration and photosynthesis 5) Describe the digestive, respiratory, excretory and reproductive systems of humans
BP106RMT Remedial Mathematics	The students should be able to: 1) Explain the application aspects of partial fraction in chemical kinetics and pharmacokinetics 2) Explain the application of logarithm to solve pharmaceutical problems. 3) Describe about the matrices and their application in solving pharmacokinetic equations 4) Explain the different elements of differentiation, differential equations and Laplase transform and their pharmacokinetics applications 5) Describe about the analytical geometry and pharmacokinetic application
BP107P Anatomy, Physiology and Health Education	The students should be able to: 1) Examine and correlate haematological parameters with clinical conditions in relevance to the health care. 2) Identify the different bones, various models/specimen/slides of human organs and tissues 3) Demonstrate the measurement of blood pressure.
BP108P Pharmaceutical Analysis-I	The students should be able to: 1) Impart knowledge in preparation and standardization of solutions with different strength. 2) Perform volumetric analysis such as acidimetry and alkalimetry, oxidation and reduction, complexometry, precipitation and non-aqueous titration. 3) Perform electro-analytical methods.
BP109P Pharmaceutics-I	The students should be able to: 1) Develop skills in compounding and dispensing of dosage forms 2) Gain knowledge about the principle and preparation procedure related to syrups, elixirs, linctus and gargles & mouth washes. 3) Gain knowledge about the principle and preparation procedure related to solutions, suspensions, emulsions and suppositories
BP110P Pharmaceutical Inorganic Chemistry	The students should be able to: 1) Perform quality control tests in limiting traces of impurities present in pharmaceuticals by performing limit tests 2) Prepare and evaluate pharmaceutical inorganic compounds 3) Identify cations and anions present in the inorganic drugs
BP111P Communicative	The students should be able to: 1) Communicate effectively with different group of peoples

English	2) Describe different elements of pronunciation 3) Explain the concepts of effective writing, presentation, and interview
BP112RBP Remedial Biology	The students should be able to: 1) Explain microscopic techniques, staining techniques and permanent slide preparation 2) Perform Microscopic study and identification of tissues pertinent to Stem, Root, Leaf, seed, fruit and flower. 3) Determine the blood group and blood pressure
B. Pharmacy II Semester	
BP201T Anatomy, Physiology and Health Education	The students should be able to: 1) Explain the gross morphology, structure and functions of various organs of the human body. 2) Describe the various homeostatic mechanisms and their imbalances. 3) Appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body. 4) Identify the various tissues and organs of different systems of human body. 5) Appreciate coordinated working pattern of different organs of each system
BP202T Pharmaceutical Organic Chemistry –I	The students should be able to: 1) Explain fundamental concepts (nomenclature, isomerism) of organic chemistry 2) Explain the concepts of hybridization, electronic and steric effects of organic molecules 3) Explain the reactivity of aldehydes and ketones, carboxylic acids, amino and azo compounds 4) Describe the reactions and mechanisms of nucleophilic substitution, addition and elimination reactions. 5) Explain the reaction orientation rules (Sayetzeffs and Markonikov's).
BP203T Biochemistry	The students should be able to: 1) Explain the biochemical role of carbohydrates, proteins, lipids and metabolic pathway of nutrients. 2) Describe the bioenergetic reactions and their biological role 3) Explain the metabolic pathways of carbohydrates, proteins and lipids 4) Explain the DNA replication, transcription, and translation processes. 5) Describe the catalytic role, therapeutic and diagnostic applications of enzymes and coenzymes.
BP204T Pathophysiology	The students should be able to: 1) Describe the mechanism of cell injury, cell adaptation and inflammation and their implications in disease 2) Explain the etiology, signs and symptoms, and clinical interpretation of haematological, nervous and gastrointestinal disorders 3) Explain the etiology and clinical interpretation of cancer 4) Explain the etiology, signs and symptoms, and clinical interpretation of infectious diseases 5) Explain the etiology, signs and symptoms, and clinical interpretation of sexually transmitted diseases
BP205T Computer Applications in Pharmacy	The students should be able to: 1) Explain the concept of number system and information systems 2) Describe the web technologies (HTML, XML) and databases (MYSQL, MS Aceess)

