YOUNG ENGINEER'S EDUCATION SOCIETY'S
MAHARASHTRA INSTITUTE OF PHARMACY(B.PHARM.)
ChouganPhata, Armori road (Betala) Po. Kinhi Ta. Bramhapuri Distt. Chandrapdur (M. S.) 441 206
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*** INSTITUTE CODE DTE 4643, PCI 3122, UNIVERSITY P253, MSBTE 1987 ***

PROGRAM OUTCOMES 2023 – 24

PO1 Pharmacy Knowledge: Possess knowledge and comprehension of the core and basic associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

PO2 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.

PO3 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.

PO4 Modern tool usage: Learn, select, and apply appropriate methods and procedures resources, and modern pharmacy-related computing tools with an understanding of the limitations.

PO5 Leadership skills: Understand and consider the human reaction to change, motivation issues, leadership and teambuilding when planning changes required for fulfilment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

PO6 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).

PO7 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 principleswhile making decisions and take responsibility for the outcomes associated with the decisions.

PO8 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.

PO9 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.

PO10 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.

PO11 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.

PROGRAM SPECIFIC OBJECTIVES

Bachelor of Pharmacy (B.Pharm.)	
PSO1	To endow students with a well-defined theoretical and practical concept in the various fields of pharmaceutical sciences such as, pharmaceutics, pharmaceutical chemistry, pharmacology and pharmacognosy apropos the requirement of pharmaceutical industries and research.
PSO2	To encourage the students to participate in lifelong learning process for a bright career and to relate and work towards serving the cause of the society.
Master of Pharmacy (M.Pharm.)	
PSO1	To produce pharmacy students with sturdy fundamental concepts and high technical competence in pharmaceutical research and technology.
PSO2	To promote the development of skilled human resource in Pharmaceutical Sciences for propagation of quality education with right professional and ethical attitude, good communication skills, right mental attitude in a multidisciplinary Pharmaceutical Sciences arena

COURSE OUTCOMES 2023-24

BACHELOROF PHARMACY

	B.PH.I-FIRSTSEMESTER	
BP101T/BP107P	**Human Anatomy and Physiology I**	
	CO1	Describe the basic terminologies in anatomy and physiology, structure of cell, cell division, Cell communication and different type soft tissue.
	CO2	Explain physiology of body fluids, blood and lymphatic system and disorders associated with it
	CO3	Describe the anatomy and physiology of cardiovascular system and disorders associated With it
	CO4	Detail the anatomy and physiology of peripheral nervous system, integumentary system and Skeletal system
	CO5	Identify different types of tissue and bones
	CO6	Determine different hematological and cardiovascular parameters
BP102T/BP108P	**Pharmaceutical Analysis I**	
	CO1	Explain the fundamentals of quantitative analysis.
	CO2	Summarize the principle, reaction, standardization and assay procedure of some drugs
	CO3	Classify and explain different types of titrimetric analysis
	CO4	Discuss various electro analytical techniques.
	CO5	Perform standardization of solutions and percentage purity determination
	CO6	Illustrate the applications of electro analytical techniques in analysis.
BP103T/BP109P	**Pharmaceutics I**	
	CO1	Explain the history and development of pharmacy and Pharmacopoeias and solve Pharmaceutical calculations
	CO2	Classify the pharmaceutical Dosage forms and make the use of systems of weights and Measures in pharmaceutical calculations

	CO3	Interpret the prescription and make use of the knowledge of posology and formulae to Calculate accurate doses of drugs even for children
	CO4	Identify and classify the type of incompatibility in the prescription
	CO5	Dispense liquid dosage forms
	CO6	Dispense solid and semi-solid dosage forms
BP104T/BP110P	**Pharmaceutical Inorganic Chemistry**	
	CO1	Identify the sources of impurities and methods to determine the impurities in inorganic drugs And pharmaceuticals as per pharmacopoeia.
	CO2	Describe the preparations and pharmaceutical importance of inorganic compounds
	CO3	Explain the role of various major intra and extracellular fluids and electrolytes
	CO4	Explain the various aspects of Radiopharmaceuticals
	CO5	Describe the procedure to perform specific test and limit test of inorganic medicinal Compounds as per official pharmacopoeia
	CO6	Perform the process of preparation and identification of some inorganic compounds
BP105T/BP111P	**Communication skills**	
	CO1	Explain the process of communication and Barriers in Communication
	CO2	Classify different communication styles and listening
	CO3	Explain written communication
	CO4	Explain interview techniques and group discussion
	CO5	Construct the sentences with different styles like pronunciation
	CO6	Doing effective communication
BP106RBT/BP112RBP	**Remedial Biology**	
	CO1	Detail the classification and salient features of five kingdom of life
	CO2	Understand and explain basic component of plant anatomy and physiology
	CO3	Explain basic anatomy and physiology of circulatory, digestive and respiratory system
	CO4	Explain basic anatomy and physiology of excretory, nervous and reproductive system
	CO5	Explain the parameters related to plant physiology
	CO6	Explain the physiological parameters related to human system.

