D.S.T.S. MANDAL'S

COLLEGE OF PHARMACY, SOLAPUR.

PROGRAM 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.

Principal
D.S.T.S. Mandal's College of Pharmacy
Solapur

COURSE OUTCOMES

I B. Pharm. Sem I

Name of the Course & Course Code	Course Outcome
Human Anatomy and Physiology-I (Theory) P111	1. Explain anatomy of various organs of human body. 2. Explain physiology of various organs of human body. 3. Understand the various homeostatic mechanisms and their imbalance. 4. Appreciate coordination between different organs and systems. 5. Define various diseases and disorders.
Pharmaceutical Analysis I (Theory) P121	1. Explain the different techniques of analysis on the basis of their classification. (Understanding, evaluating) 2. Identify different sources, types of errors and methods for minimization of errors. (Applying) 3. Explain the principles of different volumetric methods of analysis. (Understanding, evaluating) 4. Illustrate the principles of different electrochemical methods of analysis. (Understanding) 5. Develop analytical skills. (Applying)
Pharmaceutics I (Theory) P131	1. Explain the history, evaluation, scope & career in pharmacy profession. 2. Apply the standards laid down by different pharmacopoeias to obtain quality formulation. 3. Choose appropriate weights& measures to achieve the precision in formulation. 4. Formulate & evaluate various solid, liquid, semisolid dosage forms 5. Outline the guidelines of manufacturing practices, to obtain quality formulation

Name of the Course & Course Code	Course Outcome
Pharmaceutical Inorganic Chemistry I (Theory) P141	1. Restate history of pharmacopoeia, sources of impurities and the principle involved in limit test for various elements. 2. Apply the knowledge of buffers, buffer equations & isotonicity for calculation of tonicity adjustment and physiological acid base balance. 3. Explain the functions of physiological ions and electrolyte replacement therapy. 4. Express the properties, method of preparation, assay and medicinal uses of gastrointestinal agents, expectorants, emetics, astringents, haematinics, dental products and antidotes. 5. Discuss the concept of anemia and poisoning. 6. Recall different aspects of radiopharmaceuticals.
Human Anatomy and Physiology-I (Practical) P112	1. Understand the microscopic structures of various types of tissues. 2. Identify different axial and appendicular bones. 3. Perform different hematological tests. 4. Understand recording of heart rate, pulse rate and blood pressure. 5. Discriminate between normal and abnormal clinical values of physiological parameters.
Pharmaceutical Analysis I (Practical) P122	1. Demonstrate various skills related to Pharmaceutical Analysis. (Understanding) 2. Identify limit tests for different chemical impurities. (Applying) 3. Planthe preparation and standardization of titrants used in volumetric analysis. (Applying) 4. Estimate/ analyse the different excipients by various volumetric analysis techniques. (Evaluating) 5. Estimate normality and strength of various acids by electrochemical methods of analysis. (Evaluating)

Name of the Course & Course Code	Course Outcome
Pharmaceutics I (Practical) P132	1. Know the techniques of weighing, measuring & transferring solids and liquids 2. Select the appropriate container and closure for prepared formulation. 3. Prepare label as per the guidelines, size and shape of the container. 4. Formulate and evaluate monophasic dosage forms
Pharmaceutical Inorganic Chemistry I (Practical) P142	1. Perform limit tests for various elements in given sample. 2. Practice the purity tests and identification tests of the various medicinal and pharmaceutical agents. 3. Synthesize inorganic pharmaceuticals. 4. Interpret the results and record the findings.

I B. Pharm. Sem II

Name of the Course	Course Outcome
Human Anatomy and Physiology-II (Theory) P211	1. Explain anatomy of various organs of human body. 2. Explain physiology of various organs of human body. 3. Understand the various homeostatic mechanisms and their imbalance. 4. Appreciate coordination between different organs and systems. 5. Define various diseases and disorders.
Pharmaceutical Organic Chemistry I (Theory) P221	1. Name the organic compound as per common name and IUPAC. 2. Identify types of isomerism and hybridization of organic compound. 3. Remember method of preparation, name and orientation of the reactions of organic compound. 4. Illustrate the reactivity and stability of compound.
Biochemistry (Theory) P231	1. Define, classify and write the structures of different nutrient molecules and explain their biological functions. (Remembering, Understanding and evaluating). 2. Explain the metabolism of nutrient molecules in physiological and pathological conditions. (Understanding, evaluating) 3. Illustrate the catalytical role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes. (Understanding) 4. Explain the genetic organization of mammalian genome and functions of DNA in synthesis of RNAs and proteins. (Understanding, evaluating) 5. Tell bioenergetics, electron transport chain and oxidative phosphorylation associated with living cells. (Remembering)