	3) Enumerate the different application of computers in community and dispensing pharmacy 4) Explain the concepts of cheminformatics and bioinformatics 5) Explain the role of data analysis in preclinical development
BP206T Environmental Sciences	The students should be able to: 1) Create the awareness about environmental problems among learners. 2) Impart basic knowledge about the environment and its allied problems. 3) Develop an attitude of concern for the environment. 4) Motivate learner to participate in environment protection and environment improvement. 5) Acquire skills to help the concerned individuals in identifying and solving environmental problems.
BP207P Anatomy, Physiology and Health Education	The students should be able to: 1) Demonstrate senses, nervous system and endocrine system using models 2) Determination of tidal volume and vital capacity 3) Demonstrate digestive, respiratory, cardiovascular systems, urinary and reproductive systems with the help of models and specimens.
BP208P Pharmaceutical Organic Chemistry-I	The students should be able to: 1) Perform systematic qualitative analysis of unknown organic compounds 2) Preparation of organic derivatives through oxidation and reduction, acetylation, esterification and etherification and halogenation. 3) Demonstrate the structure and reactivity of organic compounds using molecular models
BP209P Biochemistry	The students should be able to: 1) Perform qualitative analysis of carbohydrates, proteins and lipids. 2) Estimate blood glucose and blood cholesterol levels. 3) Estimate creatinine levels in urine and liver function test.
BP210P Computer Applications in Pharmacy	The students should be able to: 1) Create a HTML web page to show personal information. 2) Create a MS Access database to store the patient and drug information 3) Create mailing labels using Label Wizard in MS WORD
B. Pharmacy III Semester	
BP301T Pharmaceutical Organic Chemistry –II	The students should be able to: 1) Explain the reactivity and stability of benzene and its derivatives 2) Explain the acidity of phenols and acids, and basicity of amines 3) Explain the significance of determination of analytical constants such as Acid value, Saponification value, Ester value, Iodine value, Acetyl value, Reichert Meisel (RM) value 4) Explain the synthesis and reactions of polynuclear hydrocarbons 5) Describe the stability of cycloalkanes through Baeyer's strain theory, Coulson and Moffitt's modification and Sachse Mohr's theory
BP302T Physical Pharmaceutics-I	The students should be able to: 1) Explain the solubility behaviour of drugs and the laws explaining them 2) Explain the physical states of matter/molecules and determinization of their properties 3) Describe the importance of surface and interfacial phenomenon in the pharmaceutical formulations

	4) Explain the process of complexation and protein binding 5) Describe the role of buffers in pharmaceutical and biological systems
BP303T Pharmaceutical Microbiology	The students should be able to: 1) Explain the ultra-structure and morphological classification of bacteria's 2) Describe the staining techniques and sterilization process 3) Explaining the mode of action, factors influencing and efficiency evaluation of disinfectants, antiseptics, bacteriostatic and bactericidal agents 4) Describe the importance of aseptic area and laminar flow equipment's for the microbiological processes 5) Explain about the microbial spoilage and preservation techniques of pharmaceutical products
BP304T Pharmaceutical Engineering	The students should be able to: 1) Describe the basic principles and pharmaceutical applications of size reduction and size separation 2) Explain the basic principles, methodology and applications of heat transfer, evaporation and distillation in pharmaceutical preparations 3) Describe the basic principles and pharmaceutical applications of drying and mixing 4) Explain the theories, principles, factors influencing filtration and centrifugation 5) Describe the plant construction, corrosion and corrosion prevention strategies
BP305P Pharmaceutical Organic Chemistry –II	The students should be able to: 1) Perform systematic qualitative analysis of unknown organic compounds 2) Determine the analytical constants (Acid value, Saponification value, Ester value, Iodine value, Acetyl value, Reichert Meisel (RM) value) 3) Prepare organic derivatives through oxidation, acetylation, esterification, diazotization, Claisen Schmidt reaction and Perkin reaction

BP306P Physical Pharmaceutics-I	The students should be able to: 1) Determine the solubility, pKa value and partition coefficient of pharmaceutical products. 2) Determine the surface tension, HLB number, Freundlich and Langmuir constant of pharmaceutical products. 3) Determine the critical micellar concentration, stability constant and donor acceptor ratio of pharmaceutical complexes
BP307P Pharmaceutical Microbiology	The students should be able to: 1) Explain the principles of sterilization, performing sterility testing of pharmaceuticals and sterilization of media... 2) Prepare nutrient stabs and slants, perform sub culturing and motility determination of bacteria and fungus.... 3) Perform microbiological analysis of water and antibiotics.