BP106RMT	**Remedial Mathematics**	
	CO1	Explain the theory and their application in Pharmacy
	CO2	Solve the different types of problems by applying theory
	CO3	Appreciate the important application of mathematics in Pharmacy
	CO4	Apply the chemical kinetics and Pharmacokinetics equations
	B.PH.I-SECONDSEMESTER	
BP201T/BP207P	**Human Anatomy and Physiology II**	
	CO1	Describe the various anatomical and physiological details of Nervous system
	CO2	Explain the functioning of endocrine system and digestive system
	CO3	Identify the role of respiratory and urinary system in the functioning of human body
	CO4	Describe the working of reproductive system and introduce genetics
	CO5	Identify parts of various systems through models, charts and slides
	CO6	Demonstrate the understanding of various assessment tests for normal bodily function
BP202T/208P	**Pharmaceutical Organic Chemistry**	
	CO1	Identify, construct and interpret the organic compound's structure, nomenclature, and types Of isomerism.
	CO2	Remember and understand the classification, preparation, and uses of organic compounds
	CO3	Recall and understand the process of reaction(mechanism), as well as the orientation, Stability and reactivity of organic compounds.
	CO4	Select, understand and analyze an organic compound's identification.
	CO5	Recall, identify, and analyze an unknown organic molecule using a systematic qualitative analytical approach that comprises preliminary testing, element identification, solubility testing functional group testing mp. bp and derivatives.
	CO6	analyze and construct molecular models of organic molecules.
BP203T/BP209P	**Biochemistry**	
	CO1	Describe the properties, classification and biological significance of carbohydrates, lipids, Nucleic acids, amino acids, proteins and energy rich compounds like ATP

	CO2	Elucidate the synthetic and metabolic pathways, describe energetics and recognize the physiological and pathophysiological conditions associated with carbohydrates, lipids, proteins amino acids nucleic acids.
	CO3	Summaries the concept of bioenergetics and biological oxidation emphasizing on ETC and Oxidative phosphorylation and identifying related inhibitors.
	CO4	Comprehend the enzyme its classification, kinetics, inhibitors, regulation, application in therapeutics and diagnosis
	CO5	Analyze and estimate carbohydrates, proteins and constituents of urine and blood (creatinine, sugar, cholesterol) qualitatively and quantitatively
	CO6	Determine salivary amylase activity and effect of temperature and substrate concentration on the same, preparation of buffer and measurement of its pH
BP204T	**Pathophysiology**	
	CO1	Describe mechanisms involved in the process of inflammation and infectious diseases.
	CO2	Explain pathophysiology of diseases of cardiovascular, respiratory, renal, endocrine, nervous and gastrointestinal system.
	CO3	Explain principle of cancer, pathophysiology of hematological, sexually transmitted diseases and diseases of bones and joints.
	CO4	Describe basic principles of cell injury and adaptation
BP205T/BP210P	**Computer Applications in Pharmacy**	
	CO1	Apply the knowledge of computing fundamentals and mathematics to pharmaceutical applications for any given requirement
	CO2	Evaluate the various types of database
	CO3	Determine the applications of databases in pharmacy
	CO4	Design and develop solutions to analyze pharmaceutical problems using computers
	CO5	Demonstrate the ability to use the computer and web technologies when creating pharmacy drug database.
	CO6	Integrate and apply efficiently the contemporary IT tools to all pharmaceutical related activities
BP206T	**Environmental Sciences**	
	CO1	Identify the types of environment
	CO2	Explain the natural resources and their proper utilization

	CO3	Describe ecosystems and their importance
	CO4	Explain causes and ill effects of air,water,sound, soil, marine pollution and suggest the steps to minimize all sorts of pollution
	B.PH.II-THIRDSEMESTER	
BP301T/BP305P	**Pharmaceutical Organic Chemistry II**	
	CO1	Draw the aromatic organic compounds' structure, write nomenclature and give the type of isomerism.
	CO2	Select and write the preparation, process of reaction (mechanism), and orientation of aromatic organic compounds.
	CO3	Summarize aromatic organic compound reactivity and stability.
	CO4	Explain the chemistry of fats and oils.
	CO5	Perform and analyze organic chemical synthesis.
	CO6	Identify and evaluate the process for calculating fat/oil values.
BP302T/BP306P	**Physical Pharmaceutics I**	
	CO1	Explain properties surface active agents and principles of interfacial phenomena
	CO2	Explain different types of complexes, their applications and methods of detection of complexes.
	CO3	Explain the use of physicochemical properties of drug and additives in the formulation of dosage forms.
	CO4	Explain the theories and pinciples of solubility of drug molecules in the designing the dosage forms.
	CO5	Demonstrate the use of physicochemical properties in the formulation development and evaluation of dosage forms
	CO6	Evaluate the various physicochemical properties of drug molecules
BP303T/BP307P	**Pharmaceutical Microbiology**	
	CO1	Describe the scope, history, branches, importance and application of microbiology, and themorphology, nutritional and physical requirements, cultivation of bacteria, virus and fungi