Name of the Course	Course Outcome
Pathophysiology (Theory) P241	1. Discuss the basic concepts of cell injury, pain, inflammation and hypersensitivity. 2. Explain etiology and pathogenesis of certain diseases and disorders of human body. 3. Discuss the clinical manifestations and complications of the diseases. 4. Discriminate between normal and abnormal clinical values and parameters.
Human Anatomy and Physiology-II ((Practical) P212	1. Understand the anatomy of various organs through permanent slides, models, chart or specimens. 2. Demonstrate physiology of nervous system, sensory organs and feedback mechanisms. 3. Understand recording of total blood count, body temperature, respiratory volumes and body mass index. 4. Study family planning devices and pregnancy diagnosis test. 5. Discriminate between normal and abnormal clinical values of physiological parameters.
Pharmaceutical Organic Chemistry I (Practical) P222	1. Perform qualitative analysis of unknown organic compound. 2. Synthesize suitable solid derivatives of organic compound. 3. Construct the molecular models of organic compound. 4. Interpret the results and record the findings.
Biochemistry (Practical) P232	1. Analyze qualitatively the given sample of carbohydrate and proteins. 2. Analyze qualitatively the normal and abnormal constituents of urine and correlate with physiological and pathological conditions. 3. Estimate quantitatively the normal and abnormal constituents from biological fluids. 4. Discuss enzyme kinetics and enzyme activity. 5. Make use of observations, interpret results and draw conclusion.

II B. Pharm. Sem III

Name of the Course	Course Outcome
Pharmaceutical organic chemistry-II (Theory) P311	1. Explain the structure, synthesis, reactions, orientation of monosubstituted benzene & its derivatives. 2. Discuss & predict effects of substituents on acidity of phenols, aromatic carboxylic acid & basicity of aromatic amines. 3. Define & describe different analytical constants & their significance of fats & oils. 4. Write structures, synthesis, reactions & their derivatives of Naphthalene, Anthracene & Phenanthrene. 5. Discuss method of preparations, reactions & explain about stabilities of cycloalkanes.
Physical Pharmaceutics I (Theory) P321	1. Discuss principle, types of solvents including solubility of gas, liquid, and solids in various phases. (Application). 2. Explain state of matter and various physicochemical properties of state of Matter. (comprehension) 3. Elaborate the significance of surface and interfacial tension in the design of dosage forms. (Synthesis) 4. Discuss principle, classification and application of Complexation and Protein Binding. (Comprehension, Evaluation) 5. Explain the role of pH, Buffers, buffer capacity in pharmaceutical and biological Systems. (Comprehension)
Pharmaceutical Microbiology (Theory) P331	1. Explain the ultra-structure and morphological classification of bacteria. 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.

Name of the Course	Course Outcome
	5. Explain about the microbial spoilage and preservation techniques of pharmaceutical products.
Pharmaceutical Engineering (Theory) P341	1. Summarize various unit operations, fundamental concepts and engineering principles used in pharmaceutical industries. 2. Employ the basic concept of process parameters of pharmaceutical equipment involving different unit operations. 3. Select various material handling systems. 4. Apply various tests to prevent environmental pollution. 5. Choose methods used for corrosion control in pharmaceutical industries. 6. Execute plant lay out design for optimum use of resources.
Pharmaceutical organic chemistry-II ((Practical) P312	1. Demonstrate the Recrystallisation & steam distillation laboratory techniques 2. Estimate Acid, Saponification & Iodine values for given samples of oil. 3. Prepare the given organic compound by different organic reactions. 4. Write the report of the experiment.
Physical Pharmaceutics I (Practical) P322	1. Estimate different parameters of drug like solubility, CST, Partition coefficient. (Comprehension, Evaluation) 2. Determine the pKa value by half neutralization / Henderson Hasselbalch equation. (Evaluation) 3. Practice Surface tension, HLB number, and Freundlich and Langmuir constants estimation. (Application, Evaluation). 4. Analyze stability constant and donor acceptor ratio for various complexes. (Application, Evaluation). 5. Compile a comprehensive lab report on the finding. (Application)
Pharmaceutical Microbiology (Practical)	1. Practice the lab safety instructions; and handling of instruments 2. formulate culture media