BP308P Pharmaceutical Engineering	The students should be able to: 1) Determine the moisture content, loss on drying and humidity of air 2) Perform size analysis by sieving techniques 3) Study the effect of time on the rate of crystallization
B. Pharmacy IV Semester	
BP401T Pharm. Organic Chemistry III	The students should be able to: 1) Explain the concept of stereoisomerism, resolution of racemic mixture and asymmetric synthesis 2) Describe the principle of geometrical isomerism, stereospecific and stereoselective reactions 3) Explain the synthesis, reactions and medicinal uses pyrrole, furan, and thiophene derivatives 4) Explain the synthesis, reactions and medicinal Pyrazole, Imidazole, Oxazole and Thiazole Pyridine, Quinoline, Isoquinoline, Acridine and Indole derivatives 5) Explain the principle and pharmaceutical application of metal hydride reduction, Clemmensen reduction, Birch reduction, Wolff Kishner reduction, Oppenauer-oxidation, Dakin, Beckmanns rearrangement, Schmidt rearrangement and Claisen-Schmidt condensation reactions
BP402T Medicinal Chemistry – I	The students should be able to: 1) Explain the influence of physicochemical properties, drug metabolism and stereochemistry of drugs on pharmacological functions 2) Describe the adrenergic transmission, chemical classes, synthesis and structure-activity relationship of adrenergic agents 3) Describe the cholinergic transmission, chemical classes, synthesis and structure-activity relationship of cholinergic agents 4) Explain the chemical classes, synthesis, and structure-activity relationship of sedative, anticonvulsants and antipsychotics 5) Explain the chemical classes, synthesis and structure-activity relationship of general anesthetics, analgesics and anti-inflammatory agents.

BP403T Physical Pharmaceutics-II	The students should be able to: 1) Explain the concept of colloidal dispersions and general properties dispersed systems 2) Describe the rheological properties of newtonian systems and non-newtonian systems and emulsions 3) Explain the stability of flocculated and deflocculated suspensions, emulsions and preservation of emulsions 4) Describe the concept of particle size and distribution, derived properties, porosity, packing arrangement, densities, bulkiness & flow properties of powders 5) Explain the stability of drug, factors influencing the chemical degradation of pharmaceutical dosage forms.

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BP404T Pharmacology-I	The students should be able to: 1) Explain the concepts of pharmacokinetics and enzyme kinetics 2) Describe the evaluation of drug discovery process, different phases of clinical trials and pharmacovigilance. 3) Describe the fate of adverse drug reactions and drug interactions 4) Explain the pharmacology and mechanism of action of drugs acting on autonomic and central nervous systems 5) Educate society regarding the preventive measures of adverse reactions and diseases
BP405T Pharmacognosy and phytochemistry-I	The students should be able to: 1) Explain the importance and methods for quality control of drugs of natural origin 2) Explain the cultivation, collection, processing and storage of natural drugs 3) Explain the principles and application of plant tissue culture: 4) Describe the role of Ayurveda, Unani, Siddha, Homeopathy and Chinese systems of medicine in the health care. 5) Explain the phytochemistry and application of primary and secondary metabolites of plants and marine sources.
BP406P Medicinal Chemistry – I	The students should be able to: 1) Prepare intermediate compounds and drugs of medicinal importance 2) Analyze and determine the purity of drug present in the bulk and dosage forms. 3) Determine the partition coefficient of pharmaceutical agents.
BP407P Physical Pharmaceutics-II	The students should be able to: 1) Determine the particle size distribution, bulk density, true density and porosity of pharmaceuticals 2) Determine the viscosity and sedimentation volume of pharmaceuticals 3) Determine the reaction rate, constant first order, reaction rate constant second order, accelerated stability studies of pharmaceuticals
BP408P Pharmacology-I	The students should be able to: 1) Explain and adopt the guidelines prescribed by the CPCSEA for the maintenance and handling of laboratory animals 2) Excel in the techniques such as blood withdrawal, serum and plasma separation, anesthetics and euthanasia 3) Explain the advantages and effectiveness of computer simulated animal experiments.