	CO2	Explain the microscopic techniques, staining techniques, biochemical test, and the methods of sterilization and evaluation of disinfectants with its applications in society for health benefits.
	CO3	Describe the sterility testing of pharmaceutical products, aseptic area designing, various aseptic techniques and requirement, sources and prevention of contamination, evaluate themicrobiological assay of antibiotics, vitamins and amino acids.
	CO4	Explain the types of spoilage with assessment, microbial stability of formulations, growth of animal cells in culture, procedure and application of cell cultures in Pharmaceutical industryand research
	CO5	Describe the different equipment's and techniques used in experimental microbiology, techniques like sterilization (glassware, preparation, culture media), aseptic transfer, isolationof pure culture and staining.
	CO6	Evaluate the microbiological assay of antibiotics, motility determination, sterility testing, bacteriological examination of water and acquire knowledge on the principles of biochemicaltests.
BP304T/BP308P	**Pharmaceutical Engineering**	
	CO1	Explain the importance and application of principles and equipments used for Flow of fluids.Understand the objectives, mechanism, application and uses of size reduction and size separation in Pharmaceutical industries along with working of mills and size separators
	CO2	Explain the objectives, mechanism, application and uses of Heat Transfer, Evaporation and Distillation and equipments used for each in pharmaceutical industries
	CO3	Explain the importance and application of principles and equipments of Drying, Mixing and Filtration employed in Pharmaceutical Manufacturing.
	CO4	Detail the objectives, principle and application of centrifugation and its equipment and understand materials of pharmaceutical plant construction, Corrosion and its prevention.
	CO5	Construct drying curves, determine moisture content, Perform Size analysis , size reduction and verify laws of size reduction .
	CO6	Enlist the factors affecting rate of crystallization, determine the radiation constant, humidity ofair from dry bulb and wet bulb temperatures and determine overall heat transfer coefficient.

	B.PH.II-FOURTHSEMESTER	
BP401T	**Pharmaceutical Organic Chemistry III**	
	CO1	Remember and understand the stereo chemical properties of organic compounds and stereo chemical reactions
	CO2	Recall and understand the medicinal uses and other applications of some organic compounds
	CO3	Understand the chemistry of important heterocyclic compounds
	CO4	Understand some reactions of synthetic importance
BP402T/BP406P	**Medicinal Chemistry I**	
	CO1	Explain physico chemical properties, drug metabolism .
	CO2	Describe various drugs acting on autonomic nervous system, adrenergic and cholinergic neurotransmitter.
	CO3	Explain central nervous system and various drugs acting on it.
	CO4	Describe general anasthetic drugs,narcotic and non narcotic analgesics and anti inflammatory drugs.
	CO5	Determine percentage purity of drugs
	CO6	Experiment and prepare drugs or intermediate, determine partition coefficient.
BP403T/BP407P	**Physical Pharmaceutics II**	
	CO1	Explain properties, principles and applications of dispersion systems.
	CO2	Describe the types of flow (rheology) and their measurement, thixotropic/stability of dispersions, semisolids systems and deformation of solids.
	CO3	Describe the fundamental and derived properties of powders and their pharmaceutical applications.
	CO4	Describe the reaction kinetics, factors affecting the rate of reaction and shelf-life assessment of dosage forms.
	CO5	Demonstrate the use of physicochemical properties in the formulation development and evaluation of dosage forms
	CO6	Evaluate the various physicochemical properties of drug molecules.
BP404T/BP408P	**Pharmacology I**	
	CO1	Define terminologies under pharmacology; and explain the principles of pharmacokinetic