Name of the Course	Course Outcome
P332	3. Isolate, Recognize and report the microbe for its different characters. 4. Analyze biochemical tests 5. Plan and execute antibiotic sensitivity assay and sterility test for pharmaceuticals 6. Record, Interpret results and draw conclusion
Pharmaceutical Engineering (Practical) P342	1. Plan and execute an experiment to evaluate drying, filtration, evaporation, distillation, solubility, humidity and fluid flow determination, radiation constant determination and construct drying curves. 2. Monitor different industrial unit operational processes. 3. Explain and verify experiments of size reduction, size separation, blending and crystallization. 4. Record observations as per standard protocol. 5. Interpret results and draw conclusion.

II B. Pharm. Sem IV

Name of the Course	Course Outcome
Pharmaceutical Organic Chemistry-III (Theory) P411	1. Define, classify & describe Isomerism, enantiomerism, nomenclature, resolution of racemic mixture, asymmetric synthesis & reactions of chiral molecule. 2. Illustrate on Geometrical isomers, its nomenclature, conformational isomerism, atropisomerism, stereoselective & stereospecific reactions. 3. Write the structure, prepare, reactions & medicinal uses of five membered heterocyclic ring containing heteroatom/s. 4. Write the structure, prepare, reactions & medicinal uses of six membered & fused heterocyclic ring containing one & two heteroatoms. 5. Explain & illustrate on important reaction such as reduction, rearrangement & condensation carried out in pharmaceutical organic chemistry.
Medicinal Chemistry I (Theory) P421	1. Explain correlation between physicochemical properties of drug molecule and biological activity. 2. Discuss the drug metabolic pathway,adverse effect and therapeutic value of drug. 3. Define the structural activity relationship of different class of drug. 4. Write the nomenclature of drugs and chemical synthesis of drug.
Physical Pharmaceutics II (Theory) P431	1. Illustrate properties, method of preparation and application of colloids. (Application) 2. Illustrate Newtonian and Non-Newtonian types of system along with methods for determinations of viscosity. (Evaluation) 3. Describe classifications of dispersed systems, based on the size of the dispersed particles. (Analysis)

Name of the Course	Course Outcome
	4. Explain the importance of particle size and size distribution. (Comprehension, Evaluation.) 5. Determine expiry date of dosage forms by accelerated stability studies. (Evaluation)
Pharmacology I (Theory) P441	1. Describe the scope of pharmacology, general pharmacology and basic aspects of pharmacokinetic and pharmacodynamic properties of drugs. 2. Explain the mechanism of drug action at organ system/sub cellular/macromolecular levels. 3. Elucidate the process of drug discovery and evaluation of safety and efficacy of drugs. 4. Explain the organization, functions and neurohumoral transmission of nervous system and pharmacology of drugs acting on nervous system. 5. Apply the basic pharmacological knowledge in the prevention and treatment of various diseases/disorders.
Pharmacognosy and Phytochemistry I ((Theory) P451	1. Define, explain historical background and scope of pharmacognosy along with traditional systems of medicine. 2. Explain classification of crude drugs along with their origin. 3. Apply the knowledge to confirm identity, purity and quality of natural crude drugs by different adulteration and evaluation techniques. 4. Apply the knowledge to produce quality crude drugs by modern skills of cultivation, collection and processing. 5. Discuss properties, chemistry, sources, preparation, evaluation, storage and therapeutic uses of crude drugs falling under carbohydrates, proteins, enzymes natural fibers and lipids. 6. Discuss the phytochemical screening techniques and able to identify the phytoconstituents from the crude drugs of natural