BP409P Pharmacognosy and phytochemistry-I	The students should be able to: 1) Perform chemical tests and morphological evaluation to report on the phytochemical nature of crude drugs 2) Determine phytochemical constants such as ash value, extractive values, moisture content, swelling index, stomatal number, vein islet number, vein 3) Determine the number and size of starch grains, fiber length and fiber width
B. Pharmacy V Semester	
BP501T Medicinal Chemistry – II	The students should be able to: 1) Explain the chemical classes, synthesis and structure-activity relationship of anticancer agents 2) Describe the histaminergic transmission, chemical classes, synthesis and

	structure-activity relationship of antihistamines 3) Describe the chemical classes, synthesis and structure-activity relationship of cardiovascular agents 4) Explain the chemical classes, synthesis and structure-activity relationship of local anesthetics, antidiabetic drugs and thyroid agents 5) Outline the structure, physiological role of drugs acting on endocrine system
BP502T Industrial Pharmacy-I	The students should be able to: 1) Describe the various aspects of preformulation studies and their impact in the stability of dosage form 2) Explain the techniques, quality control tests and stability testing of tablets and capsules 3) Describe the production procedure, aseptic processing and evaluation of parenteral and ophthalmic preparations 4) Describe the formulation aspects of cosmetic products such as lipsticks, shampoos, cold cream and vanishing cream 5) Explain the packaging of pharmaceutical products, legal and official requirements for containers, stability aspects of packaging materials
BP503T Pharmacology – II	The students should be able to: 1) Explain the pharmacology and mechanism of action of drugs acting on cardiovascular system 2) Explain the pharmacology and mechanism of action of drugs acting on urinary system 3) Describe the pharmacology and mechanism of action of autocoids and related drugs 4) Describe the basic concepts in endocrine pharmacology and pharmacology of analogues and inhibitors 5) Explain the principles and applications of bioassay.
BP504T Pharmacognosy and phytochemistry -II	The students should be able to: 1) Metabolic pathways of higher plants 2) Explain the phytochemistry and application of secondary metabolites of plants. 3) Explain the isolation and analysis of secondary metabolites 4) Explain the industrial production, estimation and utilization of natural drugs 5) Explain the principles and application of extraction techniques used in the analysis and isolation of phytoconstituents

BP505T Pharmaceutical Jurisprudence	The students should be able to: 1) Explain and implement the objectives, import and manufacture requirements of drugs asper Drugs and Cosmetics Act, 1940 and its rules 1945 2) Explain and implement the objectives and requirements of sale, labeling & packing of drugs and administration of drugs asper Drugs and Cosmetics Act, 1940 and its rules 1945 3) Explain and implement the objectives and requirements of Pharmacy Act –1948, Medicinal and Toilet Preparation Act –1955, Narcotic Drugs and Psychotropic substances Act-1985 and Rule 4) Explain and implement the objectives and requirements of Drugs and Magic Remedies Act and its Rules, Prevention of Cruelty to animals

	Act-1960, and National Pharmaceutical Pricing Authority 5) Describe the importance of Medical Termination of Pregnancy Act, Right to Information Act and Intellectual Property Rights (IPR)
BP506P Industrial Pharmacy-I	The students should be able to: 1) Perform pre-formulation studies, coating and evaluation of tablets 2) Prepare and evaluate creams and injections 3) Perform the quality control test for marketed tablets and capsules
BP507P Pharmacology – II	The students should be able to: 1) Demonstrate effect of drugs on isolated organs/tissues by simulated experiments 2) Demonstrate the effect of drugs on through bioassay 3) Determine PA_2 value, PD_2 value, effect of spasmogens and spasmolytics, anti-inflammatory activity and analgesic activity
BP508P Pharmacognosy and phytochemistry -II	The students should be able to: 1) Explain the morphology, powder characteristics and identification tests of phytoconstituents 2) Isolate and detect the active phytoconstituents 3) Identification and separation of phytoconstituents through paper and thin-layer chromatography
B. Pharmacy VI Semester	
BP601T Medicinal Chemistry – III	The students should be able to: 1) Explain the chemical classes, synthesis and structure-activity relationship of antibiotics 2) Describe the histaminergic transmission, chemical classes, synthesis and structure-activity relationship of antimalarials 3) Describe the chemical classes, synthesis and structure-activity relationship of antitubercular and urinary tractacting agents 4) Explain the chemical classes, synthesis and structure-activity relationship of antifungal, antiviral drugs and thyroid agents 5) Describe the drug design approaches, pharmacophore modelling and combinatorial chemistry features
BP602T Pharmacology – III	The students should be able to: 1) Explain the pharmacology and mechanism of action of drugs acting on respiratory system 2) Explain the pharmacology and mechanism of action of drugs acting on gastrointestinal system 3) Describe the pharmacology and mechanism of action of autocoids and related drugs 4) Describe the basic concepts in endocrine pharmacology and pharmacology of analogues and inhibitors 5) Explain the principles and applications of bioassay.
BP603T	The students should be able to:

Herbal Drug Technology	1) Describe the Principles of Ayurveda, Siddha, Unani and Homeopathy Medicine Systems 2) Explain the effect of Herbal-Drug and Herb-Food Interactions 3) Describe the raw materials, excipients and different herbal cosmetic products 4) Explain and adopt WHO & ICH guidelines and stability testing of herbal drugs. 5) Explain the strategies for the Good Manufacturing Practice of Indian systems of medicine
BP604T Biopharmaceutics and Pharmacokinetics	The students should be able to: 1) Explain the basic concepts in biopharmaceutics and pharmacokinetics of drug products and their clinical significance. 2) Explain the objectives, measurement and improvement of bioavailability and bioequivalence of drugs 3) Explain the significance of pharmacokinetics parameters such as t1/2, Vd and AUC 4) Explain the concept, principle and calculations aspects of Multicompartment models 5) Explain the concept, principle and application of nonlinear pharmacokinetic calculations
BP605T Pharmaceutical Biotechnology	The students should be able to: 1) Explain the principle and applications of enzyme immobilization and of biosensors in pharmaceutical Industries 2) Explain the principle and pharmaceutical applications of recombinant DNA technology 3) Describe the general method of preparation, storage and stability of bacterial vaccines, toxoids, viral vaccine, antitoxins, serum-immune and blood derivatives 4) Explain the principle and applications of ELISA, Western blotting and Southern blotting techniques in biological product development 5) Describe the various fermentation methods and sterilization methods adopted in biological production
BP606T Pharmaceutical Quality Assurance	The students should be able to: 1) Explain the elements and guidelines of Total Quality Management (TQM), ICH and Quality by design (QbD) aspects 2) Describe the construction and plant layout of organization and in a pharmaceutical industry 3) Explain the procedures and guidelines for the Quality Control and Good Laboratory Practices 4) Describe the importance and evaluation of document maintenance 5) Explain the general principle, importance and validation of instruments
BP607P Medicinal	The students should be able to: 1) Prepare intermediate compounds and drugs of medicinal importance