	CO2	Explain the principle, mechanism and factors affecting drug action
	CO3	Describe the clinical evaluation of new drugs, adverse drug reaction and drug-drug interactions
	CO4	Explain the pharmacology of drugs acting on peripheral and central nervous system
	CO5	Demonstrate common laboratory techniques in experimental pharmacology
	CO6	Screen the effect of drug sample on different PNS & CNS activities
BP405T/BP409P	**Pharmacognosy and Phytochemistry I**	
	CO1	Explain the crude drugs, their uses and chemical nature
	CO2	Explain the techniques in the cultivation and production of crude drugs
	CO3	Describe about the evaluation techniques for the herbal drugs
	CO4	Describe about the plant tissue culture and alternative systems of medicine
	CO5	Perform microscopic and morphological evaluation of crude drugs
	CO6	Perform physico-chemical evaluation of crude drugs.
	B.PH.III-FIFTHSEMESTER	
BP501T	**Medicinal Chemistry II**	
	CO1	Explain the chemistry of drugs with respective to their pharmacological activity.
	CO2	Summarize classification, drug metabolic pathway, adverse effect and therapeutic value of Drugs
	CO3	Illustrate the structural activity relationship of different class of drugs
	CO4	Outline the chemical synthesis of selected drugs
BP502T/BP506P	**Industrial Pharmacy I**	
	CO1	Explain the various pharmaceutical dosage forms and their manufacturing techniques.
	CO2	Explain the various consideration in development of pharmaceutical dosage forms
	CO3	Detail the formulation process of various dosage form and evaluation parameters for their quality.
	CO4	Describe the packaging material science and regulatory requirement for packaging material used for pharmaceutical dosage form.
	CO5	To perform and understand preformulation paratmeters and learn tablet, capsule manufacturing & Evaluation
	CO6	To learn semisolid dosage form and other dosage form manufacturing and evaluation.
BP503T/BP507P	**Pharmacology II**	

	CO1	Describe the pharmacology of drug categories used on cardiovascular pathologies and on urinary system
	CO2	Describe the pharmacology of drugs acting on the endocrine system in context to disorders like hypo/hyper thyroid, diabetes, infertility etc
	CO3	Explain the pharmacology of the drugs categories under autocoids
	CO4	Design and explain the procedures according to the principles of bioassays
	CO5	Demonstrate various bioassays using isolated tissue preparations
	CO6	Demonstrate using software about the various paradigms used to check activity of given unknown drugs through methods of preclinical pharmacology.
BP504P/BP508P	**Pharmacognosy and Phytochemistry II**	
	CO1	Explain the basic metabolic pathways, formation of different secondary metabolites and utilization of radioactive isotopes in the investigation of Biogenetic studies.
	CO2	Explain the chemistry & chemical classes, biosources, enlist the therapeutic uses and commercial applications of various secondary metabolite.
	CO3	Describe the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents.
	CO4	Detail about the methods of isolation, identification and estimation of phytoconstituents.
	CO5	Analyze the crude drugs by chemical tests and to study morphology, histology and powder characteristics of certain crude drugs.
	CO6	Isolate and identify the phytoconstituents
BP505T	**Pharmaceutical Jurisprudence**	
	CO1	Explain the provisions of import, manufacture, sale and distribution of drugs and cosmetics along with different schedules of the Drugs and Cosmetics Act and Rules.
	CO2	Explain the objectives, provisions, offences and penalties of various Pharmaceutical Legislations like Pharmacy Act, Narcotic Drugs and Psychotropic Substances act, Medicinaland Toilet Prepration act.
	CO3	Detail about the salient features of Drugs and Magic Remedies act, Prevention of Cruelty to Animals act and National Pharma Pricing Authority, Know the overview of Medical Termination of Pregnancy Act, Intellectual Property Righs, Right to Information
	CO4	Elaborate the histroy of Pharmaceutical legislations and the Pharmaceutical Code of Ethics
	B.PH.III-SIXTHSEMESTER	

BP601T/BP607P	**Medicinal Chemistry III**	
	CO1	Expalin the importance of drug design and different techniques of drug design.
	CO2	Explain the chemistry, importance of SAR, drugs metabolism, adverse effects and therapeutic value of antibiotics and antimalarials
	CO3	Explain the chemistry, importance of SAR, drugs metabolism, adverse effects and therapeutic value of anti-tubercular, anti lepral, Urinary tract anti-infective agents andantiviral drugs
	CO4	Explain and know the chemistry, importance of SAR, drugs metabolism, adverse effects andtherapeutic value of anti- fungal, antiprotozoal, anthelmintic and sulphonamides
	CO5	Carry the synthesis of drugs and their intermediates by lab procedure, microwave irradiation techniques and knowledge of chem-draw to use in drawing reactions
	CO6	Perform the assay of drugs and determination of physicochemical properties
BP602T/BP608P	**Pharmacology III**	
	CO1	Explain the mechanism of drug action and its application in gastrointestinal and respiratory disorders.
	CO2	Explain the mechanism of drugs used for malignancy and immunotherapy.
	CO3	Describe the mechanism of drug action and its relevance in the treatment of different infectious disease.
	CO4	Comprehend the principles of toxicology, treatment of various poisons and chronopharmacology
	CO5	Demonstrate with software about screening test and procedures for some pharmacological activities
	CO6	Analyse and calculate the given data for pharmacokinetic, toxicological or statistical results
BP603T/BP609P	**Herbal Drug Technology**	
	CO1	Describe about the raw material as source of herbal drugs from cultivation to herbal drug product.
	CO2	Explain the WHO and ICH guidelines for evaluation of herbal drugs, Appreciate patenting andregulatory requirements of herbal drugs, GMP in Herbal drugs industry.
	CO3	Describe about the herbal cosmetics, natural sweeteners, nutraceuticals and Herbal-Drug and Herb-Food Interactions.
	CO4	Explain the basic principles of Ayurveda, Siddha, Unani and Homeopathy and preparation and standardization of Ayurvedic formulations.