Name of the Course	Course Outcome
	origin.
Medicinal Chemistry I (Practical) P412	1. Experiment synthesis of given organic medicinal intermediate. 2. Simplify assay of drugs. 3. Discuss partition coefficient of drug. 4. Record and interpret the result.
Physical Pharmaceutics II (Practical) P422	1. Explain the importance of particle size and size distribution by sieving and microscopic methods. (Comprehension) 2. Estimate different derived properties of powders and effect of lubricant on angle of repose. (Comprehension, Evaluation) 3. Demonstration of determination viscosity of liquid and semisolids by Ostwald's Viscometer and Brookfield Viscometer. (Application) 4. Analyze the effect of different suspending agent and concentration of single suspending agents on sedimentation volume. (Analysis) 5. Determine order of reaction and accelerated stability studies. (Evaluation)
Pharmacology I (Practical) P432	1. Introduce and describe the experimental pharmacology, commonly used instruments, laboratory animals and CPCSEA guidelines for the maintenance of laboratory animals. 2. Explain the pharmacology of anaesthetics and techniques of euthanasia used in experimental pharmacology. 3. Describe the commonly used laboratory techniques in experimental pharmacology. 4. Apply the basic pharmacology knowledge in the screening of various drugs by simulated experiments.

Name of the Course	Course Outcome
	5. Appreciate correlation of simulated experiments using software and videos with in vivo pharmacology.
Pharmacognosy and Phytochemistry I ((Practical) P442	1. Evaluate unorganized crude drugs by chemical method. 2. Investigate standardization of crude drugs by various parameters. 3. Observe types of stomata, phloem fibers, starch grains and calcium oxalate crystals from plant parts. 4. Determine leaf constants by the use of camera lucida with their significance.

III B. Pharm. Sem V

Name of the Course	Course Outcome
Medicinal Chemistry-II (Theory) P511	1. Write the nomenclature of drugs having various structural features. 2. Discuss correlation between physicochemical properties of drug molecule and biological activity. 3. Relate the structure and predict its activity. 4. Outline synthetic strategies for obtaining new drugs. 5. Select a suitable medicinal agent for specific disease or disorder.
Industrial Pharmacy I (Theory) P521	1. Discus various pharmaceutical dosage forms and their manufacturing techniques. 2. Explain the considerations in development of pharmaceutical dosage forms 3. Formulate and evaluate solid, liquid and semisolid dosage forms 4. Demonstrate packaging of different dosage forms
Pharmacology II (Theory) P531	1. Explain fundamental knowledge of classification, Mechanism of action, Therapeutic effects, Clinical use, Side effects & contraindications of drugs on Cardiovascular system. 2. Explain fundamental knowledge of classification, Mechanism of action, Therapeutic effects, Clinical use, Side effects & contraindications of drugs on Autacoids and Endocrine system. 3. Describe the various receptors drug actions on different systems of body like CVS, Autacoids and Endocrine system. 4. Outline principles, applications and types of bioassay. 5. Justify correlation of pharmacology and bioassay with related medical sciences.

Name of the Course	Course Outcome
Pharmacognosy and Phytochemistry II (Theory) P541	1. Discuss biosynthesis of phytochemical constituents with their medicinal value. 2. Define and classify crude drugs along with their sources, properties, phytoconstituents, medicinal importance and commercial applications of secondary metabolites of various classes like alkaloids, glycosides, tannins, resins and volatile oils. 3. Describe pharmacognosy of crude drugs of various classes of secondary metabolites. 4. Apply the knowledge to isolate, identify and estimate phytoconstituents from crude drugs by modern extraction, chromatography and spectroscopic techniques.
Pharmaceutical Jurisprudence (Theory) P551	1. Integrate the knowledge gained about drugs and cosmetics efficiently with reference to import, export, manufacture, packing, storage and sale of drugs and cosmetics. 2. Act as a legal expert in various Indian Pharmaceutical Acts and Laws. 3. Function effectively as a drug inspector, licensing authority, drug analyst etc. 4. Estimate/Evaluate and give opinion about drug price, prevention of cruelty to animals and Intellectual Property Rights.
Industrial Pharmacy I (Practical) P522	1. Formulate and evaluate tablets 2. Formulate and evaluate capsules 3. Formulate and evaluate injections 4. Formulate and evaluate semisolid dosage forms
Pharmacology II (Practical) P532	1. Understand the in-vitro pharmacology and physiological salt solution. 2. Demonstrate & isolation of different organs/tissues from the laboratory animals by simulated experiments.