Chemistry – III	2) Analyze and determine the purity of drug present in the bulk and dosage forms. 3) Determine the physicochemical and druglike properties of drugs using drug design softwares.
BP608P Pharmacology – III	The students should be able to: 1) Demonstrate the agonist and antagonist effect of drugs on simulated experiments 2) Evaluate the toxicity aspects of drugs and related products on simulated experiments 3) Calculate and evaluate the pharmacological effect through calculation of pharmacokinetic parameters using biostatistics methods (ANOVA)
BP609P Herbal Drug Technology	The students should be able to: 1) Determine the alcohol content of Asava and Arista products 2) Prepare and evaluate cosmetic creams, lotions, shampoos, syrups, mixtures and tablets as per Pharmacopoeial requirements 3) Determine the aldehyde content, phenol content and total alkaloids of herbal formulations
B. Pharmacy VII Semester	
BP701T Instrumental Methods of Analysis	The students should be able to: 1) Explain the principle, instrumentation and pharmaceutical applications of interactions of electromagnetic radiations with drugs 2) Explain the principle, instrumentation and applications of vibrational spectrophotometric drug analysis 3) Explain the principle and applications of chromatographic separation in drug analysis 4) Describe the principle, instruments and applications of gas and liquid chromatographic separation in drug analysis 5) Describe the principle and applications of electrophoretic techniques
BP702T Industrial Pharmacy-II	The students should be able to: 1) Describe the pilot plant scale up requirements, SUPAC guidelines, and platform technology 2) Explain about the importance of WHO guidelines for Technology Transfer and technology transfer agencies in India 3) Describe about the historical overview and responsibility of regulatory affairs department 4) Explain the concepts of quality control, Quality by Design (QbD), ISO quality systems standards, 5) Explain the organization, responsibilities and certification of Central Drug Standard Control Organization and State Licensing Authorities
BP703T Pharmacy Practice	The students should be able to: 1) Describe the organizational set up of hospital, hospital pharmacy, community pharmacy and drug store inventory control 2) Explain the process of monitoring, detecting and reporting adverse drug reactions 3) Describe the functions of drug distribution system, therapeutic drug monitoring system and pharmacy and therapeutic committee 4) Explain the importance of patient counselling and education and training program for pharmacists 5) Perform interpretation of clinical laboratory tests

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BP704T Novel Drug Delivery System	The students should be able to: 1) Explain the strategies for the development of controlled approaches, mucosal and implantable drug delivery approaches 2) Describe the role of microencapsulation in the drug development 3) Explain the strategies and applications of Transdermal, gastroretentive, ocular and nasopulmonary drug delivery approaches 4) Explain the concepts and applications of liposomes, niosomes, nanoparticles, monoclonal antibodies for the targeted delivery 5) Describe the development and applications of intra uterine devices (IUDs) and applications
BP705P Instrumental Methods of Analysis	The students should be able to: 1) Estimate the amount of drugs present in the pharmaceutical products using colorimetric, UV visible and Fluorometric principles 2) Determine the ions through flame photometry and nephelo turbidometry methods 3) Separate and evaluate the natural products using paper, thin layer chromatography and column chromatography techniques
BP706PS Practice School	The students should be able to: 1) Carry out advanced experimental procedures in the drug development disciplines 2) Explain the concepts of advanced drug design and development concepts 3) Describe the advances in the areas of pharmacology, biotechnology and drug delivery systems
B. Pharmacy VIII Semester	
BP801T Biostatistics and Research Methodology	The students should be able to: 1) Apply and explain the concepts and applications of statistical techniques 2) Apply and explain the pharmaceutical applications of regression and parametric tests 3) Explain the advanced drug research tools such as design of experiments, plagiarism software 4) Explain the clinical applications of statistical analysis software tools in the clinical development 5) Describe the principle, methodology and applications of factorial design and response surface methodology techniques in the pharmaceutical processes

BP802T Social and Preventive Pharmacy	The students should be able to: 1) Explain the causes and evaluation of diseases and public health. 2) Describe the preventive measures of life threatening diseases 3) Explain the objectives and functions of national health and immunization programs 4) Describe the objectives and role of WHO in national health and immunization programs 5) Explain the importance and execution of the Health promotion and education programs in schools

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BP803ET Pharma Marketing Management	The students should be able to: 1) Explain the concepts and role of pharmaceutical marketing strategies 2) Describe the concepts and functions of product management 3) Explain the importance and strategies of online promotional techniques for OTC products. 4) Describe the functions of pharmaceutical marketing channels 5) Explain the functions of Drug Price Control Order and National Pharmaceutical Pricing Authority
BP804ET Pharmaceutical Regulatory Science	The students should be able to: 1) Explain the concept, scope and benefits of the generic drug product development 2) Describe about the different drug regulatory approval agencies and drug approval process 3) Explain about Drug Master Files (DMF), Common Technical Document (CTD), electronic Common Technical Document (eCTD) and ASEAN Common Technical Document (ACTD) research 4) Describe about the clinical trial development and pharmacovigilence 5) Explain the concepts and functions of Orange book, Federal Register, Code of Federal Regulatory and Purple book
P805ET Pharmacovigilence	The students should be able to: 1) Explain the history, development and regulatory guidelines of pharmacovigilance 2) Describe the procedures to establishment and surveillance of pharmacovigilence programmes 3) Explain the ICH guidelines for the functioning of pharmacovigilence programmes 4) Describe the concept of pharmacogenomics of adverse drug reactions and drug safety evaluation 5) Explain the principles involved in the classification of drugs
BP806ET Quality Control and Standardization of Herbals	The students should be able to: 1) Explain the quality control, quality assurance, storage and evaluation of herbal drugs 2) Describe the WHO, EU and ICH guidelines for quality control, current good manufacturing practices (cGMP) and GACP for herbal medicines 3) Explain the research guidelines for evaluating the safety and efficacy of herbal medicines 4) Describe the importance of stability testing in the evaluation of herbal medicines 5) Explain the role of chemical and biological markers in standardization of herbal products
BP807ET Computer-Aided Drug Design	The students should be able to: 1) Describe the concepts of drug discovery and design strategies 2) Explain the principle and applications of quantitative- structure activity relationship (QSAR) in the lead optimization process 3) Describe the virtual screening approaches and their applications in the drug discovery science 4) Explain the principle and applications of molecular modeling techniques 5) Describe the importance of bioinformatics analysis in the drug