	CO5	Prepare and standardize the crude drugs and herbal formulation.
	CO6	Analyse the Monographs of herbal drugs from recent Pharmacopoeias including fixed oils.
BP604T	**Biopharmaceutics and Pharmacokinetics**	
	CO1	Explain the absorption, distribution, metabolism and excretion of drugs and factors affecting them.
	CO2	Explain the concepts of bioavailability and bioequivalence of drug products and nethod for their determination.
	CO3	Explain the various pharmacokinetic parameters, their significance and determinations
	CO4	Explain the concept of compartment modeling in determination of various pharmacokinetics parameters.
BP605T	**Pharmaceutical Biotechnology**	
	CO1	Explain the importance of Immobilized enzymes in Pharmaceutical Industries
	CO2	Detail about the techniques and applications of genetic engineering in relation to production of pharmaceuticals
	CO3	Elaborate about the Monoclonal antibodies production in Industries
	CO4	Appreciate the use of microorganisms in fermentation technology
BP606T	**Pharmaceutical Quality Assurance**	
	CO1	Detail about the QA ,QC and GMP and its importance, Understand TQM,ICH guidelines, QbD , ISO 9000 & ISO 14000 and NABL accreditation with respect to Pharmaceutical Manufacturing.
	CO2	Explain the importance and significance of organization and personnel , Premises and equipments and raw materials in pharmaceutical industries
	CO3	Explain the importance and application of Quality Control and Good Laboratory Practices in Pharmaceutical Manufacturing.
	CO4	Describe the concepts and importance of Complaints, Documentation, Calibration, Validation and Warehousing in Pharmaceutical Manufacturing
	B.PH.VI-SEVENTHSEMESTER	
BP701T/BP705P	**Instrumental Methods of Analysis**	
	CO1	Explain the interaction of matter with electromagnetic radiations and its applications in drug analysis by UV spectroscopy and IR spectroscopy.

	CO2	Explain the interaction of matter with electromagnetic radiations and its applications in drug analysis by Fluorimetry, flame photometry AAS and Nephelometery
	CO3	Explain the chromatographic separation techniques like adsorption, partition, column, Thin layer and electrophoresis in analysis of drugs.
	CO4	Describe about the chromatographic separation techniques like GC, HPLC, Ion exchange, gel and affinity chromatography in analysis of drugs.
	CO5	Perform quantitative & qualitative analysis of drugs using various spectroscopic instruments like Fluorimetry, colorimetry, UV and nephelometry.
	CO6	Perform quantitative & qualitative analysis of drugs using various chromatographic techniques like Paper, Thin, column and demonstrate the GC and HPLC instrumentation
BP702T	**Industrial Pharmacy-II**	
	CO1	Explain the process of pilot plant and scale up of pharmaceutical dosage forms.
	CO2	Detail the process of technology transfer from lab scale to commercial batch.
	CO3	Relate the different Laws and Acts that regulate pharmaceutical industry.
	CO4	Apply efficiently the quality management systems, approval process and regulatory requirements for drug products.
BP703T	**Pharmacy Practice**	
	CO1	Explain the concept of Hospital, hospital pharmacy and Community Pharmacy, their organization along with Drug distribution system in hospital, Hospital formulary, Therapeuticdrug monitoring, Patient medication history interview and Community pharmacy management
	CO2	Explain and summarize the Pharmacy and therapeutic committee, Drug information services, Patient counselling, Education and training program in the hospital and Prescribedmedication order and communication skills.
	CO3	Outline the Budget preparation and implementation, detailed concept of clinical pharmacy, and details of over the counter (OTC) sales
	CO4	Summarize the drug store management and inventory control, Investigational use of drugs and Interpretation of Clinical Laboratory Tests Blood chemistry, hematology, and urinalysis.
BP704T	**Novel Drug Delivery System**	