Name of the Course	Course Outcome
	3. Appreciate the various receptor actions using isolated tissue preparation. 4. Explain basic concepts and their different methods of bioassay. 5. Identify the activity of drugs using different models.
Pharmacognosy and Phytochemistry II ((Practical) P542	1. Evaluate crude drugs by morphological, microscopical and chemical analysis. 2. Isolate active chemical constituents from crude drugs by extraction and distillation processes. 3. Evaluate the phytoconstituent by chromatographic techniques. 4. Test unorganized crude drugs by physicochemical analysis.

III B. Pharm. Sem VI

Name of the Course	Course Outcome
Medicinal Chemistry-III (Theory) P611	1. Write the nomenclature of drugs having various structural features. 2. Discuss correlation between physicochemical properties of drug molecule and biological activity. 3. Relate the structure and predict its activity. 4. Outline synthetic strategies for obtaining new drugs. 5. Select a suitable medicinal agent for specific disease or disorder.
Pharmacology III (Theory) P621	1. Explain fundamental knowledge of classification, mechanism of action, therapeutic effects, clinical uses, side effects and contraindications of drugs acting on Respiratory system and Gastro intestinal systems. 2. Understand the mechanism of drug action and its relevance in the treatment of different infectious diseases in chemotherapy and immune pharmacology. 3. Outline principles of toxicology and principles of treatment of various poisoning. 4. Explain principles of chronopharmaoclogy. 5. Appreciate correlation of pharmacology with related medical sciences.
Herbal Drug Technology (Theory) P631	1. Explain raw material as a source of herbal drugs from cultivation to finished product. 2. Explain various herbal drug industry with present and future prospects. 3. Apply the pharmaceutical skills in producing nutraceuticals and ayurvedic formulation along with the natural excipients. 4. Describe the safety and efficacy with regulatory requirements of herbal medicine with patenting and

Name of the Course	Course Outcome
	GMP. 5. Classify, prepare and evaluate herbal cosmetics for skin and hair use.
Biopharmaceutics and Pharmacokinetics II (Theory) P641	1. Understand the basic concepts of Biopharmaceutics & Pharmacokinetics and their significance. 2. Determine factors affecting drug absorption, bioavailability and bioequivalence. 3. Describe disposition kinetic models, first order and second order. 4. Evaluate the PK parameters related to distribution, metabolism and excretion. 5. Explain the clinical pharmacokinetics, and their significance and applications.
Pharmaceutical Biotechnology (Theory) P651	1. Define and explain historical background, scope and application of biotechnology in various industries. 2. Define fermentation and apply the knowledge to manufacture different pharmaceuticals by fermentation technique. 3. Discuss genetic engineering and various newer techniques to obtain genetically modified products. 4. Explain role of immunology in health and diseases including preparation of vaccines and sera.
Quality Assurance (Theory) P661	1. Define quality assurance, quality control, total quality management and related terms. 2. Recall the responsibilities of QA & QC departments and importance of documentation. 3. Understand the importance of cGMP, GLP, ICH, ISO, NABL accreditation and Warehousing. 4. Explain the concept of QbD and QC tests for packaging material. 5. Elaborate calibration and validation protocol.

Name of the Course	Course Outcome
Medicinal Chemistry III (Practical) P612	1. Recall the safe handling of very reactive chemical reagent by giving suitable reaction or demonstration of the same. 2. Experiment with the synthesis of given organic medicinal intermediates. 3. Purify and analyze the product by recrystallization, TLC and melting point. 4. Summarize the result and document the observations.
Pharmacology III ((Practical) P622	1. Understand dose calculation in pharmacological experiments. 2. Demonstration and isolation of different organs/tissues from the laboratory animals by simulated experiments. 3. Estimate serum biochemical parameters by using semi auto-analyser. 4. Explain determination of acute oral toxicity, acute skin, and eye irritation of test substances. 5. Understand the calculations of pharmacokinetic parameters from given data and biostatistics methods in experimental pharmacology.
Herbal Drug Technology ((Practical) P632	1. Identify phytochemical constituents of crude drugs. 2. Formulate herbal cosmetics for skin and hair. 3. Investigate to standardize excipients, extracts and herbal formulation. 4. Analyze herbal ingredients as per monograph of Pharmacopoeia.