	design
BP808ET Cell and Molecular Biology	The students should be able to: 1) Describe the foundations and applications of molecular biology. 2) Summarize the DNA properties of cell biology. 3) Describe protein structure and function. 4) Describe basic molecular genetic mechanisms. 5) Summarize the Cell signals and signalling pathways
BP809ET Cosmetic Science	The students should be able to: 1) Explain the evolution, types and applications of cosmetic products 2) Explain the principle and formulations aspects of skin and hair care products 3) Describe the benefits of herbal cosmetics 4) Explain the analytical methods for the evolution of cosmetic products 5) Explain the mechanism of action and problems of cosmetic products
BP810ET Pharmacological screening methods	The students should be able to: 1) Explain the CPCSEA and OECD guidelines for maintenance, breeding and conduct of experiments on laboratory animals 2) Describe the techniques for collection of blood and common routes of drug administration in laboratory animals, 3) Explain the rationale for selection of preclinical models 4) Demonstrate the various screening methods used in preclinical research 5) Describe the tools used in the for the pre-clinical data analysis and interpretation
BP811ET Advanced Instrumentation Techniques	The students should be able to: 1) Explain the principle, instrumentation and applications of NMR and mass spectroscopy methods in the drug analysis and drug discovery 2) Explain the principle, instrumentation and applications of thermal and X-ray diffraction methods in the drug analysis and drug discovery 3) Describe the ICH and USFDA guidelines for the calibration and validation of instruments 4) Explain the principle, instrumentation and applications of radio immune assay in the drug analysis and drug discovery 5) Explain the principle, instrumentation and applications of hyphenated techniques in the drug analysis and drug discovery
BP812ET Diatary Supplements and Neutraceuticals	The students should be able to: 1) Explain the health benefits of nutraceuticals and Dietary supplements 2) Explain the chemistry and functions of phytochemicals as nutraceuticals 3) Describe the generation of free radicals and their role in tissue damage 4) Explain the role of natural antioxidants in preventing the free radical mediated diseases 5) Describe the function of regulatory authorities (FSSAI, FDA, FPO, MPO, AGMARK. HACCP) in maintaining the safety aspects of neutraceticals
BP813ET	The students should be able to:

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Pharmaceutical Product Development	1) Explain the objectives, regulations and stability assessement aspects related to preformulation 2) Describe the role of pharmaceutical excipients in pharmaceutical product development 3) Describe the aelection and application of excipients in pharmaceutical formulations industrial applications 4) Explain the objectives and applications of optimization techniques in pharmaceutical product development 5) Describe the quality control testing of packaging materials for pharmaceutical product
BP813PW Project Work	The students should be able to: 1) Study on multidisciplinary areas related to pharmacy profession. 2) Develop required skills for technical presentation. 3) Concentrate on specific topic in scientific and pharmacy fields. 4) Gain more advanced knowledge of the research and manuscript writing 5) Describe new trends among group of students and faculties.

Programme outcomes

1. **Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.
2. **Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
3. **Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.
4. **Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.
5. **Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well-being.
6. **Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).
7. **Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.
8. **Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

9. **The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.
10. **Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
11. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.