	CO1	Detail about the types and application of polymers in formulation of controlled release drug delivery systems.
	CO2	Explain novel drug delivery systems such as microspheres /microcapsules, microparticles, methods of microencapsulation, applications
	CO3	Elaborate about the formulation considerations of Mucosal Drug Delivery system and buccal delivery systems, implantable Drug Delivery Systems and explain the Targeted Drug Deliverysuch as, liposomes, niosomes, nanoparticles, monoclonal antibodies and their applications
	CO4	Explain basic components of Transdermal Drug Delivery Systems, formulation approaches, gastroadhesive systems, Nasal and Pulmonary routes of drug delivery, Ocular formulationsand Intrauterine Drug Delivery Systems
	B.PH.IV-EIGHTHSEMESTER	
BP801T	**Biostatistics and Research Methodology**	
	CO1	Explain the operation of M.S. Excel, SPSS, R and MINITAB ® , DoE (Design of Experiment)
	CO2	Apply the various statistical techniques to solve statistical problems
	CO3	Appreciate statistical techniques in solving the problems
	CO4	Perform the Design and Analysis of experiments
BP802T	**Social and Preventive Pharmacy**	
	CO1	Explain the concept of health in context of sociology and develop preventive meaures with respect to India
	CO2	Detail about the globally prevailing diseases and their prevention
	CO3	Elaborate about the health policies and public health preventive measures
	CO4	Highlight the corrective measures at rural and urban levels
BP 804 ET	**Pharmaceutical Regulatory Science**	
	CO1	Discuss regulatory concepts, Basic terminology, Guidelines, Regulations, Laws and Acts, Orange book, Federal Register, Code of Federal Regulatory, Purple book
	CO2	Describe the process/stages of drug discovery and development, Innovator and Generic product development

	CO3	Enlist the regulatory authorities/agencies of India and of different countries, theirs organization and types of applications for approval process. Enumerate the documentsrequired for submission in DMF,CTD/eCTD/aCTD
	CO4	Describe the requirements of approvals for conducting clinical trials, pharmacovigilance and the process of safty monitoring in clinical trials, regulatory approval process and their registration in Indian and International markets
BP809 ET	**Cosmetic Science**	
	CO1	Detail about the classification of cosmetic and cosmeceutical products along with cosmetic excipient and formulations of skin, hair, oral cosmetics
	CO2	Describe about the formulation and building blocks of skin care and oral care products
	CO3	Explain the role of herbs in cosmetics and explain pecification and analytical methods for various cosmetics
	CO4	Explain the principles of Cosmetic Evaluation and Cosmetic problems associated with Hair, teeth and skin
BP803 ET	**Pharmaceutical Marketing**	
	CO1	Summarize and explain the concept and scope of Marketing and pharmaceutical market withspecial reference to quantitative & Qualitative aspects along with consumer buying behaviour
	CO2	Explain and outline the concept of Product decision including product line, product mix, product life cycle, product portfolio, positioning, branding, packaging, labelling and productmanagement.
	CO3	Summarize and interpret the methods and determinants of promotional mix including selling, advertising, sampling, retailing, public relation and also know and understand the concept ofpharmaceutical marketing channels, its designing, members, types etc. along with physical distribution; duties of sales representative, detailing, selection, training, motivating, compensation and future prospects of PSR
	CO4	Explain and interpret the meaning, importance, objectives, determinants of pricing, its methods and strategy with special reference to DPCO and NPPA. Understand the emergingconcepts of marketing like rural, industrial and global marketing along with consumerism

BP805ET		**Pharmacovigilance**
	CO1	Explain importance of drug safety monitoring along with history, development, national and international scenario of pharmacovigilance
	CO2	Describe dictionaries, coding and terminologies in pharmacovigilance and also detection of new adverse drug reactions and their assessment
	CO3	Outline International standards for classification of diseases and drugs along with adverse drug reaction reporting systems and communication in pharmacovigilance
	CO4	Detail about Pharmacovigilance Program of India (PvPI) , ICH guidelines alomg with writing case narratives of adverse events and their quality.