IV B. Pharm. Sem VII

Name of the Course	Course Outcome
Instrumental Methods of Analysis (Theory) P711	1. Define common terminologies like spectroscopy, chromatography and its types. 2. Discuss basic principles involved in spectroscopy and chromatography. 3. Explain the instrumentation of UV, IR, fluorimeter, flame photometer, AAS, HPLC, GC. 4. Explain separation and identification of compounds by various chromatographic techniques and electrophoresis technique. 5. Recall applications of various spectroscopic and chromatographic techniques for organic, inorganic and natural products.
Industrial Pharmacy II (Theory) P721	1. Explain the process of pilot plant and scale up of pharmaceutical dosage forms. 2. Describe the process of technology transfer from lab scale to commercial batch. 3. Familiar with different Laws and Acts that regulate pharmaceutical industry. 4. Illustrate the approval process and regulatory requirements for drug products.
Pharmacy Practice (Theory) P731	1. Understand the organization of hospitals and concept of pharmacy practice and community pharmacy. 2. Understand the functions of pharmacy practice including therapeutic drug monitoring, patient medication history interview patient counselling, and assessment of drug related problems. 3. Play the role as hospital pharmacist in pharmacy and therapeutic committee, provide drug information services, education and training programmes in hospitals.

Name of the Course	Course Outcome
	4. Understand the concepts of drug store management 5. Interpret the clinical laboratory values to provide better service to the patients.
Novel Drug Delivery System (Theory) P741	1. Understand the need, concept, design and evaluation of various customized modified release dosage forms. 2. Integrate the principles of drug release with the design of modified release dosage forms. 3. Interpret the criteria for selection of drugs and polymers for the development of novel delivery systems drug delivery modules. 4. Implement technological possibilities for design of various delivery modules of novel drug delivery systems.
Instrumental Methods of Analysis (Practical) P712	1. Demonstrate absorption maxima and effect of solvents on absorption maxima, experiment on HPLC and Gas Chromatography. 2. Practice assay of Paracetamol, Simultaneous estimation of ibuprofen and paracetamol by UV spectroscopy. 3. Estimate various ions like sodium, potassium by flame photometry and chlorides and sulphates by nephelo turbidometry. 4. Perform colorimetric estimation of dextrose, sulfanilamide. 5. Perform fluorimetric estimation of quinine sulphate and quenching of fluorescence. 6. Separate amino acids by paper chromatography, sugars by TLC and plant pigments by column chromatography.

IV B. Pharm. Sem VIII

Name of the Course	Course Outcome
Biostatistics and Research Methodology (Theory) P811	1. Identify the overall process of designing a research study from its inception to its report. 2. Describe the appropriate statistical methods required for a particular research design. 3. Choose the appropriate research design and explain the basic method of hypothesis testing. 4. Discuss various methods of data processing and analysis.
Social and Preventive Pharmacy (Theory) P821	1. Explain various dimensions of health, communicable and noncommunicable diseases 2. Understand importance of hygiene and balanced diet in health 3. Acquire high consciousness of current issues related to health and promote health education in society 4. Have a critical way of thinking based on current healthcare development. 5. Evaluate alternative ways of solving problems related to health and pharmaceutical issues
Pharmacovigilance (Theory) P851	1. Understand the importance of drug safety monitoring and Scope of pharmacovigilance. 2. Execute the various terminologies, dictionaries, coding used in pharmacovigilance. 3. Detect new adverse drug reactions and their reporting systems with communication in pharmacovigilance. 4. Evaluate the drug safety in pediatrics, geriatrics, pregnancy, and lactation. 5. Understand the Pharmacovigilance Program of India (PvPI) and ICH, CIOMS Guidelines.
Quality Control	1. Evaluate the quality control of herbs by various