MASTER OF PHARMACY		
SEMESTER I		
	M.PHARM.- PHARMACEUTICS	
MPH101T	**Modern Pharmaceutical Analytical Techniques**	
	CO1	Recall, apply and interpret theoretical principle, instrumentation and applications of Spectroscopic techniques like UV, IR, Fluorimetry, AAS and FES.
	CO2	Recall, apply and interpret theoretical principle, instrumentation and applications of Spectroscopic techniques like NMR, MS and X-ray crystallography.
	CO3	Recall, apply and interpret theoretical principle, instrumentation and applications of chromatographic techniques like paper, TLC, Ion exchange, column GC, HPLC and Affinity chromatograph.
	CO4	Recall, and understand theoretical principle, instrumentation and applications of electrophoresis and immunological techniques like RIA, ELISA and bioluminescence assay.
MPH102T	**Drug Delivery System**	
	CO1	Explain various approaches for the development of NDDS
	CO2	Explain the criteria for the selection of drugs and polymers for the development of delivery of NDDS
	CO3	Explain the various formulations and technology for the preparation of NDDS
	CO4	Explain the different evaluation parameters of novel drug delivery formulations
MPH103T	**Modern Pharmaceutics**	

	CO1	To understand the goal and methodologies of Preformulation Studies along with the Kinetic principles and stability testing
	CO2	To understand optimization techniques in pharmaceutical formulation and processing
	CO3	To explain Pharmaceutical Validation, policies of current good manufacturing practices and concept of Total Quality Management
	CO4	To explain Physics of tablet compression, Dissolution parameters and Pharmacokinetic parameter and linearity Concept of significance
MPH104T	**Regulatory Affair**	
	CO1	Describe the concepts of innovator and generic drugs, drug development process and the regulatory guidance's and guidelines for filing and approval process
	CO2	Demonstrate the process of preparation of Dossiers and their submission to regulatory agencies in different countries
	CO3	Describe the post approval regulatory requirements for actives and drug products submission of global documents in CTD/ eCTD formats
	CO4	Detail about the clinical trials requirements applying efficiently for approvals of conducting clinical trials, pharmacovigilence and process of monitoring in clinical trials.
MPH105P	**Pharmaceutics Practical I**	
	CO1	Analyze pharmacopoeial compounds and their formulations by UV Vis spectrophotometer
	CO2	To perform Experiments based on HPLC, HPLC, Gas Chromatography, flame photometry
	CO3	To perform In-vitro dissolution profile of CR/ SR marketed formulation, sustained release matrix tablets, osmotically controlled DDS, Muco adhesive tablets, trans dermal patches
	CO4	To carry out preformulation studies of tablets, Micromeritic properties of powders and granulation, effect of binders on dissolution of a tablet.
	M.PHARM.- PHARMACEUTICALCHEMISTRY	
MPC101T	**Modern Pharmaceutical Analytical Techniques**	
	CO1	Recall, apply and interpret theoretical principle, instrumentation and applications of Spectroscopic techniques like UV, IR, Fluorimetry, AAS and FES.
	CO2	Apply and interpret theoretical principle, instrumentation and applications of Spectroscopic, techniques like NMR, MS and X-ray crystallography. Electroanalytical and Thermal methodsof analysis like DTA, DSC, TG.

	CO3	Recall, apply and interpret theoretical principle, instrumentation and applications of chromatographic and immunological techniques like paper, TLC, HPTLC, Ion exchange,column GC, HPLC, UPLC, Gel and Affinity chromatography, RIA, ELISA and bioluminescence assay.
	CO4	Recall and explain theoretical principle, instrumentation and applications of electrophoresis and immunological techniques like RIA, ELISA and bioluminescence assay.
MPC102T	**Advanced Organic Chemistry I**	
	CO1	Deatil the basic aspects of organic chemistry, mechanism and synthetic applications of some named reactions
	CO2	Enlist synthetic reagents, protecting groups and their applications
	CO3	Explain some named reactions and synthetic procedures of drugs containing five, six membered and fused heterocyclic
	CO4	Discuss about different techniques of organic synthesis and their applications to process chemistry as well as drug discovery
MPC103T	**Advanced Medicinal Chemistry**	
	CO1	Explain the various stages and techniques involved in drug discovery.
	CO2	Elaborate the importance of medicinal chemistry in drug development.
	CO3	Enlist and explain several techniques to design and create novel drug-like compounds for biological targets
	CO4	Explain the chemistry as well as the design of enzyme inhibitors and peptididomimetics.
MPC104T	**Chemistry of Natural Products**	
	CO1	Sow the chemistry and medicinal importance of natural compounds as lead molecules for new drug discovery
	CO2	Illustrate the classification, isolation, purification and structural characterization of simple constituents from natural source
	CO3	Interpret general method of structural elucidation of compounds of natural origin
	CO4	Explain the concept of rDNA technology tool for new drug discovery
MPC105P	**Pharmaceutical Chemistry Practical I**	