Name of the Course	Course Outcome
and Standardization of Herbals (Theory) P861	methods. 2. Know the various WHO guidelines related to herbals. 3. Role of ICH and EU guidelines of herbal medicines. 4. Importance of stability, standardization and legal requirements of herbal medicines.
Cosmetic Science (Theory) P891	1. Design Cosmetics & Cosmeceuticals that are stable, effective & economical. 2. Act as a legal expert in various pharmaceutical acts and laws pertaining to cosmetics. 3. Function effectively as a Cosmetic manufacturer & Cosmetic Analyst. 4. Explain the role of cosmetic excipients & building blocks in the formulation of cosmetics.
Experimental Pharmacology (Theory) P8101	1. Appreciate the applications of various commonly used laboratory animals. 2. Apply the regulations and ethical requirement for the usage of experimental animals. 3. Describe the various screening methods involved in the drug discovery process. 4. Understand and apply techniques of euthanasia used in experimental pharmacology. 5. Appreciate and demonstrate the importance of biostatistics and research methodology.

I M. Pharm. Sem I (Pharmaceutics)

Name of the Course	Course Outcome
Modern Pharmaceutical Analytical Techniques (Theory) MPH101T	1. Interpret the possible structure or functional groups present in the drug or organic molecule. 2. Explain different spectroscopic methods used for quantitative analysis of drug or organic molecule. 3. Discuss different separation techniques of chromatography used in pharmacy. 4. Explain different crystal forms of drugs and its importance in pharmacy.
Drug Delivery System (Theory) MPH102T	1. Understand the proper use of drug and polymers for different formulation. 2. Gain the knowledge of formulation evaluation concept of novel drug delivery system. 3. Understand the various approaches for development of novel drug delivery system. 4. Understand the importance of vaccination.
Modern Pharmaceutics (Theory) MPH103T	1. Explain the elements of pre-formulation studies. 2. Utilize the optimization techniques in pharmaceutical formulation and processing. 3. Understand the Pharmaceutical Validation, policies of current good manufacturing practices and concept of Total Quality Management. 4. Perform stability testing of pharmaceuticals & be an expert in packing of Dosage forms.
Regulatory Affair (Theory) MPH104T	1. Explain the approval process for drug/formulation. 2. Understand the chemistry, manufacturing controls and their regulatory importance. 3. Analyze documentation requirements for approval process. 4. Learn Pharmacovigilance and process of clinical trials.

Name of the Course	Course Outcome
Pharmaceutics Practical I (Practical) MPH105P	1. Analyze Pharmacopeial compounds and their formulations by various analytical techniques. 2. Carry out the preformulation studies of tablets. 3. Formulate various NDDS like Sustained release formulations, Mucoadhesive tablets, Floating drug delivery systems, Transdermal Patches etc. 4. Evaluate various NDDS like Sustained release formulations, Mucoadhesive tablets, Floating drug delivery systems, Transdermal Patches etc.

I M. Pharm. Sem II (Pharmaceutics)

Name of the Course	Course Outcome
Molecular Pharmaceutics (Theory) MPH201T	1. Understand the concept and approaches of various novel drug delivery systems. 2. Select drugs & polymers for targeted drug delivery systems. 3. Formulate Novel drug delivery systems that are stable and effective. 4. Evaluate Novel drug delivery systems.
Advanced Biopharmaceutics and Pharmacokinetics (Theory) MPH202T	1. Interpret the basic concepts in Biopharmaceutic and pharmacokinetics. 2. Utilize the raw data and derive the pharmacokinetic models and parameters that best describe the process of drug absorption, distribution, metabolism and elimination. 3. Understand the critical evaluation of Biopharmaceutics studies involving drug product equivalency. 4. Design and evaluate dosage regimens of the drugs

Name of the Course	Course Outcome
	using pharmacokinetic and Biopharmaceutic parameters.
Computer Aided Drug Delivery System (Theory) MPH203T	1. Utilize knowledge and skills necessary for computer applications in pharmaceutical research and development and understand the application of computers across the entire drug R & D process. 2. Use computers in preclinical & clinical development & market analysis. 3. Apply artificial intelligence & robotics in drug development. 4. Understand computational modeling of Drug disposition.
Cosmetic and Cosmeceuticals (Theory) MPH204T	1. Understand various key ingredients and basic science to develop cosmetics and cosmeceuticals. 2. Integrate key building blocks for various Cosmetics & Cosmeceuticals. 3. Utilize current technologies used in manufacturing of Cosmetics & Cosmeceuticals. 4. Formulate Cosmetics & Cosmeceuticals that are safe, stable & effective.
Pharmaceutics Practical II (Practical) MPH205P	1. Formulate various NDDS like Liposomes, Niosomes, Microspheres, Spherules etc. 2. Evaluate various NDDS like Liposomes, Niosomes, Microspheres, Spherules etc. 3. Utilize software's for development & evaluation of Pharmaceuticals. 4. Formulate & Evaluate Cosmetics & Cosmeceuticals to address Dry skin, Acne, Skin Blemish, Wrinkles etc.