	CO1	Outline practical skills of instruments and carry the analysis of various drugs in single and combine dosage form
	CO2	Synthesise compounds based upon rearrangement reactions
	CO3	Identify organic compounds using various functional group test
	CO4	Intrerpret various characterization techniques, isolation and purification methodologies
SEMESTER II		
	M.PHARM.- PHARMACEUTICS	
MPH201T	**Molecular Pharmaceutics (Nano Tech and Targeted DDS)**	
	CO1	Explain the basic concepts of Targeting and Targeted Drug Delivery Systems.
	CO2	Describe the preparation and evaluation of Micro Capsules / Micro Spheres/ Niosomes, Aquasomes
	CO3	Describe the preparation and evaluation of Pulmonary Drug Delivery Systems, Aerosol, Intra Nasal Route Delivery systems
	CO4	Explain gene therapy , preparation and evaluation of nucleic acid based therapeutic delivery system, liposomal gene delivery systems
MPH202T	**Advanced Biopharmaceutics and Pharmacokinetics**	
	CO1	Explain the mechanisms and factors affecting drug absorption from GIT
	CO2	Explain the biopharmaceutical factors in drug product design and its in vitro performance
	CO3	Explain pharmacokinetic parameters using compartmental and non-compartmental modeling.
	CO4	Explain the objectives and methods of bioavailability and bioequivalence studies.
MPH203T	**Computer Aided Drug Delivery System**	
	CO1	Discuss the history of computers in pharmaceutical research and development
	CO2	Explain the computational modelling of drug disposition and computers in preclinical development
	CO3	Demonstrate the optimization techniques in pharmaceutical formulation and computers in market analysis
	CO4	Integrate and apply efficiently the computational tools in clinical development, artificial intelligence (AI), robotics and computational fluid dynamics (CFD)
MPH204T	**Cosmetic and Cosmeceuticals**	

	CO1	Distinguish various regulatory aspects pertaining to cosmetics
	CO2	Categorize different aspects of cosmetics use
	CO3	Explain and demonstrate various building blocks for cosmetics along with the design of different cosmetics formulation
	CO4	Define guidelines for herbal ingredients in cosmetics
MPH205P	**Pharmaceutics Practical II**	
	CO1	Demonstrate the formulation and evaluation of novel drug delivery systems such as: Alginate beads/ liposomes/Neosomes
	CO2	Exhibit the development and evaluation of cosmetic formulations such as: Creams/ Shampoo and Toothpaste etc
	CO3	Carryout the improvement of dissolution characteristics of slightly soluble drug
	CO4	Apply the software knowledge in pharmaceutical development, modeling of drug disposition
	M.PHARM.PHARMACEUTICALCHEMISTRY	
MPC201T	**Advanced Spectral Analysis**	
	CO1	Interprete the UV max calculation of various organic compounds
	CO2	Interprete NMR, Mass and IR spectra of various organic compounds
	CO3	Explain the theoretical and practical skills of the hyphenated instruments
	CO4	Explain the principle, instrumentation and application of thermal methods, Raman spectroscopy and Radioimmuno assay
MPC202T	**Advanced Organic Chemistry II**	
	CO1	Explain the concept of stereochemistry and asymmetric synthesis
	CO2	Describe the different types of catalysts, catalytic process and their applications
	CO3	Explain the concept and applications of peptide chemistry
	CO4	Explain the principles and enlist the applications of Green chemistry
MPC203T	**Computer Aided Drug Design**	
	CO1	Explain and apply the different CADD techniques and drug discovery
	CO2	Explain and apply the physiochemical parameters of QSAR in drug discovery
	CO3	Enlist and apply various strategies and software's to design and develop new drug molecule

	CO4	Explain the concept of in silico drug design and screening protocols
MPC204T	**Pharmaceutical Process Chemistry**	
	CO1	Explain the fundamentals of process chemistry and scale-up techniques for APIs and intermediates.
	CO2	Explain the different unit processes that occur during the manufacturing of APIs.
	CO3	Highlight the numerous reactions that occur in process chemistry.
	CO4	Detail about the numerous facets of industrial safety in Pharmaceutical Industry.
MPC205P	**Pharmaceutical Chemistry Practical II**	
	CO1	Synthesize organic compounds based on various approaches like oxidation, reduction and hydrogenation, nitration
	CO2	Interpret and analyse various organic compounds by UV, FT-IR, DSC, NMR and MS
	CO3	Synthesize specific mentioned organic compounds
	CO4	Perform various pharmcophore modeling experiments and software based experiments
	SEMESTER III (COMMON SUBJECT)	
MRM301T	**Research Methodology and Biostatastics**	
	CO1	Develop the ability to apply the methods while working on a research project work
	CO2	Describe the appropriate statistical methods required for a particular research design
	CO3	Choose the appropriate research design and develop appropriate research hypothesis for a research project
	CO4	Develop a appropriate framework for research studies