I M. Pharm. Sem I (Pharmaceutical Quality Assurance)

Name of the Course	Course Outcome
Modern Pharmaceutical Analytical Techniques (Theory) MQA101T	1. Interpret the possible structure or functional groups present in the drug or organic molecule. 2. Explain different spectroscopic methods used for quantitative analysis of drug or organic molecule. 3. Discuss different separation techniques of chromatography used in pharmacy. 4. Explain different crystal forms of drugs and its importance in pharmacy.
Quality Management System (Theory) MQA102T	1. Understand and Define Quality and its concept and cost involved. 2. Learn Strategic planning and implementation of quality system. 3. Understand the keys to customer satisfaction. 4. Describe various types guidelines and certifications for Quality management in Pharmaceuticals. 5. Describe the various tools like benchmarking, Statistical process control, ICH guidelines for pharmaceutical product development.
Quality Control and Quality Assurance (Theory) MQA103T	1. Understand the cGMP aspects in a pharmaceutical industry. 2. Understand the importance of documentation in a pharmaceutical industry. 3. Apply the knowledge of pharmacopoeial quality control test for dosage forms. 4. Perform the responsibilities in the QA & QC department.
Product Development and Technology Transfer	1. Anticipate the regulatory principles and requirements of drug discovery and development. 2. Understand the concept of preformulation studies for various formulations.

Name of the Course	Course Outcome
(Theory) MQA104T	3. Learn the concept of product scale-up and technology transfer from R&D to production plant. 4. Interpret the guidelines on clinical trials and anticipate the process of product registration in different countries.
Pharmaceutical Quality Assurance Practical I (Practical) MQA105P	1. Perform the analysis of dosage forms by analytical methods. 2. Perform preformulation study. 3. Perform quality control test of tablet and other formulation. 4. Know the stability process.

I M. Pharm. Sem II (Pharmaceutical Quality Assurance)

Name of the Course	Course Outcome
Hazards and Safety Management (Theory) MQA201T	1. Explain about environment, ecosystem and environment associated problems. 2. Discuss about Air and Chemical based Hazards and how to overcome this problem? 3. Explain about Industrial process that leads to Fire and Explosion. 4. Discuss about Hazards, Risk Management & safety measures to be taken to avoid fire and explosion in industry.
Pharmaceutical Validation (Theory) MQA202T	1. Understand the concepts of calibration, qualification and validation. 2. Describe the qualification of various equipment and instruments. 3. Validate the different processes in pharmaceutical industry. 4. Know the general Principles of Intellectual Property.

Name of the Course	Course Outcome
Audits and Regulatory Compliance (Theory) MQA203T	1. Understand the importance and role of quality systems and audits in pharmaceutical manufacturing environment. 2. Frame the checklist for auditing various departments and processes in pharmaceutical industry. 3. Learn the methodology of conducting the audit of various departments. 4. Prepare the audit report and anticipate the deficiencies.
Pharmaceutical Manufacturing Technology (Theory) MQA204T	1. Describe the common practice in pharmaceutical industry development, plant layout and Production planning. 2. Acquire knowledge of various process, their application and problem encounter during non-sterile manufacturing. 3. Apply the knowledge of principles and practice of sterile a non-sterile manufacturing of Pharmaceuticals. 4. Understand the implementation of PAT and QBD techniques in pharmaceutical manufacturing. 5. Discuss in detail stability aspects of packaging materials.
Pharmaceutical Quality Assurance Practical II (Practical) MQA205P	1. Understand the concepts of calibration, qualification and validation. 2. Perform the qualification of various equipments and instruments. 3. Perform the analysis by UV, HPLC, Flame photometry methods. 4. Know the check list of requirements in pharmaceutical industry.

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